Full-length Report

JHP

Journal of Health Psychology
2025, Vol. 30(12) 3246–3257

DOI: 10.1177/13591053241287675
journals.sagepub.com/home/hpq
Sage

Psychometric evaluation of the Turkish version of the Work-Related Stress Scale: A study among search and rescue workers responding to the 2023 Kahramanmaraş earthquakes

Mehmet Halil Öztürk[1] and Ahmet Doğan Kuday[2]

Abstract

This study evaluates the reliability and validity of the Turkish version of the Work-Related Stress Scale (WRSS) among search and rescue workers who responded to the 2023 Kahramanmaraş earthquakes. Data were collected from 275 workers between January and April 2024 using the Personal Information Form and the Turkish version of the WRSS. Language, content, and construct validity were assessed, and reliability was determined using item-total correlation, Cronbach's alpha, split-half, and test-retest methods. The scale demonstrated strong content validity with a CVI range of 0.9–1.0 and a mean CVI of 0.98. Exploratory factor analysis yielded factor loadings from 0.469 to 0.932, resulting in four factors that explained 75.3% of the variance. The reliability coefficients for the sub-dimensions ranged from 0.833 to 0.900, with an overall Cronbach's alpha of 0.913. These results indicate that the Turkish WRSS is a valid and reliable tool for assessing stress among search and rescue workers.

Keywords

adaptation, first responders, psychometric, SAR, strain

Introduction

Disasters are events, whether natural, technological, or man-made, that disrupt society's normal functioning and cause serious adverse impacts on human life and livelihoods that exceed local coping resources (Koçak et al., 2015). Disasters pose a constant threat to billions of people worldwide. The year 2023 was especially significant in terms of disaster impacts. The Emergency Events Database (EM-DAT) documented 399 natural disasters in 2023, resulting in 86,473 deaths, affecting 93.1 million people, and causing an economic

[1]Pamukkale University, Türkiye
[2]Bezmialem Vakıf University, Türkiye

Corresponding author:
Ahmet Doğan Kuday, Department of First and Emergency Aid, Vocational School of Health Services, Bezmialem Vakıf University, Muhsin Yazicioglu Avenue, 2115 Street, No:6, 34265 Sultangazi, Istanbul, Türkiye.
Email: dogankuday@gmail.com

loss of US$ 202.7 billion. The most impactful event was the Indonesian Drought of 2023, which affected 18.8 million people between June and September 2023. The second most impactful event was the earthquake in Türkiye and the Syrian Arab Republic, which caused 56,683 deaths, affected 18 million people and caused USD 42.9 billion worth of damage (CRED, 2024).

Although earthquakes are not preventable, disaster-related deaths and injuries can be reduced through measures such as early prediction, more resilient infrastructure, and emergency preparedness. Therefore, it is important to anticipate the unexpected and be prepared to handle the worst-case scenarios. Equally important is the rapid response required when disasters strike, which can significantly reduce the loss of life and the severity of injuries (Çalışkan and Özcebe, 2013). In large-scale disasters where severe destruction occurs, the need for urgent intervention becomes evident. This is where the role of search and rescue (SAR) teams becomes vital. SAR operations are essential for quickly organizing and executing efforts to treat the sick and injured, and for locating and rescuing disaster victims (Koçak et al., 2021). A sufficient number of trained healthcare professionals and SAR teams are required to effectively manage these tasks. These teams are responsible for conducting search operations, providing immediate medical assistance, and ensuring that those in distress are safely transported to healthcare facilities. However, it should be noted that these teams face various difficulties while performing their work-related activities.

The literature contains many studies on the challenges faced by disaster workers. It has been determined that SAR teams encounter many problems such as encountering many dead bodies (Benedek et al., 2007), being exposed to diseases and injuries (Aitken et al., 2009), failing to meet basic health needs (Shen et al., 2015), experiencing various coordination problems (Cook et al., 2018; Tatham and Spens, 2016), working with insufficient sleep and irregular periods (Connelly, 2006), and facing ethical issues. A systematic review of these challenges grouped the issues faced by disaster responders into six categories: environment and health, communication and information, organizational, logistical, individual, and other factors (Kuday et al., 2023). These issues lead disaster response teams to experience work-related stress, resulting in various negative psychological outcomes (Kawashima et al., 2016; Lunau et al., 2018; Saijo et al., 2007). A systematic review conducted on this topic indicated that workers involved in disaster response suffer from post-traumatic stress disorder, burnout, depression, and stress (Sehlikoglu et al., 2023). Therefore, it is crucial to identify and measure the stress experienced by SAR teams within the scope of disaster response.

In the literature, scales assessing work-related stress are not specific to disaster-related events and are applied to heterogeneous populations (Fjeldheim et al., 2014; Geronazzo-Alman et al., 2017). Recognizing the lack of an instrument designed to measure stress surveillance in search and rescue (SAR) workers, Chen et al. (2021) developed and evaluated the Work-Related Stress Scale (WRSS) in Taiwan, where it was originally developed in English. Although there are existing stress scales for healthcare workers, earthquake stress, and occupational stress in Türkiye, there is also no specific scale for work-related stress in SAR teams. Therefore, we aimed to determine the Turkish validity and reliability of the WRSS in this study. The Turkish version of the WRSS is expected to enhance occupational health and safety practices and academic research by accurately assessing stress levels among SAR workers in Türkiye (Supplemental Material).

Methods

Study design and sample

This study was methodologically conducted between January and April 2024 to examine the reliability and validity of the Turkish version of the WRSS. The inclusion criteria required

participants to be prehospital personnel, such as paramedics and emergency medical technicians, who had experience in search and rescue (SAR) operations specifically related to earthquakes, floods, and other disaster situations. Another inclusion criterion was to have been involved in recent 2023 Kahramanmaraş Earthquakes. On February 6, 2023, two devastating earthquakes occurred in the South-eastern region of Türkiye: a 7.7 magnitude quake in Kahramanmaraş's Pazarcık district, followed by a 7.6 magnitude quake in the Elbistan district (Yılmaz et al., 2023). The earthquake killed at least 41,000 people and injured 115,000 in Türkiye (Özel et al., 2023). This disaster had the potential to cause search and rescue team members to experience physical and psychological stress at the time and psychological and emotional trauma later (Kınık et al., 2024). Conducting the study with people who had this kind of experience was a key point in obtaining more reliable and valid results. Individuals who did not meet the inclusion criteria were not included in the study.

In the literature, it has been reported that the sample size in scale studies should be 5–10 times the number of scale items or a sample size between 200 and 500 should be used (Gorsuch, 2015; Schumacker and Lomax, 2010). In addition, the scales should be tested by conducting a pilot study with a group of 30–100 people (Kishore et al., 2021). Considering these views in the literature, 80 prehospital personnel were included in the pilot study and 275 prehospital personnel were included in the main study. Instead of a number close to the minimum suggested in the literature, including 80 participants in the pilot study ensured that there were at least five times as many participants as items on the scale. This approach not only allowed for the evaluation of the scale's readability and comprehensibility but also facilitated the calculation of the scale's Cronbach's alpha value. To access the participants, we reached out to institutions and organizations involved in SAR operations and employed a convenience sampling method to recruit participants. The participants in the pilot study had the same characteristics as those in the main sample. However, the pilot study participants were not included in the main study.

Instruments

Personal Information Form and WRSS were used as data collection tools in the study. The personal information form was prepared by the researchers and consists of four questions including age, sex, educational status, and profession of the participants. WRSS is a scale designed by Chen et al. (2021) to measure the stress of rescue workers. The scale has a total of 16 items and consists of 4 subscales (physical demands, psychological response, environmental interruption, and leadership domain). Each item on the scale is scored on a 4-point Likert scale as follows: 1 = not at all stressful, 2 = a little bit stressful, 3 = stressful, and 4 = very stressful. The total score of the scale ranges from 16 to 64 points. As the score increases, the level of perceived stress also increases. The overall Cronbach's alpha value for the original scale is 0.89. The Cronbach alpha value for the sub-dimensions of the original scale are 0.85 for physical demands, 0.78 for psychological response, 0.88 for environmental interruption, and 0.74 for leadership (Chen et al., 2021).

Language validity

The implementation phase of that scale into Turkish was carried out by four language experts using the translation-retranslation method (Hambleton et al., 2004). WRSS was initially translated from English to Turkish by two scholars who were well-versed in both languages. The scale translated into Turkish was then translated into English by the different two experts. At the end of translation and retranslation studies, the compatibility of the original scale and the retranslation scale was evaluated and checked, and it was determined that they were compatible.

Content validity

Content validity is conducted to determine the extent to which a measurement tool covers the conceptual area of the construct it aims to measure (Iyer, 2017). For the content validity of the WRSS, 10 people with expertise in disaster and emergency management were consulted. After the expert opinions were collected, the Content Validity Index (CVI) was calculated using the Davis method to determine the validity of the items. According to this method, each item is scored from 1 to 4 and the CVI is obtained by dividing the number of experts who selected the third and fourth options for each item by the total number of experts (Davis, 1992). In our study, CVIs ranged from 0.90 to 1.00, and the mean CVI value was 0.98. A CVI higher than 0.80 indicated that the content validity of the scale was achieved, and then the pilot study was started (Polit et al., 2007).

Pilot study

Before the scale was administered to the main sample, a pilot study was conducted with 80 participants to assess its readability and comprehensibility. The results of the Kaiser–Meyer–Olkin (KMO; 0.782) and Bartlett's Test of Sphericity ($X^2 = 585.263$, $p < 0.001$), which were conducted to determine the suitability of the pilot data for analysis, revealed that the data were suitable for analysis. In addition, the reliability analysis conducted after the pilot study showed that the overall alpha value of the scale was 0.824. After determining that all items of the measurement tool were readable and comprehensible, and that the scale was reliable and suitable for analysis, the main application was conducted.

Data collection and analyses

The data collection process was carried out by distributing data forms to the participants through Google Forms. Before the data forms were filled out, the researchers explained the aims, methodology, and ethical considerations of the study to the participants. Participants were then asked for voluntary participation and encouraged to fill out the data forms at their own discretion. Each participant was allocated approximately 5–10 minutes to complete the form. The data collected from the participants were analyzed using Statistical Product and Service Solutions (SPSS) version 25 and Jeffreys's Amazing Statistics Program (JASP) version 0.18.3 software packages. The normality of the data was assessed using histogram plots and *z*-scores for skewness and kurtosis. The histogram plots indicated that the data were normally distributed, and the *z*-scores for skewness and kurtosis did not exceed the critical value of 3.29. Therefore, based on these assessments, the data were considered to follow a normal distribution (Kim, 2013). Descriptive findings were presented as numbers, percentages, means, and standard deviations. The significance level of the analyses was set at 0.05.

In order to determine whether the collected data were suitable for factor analysis, KMO and Bartlett's sphericity tests were first applied, followed by exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to assess construct validity. Principal Component Analysis (PCA) was used for factor extraction and the direct oblimin method was used for factor rotation in EFA. Since the sample size was limited in our study, both EFA and CFA analyses were conducted on the same sample in line with the literature (Worthington and Whittaker, 2006). In structural equation modeling studies, chi-square model, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Standardized Residuals Root Mean Square (SRMR) values should be reported as a minimum (Kline, 2015). In addition to these, Goodness of Fit Index (GFI), Incremental Fit Index (IFI), Tucker-Lewis Index (TLI), and Normed Fit Index (NFI) values were also presented in our study. Cronbach's alpha, split half method, response bias (Hotelling's *T*-squared), summability

Table 1. Characteristics and WRSS score of the participants.

Variables	*n*	%	Work-related stress	
			Mean ± SD	*p*
Age				
20–28	84	30.5	45.27 ± 8.57	0.320
29–37	104	37.8	46.29 ± 8.90	
38–46	78	28.4	43.93 ± 9.26	
47–55	9	3.3	47.00 ± 5.31	
Sex				
Male	165	60.0	45.20 ± 8.49	0.751
Female	110	40.0	45.54 ± 8.70	
Education status				
High school	69	25.1	43.91 ± 8.67	0.108
Associate degree	105	38.2	44.66 ± 9.28	
Bachelor's degree	83	30.2	46.92 ± 8.49	
Postgraduate degree	18	6.5	47.38 ± 7.30	
Profession				
EMT	107	38.9	47.07 ± 8.98	0.057
Paramedic	104	37.8	44.68 ± 8.51	
Nurse/Midwife	34	12.4	44.36 ± 8.81	
Physician	30	10.9	42.94 ± 8.76	

(Tukey's Summability Test), and test-retest method were used in the reliability analysis. Thresholds for factor loadings and item-total correlation were set as $\geqslant 0.40$ and Cronbach's alpha $\geqslant 0.70$ (Cronbach, 1951; Hair et al., 2010).

Ethical consideration

Firstly, permissions were obtained from the authors of the WRSS via e-mail for its use in this study. Ethics approval was then granted by the Scientific Research and Publication Ethics Committee of the relevant university (Date: 01.12.2023 No: 455745). Participants were fully informed about the study's objectives and procedures. They were informed that their participation was voluntary, did not involve any risk or coercion, and that they had the option to withdraw at any time without any consequences. Informed consent was then obtained electronically, ensuring that participants explicitly agreed to take part. Measures were taken to ensure the confidentiality of their responses and to protect their privacy throughout the study.

Results

Descriptive analysis result

Of the participants, 165 (60%) were male and 110 (40%) were female. Their ages ranged between 20 and 55 years, with a mean age of 33.28 ± 7.16 years. Among 275 participants, 69 (25.1%) were high school graduates, 105 (38.2%) were associate, 83 (30.2%) were undergraduate, and 18 (6.5%) were postgraduate. About 107 participants (38.9%) were EMTs, followed by paramedics ($n = 107$, 37.8%), nurses/midwives ($n = 34$, 12.4%), and physicians ($n = 30$, 10.9%). As seen Table 1, when the relationship between the WRSS scores of the participants and demographic variables was analyzed, no statistically significant difference was found according to age ($p = 0.320$), sex ($p = 0.751$), educational status ($p = 0.108$), and professions ($p = 0.057$).

Table 2. Exploratory factor analysis result of the WRSS.

Items	PHY	PSY	ENV	LEAD	Eigenvalues	Explained variance (%)	Cumulative variance (%)
Item 1	0.932				6.902	46.0	46.0
Item 2	0.925						
Item 3	0.827						
Item 4		0.469			1.789	11.9	57.9
Item 5		0.738					
Item 6		0.870					
Item 7		0.899					
Item 8			0.825		1.614	10.8	68.7
Item 9			0.700				
Item 10			0.869				
Item 11			0.772				
Item 12				0.735	1.088	6.6	75.3
Item 13				0.820			
Item 14				0.848			
Item 15				0.694			

ENV: environmental interruption; LEAD: leadership; PHY: physical demands; PSY: psychological response.

When the descriptive statistics of WRSS scores were analyzed, it was found that WRSS varied between 15 and 60 points and the mean score was 45.33 ± 8.83. When the mean scores of the WRSS items were analyzed, the lowest mean score was Item-8 *(insan gücünün yetersiz olması)* with 2.61 ± 0.87. The highest mean score was Item-11 *(arama-kurtarma çalışmaları sırasında yaşanabilecek olası zararlardan endişe duymak)* with 3.21 ± 0.80.

Validity analysis of the WRSS

When the suitability of the data set for factor analysis was evaluated before factor analysis, the KMO value was 0.875 and Bartlett's sphericity test was significant ($X^2 = 2731.393$; $p < 0.001$). Item-5 *(afetzedelere başsağlığı dilemek ve olumsuz duyguların beni etkilemesine izin vermemek)* was excluded from the analysis because its factor loading was 0.28, thus below the threshold value of 0.40 (Hair et al., 2010). The final EFA result revealed a 4-factor structure consisting of 15 items. The factor loadings of all items in the scale were above 0.40, and the factor loadings ranged from 0.469 to 0.932. According to the analysis, the first factor (physical demands) consisted of three items with factor loadings ranging from "0.827 to 0.932" and explained 46.0% of the total variance. The second factor (psychological response) consisted of four items with factor loadings ranging between "0.469 and 0.899" and explained 11.9% of the total variance. The third factor (environmental interruption) consisted of four items with factor loadings ranging between "0.700 and 0.869" and explained 10.8% of the total variance. The fourth factor (leadership domain) consisted of four items with factor loadings ranging between "0.694 and 0.848" and explained 6.6% of the total variance. The cumulative explanatory power was 75.3% (Table 2).

As a result of the CFA conducted after the EFA, the variables that reduced the fit were determined, and the model was improved by selecting the highest ones among the errors with high modification index values. In this context, covariates were created for "S11 and S12," and "S14 and S15." As a result of the improvement, the X^2/df value was found to be 2.710 and the RMSEA was 0.079. All fit indices obtained are shown in Table 3. The standardized loadings obtained from confirmatory factor analysis ranged between 0.49 and 0.93 (Figure 1). According to these results, the

Table 3. Confirmatory factor analysis result of the WRSS.

Fit index	Excellent fit	Acceptable fit	WRSS
X^2/df	$0 \leqslant \chi^2/df \leqslant 3$	$3 \leqslant \chi^2/df \leqslant 5$	2.710
RMSEA	0.00 ⩽RMSEA⩽0.05	0.05 ⩽RMSEA⩽0.08	0.079
SRMR	0.00 ⩽SRMR⩽ 0.05	0.05⩽SRMR⩽0.08	0.064
CFI	0.95 ⩽ CFI	0.85 ⩽ CFI	0.948
GFI	0.90 ⩽ GFI	0.85 ⩽ GFI	0.980
IFI	0.90⩽IFI⩽ 1.00	0.80 ⩽IFI	0.948
TLI	0.90 ⩽ TLI	0.80 ⩽ TLI	0.933
NFI	0.90 ⩽ NFI	0.80 ⩽ NFI	0.921

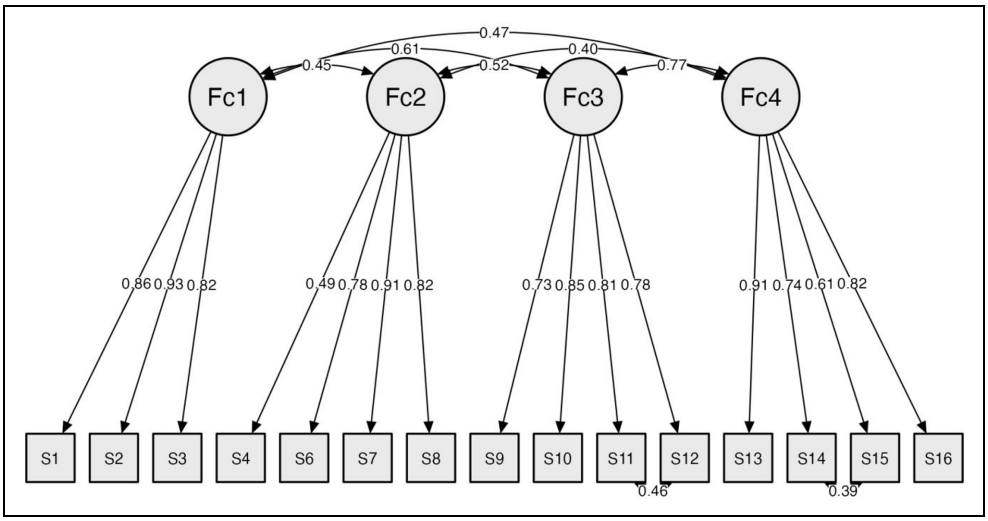

Figure 1. Model plot of the WRSS.

structural equation modeling results of the scale were significant at the $p < 0.05$, level and it was concluded that the 15 items and four sub-dimensions of the scale were related to the structure of the scale.

Reliability analysis of the WRSS

The item-total correlation values of the participants' responses to the scale questions were examined, and it was determined that there were no items below 0.40. The total item correlation values of the 15 items on the scale ranged between 0.507 and 0.725. When each sub-dimension was evaluated within itself, it was found that the item-total correlation coefficients of the "physical demand" sub-dimension of the scale were between 0.580 and 0.607, "psychological response" between 0.520 and 0.603, "environmental interruption" between 0.617 and 0.725, and "leadership domain" between 0.507 and 0.676. Cronbach's alpha coefficient was 0.900 for "physical demand," 0.833 for "psychological response," 0.880 for "environmental interruption," 0.868 for "leadership domain," and 0.913 for the whole scale (Table 4).

The reliability of the scale was also evaluated using the split-half method. While the Cronbach's alpha coefficient of the first half of

Table 4. Reliability analyses result of the WRSS.

Factors	Substances	Item-total correlation	Cronbach alpha	AVE	CR
Physical demands	Item 1	0.591	0.900	0.755	0.92
	Item 2	0.607			
	Item 3	0.580			
Psychological response	Item 4	0.520	0.833	0.592	0.84
	Item 5	0.603			
	Item 6	0.585			
	Item 7	0.538			
Environmental interruption	Item 8	0.617	0.880	0.624	0.87
	Item 9	0.713			
	Item 10	0.705			
	Item 11	0.725			
Leadership	Item 12	0.676	0.868	0.595	0.86
	Item 13	0.608			
	Item 14	0.507			
	Item 15	0.656			
Total WRSS			0.913	0.641	0.87

the scale was 0.853, the Cronbach's alpha coefficient of the second half was 0.894. The Spearman-Brown coefficient was 0.797, and the Guttman coefficient was 0.794, indicating good internal consistency. The response bias of the WRSS was analyzed with Hotelling's *T*-square test. As a result of this test, it was determined that there was no response bias in the scales with an F value of 10.694 (Hotelling $T^2 = 157.170$; $p < 0.001$). In addition, Tukey's summability test was conducted to obtain a total score from the scale. The results showed that the scale was summable and that the traits measured showed sufficient variation, with an F value of 21.334 ($p < 0.001$).

When the average variance explained (AVE) of the measurement model was evaluated, it was found to be 0.755 for physical demand, 0.592 for psychological response, 0.624 for environmental interruption, and 0.595 for leadership domain sub-dimensions. When composite reliability (CR) was evaluated, it was found to be 0.92, 0.84, 0.87, and 0.86, respectively. Finally, a retest method was applied with 50 participants to test the scale's invariance over time. The results of the correlation analysis showing the relationship between the test-retest revealed a highly significant positive correlation between the two tests ($r = 0.912$, $p < 0.001$).

Discussion

In this study, the Turkish validity and reliability of the WRSS were tested. The WRSS is a scale developed to measure stress in rescue workers after responding to traumatic mass-casualty events. Specifically, there is no similar scale in Türkiye specifically designed to measure work-related stress in SAR teams. Existing scales such as the Stressor Scale for Emergency Nurses (Hancerlioglu et al., 2020), the Perceived Occupational Stress Scale (Yıldırım et al., 2024), the Earthquake Stress Coping Scale (Yöndem and Eren, 2008), the General Job Stress Scale (Teleş, 2020), and the Nurse Stress Scale (Mert et al., 2020) address various aspects of stress but are not tailored to the unique context of SAR work. Therefore, the development of the Turkish version of the WRSS fills a gap in existing scales by providing a specialized tool for measuring stress in SAR teams. For an objective and reliable assessment, prehospital personnel from a variety of SAR backgrounds, especially those who

had recently been involved in a disaster, were selected as participants. Result of the study, the Turkish version of the WRSS was found to be valid and reliable, and the findings are discussed below.

Firstly, content validity for WRSS was confirmed with expert reviews, resulting in CVI values between 0.9 and 1, with an average of 0.98. This indicates that the WRSS has very high content validity (Polit and Beck, 2006). The KMO value (0.875) and Bartlett's test ($p < 0.001$) also confirm the suitability of the sample size for factor analysis (Kaiser, 1974). In the first EFA analysis, the fifth item was removed from the analysis because it showed a factor loading of 0.28. Subsequently, the second EFA analysis confirmed a 4-factor structure consisting of 15 items. The explained variance ranged from 40% to 60% is considered sufficient, and our study achieved a cumulative variance of 75.3%, indicating strong construct validity (Pallant, 2020). Although the original study did not report cumulative variance for comparison, our results suggest that the Turkish version of WRSS maintains structural consistency with the original and demonstrates high construct validity. The factor loadings for WRSS ranged from 0.469 to 0.932, and are comparable to the original version's loadings of 0.46–0.89. The CFA results confirmed that the factors identified in the EFA exhibit a valid and compatible structure, with no unacceptable goodness-of-fit indices. The model demonstrated excellent fit with $X^2/df = 2.710$, GFI = 0.980, IFI = 0.948, TLI = 0.933, and NFI = 0.921. CFI = 0.948 and SRMR = 0.064 indicated an acceptable fit. The RMSEA value of 0.079, which is below the accepted threshold of 0.08, confirmed the model's adequacy (Harrington, 2009). While the goodness-of-fit indices were slightly lower than those of the original scale, the results affirm that the items and four subscales effectively measure stress among search and rescue workers.

Many methods, including item-total correlation, Cronbach's alpha coefficient, split-half method, AVE, CR, and test-retest reliability, were used to evaluate the scale's reliability. A Spearman-Brown coefficient between 0.5 and 0.7 is considered moderate, between 0.7 and 0.9 is considered good, and above 0.9 is considered excellent (de Vet et al., 2017). Cronbach's alpha coefficient values between 0.7 and 0.95 are generally considered acceptable (Tavakol and Dennick, 2011). The Spearman-Brown coefficient of the Turkish version of the WRSS was 0.797, indicating good reliability. Moreover, Cronbach's alpha coefficient ranged between 0.913 for the total scale and between 0.868 and 0.900 for the sub-dimensions, indicating that the internal consistency of the scale was high. The 16-item original scale has a total Cronbach's alpha value of 0.89 and its sub-dimensions vary between 0.74 and 0.88. In this context, it is seen that the Turkish version of the scale has a similar performance to the original scale in terms of internal consistency and is even more reliable. The CR value of latent variables in the measurement model should be higher than 0.70 and AVE value should be higher than 0.50 (Nunnally and Bernstein, 1994). In addition, according to the CR value calculated for each construct should be greater than the AVE value (Hair et al., 2010). In our study, it was determined that the AVE values of the sub-dimensions of the scale were between 0.592 and 0.755, and the CR values were between 0.84 and 0.92. When compared with the original scale, it was observed that the AVE and CR values of the other factors except for the third factor were higher. However, the difference in AVE values (0.65 vs 0.624) and CR values (0.88 vs 0.87) for the third factor is not excessively large. In the test-retest method, observing a significant positive correlation between the two tests indicates that the scale can be used reliably over the long term and assesses the measured construct consistently. Overall, the results demonstrate strong performance, indicating that the items effectively represent the measured construct, assess it accurately, and can be used reliably.

Having such a validated and reliable tool is highly beneficial for those measuring preventive health behaviors. By accurately assessing stress levels, the WRSS can help identify individuals at higher risk for burnout and other stress-related issues, allowing for timely and effective preventive measures. However, this study has several limitations. Firstly, the primary limitation is that both the EFA and CFA were conducted on the same sample. Another significant limitation is that the study only included prehospital personnel, excluding other rescue workers such as firefighters and volunteers. In future studies, diversifying the sample and expanding its scope may further increase the general validity of the scale. In addition, repeating the EFA and CFA on different sample groups may allow the findings to be evaluated from a broader perspective. Finally, integrating the WRSS into routine occupational health assessments could facilitate continuous monitoring and early detection of stress-related issues. This approach would not only enhance the well-being and performance of SAR workers but also contribute to the development of comprehensive health and safety policies.

Conclusions

Validating scales in diverse cultural contexts is crucial because it ensures that these tools remain effective and accurate across various environments. Recognizing and addressing cultural differences in stress perception and response can enhance the global applicability of these scales. This, in turn, facilitates the development of more effective support systems tailored to the needs of workers in different cultural settings. This study has demonstrated that the Turkish version of the WRSS exhibits high content validity, strong construct validity, and excellent internal consistency. The WRSS provides a specialized tool for evaluating the stress factors experienced by SAR workers in the aftermath of disaster response, thereby addressing a significant gap in the field of stress measurement. It is anticipated that the Turkish adaptation of the WRSS will be instrumental for researchers, practitioners, and policymakers in Türkiye, offering valuable insights into and improved management of the psychological well-being of search and rescue personnel. Furthermore, validating and adapting such scales for different cultural contexts not only broadens their applicability but also supports the creation of more nuanced and effective strategies for addressing stress-related challenges on a global scale. Therefore, this study emphasizes the importance of considering cultural factors in stress measurement and highlights the WRSS as a significant resource for advancing our understanding and support of SAR personnel's psychological health.

Author contributions

Conceptualization: Mehmet Halil Öztürk, Ahmet Doğan Kuday; Resources: Mehmet Halil Öztürk, Ahmet Doğan Kuday; Methodology: Mehmet Halil Öztürk, Ahmet Doğan Kuday; Formal analysis and investigation: Mehmet Halil Öztürk; Visualization: Ahmet Doğan Kuday; Writing—original draft preparation: Mehmet Halil Öztürk, Ahmet Doğan Kuday; Writing—review and editing: Ahmet Doğan Kuday, Özcan Erdoğan.

Data availability statement

The data generated during and/or analysed during the current study are not publicly available due to it was stated that the data collected while obtaining institutional permission will not be shared with any other person/platform.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Ethics approval

Ethics approval was obtained from the Scientific Research and Publication Ethics Committee of Pamukkale University (Date: 01.12.2023 No: 455745).

Informed consent

All participants gave their informed consent before participating in this study.

ORCID iD

Ahmet Doğan Kuday https://orcid.org/0000-0001-8361-5526

Supplemental material

Supplemental material for this article is available online.

References

Aitken P, Leggat P, Robertson A, et al. (2009) Health and safety aspects of deployment of Australian Disaster Medical Assistance Team members: Results of a national survey. *Travel Medicine and Infectious Disease* 7(5): 284–290.

Benedek DM, Fullerton C and Ursano RJ (2007) First responders: Mental health consequences of natural and human-made disasters for public health and public safety workers. *Annual Review of Public Health* 28(1): 55–68.

Çalışkan C and Özcebe H (2013) Afetlerde enfeksiyon hastalıkları salgınları ve kontrol önlemleri. *TAF Preventive Medicine Bulletin* 12(5): 583.

Chen Y-L, Tzeng W-C, Chao E, et al. (2021) Development and validation of an instrument to measure work-related stress among rescue workers in traumatic mass-casualty disasters. *International Journal of Environmental Research and Public Health* 18(16): 8340.

Connelly M (2006) IMERT deployment to Baton Rouge, Louisiana in response to hurricane Katrina, September 2005. *Disaster Management & Response* 4(1): 4–11.

Cook ADB, Shrestha M and Htet ZB (2018) An assessment of international emergency disaster response to the 2015 Nepal earthquakes. *International Journal of Disaster Risk Reduction* 31: 535–547.

CRED (2024) *2023: Disasters in Numbers*. Brussels: CRED. Available at: https://files.emdat.be/reports/2023_EMDAT_report.pdf (accessed 11 May 2024).

Cronbach LJ (1951) Coefficient alpha and the internal structure of tests. *Psychometrika* 16(3): 297–334.

Davis LL (1992) Instrument review: Getting the most from a panel of experts. *Applied Nursing Research* 5(4): 194–197.

de Vet HCW, Mokkink LB, Mosmuller DG, et al. (2017) Spearman–Brown prophecy formula and Cronbach's alpha: Different faces of reliability and opportunities for new applications. *Journal of Clinical Epidemiology* 85: 45–49.

Fjeldheim CB, Nöthling J, Pretorius K, et al. (2014) Trauma exposure, posttraumatic stress disorder and the effect of explanatory variables in paramedic trainees. *BMC Emergency Medicine* 14(1): 11.

Geronazzo-Alman L, Eisenberg R, Shen S, et al. (2017) Cumulative exposure to work-related traumatic events and current post-traumatic stress disorder in New York City's first responders. *Comprehensive Psychiatry* 74: 134–143.

Gorsuch RL (2015) *Factor Analysis*. New York, NY: Routledge/Taylor & Francis Group.

Hair JF, Black WC, Babin BJ, et al. (2010) *Multivariate Data Analysis: A Global Perspective*, 7th edn. Upper Saddle River, NJ: Pearson Education.

Hambleton RK, Merenda PF and Spielberger CD (eds) (2004) *Adapting Educational and Psychological Tests for Cross-Cultural Assessment*. New York, NY: Psychology Press.

Hancerlioglu S, Konakci G and Aykar FS (2020) Assessing psychometric properties of Turkish version of the stressor scale for emergency nurses. *Turkish Journal of Emergency Medicine* 20(2): 69–74.

Harrington D (2009) *Confirmatory Factor Analysis*. New York, NY: Oxford University Press.

Iyer RD (2017) Developing and validating a questionnaire to measure some factors of school culture: A psychometric process. *Prabandhan: Indian Journal of Management* 10(11): 7.

Kaiser HF (1974) An index of factorial simplicity. *Psychometrika* 39(1): 31–36.

Kawashima Y, Nishi D, Noguchi H, et al. (2016) Post-traumatic stress symptoms and burnout among medical rescue workers 4 years after the Great East Japan Earthquake: A longitudinal

study. *Disaster Medicine and Public Health Preparedness* 10(6): 848–853.

Kim H-Y (2013) Statistical notes for clinical researchers: Assessing normal distribution (2) using skewness and kurtosis. *Restorative Dentistry & Endodontics* 38(1): 52.

Kınık K, Kuday AD and Çalışkan C (2024) Psychological hardiness and compassion satisfaction among the Turkish Red Crescent: The case of 2023 Kahramanmaras Earthquake. *Disaster Medicine and Public Health Preparedness* 18: e58.

Kishore K, Jaswal V, Kulkarni V, et al. (2021) Practical guidelines to develop and evaluate a questionnaire. *Indian Dermatology Online Journal* 12(2): 266–275.

Kline RB (2015) *Principles and Practice of Structural Equation Modeling*. New York, NY: Guilford Press.

Koçak H, Çaliskan C, Kaya E, et al. (2015) Determination of individual preparation behaviors of emergency health services personnel towards disasters. *Journal of Acute Disease* 4(3): 180–185.

Koçak H, Kınık K, Çalışkan C, et al. (2021) The science of disaster medicine: From response to risk reduction. *Medeniyet Medical Journal* 36(4): 333–342.

Kuday AD, Özcan T, Çalışkan C, et al. (2023) Challenges faced by medical rescue teams during disaster response: A systematic review study. *Disaster Medicine and Public Health Preparedness* 17: e548.

Lunau T, Wahrendorf M, Müller A, et al. (2018) Do resources buffer the prospective association of psychosocial work stress with depression? Longitudinal evidence from ageing workers. *Scandinavian Journal of Work, Environment & Health* 44(2): 183–191.

Mert S, Aydin Sayilan A and Baydemir C (2020) Nurse Stress Scale (NSS): Reliability and validity of the Turkish version. *Perspectives in Psychiatric Care* 57(2): 443–454.

Nunnally JC and Bernstein IH (1994) *Psychometric Theory*, 3rd edn. New York, NY: McGraw-Hill.

Özel M, Altintaş M, Tatliparmak AC, et al. (2023) The role of Mangled Extremity Severity Score in amputation triage in a transport health facility with catastrophic earthquake admissions. *Injury* 54(11): 111003.

Pallant J (2020) *SPSS Survival Manual*. London: Routledge.

Polit DF and Beck CT (2006) The content validity index: Are you sure you know what's being reported? Critique and recommendations. *Research in Nursing & Health* 29(5): 489–497.

Polit DF, Beck CT and Owen SV (2007) Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in Nursing & Health* 30(4): 459–467.

Saijo Y, Ueno T and Hashimoto Y (2007) Job stress and depressive symptoms among Japanese fire fighters. *American Journal of Industrial Medicine* 50(6): 470–480.

Schumacker RE and Lomax RG (2010) *A Beginner's Guide to Structural Equation Modeling*. Mahwah, NJ: Routledge/Taylor & Francis Group.

Sehlikoglu S, Yilmaz Karaman IG, Yastibas Kacar C, et al. (2023) Earthquake and mental health of healthcare workers: A systematic review. *Turkish Journal of Clinical Psychiatry* 26: 309–318.

Shen W, Jiang L, Zhang M, et al. (2015) Practical experiences and lessons of medical response to major disasters in China. *Hong Kong Journal of Emergency Medicine* 22(5): 270–280.

Tatham P and Spens K (2016) Cracking the humanitarian logistic coordination challenge: Lessons from the urban search and rescue community. *Disasters* 40(2): 246–261.

Tavakol M and Dennick R (2011) Making sense of Cronbach's alpha. *International Journal of Medical Education* 2: 53–55.

Teleş M (2020) Validity and reliability of the Turkish version of the general work stress scale. *Journal of Nursing Management* 29(4): 710–720.

Worthington RL and Whittaker TA (2006) Scale development research. *The Counseling Psychologist* 34(6): 806–838.

Yıldırım M, Dilekçi Ü, Marcatto F, et al. (2024) Validation of a Turkish translation of the perceived occupational stress scale and measurement invariance across Turkish and Italian workers. *Risk Management and Healthcare Policy* 17: 261–268.

Yılmaz S, Karakayali O, Yilmaz S, et al. (2023) Emergency Medicine Association of Turkey Disaster Committee summary of field observations of February 6th Kahramanmaraş earthquakes. *Prehospital and Disaster Medicine* 38(3): 415–418.

Yöndem ZD and Eren A (2008) Deprem Stresi İle Baş Etme Stratejileri Ölçeğinin geçerlik ve güvenirlik çalışmaları. *Türk Psikolojik Danışma ve Rehberlik Dergisi* 3(30): 60–75.