

Alexandra Vasconcelos Antunes Setta* Sergio Roberto de Lucca* 

* Universidade Estadual de Campinas,
Faculdade de Ciências Médicas,
Departamento de Saúde Coletiva.
Campinas, SP, Brazil.

Contact:

Alexandra Vasconcelos Antunes Setta

E-mail:

a262224@dac.unicamp.br

How to cite (Vancouver):

Setta AVA, Lucca SR. Digital Stressors Scale: translation and cross-cultural adaptation for the Brazilian context. Rev Bras Saude Ocup [Internet]. 2026;51:e14. Available from: <https://doi.org/10.1590/2317-6369/14925en2026v51e14>



Digital Stressors Scale: translation and cross-cultural adaptation for the Brazilian context

Digital Stressors Scale: tradução e adaptação transcultural para o contexto brasileiro

Abstract

Introduction: Digital stress at work represents a growing risk to occupational health. Up-to-date measurement instruments are essential for proper assessment. **Objective:** To translate and cross-culturally adapt the Digital Stressors Scale (DSS) to the Brazilian context. **Methods:** Methodological study of translation, evaluation by a committee of seven experts, pre-testing with five participants from the target population, back-translation, and pilot study with 150 workers. Content validity was assessed by the Content Validity Index (CVI) and the Agreement Rate (AR), and preliminary internal consistency by Cronbach's alpha (α) and McDonald's omega (ω). **Results:** Idiomatic, semantic, experiential, and conceptual equivalences were obtained between the translated version and the original (CVI = 0.96). More than 95% of participants agreed with the clarity and applicability of the instrument. The long and short versions had coefficients $\alpha \geq 0.68$ and $\omega \geq 0.70$. **Discussion:** The combination of α and ω reinforces the robustness of internal consistency, as omega is less influenced by the limitations of alpha. **Conclusion:** The Brazilian version of the DSS showed promising initial evidence in a pilot study, however, it does not yet provide sufficient evidence for widespread use in Brazil. Robust psychometric analyses in larger samples are recommended.

Keywords: Occupational Health; Surveys and Questionnaires; Health Impact Assessment; Occupational Stress; Information Technology; Digital Technology.

Resumo

Introdução: O estresse digital no trabalho representa um risco crescente à saúde dos(as) trabalhadores(as). Instrumentos de mensuração atualizados são essenciais para avaliação adequada. **Objetivo:** Traduzir e adaptar transculturalmente o Digital Stressors Scale (DSS) ao contexto brasileiro. **Métodos:** Estudo metodológico de tradução, avaliação por comitê com sete especialistas, pré-teste com cinco participantes da população-alvo, retrotradução e estudo-piloto com 150 trabalhadores(as). A validade de conteúdo foi avaliada pelo Índice de Validade de Conteúdo (IVC) e pela Taxa de Concordância (TC), e a consistência interna preliminar pelo alfa de Cronbach (α) e pelo ômega de McDonald (ω). **Resultados:** Foram obtidas as equivalências idiomática, semântica, experimental e conceitual entre a versão traduzida e a original (IVC = 0,96). Mais de 95% dos participantes concordaram com a clareza e aplicabilidade do instrumento. As versões longa e curta apresentaram coeficientes $\alpha \geq 0,68$ e $\omega \geq 0,70$. **Discussão:** A combinação de α e ω reforça a robustez da consistência interna, pois o ômega é menos influenciado pelas limitações do alfa. **Conclusão:** A versão brasileira do DSS apresentou evidências iniciais promissoras em estudo-piloto, contudo, ainda não fornece evidências suficientes para uso amplo no Brasil. Recomenda-se a realização de análises psicométricas robustas em amostras maiores.

Palavras-chave: Saúde do Trabalhador; Inquéritos e Questionários; Avaliação do Impacto na Saúde; Estresse Ocupacional; Tecnologia da Informação; Tecnologia Digital.

Introduction

The intensive use of Information and Communication Technologies (ICT) at work has intensified during and after the COVID-19 pandemic. Although essential to the continuity of productive activities, this forced digitization has increased technostress (stress resulting from individual efforts to cope with the demands of using ICT for work)¹ among workers, mainly due to remote working, constant connectivity, excessive demands, lack of technical support, blurred boundaries between personal, and professional life and difficulty in mentally disconnecting from work².

Once the pandemic is over, the effects of this flexibilization and intensification remain. One example is the adoption of hybrid work by 86% of companies in Brazil³. Although the flexibility obtained with ICT has been associated with quality of life, recent studies point to technostress as a critical mediator of this relationship⁴. According to The Future of Jobs Report⁵, published by the World Economic Forum in 2025, digital transformation will continue to be the main driver of change in the global labor market and estimates that, by 2030, tasks shared between humans and technologies will increase by 30%, while exclusively human tasks will decrease substantially.

Even before the pandemic, the contemporary subject was already living under self-imposed productivity, in a society of fatigue⁶. After the pandemic, this logic has intensified: hyperconnectivity has transformed autonomy into surveillance and flexible work into exhaustion. One reflection of the impacts of this new morphology of work is the 134% increase in benefits granted by the Brazilian Social Security System for temporary incapacity due to mental disorders in the two-year period from 2022 to 2024⁷.

Technologies have intensified work with new impacts on workers' health and well-being, related to stress, anxiety and fatigue resulting from work-related psychosocial risks³. Although the instruments for assessing work-related psychosocial risks, developed between the 1990s and 2000s, are still widely used, they do not cover work characterized by intense dependence on the use of ICTs and exposure to technostress⁸⁻¹⁰ currently known as digital stress¹¹, with a more comprehensive approach.

Digital stress can be understood as the negative psychological response resulting from the use of ICT at work¹². Ragu-Nathan et al.¹² define it as a stress phenomenon experienced by users as a result of using ICT. Fischer et al.¹¹ added the perceptions, emotions, and expectations related to the presence and evolution of these technologies, and their effects on automation and job security.

Empirical evidence points to the negative impact of digital stress on workers' psychological well-being, such as feelings of fatigue, anxiety and burnout, as well as hypertension, diabetes, dyslipidemia, obesity, depression and insomnia as consequences of technostress¹²⁻¹⁵. Moreover, increased absenteeism and turnover, reduced individual performance at work and success in digitalization processes and reduce productivity in organizations^{15,16}.

In Brazil, specific instruments for assessing this type of stress are scarce and outdated: 1) RED-TIC¹⁷ has good internal consistency but does not include contemporary digital stressors⁸. 2) Techno-Stress Creators and Inhibitors-TSCI¹⁸ does not include emerging categories such as safety and invasion of privacy¹³ and has been partially adapted to Brazil. This methodological gap can also compromise scientific progress, making it difficult to produce evidence on organizational and individual factors that contribute to the development of digital stress and its consequences in Brazil⁸.

The Digital Stressors Scale (DSS)¹¹, published in 2021, is one of the most up-to-date and complete instruments for assessing digital stress. The aim of this study is to translate, culturally adapt to the Brazilian context and analyze the psychometric properties of this instrument in a preliminary way.

The instrument

The DSS consists of 50 items distributed over 10 dimensions/scales related to the use of ICT for work (**Chart 1**), assessed using a 7-point Likert scale (1= totally disagree to 7= totally agree), plus the option "don't know" (-1). The application must be online and individual, and the results can be analyzed individually or collectively^{11,19}.

Chart 1 The 10 assessment scales of the Digital Stressors Scale

Scale	Description of the stressor	No. of items
Complexity	Difficulty understanding the use of ICT	5
Conflicts	Invasion of the barrier between work and private life	5
Insecurity	Fear of unemployment due to the possibility of automation of tasks and skills performed by the worker	5
Invasion (of Privacy)	The prospect of interactions with ICT being monitored by third parties	5
Overload	Excessive external demands in the form of work or information and communication overload.	5
Safety	The need to deal with threats that can harm the user and/or the organization and that require additional attention, such as viruses, hackers, etc.	5
Social environment	Characteristics of ICT, which can create social rules and expectations that may not be in line with those of the individual.	5
Technical support	The absence of adequate technical support and/or resources.	5
Usefulness	Lack of usefulness and/or low levels of user-friendliness.	5
Unreliability	Lack of reliability, when ICT does not respond as expected.	5

ICT: Information and Communication Technologies.

Source: Translated and adapted from Fischer et al.¹¹.

The instrument can be applied in its complete form (multidimensional), assessing digital stress as a single construct, or segmented by dimension/scale (unidimensional). The result is given by calculating the arithmetic mean of the items, so that higher scores indicate a higher level of perceived digital stress. Answers left blank or scored “-1” should be replaced by the median of the other values corresponding to that item, respecting the proportion of 10%^{11,19}.

Its original version has adequate psychometric properties for both multidimensional and unidimensional application. Internal consistency showed satisfactory coefficients (Cronbach’s alpha, McDonald’s omega, and total omega > 0.70), convergent and discriminant validity of average variance extracted (AVE) > 0.50; Fornell-Larcker criterion and heterotrait-monotrait ratio (HTMT) < 0.90. Furthermore, concurrent validity was successfully tested, with a strong Spearman correlation ($r_s = 0.923$; $p < 0.001$) with the TSCI instrument¹¹.

In 2023, a short version was published, keeping the 10 dimensions/assessment scales, but with 30 items, three in each dimension, also with good psychometric properties evidenced by confirmatory factor analysis [Comparative Fit Index (CFI = 0.99), Root Mean Square Error of Approximation (RMSEA = 0.045) and Standardized Root Mean Square of Residuals (SRMR = 0.034)], and Cronbach’s alpha above 0.70 in all dimensions. The short version should only be applied in its complete (multidimensional) form¹⁹.

Methods

Translation and Cross-Cultural Adaptation Procedure

This is an original, methodological study, of an instrumental nature, aimed at the cross-cultural adaptation of an instrument to the Brazilian context. Authorization to carry out the procedure was obtained from the authors in September 2021. The authorization obtained establishes that the original article¹¹ of the publication of the

instrument must always be explicitly mentioned and referenced in publications that use the DSS in Portuguese. It also states that the instrument must not be used for commercial purposes or converted into software without the explicit consent of the University of Applied Sciences Upper Austria^b.

The process of adaptation into Brazilian Portuguese took place between September 2022 and August 2023, maintaining the original format and digital use of the instrument.

To ensure linguistic, semantic, cultural and conceptual equivalence between the original and adapted versions, the five stages of the cross-cultural adaptation procedure (**Figure 1**) were carried out, based on references from the national^{20,21} and international literature, in accordance with the guidelines in Appendix A of the International Test Commission (ITC) guide²² and Box G of the Consensus-based Standards for The Selection of Health Measurement Instruments (COSMIN) checklist²³.

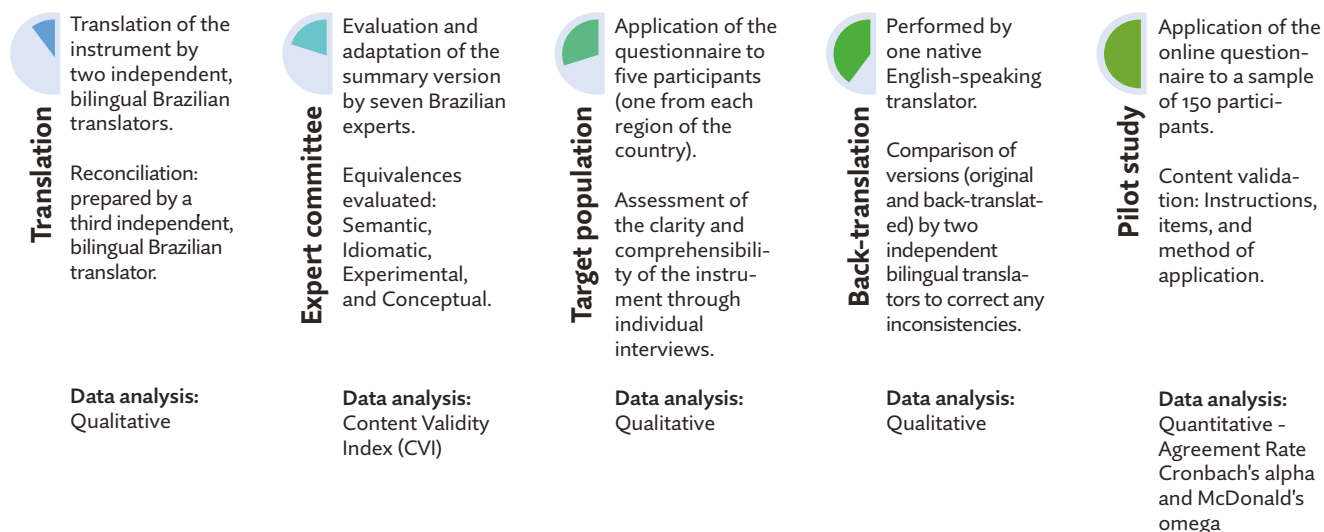


Figure 1 Summary of the five steps taken to translate and cross-culturally adapt the DSS into Brazilian Portuguese
Source: Authors' own elaboration.

1. Translation: The original questionnaire was sent to two independent bilingual Brazilian translators who were familiar with the purpose of the study, one of whom was a specialist in psychosocial assessment. A third independent, bilingual, Brazilian translator with experience in the field synthesized the versions and reconciled them into a single version, respecting the original meaning and the Brazilian linguistic context.
2. Committee of experts: Seven Brazilian, bilingual, post-graduate judges from the fields of psychology, occupational medicine, sociology, ergonomics and Information Technology (IT), selected for convenience and expertise - five with experience in psychometric tests and four in the construct studied. A 5-point Likert scale (1=not equivalent to 5=very equivalent) was used to assess the semantic, idiomatic, experiential, and conceptual equivalence between the versions. Items scored below 4 were revised and re-evaluated.
3. Evaluation of the target population: Five workers from the five regions of the country, with different professional profiles (coordinator, research analyst, quality technician, operation leader, and administrative assistant) were chosen for convenience. Participants were invited to answer the questionnaire via Google Forms and to take part in open interviews via video call to assess the clarity of the questionnaire's instructions, their understanding of the items, the suitability of the Likert scale and the online format for

^b Contact person: Dr. René Riedl.

application, as well as the response time. Inclusion criteria: active workers aged between 18 and 75 who use ICT in their work activities.

4. Back-translation: The final Brazilian Portuguese version was sent to a bilingual, native English translator for back-translation²⁰. The resulting version was compared to the original by two independent bilingual translators, one a native English speaker, both working in IT but with no experience in the construct being assessed.
5. Pilot study: For this stage, the ITC guide²² recommends a minimum sample of $n = 30$. A total of 150 workers (**Table 1**) took part, invited for convenience via social networks, by sharing an invitation letter with an open Google Forms link. Multiple responses were blocked, and responses were not mandatory. The inclusion criteria followed those of stage 3. After completing the questionnaire, they answered three objective questions with the options “agree” or “disagree” to validate the content: 1) Can the test instructions be fully understood? 2) Is the online test suitable? 3) Can the items be understood without difficulty? A field was left open for comments and suggestions. The answers to the questionnaire were used for a preliminary reliability analysis, as suggested by the ITC - TD-5 guideline²², to check the preliminary internal consistency of the adapted instrument before carrying out more complex and extensive validation studies^{21,22}.

Table 1 Sociodemographic characteristics of the participants in the pilot study carried out in Brazil between January and August 2023

	(n = 150)	%
Age group (years)		
18 a 28	21	14.0
29 a 39	27	18.0
40 a 50	52	34.7
51 a 61	34	22.7
62 a 75	16	10.7
Gender		
Female	101	67.3
Male	49	32.7
Level of schooling		
Completed high school	8	5.3
Incompleted higher education	4	2.7
Completed higher education	33	22.0
Postgraduate	105	70.0
Country region		
North	1	0.7
Northeast	9	6.0
Central-West	3	2.0
South	13	8.7
Southeast	124	82.7
Type of sector		
Private	124	82.7
Public	26	17.3

Source: Authors' own elaboration.

Data analysis

The semantic, idiomatic, experiential and conceptual equivalences of the items were analyzed using the Content Validity Index (CVI), to reduce the probability of random agreement, a Likert scale of five points was used²⁴, the CVI was calculated by the proportion of 4 or 5 responses from the judges, considering these categories as indicative of the item's suitability. The CVI-Item was obtained for each item (average of the four equivalences evaluated). To evaluate each scale, the S-CVI/AVE was used (average of the CVI-I for all the items in the scale) and the complete instrument was evaluated by the S-CVI (average of the CVI-I for all the items). The S- CVI/AVE and S- CVI were also calculated considering the items referring to the short version of the instrument. With a panel of seven judges, values ≥ 0.80 were considered indicative of satisfactory content validity²⁵.

Content validation was also carried out using the agreement rate of the answers to the three questions applied to the 150 participants, calculated as ("agree" $\div$ total answers $\times$ 100), with $\geq 90\%$ being the minimum acceptable value²¹.

The preliminary analyses of reliability and internal consistency used the responses of the 150 participants, considering the respective items of the original version and the short version. McDonald's Omega (ω) and Cronbach's Alpha (α) coefficients were used, with the respective 95% Confidence Interval (CI). Values above 0.70 indicated adequate internal consistency^{26,27}. Missing data and items scored "-1" were replaced by the median¹⁹.

The responses of all survey participants were anonymized and processed in Excel. All statistical analyses were carried out using R software. The Brazilian version of the DSS is expected to have adequate content validity and satisfactory preliminary internal consistency in the pilot study for both the original and short versions.

Ethical considerations

The ethical guidelines established by CNS Resolution No. 466/2012 were followed. The study was approved by the Research Ethics Committee of the State University of Campinas, opinion No. 5.667.487 of September 5, 2022. All participants consented and signed the Informed Consent Form; participation was voluntary. The anonymity and confidentiality of the participants was guaranteed, and data analysis was not individualized. The research was recorded and the data made available on the OSF repository (<https://osf.io/prz6d/overview>)²⁸. The recommendations of the CHERRIES guide for reporting electronic research²⁹ were followed.

Results

The idiomatic, semantic, conceptual, and experiential equivalence evaluations resulted in CVI-I = 1.00 for the instructions and CVI-I = 0.96 for the Likert scale. Of the 50 items evaluated, four required adjustments and underwent two rounds of evaluation by the expert committee. In the end, all had a CVI of over 0.80. The complete instrument had an S-CVI of 0.96 for both versions.

As an example of the adjustments made, item 4 of the Social Environment dimension was initially translated as: "*Sinto que as TIC criam normas sociais indesejadas [...]*"; resulting in CVI-I: 0.4. After reformulation it became: "*Eu sinto que as TIC criam regras sociais indesejadas [...]*", CVI-I: 1.0.

Chart 2 shows the original English and Brazilian Portuguese versions, with the 30 items of the short version highlighted, and their respective CVIs.

Chart 2 Digital Stressors Scale in English and Brazilian Portuguese, with content validity indices for the 50-item and 30-item versions (in gray)

Digital Stressors Scale	Escala de Estressores Digitais	50 itens S-CVI: 0,96 30 itens S- CVI: 0,96
<i>The penetration of society by information and communication technologies (ICT) is ongoing and there is no doubt that ICT have become an important factor in the lives of many people – at this point, a society without ICT is hard to imagine. Individuals, organizations, and society as a whole profit from the use of ICT in many ways; improved access to information as well as improved productivity are just some few examples. In this context, we want to investigate your perceptions concerning digitization in your professional environment.</i> <i>Explanation</i> <i>Please be aware that at this point the abbreviation ICT for “information and communication technologies” is used to refer to a number of technologies, such as those usually found in an office environment. Usually, when we refer to ICT, we mean:</i> <i>Mobile technologies (e.g., smartphone, laptop, pager, PDA)</i> <i>Network technologies (e.g., internet, intranet, VPN)</i> <i>Communication technologies (e.g., e-mail, voicemail)</i> <i>Enterprise software (e.g., PeopleSoft®, SAP®, Oracle® applications)</i> <i>Generic application technologies (e.g., for word processing, spreadsheet, presentation)</i> <i>Collaborative technologies (e.g., instant messaging, videoconferencing, teleconferencing)</i> <i>Other work specific technologies</i>	A inserção das Tecnologias de Informação e Comunicação (TIC) na sociedade tem avançado, e não há dúvida que as TIC se tornaram um fator importante na vida de muitas pessoas – hoje em dia, é difícil de imaginar a sociedade sem TIC. Indivíduos, organizações e a sociedade em geral se beneficiam de várias maneiras com o uso das TIC; melhor acesso à informação e melhor produtividade são apenas alguns exemplos. Neste contexto, queremos investigar suas percepções relativas à digitalização no seu ambiente profissional. Explicação Por favor esteja ciente que neste momento a abreviação TIC para “Tecnologia de Informação e Comunicação” é usada para se referir a inúmeras tecnologias, como aquelas normalmente encontradas em um ambiente de escritório. Normalmente, quando nos referimos a TIC, queremos dizer: - Tecnologias móveis (p.ex., smartphone, notebook, tablets, smartwatch, assistente pessoal digital) - Tecnologias de rede (p.ex., internet, intranet, VPN) - Tecnologias de comunicação (p.ex., e-mail, WhatsApp®, mensagens de voz) - Programas empresariais (p.ex., aplicativos PeopleSoft®, SAP®, Oracle®) -Tecnologias de aplicações genéricas (p.ex., processador de texto, planilhas, apresentação) - Tecnologias colaborativas (p.ex., mensagem instantânea, videoconferência, teleconferência) - Outras tecnologias específicas do trabalho	CVI-I: 1,00
<i>The questions will be related to your perceptions of the ICT in your professional environment as well as your personal well-being. If you are ready, please press the “Next” button. Please note: Should you not be certain how to answer a question, whether it is not clear to you how to answer or if the statement is not applicable to your situation, then please choose the “Don’t know” option. Thank you!</i> As questões serão relacionadas à sua percepção sobre o uso de TIC em seu ambiente profissional, assim como o seu bem-estar pessoal. Para cada questão indique a sua percepção quanto a situação apresentada, em uma escala de (1) = discordo totalmente a (7) = concordo totalmente. Observe: Caso não tenha certeza de como responder uma questão, seja por não saber como responder ou se a afirmação não é aplicável a sua situação, por favor, escolher a opção (-1) “Não sei”. Obrigado! Se estiver pronto, por favor, pressione o botão “Próximo”.		CVI-I: 0,96

Continue

Continuation

I – Complexity/Complexidade	50 itens S-CVI/AVE: 0,99 30 itens S-CVI/AVE: 0,99
I often find it too complicated to accomplish a task using the ICT that are available to me at work.	CVI-I
1. Eu frequentemente acho muito complicado realizar uma tarefa utilizando as TIC que estão disponíveis para mim no trabalho.	0,96
2. <i>I often need more time than expected to accomplish a task using the ICT that are available to me at work.</i> 2. Eu frequentemente preciso de mais tempo do que o esperado para realizar uma tarefa utilizando as TIC que estão disponíveis para mim no trabalho.	1,00
3. <i>I feel that the ICT that are available to me at work are too confusing.</i> 3. Eu acho que as TIC que estão disponíveis para mim no trabalho são muito confusas.	1,00
4. <i>I often do not find enough time to keep up with new functionalities of ICT at work.</i> 4. Eu frequentemente não tenho tempo suficiente no trabalho para acompanhar as novas funcionalidades das TIC.	1,00
5. <i>It would take me too long to completely figure out how to use the ICT that are available to me at work.</i> 5. Levaria muito tempo para que eu entendesse completamente como usar as TIC que estão disponíveis para mim no trabalho.	0,96
II – Conflicts/Conflito	50 itens S-CVI/AVE: 0,96 30 itens S-CVI/AVE: 0,96
1. <i>I feel that my private life suffers due to ICT enabling work-related problems to reach me everywhere.</i>	CVI-I
1. Eu sinto que a minha vida pessoal é afetada, uma vez que as TIC permitem que problemas relacionados ao trabalho me alcancem em todo lugar.	0,96
2. <i>It is too hard for me to keep my private life and work life separated due to ICT.</i> 2. Para mim é muito difícil manter minha vida pessoal separada da minha vida profissional devido às TIC.	0,96
3. <i>ICT make it harder to create clear boundaries between my private life and work life.</i> 3. As TIC tornam mais difícil criar fronteiras claras entre a minha vida pessoal e a minha vida profissional.	0,93
4. <i>My work-life balance suffers due to ICT.</i> 4. O equilíbrio entre minha vida profissional e pessoal é afetado devido às TIC.	1,00
5. <i>The ubiquity of ICT disturbs my work-life balance.</i> 5. A presença constante das TIC atrapalha o equilíbrio entre minha vida profissional e pessoal.	0,96
III – Insecurity/Insegurança	50-item S-CVI/AVE: 0.96 30-item S-CVI/AVE: 0.96
1. <i>I feel that my job position is threatened due to ICT.</i>	CVI-I
1. Eu sinto que meu cargo está ameaçado devido às TIC.	0,96

Continue

Continuation

2. <i>I fear that I could be replaced at work due to the increasing standardization of work processes, which is enabled by ICT.</i> 2. Eu receio que eu possa ser substituído no meu emprego devido à crescente padronização de processos de trabalho impulsionada pelas TIC.	0,89
3. <i>I cannot be optimistic about my long-term job security because of the threat of ICT automatization.</i> 3. Eu não consigo ser otimista em relação à segurança do meu emprego a longo prazo devido à ameaça da automatização representada pelas TIC.	0,96
4. <i>I fear that I could be replaced by machines.</i> 4. Eu tenho medo de que eu possa ser substituído por máquinas.	0,96
5. <i>I fear that digitalization will cost me my job.</i> 5. Eu temo que a digitalização irá custar o meu emprego.	0,96
IV – Invasion (of Privacy)/Invasão de privacidade	50 itens S-CVI/AVE: 1,00 30 itens S-CVI/AVE: 1,00
1. <i>I fear that my use of ICT is less confidential than I would like to.</i> 1. Eu tenho receio de que as TIC que uso sejam menos confidenciais do que eu gostaria.	1,00
2. <i>I fear that the information that I exchange using ICT is not as protected as I would like to.</i> 2. Eu tenho receio que as informações que eu troco utilizando as TIC não sejam tão protegidas quanto eu gostaria.	1,00
3. <i>I fear that malevolent outsiders (e.g., hackers) can easily copy my identity due to ICT.</i> 3. Eu tenho receio de que estranhos mal-intencionados (por exemplo, hackers) possam facilmente copiar minha identidade devido às TIC.	0,96
4. <i>My personal information is too easily accessible due to ICT.</i> 4. Minhas informações pessoais são facilmente acessíveis devido às TIC.	0,96
5. <i>I fear that my personal data can easily be stolen by others on-line.</i> 5. Eu tenho receio de que meus dados pessoais possam ser facilmente roubados por outros, de forma on-line.	1,00
V – Overload/Sobrecarga	50 itens S-CVI/AVE: 0,96 30 itens S-CVI/AVE: 0,93
1. <i>Due to ICT I have too much to do.</i> 1. Devido às TIC, eu tenho muito o que fazer.	CVI-I 0,85
2. <i>Due to ICT I have a too large variety of different things to do at work.</i> 2. Devido às TIC, eu tenho várias coisas diferentes para fazer no trabalho.	1,00
3. <i>ICT make it too easy for other individuals to send me additional work.</i> 3. As TIC facilitam muito que outras pessoas me enviem trabalho adicional.	0,96
4. <i>I never have any spare time, because my schedule is too tightly organized by ICT.</i> 4. Eu nunca tenho tempo livre, pois minha agenda é organizada de forma muito apertada por meio das TIC.	0,93
5. <i>There is a constant surge of work-related information coming in through ICT that I just cannot keep up with.</i> 5. Há uma constante onda de informações relacionadas ao trabalho vindas por meio das TIC que eu simplesmente não consigo acompanhar.	1,00

Continue

VI – Safety/Segurança		50-item S-CVI/AVE: 0.92 30-item S-CVI/AVE: 0.89	
1. <i>I have to worry too often, whether I might download malicious programs.</i> 1. Eu tenho que me preocupar com muita frequência com o risco de baixar programas mal-intencionados.		CVI-I	
			0,92
2. <i>I have to worry too often, whether I might receive malicious e-mails.</i> 2. Eu tenho que me preocupar, com muita frequência com o risco de receber e-mails mal-intencionados.			0,89
3. <i>I fear that hackers might get access to company secrets through a mistake of mine.</i> 3. Eu tenho receio que hackers possam ter acesso a segredos da empresa devido a um erro meu.			1,00
4. <i>I feel anxious when I get an e-mail from somebody that I do not know as it could be a malevolent attack.</i> 4. Eu fico ansioso(a) quando recebo um e-mail de alguém que não conheço pois pode ser ataque mal-intencionado.			0,86
5. <i>E-Mails whose sender I do not know make me nervous.</i> 5. Eu me sinto nervoso(a) com e-mails cujos remetentes eu desconheço.			0,93
VII – Social Environment/Ambiente Social		50 itens S-CVI/AVE: 1,00 30 itens S-CVI/AVE: 1,00	
1. <i>Due to ICT I have too much to do with the problems of others.</i> 1. Devido às TIC me envolvo muito com os problemas dos outros.		CVI-I	
			1,00
2. <i>I think that ICT generate too much of an expectation that I have to be reachable everywhere and at any time.</i> 2. Eu acho que as TIC geram muita expectativa de que eu tenha que estar acessível em qualquer lugar e a qualquer momento.			1.00
3. <i>Too much time gets lost at work because of irrelevant communication with other people on social media.</i> 3. Perde-se muito tempo no trabalho devido a comunicação irrelevante com outras pessoas nas mídias sociais.			1.00
4. <i>I feel that ICT create unwanted social norms (e.g., the expectation that e-mails should be answered right away).</i> 4. Eu sinto que as TIC criam regras sociais indesejadas (por exemplo, a expectativa de que e-mails devam ser respondidos imediatamente).			1.00
5. <i>It is too hard to take a break from social interactions at work due to the communication possibilities of ICT.</i> 5. É muito difícil fazer uma pausa nas interações sociais no trabalho devido às possibilidades de comunicação pelas TIC.			0,93
VIII – Technical Support/Suporte Técnico		50-item S-CVI/AVE: 0.96 30-item S-CVI/AVE: 0.96	
1. <i>I have to worry about ICT-related problems as our organization does not offer enough support for their removal.</i> 1. Eu tenho que me preocupar com problemas relacionados às TIC, visto que nossa organização não oferece suporte o suficiente para solucioná-los.		CVI-I	
			0,96

Continue

Continuation

2. <i>In the case of ICT-related problems, it happens too often that there is not enough support available at work.</i> 2. Nos casos de problemas relacionados às TIC, acontece com muita frequência de não haver suporte suficiente disponível no trabalho.		1,00
3. <i>I think that it happens too often that technical support is not available when I need it.</i> 3. Eu acho que acontece com muita frequência de não ter o suporte técnico disponível quando eu o necessito.		0,96
4. <i>I often have to wait for a long time because technical problems cannot be adequately solved in our organization.</i> 4. Muitas vezes tenho que esperar por um longo tempo porque os problemas técnicos não são resolvidos adequadamente em nossa instituição.		0,83
5. <i>I fear that a technical problem I have at work could not be solved by anyone else at work.</i> 5. Eu tenho receio de que algum problema técnico que eu tenha no trabalho não possa ser resolvido por outra pessoa na empresa.		0,93
IX – Usefulness/Ineficácia	50 itens S-CVI/AVE: 1,00 30 itens S-CVI/AVE: 1,00	
1. <i>I think that the demands of my work and the functions provided by the ICT I use do not fit sufficiently.</i> 1. Eu acho que as demandas do meu trabalho e as funções proporcionadas pelas TIC que eu utilizo não se encaixam o suficiente.	CVI-I:	
	1,00	
2. <i>I think that I do not gain enough benefits from using the ICT that I am provided with at work for my tasks.</i> 2. Eu acho que não obtenho benefícios suficientes ao usar as TIC que estão disponíveis para mim no trabalho.		0,93
3. <i>The ICT I use at work are full of too many functionalities that I never need.</i> 3. As TIC que eu utilizo no trabalho possuem diversas funcionalidades, de que eu nunca preciso.		1,00
4. <i>It requires too many different systems to fulfill the tasks that I have to do during an average day at work.</i> 4. São exigidos vários sistemas diferentes para preencher as tarefas que eu preciso cumprir durante um dia normal de trabalho.		0,96
5. <i>I think that most of the ICT I am supplied with at work is not useful enough and I could work without it.</i> 5. Eu acho que a maioria das TIC fornecidas a mim no trabalho não são úteis o suficiente e eu poderia trabalhar sem elas.		0,96
X – Unreliability/Confiabilidade	50 itens S-CVI/AVE: 0,96 30 itens S-CVI/AVE: 0,96	
1. <i>I think that I am too often confronted with unexpected behavior of the ICT I use at work (e.g., breakdowns or long response times).</i> 1. Eu acho que enfrento com muita frequência comportamentos inesperados das TIC que eu utilizo no trabalho (por exemplo, bugs, panes ou longos tempos de resposta).	CVI-I	
	0,82	
2. <i>I think that I lose too much time due to technical malfunctions.</i> 2. Eu acho que perco muito tempo devido às falhas técnicas.		0,96

Continue

Continuation

3. <i>I think that I spend too much time trying to fix technical malfunctions.</i> 3. Eu acho que gasto muito tempo tentando solucionar falhas técnicas.	1,00
4. <i>There is just too much of my time at work wasted coping with the unreliability of ICT.</i> 4. Existe um grande desperdício do meu tempo no trabalho para lidar com a falta de confiabilidade das TIC.	0,93
5. <i>The daily hassles with ICT (e.g., slow programs or unexpected behavior) are really bothering me.</i> 5. As dificuldades diárias com as TIC (por exemplo, programas lentos ou comportamentos inesperados) estão realmente me incomodando.	0,96

Recommended values: S-CVI: Content Validity Index complete instrument

S-CVI-AVE: Content Validity Index - Scale Average (>0.80)

CVI-I: Content Validity Index - Item (>0.80)

Source: Translated and adapted from Fischer et al.¹¹.

In the stage with the target population, participants didn't report any difficulty. The average response time was 15 minutes (SD = 5).

In the comparison between the original and back-translated versions, two inconsistencies were corrected, the most relevant of which refers to the item in the "social environment" category, which in English is: "Too much time gets lost at work because of irrelevant communication with other people on social media", initially translated as "*Perde-se muito no trabalho [...]*", which would omit the idea of wasted time. It has been adjusted to "*Perde-se muito tempo no trabalho [...]*", remaining faithful to the original.

In the pilot study, the agreement rate was 96% - understanding of the instructions, 99% - online application; and 97% - understanding of the items, values above those recommended, showing adequate validity for cross-cultural adaptation. Of the 150 participants, 19 commented; five considered the questionnaire long, two suggested presenting the items randomly to reduce the feeling of repetition. There were no suggestions for changes to the translation.

Table 2 shows the Cronbach's alpha values, with the respective CIs, and McDonald's omega values for the 10 scales of the long and short versions. The results obtained indicate an excellent level of internal consistency for the long version, with the conflict, insecurity, support, and reliability scales having values above 0.90 and the others above 0.70.

Table 2 Results of the internal consistency analysis using Cronbach's alpha and McDonald's omega for the full and short versions of the Digital Stressors Scale

	Full Version (50 items)				Short Version (30 items)			
	Cronbach's alpha	CI Lower	CI Higher	McDonald's Omega	Cronbach's alpha	CI Lower	CI Higher	McDonald's Omega
Complexity	0.86	0.83	0.89	0.96	0.68	0.63	0.73	0.71
Conflicts	0.92	0.9	0.94	0.95	0.85	0.81	0.86	0.84
Insecurity	0.92	0.9	0.94	0.95	0.9	0.88	0.91	0.9
Invasion	0.88	0.84	0.91	0.93	0.81	0.78	0.84	0.83
Overload	0.86	0.82	0.89	0.89	0.75	0.7	0.78	0.77
Safety	0.86	0.82	0.89	0.92	0.87	0.79	0.84	0.83
Environment	0.83	0.79	0.87	0.88	0.73	0.69	0.77	0.75
Support	0.94	0.93	0.96	0.96	0.91	0.89	0.92	0.91
Usefulness	0.77	0.71	0.82	0.81	0.71	0.67	0.76	0.72
Unreliability	0.93	0.91	0.94	0.95	0.84	0.81	0.86	0.85

CI: Confidence Interval. Recommended value: > 0.70

Source: Authors' own elaboration.

As for the short version, only the Complexity scale had an alpha of 0.68, but this was offset by a higher CI of 0.73 and an omega of 0.71, as recommended in the literature. The percentage of missing items was 2.10% for the long version and 1.14% for the short version.

Discussion

The hypothesis that the translated instrument would have satisfactory content validity and preliminary internal consistency in a pilot study for both the original (50 items) and short (30 items) versions was confirmed.

The expert evaluation stage revealed high agreement, with CVI-Is ≥ 0.80 for all items after adjustments, and S-CVI 0.96 for the complete instrument, suggesting that the items, as well as being understandable, were consistent with the original version.

The participants in the target population understood the instrument well, representing different regions and realities of ICT use in Brazil. The back-translated version was analyzed by two independent translators, who identified the need for adjustments to two items. This stage was essential to consolidate the quality of the final version.

The pilot study confirmed the clarity of the instrument, with over 95% agreement on the instructions, understanding of the items and online application. Some participants criticized the length of the instrument (50 items), mentioning a feeling that the questions were repetitive. This points to the possibility of randomizing items in future applications to reduce response bias and fatigue. These indicators support the validity of cross-cultural adaptation.

The results of the preliminary reliability analysis indicated satisfactory internal consistency in both the full and short versions. The alpha and omega were higher than 0.70 for all the scales in the full version. In the short version, only the complexity scale had an alpha of 0.68, offset by an omega of 0.71 and a CI of over 0.73. These data meet the criteria widely accepted in psychometric literature, which considers values above 0.70 to indicate adequate reliability^{26,30,27}.

The alpha coefficient is sensitive to the total number of items, so longer scales tend to artificially inflate alpha values. On the other hand, in shorter versions, as observed in this study, the alpha can show lower results, even when the internal consistency is adequate³⁰. Sample size also influences these estimates: small samples, common in preliminary analyses, tend to generate less stable results. However, a study published in 2024 showed that a sample of more than 30 participants is suitable for reliability analysis in a pilot study³¹.

To mitigate these limitations and strengthen the robustness of the analyses, the study also used McDonald's omega coefficient, which offers a more realistic estimate of reliability by considering the individual factor loadings and associated errors. The omega values were adequate (≥ 0.70 and ≤ 0.96). Applying these coefficients together contributes to a more accurate assessment of internal consistency and strengthens the preliminary validity of the Brazilian version of the DSS, both in its complete form and in the short version²⁷.

It is important to mention that the authors suggest a specific interpretation of the results, according to which a value equal to "1" could already be indicative of perceived stress¹⁸. However, in agreement with the expert committee, we decided to keep the continuous reading of the scores, compatible with the usual psychometric functioning of seven-point Likert scales, for the Brazilian version³².

Compared to COSMIN checklist G²³, only two items were not fully met: the similarity between the original validation samples and this study (convenience sample) and the absence of confirmatory factor analysis or Item Response Theory (IRT), which were not in the current scope. The psychometric qualities established in the original instrument may be affected in the adapted version due to differences between the characteristics of the samples, which, in the original version, were predominantly male (56.2%), graduates (37.4%) and a mean age of 39 years (standard deviation = 14.99)¹¹.

In a recent study carried out in Norway by Sevic et al., the validation of the DSS did not show a good fit with the original format. The authors carried out an exploratory factor analysis, resulting in a version with 37 items

distributed in eight factors with high internal consistency (α and $\omega > 0.80$). This result reinforces the importance of re-evaluating the factor structure in different cultural contexts and corroborates the need for further studies to confirm the structure of the DSS in Brazil³³.

The use of a convenience sample and online collection represents a methodological limitation, with a risk of selection bias. In this study, the sample was made up predominantly of workers from the Southeast and with a high level of education. Despite this, it allowed access to participants from all regions, saving resources. Low familiarity with the electronic form may have had an impact on response time or completion rate, and potential bias due to respondent fatigue.

Conclusion

The Brazilian version of the Digital Stressors Scale, in its original and short versions, showed preliminary evidence of adequate content validity and internal consistency, demonstrating good linguistic, conceptual, experimental and semantic adaptation to the national context. Although promising, the pilot study does not yet provide sufficient evidence for widespread use in Brazil. It is recommended to continue evaluating the psychometric properties with larger and more diverse samples and use factorial or IRT-based analyses to confirm their internal structure and improve their accuracy and applicability.

References

1. Tarafdar M, Tu Q, Ragu-Nathan BS, Ragu-Nathan TS. The impact of technostress on role stress and productivity. *J Manage Inf Syst*. 2007 Jul;24(1):301-28. <https://doi.org/10.2753/MIS0742-1222240109>
2. Bahamondes-Rosado ME, Cerdá-Suárez LM, Ortiz de Zevallos GFD, Espinosa-Cristia JF. Technostress at work during the COVID-19 lockdown phase (2020-2021): a systematic review of the literature. *Front Psychol*. 2023 Apr;14(April):1173425. <https://doi.org/10.3389/fpsyg.2023.1173425>
3. Agência Tecere. Trabalho híbrido predomina na América Latina, mas empresas tendem a aumentar a frequência no escritório JLL. April 12, 2024 [cited Nov 2 2025]. Available from: <https://www.jll.com/en-us/insights/hibrido-predomina-na-america-latina>
4. Andrulli R, Gerards R. How new ways of working during COVID-19 affect employee well-being via technostress, need for recovery, and work engagement. *Comput Human Behav*. 2023;139:107560. <https://doi.org/10.1016/j.chb.2022.107560>
5. World Economic Forum. The future of jobs report 2025: insight report. Cologny: World Economic Forum; 2025 [cited 20 jan 2025]. Available from: <https://www.weforum.org/publications/the-future-of-jobs-report-2025/>
6. Byung-Chul Han. *Sociedade do cansaço*. Petrópolis: Vozes; 2015.
7. Nações Unidas Brasil. Brasil: afastamentos por problemas de saúde mental aumentam 134%. Brasília, DF: Nações Unidas Brasil; 2025 [cited Nov 7 2025]. Available from: <https://brasil.un.org/pt-br/292926-brasil-afastamentos-por-problemas-de-sa%C3%BAde-mental-aumentam-134>
8. Setta AV, Lucca SR. Tecnologias de informação e comunicação: revisão de escopo dos instrumentos de avaliação dos fatores de risco psicossociais no trabalho contemporâneo. *Rev Bras Saude Ocup*. 2024;49:e6. <https://doi.org/10.1590/2317-6369/02722pt2024v49e6>
9. Karasek R, Formanzzin M, Agbenyikey W, Dolland M, Li J, Si C, et al. The multilevel 'associationalist' demand- control theory and the job content questionnaire 2.0. *Eur J Prev Cardiol* 2017;24(2_suppl):7-53.
10. Burr H, Berthelsen H, Moncada S, Nübling M, Dupret E, Demiral Y, et al. The Third Version of the Copenhagen Psychosocial Questionnaire. *Saf Health Work*. 2019 Dec;10(4):482-503. <https://doi.org/10.1016/j.shaw.2019.10.002>
11. Fischer T, Reuter M, Riedl R. The digital stressors scale: development and validation of a new survey instrument to measure digital stress perceptions in the workplace context. *Front. Psychol*. 2021 Mar;12(March):607598. <https://doi.org/10.3389/fpsyg.2021.607598>
12. Ragu-Nathan TS, Tarafdar M, Ragu-Nathan BS, Tu Q. The consequences of technostress for end users in organizations: conceptual development and empirical validation *Inf Syst Res*. 2008 Dec;19(4):417-33. <https://doi.org/10.1287/isre.1070.0165>

13. Fischer T, Pehböck A, Riedl R. Is the technostress creators inventory still an up-to-date measurement instrument? Results of a large-scale interview study. 14th International Conference on Wirtschaftsinformatik 2019 Feb [cited 22 jan 2025];1:1834-45. Available from: https://www.researchgate.net/publication/331198725_Is_the_Technostress_Creators_Inventory_Still_an_Up-To-Date_Measurement_Instrument_Results_of_a_Large-Scale_Interview_Study
14. Nastjuk I, Trang S, Grummeck-Braamt JV, Adam MT, Tarafdar M. Integrating and synthesising technostress research: a meta-analysis on technostress creators, outcomes, and IS usage contexts Eur J Inf Syst. 2024;33(3):361-82. <https://doi.org/10.1080/0960085X.2022.2154712>
15. Tarafdar M, Tu Q, Ragu-Nathan TS, Ragu-Nathan BS. Crossing to the dark side: examining creators, outcomes, and inhibitors of technostress. Commun ACM. 2011;54(9):113-20. <https://doi.org/10.1145/1995376.1995403>
16. Fuglseth AM, Sørebo Ø. The effects of technostress within the context of employee use of ICT. Comput Human Behav. 2014;40:161-70. <https://doi.org/10.1016/j.chb.2014.07.040>
17. Carlotto MS, Câmara SG. Tradução, adaptação e exploração de propriedades psicométricas da escala de tecnostresse (RED/TIC) Psicol Estud. 2010;15(1):171-8. <https://doi.org/10.1590/S1413-73722010000100018>
18. Veiga MG, Felizi RT, Trevisan GD, Cubero DI, Fernandes CE, Oliveira E. Translation and validation of the techno-stress questionnaire in Brazil Rev Assoc Med Bras. 2022 Nov;68(12):1709-14. <https://doi.org/10.1590/1806-9282.20220793>
19. Riedl R, Fischer T, Reuter M. Measuring digital stress in the workplace context. Inform Spektrum 2023 Dec 21;46(5-6):235-9. <https://doi.org/10.1007/s00287-023-01553-9>
20. Borsa JC, Damasio BF, Bandeira DR. Adaptação e validação de instrumentos psicológicos entre culturas: algumas considerações. Paidéia (Ribeirão Preto). 2012;22(53):423-32. <https://doi.org/10.1590/S0103-863X2012000300014>
21. Alexandre NM, Coluci MZ. Validade de conteúdo nos processos de construção e adaptação de instrumentos de medidas. Cien Saude Colet. 2011 Jul;16(7):3061-8. <https://doi.org/10.1590/S1413-81232011000800006>
22. International Test Commission. Diretrizes do ITC para tradução e adaptação de testes. 2a ed. 2017.
23. Mokkink LB, Terwee CB, Patrick DL, Alonso J, Stratford PW, Knol DL, et al. The COSMIN checklist for assessing the methodological quality of studies on measurement properties of health status measurement instruments: an international Delphi study Qual Life Res. 2010 May;19(4):539-49. <https://doi.org/10.1007/s11136-010-9606-8>
24. Wynd CA, Schmidt B, Schaefer MA. Two quantitative approaches for estimating content validity. West J Nurs Res. 2003 Aug;25(5):508-18. <https://doi.org/10.1177/0193945903252998>
25. Polit DF, Beck CT. The content validity index: are you sure you know what's being reported? Critique and recommendations Res Nurs Health. 2006 Oct;29(5):489-97. <https://doi.org/10.1002/nur.20147>
26. Izah SC, Sylva L, Hait M. Cronbach's alpha: a cornerstone in ensuring reliability and validity in environmental health assessment. ES Energy Environ 2023;23:1-14. <https://doi.org/10.30919/esee1057>
27. Kalkbrenner MT. Alpha, Omega, and H internal consistency reliability estimates: reviewing these options and when to use them counts outcome Res Eval. 2023 Jan;14(1):77-88. <https://doi.org/10.1080/21501378.2021.1940118>
28. Setta AV, Lucca SR. Brazilian version of Digital Stressors Scale: cross-cultural adaptation OSF. 2025 [cited 08 jul 2025]. Available from: <https://osf.io/prz6d/overview>
29. Eysenbach G. Improving the quality of Web surveys: the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) J Med Internet Res. 2004 Sep;6(3):e34. <https://doi.org/10.2196/jmir.6.3.e34>
30. Tavakol M, Dennick R. Making sense of Cronbach's alpha. Int J Med Educ. 2011;2:53-5. Available from: <https://doi.org/10.5116/ijme.4dfb.8dfd>
31. Bujang MA, Omar ED, Foo DH, Hon YK. Sample size determination for conducting a pilot study to assess reliability of a questionnaire Restor Dent Endod. 2024 Jan;49(1):e3. <https://doi.org/10.5395/rde.2024.49.e3>
32. DeVellis RF. Scale development: theory and applications. 4th ed. Los Angeles: Sage; 2017. Chapter 3; Reliability. (Applied social research methods series, v. 26).
33. Sevic A, Foldnes N, Brønnick KK. Measuring digital stress in Norway: translation and validation of the Digital Stressors Scale Front Psychol. 2024 Feb;15:1297194. <https://doi.org/10.3389/fpsyg.2024.1297194>

Information on academic work: Work based on the doctoral thesis by Alexandra Vasconcelos Antunes Setta, entitled “Escala de Estressores Digitais: adaptação transcultural e validação psicométrica do instrumento para o português brasileiro (Digital Stressors Scale: cross-cultural adaptation and psychometric validation of the instrument for Brazilian Portuguese)”, presented on January 16, 2026, at the Faculty of Medical Sciences of the State University of Campinas.

Authors' Contributions: Setta AVA, Lucca SR contributed to the conception of the study; data collection, analysis, and interpretation; writing and critical review of the manuscript. The authors have approved the final version and take full public responsibility for the work carried out and the content published.

Data availability: The entire set of anonymized data supporting the results of this study is available at: OSF (Open Science Framework). URL or DOI: <https://doi.org/10.17605/OSF.IO/PRZ6D>. July 8, 2025.

Statement on the use of Artificial Intelligence: During the preparation of the article, the artificial intelligence tool Chat GPT version 5.2 was used to carry out the grammar and language review. The authors declare that they have reviewed and validated all the content generated with the help of the artificial intelligence tool.

Funding: The authors declare that the study was not subsidized.

Competing interests: The authors declare that there are no competing interests.

Presentation at a scientific event: The authors declare that the study has not been presented at a scientific event.

Received: July 14, 2025

Revised: December 8, 2025

Approved: January 7, 2026

Responsible editors:

Raoni Rocha Simões 

Universidade Federal de Ouro Preto - UFOP

Tânia Maria de Araújo 

Universidade Estadual de Feira de Santana - UEFS