Translation and Validation of the Digital Stress Scale (DSS) in Indonesian Version

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Abstract. This study aimed to translate the digital stress scale (DSS) into Indonesian version using three stages. Study 1 translated and validated the DSS into Indonesian using a back-translation approach with six experts and produced a scale translation script in the Indonesian version. Subsequently, study 2 validated the DSS in the Indonesian version through exploratory factor analysis (EFA), and a total of 453 respondents participated in this stage. EFA results showed a KMO value of .87, accounting for 56.3% of the total variance. The analysis identified five factors, consistent with the original version, but two items were excluded because of low factor loading. Study 3 was conducted to confirm the model from Study 2 using confirmatory factor analysis (CFA), and a total of 544 respondents participated. CFA showed that the DSS has five dimensions, similar to the original version, with a CFI value = .93, TLI = .91, NFI = .90, GFI = .91, and RMSEA = .07. However, the results did not support measurement invariance across gender. In conclusion, this study produced an instrument with good psychometric properties for measuring stress resulting from digital activities.

Keywords: Digital stress scale, Exploratory factor analysis, Confirmatory factor analysis, Measurement invariance, Psychometrics.

Psympathic :
Jurnal Ilmiah Psikologi
Vol. 13:1, June 2026,
Page 129-138

eISSN: 2502-2903
pISSN: 2356-3591

Article Info
Received:
November 04, 2025
Accepted:
June 08, 2026
Published:
June 30, 2026

DOI:
https://doi.org/10.15575/psy.v13i1.51799

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Introduction

The number of internet users in Indonesia continues to grow each year. In 2023, an estimated 77% of the Indonesian population used the internet. People use the internet to maintain social relationships through social media (Mutia, 2022). As of 2023, the most popular social media platforms in Indonesia include Facebook, YouTube, WhatsApp, Instagram, and TikTok (Annur, 2023). Aside from maintaining social functions, the Internet facilitates information search, communication, shopping, and numerous other purposes (Prados-Peña et al., 2022; Wijayanti et al., 2022; Yoon et al., 2022). Internet can have both positive and negative impacts. According to Nabiilah et al. (2023), the use of social media has facilitated the spread of pornographic content, hate speech, and radicalism, as well as other forms of derogatory behavior toward others.

Another negative impact of internet use is digital stress, which refers to tension and anxiety caused by technology use, including online activities and social media (Steele et al., 2020). Digital stress results from being connected to the internet all day. This constant connection creates pressure to respond to messages promptly, maintain a positive online image, conform to social norms, and exposure to unhealthy social media content. Additionally, security issues require individuals to process information overload and use increasing caution while being online (Gilbert et al., 2022; Winstone et al., 2023). In Indonesia, social media use among adolescents has complex impacts. It supports the need for social relationships and communication, but also has the potential to cause stress. Furthermore, in the workplace, media-based interactions and digital information can be a source of stress for the younger generation, particularly when interacting with groups from different generations (Sitinjak, 2025).

Technological advancement has significantly impacted individuals psychological well-being in both workplace and educational settings. Indonesian employees have reported elevated stress levels while working in the digital era (Sitinjak et al., 2025). One major factor contributing to this increased stress is the rapid development of digital technologies, which

require employees to remain constantly connected to access work-related information. Additionally, the rise of remote work arrangements, where individuals are expected to complete tasks regardless of physical location, intensifies the demand for continuous online availability. This situation often leads to multiflatform overload, as individuals must manage multiple digital platforms simultaneously.

Previous studies have identified multiflatform overload as a significant predictor of increased stress levels among students in the United States (Makinson et al., 2012). Similarly, Indonesian students have shown patterns of distress associated with excessive screen time and frequent interactions across various digital platforms. This stress is reportedly associated with decreased sleep quality, reduced discipline, lower academic performance (Hapsari et al., 2024), and increased internet addiction (Kabakoğlu et al., 2026).

Given the detrimental effects, digital stress should be minimized to support individual well-being and productivity. Accurate psychological assessment is essential for identifying individuals who experience stress resulting from excessive exposure to digital information and activities. Hall et al. (2021) recently developed a psychological scale for measuring digital stress in the English language. Creating a psychological scale for measuring digital stress is essential due to increased technology and social media use. In Indonesia, studies on stress arising from the use of technology remain limited. This phenomenon is generally understood through two constructs, namely technostress and digital stress. However, to date, no validated instruments are available to measure the two constructs in the Indonesian context. Previous studies have generally used instruments independently translated into Indonesian without adequate psychometric validation (Putriani & Apriani, 2022; Ulandari & Islamia, 2025). Therefore, this study aimed to translate the DSS developed by Hall into Bahasa Indonesia. The instrument was subsequently tested to determine the validity and reliability. Due to various limitations, this study focused solely on translation without incorporating cross-cultural adaptation.

Two broad sources of stress can arise from internet use. The first is associated with stressors that are harmful to other people, such as cyberbullying and humiliation. The second is related to socialization and communication with close friends, for example, the hope of getting a positive appraisal from other people on posted photos (Winstone et al., 2023). The second source of stress is the root of digital stress, namely the pressure felt by someone from the hostile experience of using digital equipment connected to the internet all the time.

Digital stress is a new concept in psychology. Previous studies initially used different terms to describe the impact of social media on psychological stress, including Facebook-induced theory, Facebook-related stress, and social network site exhaustion. However, digital stress has different dynamics from ordinary stress. According to Lazarus transactional theory, stress arises from an individual appraisal of environmental demands that threaten well-being and the evaluation of available coping resources to manage the demands (Ragu-Nathan et al., 2008). Within the context of information communication using technology, stress comes from multitasking in running several devices, communication load, as well as cognitive and motivational engagement in online interaction (Gilbert et al., 2022; LaRose et al., 2014; Reinecke et al., 2017).

As digital stress is a new construct, instruments designed for its measurement are still evolving. Previous studies used questionnaires derived from national surveys to measure digital stress (Nick et al., 2022). Other studies used different approaches to view digital stress, such as focus group discussions (FGD) and text analysis from social media (De Groote & Van Ouytsel, 2022; Weinstein & Selman, 2016; Winstone et al., 2023). Steele et al. (2020) developed a model to explain digital stress in everyday life. The model consists of four dimensions. First, availability stress refers to the distress that arises from a person belief in other people assessments in the digital world. Second, approval anxiety originates from other people responses and reactions to the digital footprint. Third, fear of missing out is the distress resulting from social consequences when a person is not involved in valuable activities with others. Fourth, connection overload is caused by excessive input from the internet, such as notifications, posts, and messages.

Hall et al. (2021) empirically tested the model and identified a five-factor structure. The revised model retained the four dimensions proposed by Steele et al. (2020) with one additional dimension, namely online vigilance. This refers to an individual ability to maintain attention, as well as receive and handle stimuli that originate from the internet (Reinecke et al., 2018). Online vigilance is related to phubbing and boredom, which trigger an individual to be attached to a smartphone, potentially causing stress (Duradoni et al., 2023). A meta-analytic study conducted by Khetawat and Steele (2023) showed that all five dimensions of the DSS were significantly associated with psychosocial distress. These results provide empirical support for the theoretical adequacy of the DSS as a comprehensive instrument for explaining and assessing individual levels of digital stress.

The DSS has been translated and validated in several linguistic and cultural contexts. Xie et al. (2023) translated the DSS into Chinese and found that the five-factor structure provided a good fit.

Furthermore, the results supported a bifactor structure, showing that the DSS can be interpreted both as a global measure of digital stress and a set of specific subdimensions. Gao et al. (2024) also translated and validated the DSS among students in China. The results confirmed that the dimensional structure was appropriate for the linguistic and cultural characteristics of Chinese students, and the instrument showed satisfactory validity. However, the study did not establish measurement invariance across gender, suggesting that the DSS equivalence between male and female students remains uncertain. More recently, Funke et al. (2025) developed a short version of the DSS in German, Italian, and Japanese. The results indicated that the short form showed adequate psychometric properties and was valid across the three language contexts.

Scales to measure the impact of digital technology on stress have already been created, namely the Digital Stress Scale (DSS) (Fischer et al., 2021), the Technostress Scale (Ragu-Nathan et al., 2008), and the digital transformation stress scale (Makowska-Tłomak et al., 2021; Makowska-Tłomak et al., 2023). However, these scales measure digital stress in the workplace context. DSS is a stress scale for daily activities created by Hall et al. (2021) in English. It was validated cross-culturally by Funke et al. (2023) and translated into Mandarin by Zhang et al. (2023). However, no study has translated DSS into Bahasa.

Table 1.
First stage of the translation process

Original Item	Translated by experts
My friends expect me to be constantly available online	*Teman-teman saya berharap saya untuk selalu ada secara online*
	Teman saya mengira saya selalu ada secara online
	Teman saya berharap agar saya bisa selalu siap dihubungi
	Teman-teman saya menginginkan saya agar selalu online
	Teman-temanku berspekulasi kalo aku online secara teratur

Methods

This study used a quantitative approach and was conducted to test the psychometric properties of the DSS translated into Indonesian. It was carried out in three stages, namely translating the DSS into Indonesian, as well as testing the validity and reliability. The first study used a forward-backward approach, while the second study used exploratory factor analysis (EFA), and the third study used confirmatory factor analysis (CFA).

Study 1

Translation process

The instrument used in this study was the DSS. The team translated the manuscript from English into Indonesian in four stages. First, the Expert translated the DSS from English into Indonesian. This stage involved five experts in English, namely English teachers and fresh graduates majoring in the language. At this stage, the expert translated the DSS into Bahasa. The expert was provided with a form containing the original version of the DSS and blank columns to translate each item. The expert was given one week to translate 24 items. After completing the translation process, the results were collected for further processing. Table 1 shows the results of the item translation conducted by experts.

First, the study team selected the translation process results in step 1. This stage was performed by selecting the best translation results from the five translations for each item. At this stage, an FGD was conducted with five experts, including the study team and clinical psychologists. Discrepancies in the selection of item translation were further discussed to determine the most appropriate translation result in Bahasa. At this stage, the study team assessed all translation results produced by experts in the first stage. Based on the assessment results, the team selected and, when necessary, revised the item translation to obtain the most appropriate formulation. For example, at this stage, the team selected and revised one of the items to: *"Teman-teman mengharapkan saya selalu siap dihubungi."*

Third, the expert performed the back translation of the results into Indonesian, which was evaluated in stage 2, into the original language. This stage was conducted by an English lecturer with experience in English-speaking countries and Indonesia. The Indonesian version of DSS was provided to the expert for translation back into English. The result of this process is the DSS in the backward-translated version. The following is an example of a back translation item that passed stage 2. The item “My friends expect me to always be available” has been back-translated to “My friends expect me to always be online.”

Fourth, the study team, assisted by language experts, conducted an FGD on the results of the back translation, which had been conducted in stage 3. This process was performed by comparing the original items with the results of the back translation. This process underscored conceptual equivalence, namely the emphasis of the translation results on the similarity of concepts from the original version. Although the results

of comparing the items were found to be linguistically dissimilar, the two items have the same concept (Brislin, 1970; Cha et al., 2007; Prieto, 1992). The outcome of this stage was a DSS in Indonesian comprising 24 items. A complete list of the DSS items in the Indonesian version is shown in Table 2.

Study 2

Participants

A total of 453 respondents participated in the EFA process. Respondents consisted of college students, with the majority being 21 years old and aged 17–25 years old. Most respondents spent at most 5 hours per day accessing the internet and had access to the internet via devices such as cell phones, laptops, tablets, and PCs. The respondents accessed the internet with different goals, including getting information or finding learning support materials such as lecture notes or Zoom meetings. Others use the internet to connect with friends, shop online, or for entertainment, such as listening to music, playing games, and reading comics.

Instruments

The Indonesian version of DSS was used to collect data in this study. The scale consists of 24 items rated on a Likert scale that ranges from strongly agree = 5 to strongly disagree = 1. Among the 24 items, 23 were favorable while 1 was unfavorable. The instrument assessed five dimensions of digital stress, namely approval anxiety, connection overload, fear of missing out (FoMO), online vigilance, and availability stress. In this study, the DSS was administered to adolescents and early adult respondents.

Data Collection

The questionnaire was developed and administered using Google Forms. The filling link was distributed through social media such as WhatsApp and Instagram. Before completing the questionnaire, respondents were required to provide informed consent and were free to choose whether to participate in the study. The questionnaire started with filling in the respondents demographics. To protect respondents privacy, the questionnaire did not include private data such as name, address, and email. Filling in a cellphone number was included but optional. The respondent's cellphone number was needed to send a reward to the ten respondents obtained from the draw. The ten people received a Gopay of IDR 50,000.

Data Analysis

In EFA process, the Kaiser-Meyer-Olkin (KMO) test was used as a benchmark to determine the suitability of the respondents. The number of factors was five, adjusted to the original scale. Varimax rotation made it easier for us to interpret the structure of the items in the factors (Furr & Bacharach, 2014).

Study 3

Participant

A total of 544 respondents participated in the CFA analysis, including 141 males and 403 females. The age range was from 12 years to 25 years, with an average of 17 years and a standard deviation of 4.65. Demographic data also showed that, on average, respondents have at least two devices for daily activities. Only about 27% of respondents have one device, and at least 50% spent one hour per day accessing the internet, with 17% spending five or more hours.

Instruments

The DSS tested in Study 2 was used to collect data in Study 3. The scale used had a total reliability of $\alpha = .80$. In addition, each dimension of the DSS also had its reliability score: availability stress had $\alpha = .76$; approval anxiety had $\alpha = .92$; fear of missing out had $\alpha = .84$; connection overload had $\alpha = .88$; and online vigilance had $\alpha = .79$.

Data Analysis

CFA was conducted to evaluate the fit of the proposed model using several criteria, such as TLI ≥ .90, CFI ≥ .90, GFI ≥ .90, and RMSEA = .05 - .08 (Byrne, 2013). Data were analyzed using JASP software version 0.17.3. After the CFA, measuring invariance was also tested to determine whether a CFA or SEM model could be used in several groups. When invariance was satisfied, the model was deemed applicable for each group (Hirschfeld & Von Brachel, 2014). In this study, measurement invariance was performed at the configural, metric, scalar, strict, and structural levels in gender groups (male and female).

Results and Discussion

Results

Study 2

The analysis results showed that the average Kaiser-Mayer-Olkin (KMO) value was .87. The range of KMO values for each item was from .71 to .94, and the Barlet Test value was $\chi^2 = 357.64$ with $p < .001$. Field (2024) stated that the given values were sufficient to perform the EFA test. Using the promax rotation, the results showed that five factors formed from 24 items with a total variance of 55.7%. The decision to retain five factors was based on the eigenvalues obtained from the EFA and was supported by previous study results that consistently validated the five-factor structure. The proportion of variance explained by each factor ranged from 7.3% to 14.3%. Factors were formed according to the dimensions in the original version of the scale.

The promax-rotated solution identified five different factors that contribute to social media-related anxiety. Factor 1, called approval anxiety, includes six

Table 2.
EFA Results

Item	AA	CO	FoMO	OV	AS
I am nervous about how people will respond to my posts and photos (1)	.93				
Saya merasa gelisah tentang bagaimana orang lain akan menanggapi postingan dan foto-foto saya (1)					
I feel anxious about how others will respond when I share a new photo on social media (3)	.92				
Saya merasa cemas terhadap tanggapan orang lain ketika saya berbagi foto baru di media sosial (3)					
I feel nervous about how others will respond when I post new updates on social media (11)	.88				
Saya merasa gelisah terhadap tanggapan orang lain ketika saya membuat postingan baru di media sosial (11)					
I feel nervous after I share a post or photo to see how others responded to it (21)	.73				
Saya merasa gelisah dengan respon yang akan orang berikan kepada postingan atau foto yang baru saya bagikan (21)					
I put a lot of effort into finding or creating a photo that others will approve of when I post it online (8)	.34		.40		
Saya berusaha keras untuk menemukan atau membuat foto yang akan diterima orang lain ketika saya mempostingnya (8)					
I put a lot of effort into composing messages and posts I share online (24)	.30		.47		
Saya berusaha keras ketika merangkai pesan dan membagikan postingan secara online (24)					
I spend too much time responding to notifications/messages (20)		.76			
Saya menghabiskan banyak waktu untuk menanggapi notifikasi/pesan (20)					
On top of the other things I must do, keeping up with notifications is a chore (18)		.77			
Dari segala hal yang harus saya lakukan mengecek notifikasi menjadi pekerjaan utama (18)					
I feel stressed because I must sift through a lot of unimportant notifications to get to the important ones (23)		.74			
Saya merasa stres karena saya harus menyaring banyak notifikasi yang tidak penting untuk mendapatkan yang penting (23)					
I have to check too many notifications (14)		.72			
Saya harus memeriksa terlalu banyak notifikasi (14)					
I feel overwhelmed with the flow of messages/notifications on my phone (16)		.70			
Saya merasa kwalahan dengan pesan atau notifikasi yang beruntun di ponsel saya (16)					
It feels like there is always a reminder—like a flashing light or buzz—that there is some other message that I need to attend to (19)		.69			
Saya merasa selalu ada pengingat, seperti lampu yang berkedip atau getaran bahwa ada pesan yang harus saya perhatikan (19)					
I fear that others have more rewarding experiences than me (7)			.82		
Saya takut orang lain memiliki pengalaman yang lebih berharga dari pada saya (7)					
I fear my friends are having more rewarding experiences than me (5)			.81		
Saya takut teman-teman saya meiliki pengalaman yang lebih berharga dari pada saya (5)					
I get worried when I find out my friends are having fun without me (13)			.74		
Saya khawatir ketika saya mengetahui teman-teman saya bersenang-senangtanpa saya (13)					
I get anxious when I don't know what my friends are up to (15)			.69		
Saya menjadi cemas ketika saya tidak tahu apa yang sedang dilakukan dengan teman-teman saya (15)					
I must have my phone with me to know what is going on (17)				.87	
Saya harus selalu membawa ponsel untuk mengetahui apa yang sedang terjadi (17)					
I feel lost or "naked" without my phone (22)				.78	
Saya merasa kehilangan atau hampa tanpa ponsel saya (22)					
I am constantly checking my phone for messages/notifications (9)				.70	
Saya selalu memeriksa notifikasi atau pesan pada ponsel saya (9)					
I feel socially unavailable when I do not have my phone (6)				.38	
Saya merasa tidak bersosialisasi ketika tidak memegang ponsel (6)					
For my friends, it is important that I am constantly available online (4)					.77
Bagi teman-teman saya, hal terpenting adalah saya selalu siap dihubungi (4)					
My friends expect me to be constantly available online (2)					.75
Teman-teman mengharapkan saya selalu siap dihubungi (2)					
Most of my friends approve of me being constantly available online (10)					.68
Sebagian besar teman-teman menyetujui saya selalu siap dihubungi (10)					
I feel a social obligation to be constantly available online (12)					.35
Saya merasa punya kewajiban sosial untuk online secara teratur (12)					
Explained variance (%)	14.3	13.3	10.2	10.6	7.3
α	.91	.86	.84	.78	.77

Note: AA = approval anxiety, CO = connection overload, FoMO = fear of missing out, OV = online vigilance, and AS = availability stress.

different items and has a high-reliability score of α = .82. Factor 2, called connection overload, consists of six items and has a reliability score of α = .87. Factor 3 was fear of missing out and includes four items, with a reliability score of α = .84. Factor 4, online vigilance, has four items and a reliability score of α = .77. Finally, factor 5, availability stress, has three items and a reliability score of α = .72. Detailed results are presented in Table 2.

The analysis further indicated that Items 8 and 24, originally specified under the approval anxiety dimension, also showed substantial factor loadings on the FoMO dimension. This result shows the presence of cross-loadings, as the two items were strongly

associated with both approval anxiety and FoMO. Given the lack of discriminant validity, the items were considered problematic and excluded from subsequent analyses. After removing Items 8 and 24, the model total variance explained increased to 56.3%. The contribution of the factors varied between 7.9% and 14.5%. Additionally, the reliability of the approval anxiety dimension improved, resulting in a Cronbach's alpha coefficient of α = .92.

Study 3

The fit value of the model was shown by $\chi 2 = 654.09$, $p < .01$; CFI = .93; TLI = .91; NFI = .90; GFI = .91; and RMSEA = .07. The analysis results indicated that all items and the variances associated with each dimension were statistically significant, suggesting the measurement model showed an adequate fit to the data. A second-order factor model was further tested to explore the higher-order structure of the construct. This test was conducted due to differences in results regarding the DSS construct structure in previous studies. Steele et al. (2020) conceptualized DSS as a first-order construct, while Gao et al. (2024) proposed that DSS is more appropriately represented as a second-order construct. Based on these differences, this study conducted additional tests to identify the most appropriate factor structure. The results indicated that both the first and second-order models showed generally acceptable fit indices. However, the NFI value for the second-order model fell below the recommended cutoff criterion. Consequently, the first-order model was retained as the final for this study. Table 3 shows a comparison of the fit indices between the first and second-order models.

Figure 1 shows the standardized factor loadings for each item and the correlations among the DSS dimensions. The analysis indicated that all items showed statistically significant factor loadings, and the correlations among the dimensions were also significant. These results imply that the items adequately represent the respective constructs and the dimensions are significantly related.

After determining the adequate model, an invariance test of the model was conducted at the gender level. The test determines whether the model produces suitable males and females. The results showed that the model did not meet the recommended fit criteria, particularly for the NFI and partially for the GFI indices, suggesting the DSS may be interpreted differently by male and female respondents. A more detailed presentation of the results is provided in Table 4.

Discussion

This study aimed to translate and validate the DSS into an Indonesian version. The EFA results showed that the instrument has five dimensions, similar to the original scale dimensions developed by Hall et al. (2021). However, there are two items from the approval anxiety dimension that also correlate with the FoMO dimension, namely item 8 ("I put a lot of effort into finding or creating a photo that others will approve of when I post it online ") and item 24 ("I put a lot of effort into composing messages and posts I share online"). These two items were considered ambiguous and removed from the DSS. The internal consistency analysis showed good results, with alpha = .84. Eliminating two items did not reduce the instrument overall psychometric quality, as shown by an increase in the total variance explained. In addition, the model also maintained f internal reliability, as shown by Cronbach's alpha remaining consistent even after the removal of the two items.

The CFA results indicated that all dimensions of the DSS showed an acceptable fit within the first-order model. Similarly, Gao et al. (2024) reported that the first-order structure of the DSS showed a satisfactory model fit in the Chinese version. Xie et al. (2023) also found that the first-order model of the DSS achieved an acceptable fit in the Chinese context. Collectively, these results further confirm the robustness of the DSS first-order structure across different linguistic and cultural settings.

The measurement invariance analysis showed that the DSS was not invariant across gender. This suggests that male and female respondents may respond differently to digital stress. Consistent with this result, Gao et al. (2024) also reported a lack of gender invariance in the Chinese version of the DSS. The lack of measurement invariance shows that the instrument may not assess digital stress equivalently across gender groups. Therefore, comparisons of latent means or observed scores between males and females should be interpreted with caution. These differences may be attributed to variations in social media usage patterns between males and females. Previous studies have shown that females tend to use social media more frequently to maintain social relationships, build communities, and engage in social comparison than males (Ahn, 2011; Choi, 2022). Furthermore, gender differences in responding to digital stress may be influenced by differences in coping strategies. Men tend to use more active coping strategies, such as physical activity or exercise. In contrast, females more often use passive or expressive approaches, for example, through art and other emotional-expressive activities (Park et al., 2024). These differences in coping strategies can influence how individuals manage the psychological stress associated with digital technology use. Previous studies have also reported gender differences in the use of information and communication technologies (ICT). Men generally excel in the technical and operational aspects of techno-

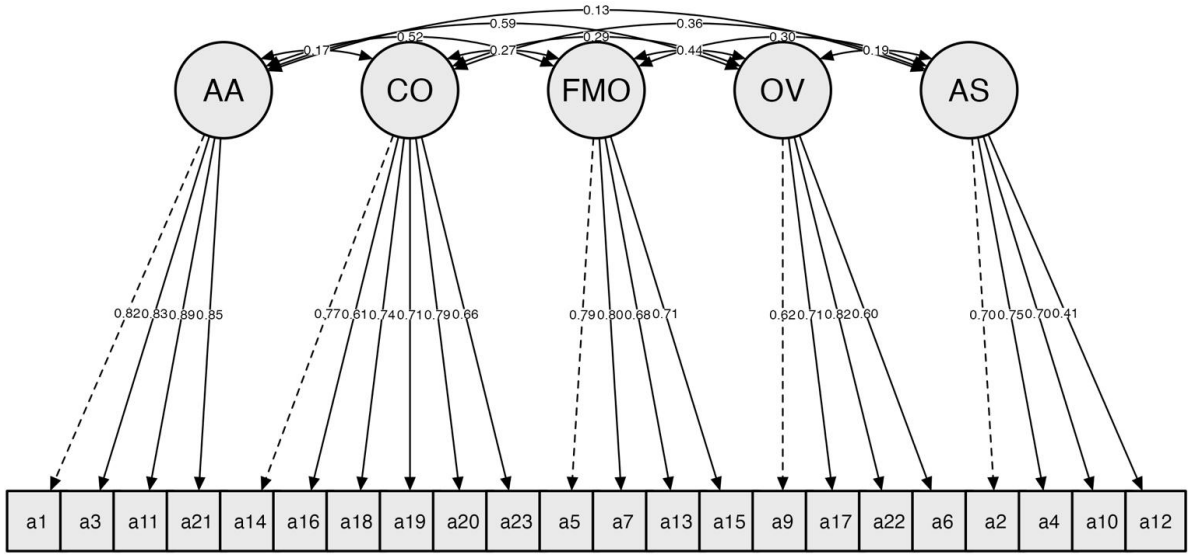
Table 3.
EFA Results

Model	χ^2	CFI	TLI	NFI	GFI	RMSEA
1st order model	654.09**	.93	.91	.90	.91	.06
2nd order model	620.56**	.92	.90	.88	.90	.06

Note: ** = p < .01; * = p < .05

Table 4.
Measurement invariance testing of the DSS based on gender (male and female)

Model	Model Fit Index					
	χ^2	CFI	TLI	NFI	GFI	RMSEA
Measurement invariance based on gender						
Configural	959.64***	.91	.89	.86	.87	.07
Metric	285.866***	.91	.90	.85	.87	.07
Scalar	295.408***	.91	.91	.85	.96	.07
Residual	315.610***	.91	.91	.84	.96	.07



Note: AA = approval anxiety; CO = connection overload; FMO = Fear of missing out; OV = online vigilence; AS = availiability stress

Figure 1. Result of CFA of Digital Stress

logy, while females tend to be better at using technology for academic needs, communication, and social interaction (Qazi et al., 2022). These differences in digital usage patterns and competencies have the potential to shape distinct digital experiences for men and females, including in how both genders deal with the pressures and demands of technology use. Furthermore, females are reported to be more vulnerable to technology-related stress, particularly in the context of digital transformation in the workplace. This condition can be explained by the concept of stereotype threat, in which females are often perceived as less competent in technology. The stereotypes can lead to anxiety, low self-confidence, and feelings of helplessness (ICT helplessness) when facing technological challenges (Makowska-Tłomak et al., 2024). Consequently, females tend to experience higher levels of technostress and emotional distress than men when facing the demands of digital adaptation. The absence of gender invariance may also be partly explained by the unequal gender distribution in the sample, with male respondents being underrepresented compared to females.

Conclusion

In conclusion, this study successfully translated and validated DSS into Indonesian. Based on the EFA, two items were removed, yielding a final version of 22 items. The results indicate that the Indonesian version of the DSS indicates adequate validity and reliability. The measurement of invariance among gender groups showed that DSS did not meet the criteria for invariance across gender, suggesting differential responses to the scale between male and female respondents. Overall, the results support the satisfactory psychometric properties of the Indonesian

version of DSS. However, the absence of measurement invariance across gender shows that the scale may not function equivalently for both genders. This implies that comparisons of DSS scores across gender groups should be interpreted with caution.

Despite the significant results, several limitations must be acknowledged. First, this study used teenagers as respondents. Future studies should use respondents with more varied levels of development and occupation. Second, this study did not examine convergent and divergent validity by correlating the DSS with other measures of stress or related psychological constructs. Future studies are recommended to examine potential item bias across gender using more advanced psychometric approaches, such as the Rasch model, Item Response Theory (IRT), or other differential item functioning (DIF) techniques. Additionally, subsequent studies should examine measurement invariance across other relevant demographic groups, including occupational background and academic status, as these factors have also been shown to contribute to stress development (Hakim et al., 2024; Yosua & Panggabean, 2023). More investigations on convergent and divergent validity are needed to strengthen the evidence supporting the construct validity of DSS Indonesian version. Moreover, continued evaluation of the cross-cultural adaptation is necessary to ensure that the instrument functions validly and equally in the Indonesian cultural context.

Declaration

Acknowledgments

The author is grateful to Lembaga Penelitian and Pengabdian Masyarakat Universitas Negeri Padang for funding this study.

Funding

This work was supported by Lembanga Penelitian dan Pengabdian Masyarakat Universitas Negeri Padang with contract number 1140/UN35.15/LT/2023.

Author Contributions

Conceptualization: R.K., E.M., R.H.U; Methodology: R.K; Data collection and investigation: E.M., R.H.U., P., D.D; Data analysis: R.K; Writing—Original Draft Preparation: R.K., E.M., R.H.U; Writing—Review & Editing: P., D.D; Supervision: E.M., R.H.U., D.S.

Conflict of Interest

The authors declare that they have no conflict of interest.

Use of Artificial Intelligence

The authors used Gramarly and ChatGPT to facilitate the translation and language editing of the manuscript. No AI technologies were used to generate data, conduct analysis, or perform any part of the scientific process.

Ethical Clearance

Ethical review and approval were waived for this study because all data were collected anonymously, participation was voluntary, and no personally identifiable information was obtained.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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