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Psychometric Properties of a Persian Version of the Chalder Fatigue Scale

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Abstract

Background: Fatigue refers to a lack of energy that makes it challenging to initiate or maintain voluntary activities. The Chalder Fatigue Scale (CFS) is a tool designed to assess the severity of fatigue. Studies indicate that it has strong validity and internal reliability, measuring both the mental and physical aspects of fatigue. We aimed to translate this questionnaire and to evaluate its psychometric properties in Iran.

Methods: The translation process adhered to guidelines for cross-cultural adaptation of self-report measures. This cross-sectional study included 70 participants. The reliability of the CFS was evaluated through internal consistency and test–retest reliability. To determine test–retest reliability, each participant completed the scale twice, with a two-week interval between assessments. Construct validity was assessed using factor analysis and principal component analysis. For content validity, a form was completed by 15 experts to evaluate the relevance and necessity of the items, calculating both the Content Validity Index (CVI) and the Content Validity Ratio (CVR).

Results: The average age of the participants was 38 years, with a standard deviation of 8.52. Among the participants, 22 (31.4%) were male. Content validity analysis yielded a CVI of 0.88, indicating acceptable relevance, and a CVR of 0.81, demonstrating good content validity. Factor analysis identified a two-factor solution. The Cronbach's alpha coefficient for the CFS was 0.89. The Intraclass Correlation Coefficient for the CFS was 0.79 (95% confidence interval: 0.66–0.87, $P < 0.001$), reflecting good test-retest reliability.

Conclusion: The results indicate that the CFS is a reliable and valid tool for assessing fatigue, making it suitable for use in both research and clinical environments in Iran.

Keywords: Fatigue, Validity, Reliability, Persian, Chalder Fatigue Scale

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Introduction

Fatigue is characterized by a deficiency in physical or mental energy, leading to challenges in initiating or maintaining voluntary activities (1). This pervasive symptom is not only common but is also associated with a wide range of chronic illnesses, including conditions such as fibromyalgia, chronic fatigue syndrome, and cancer (2). Transferring knowledge about fatigue between different groups—such as healthcare providers, researchers, and patients—is crucial for fostering a comprehensive understanding of this complex issue (3). Recently, fatigue has received growing attention as a key aspect of health-related quality of life assessments (4). Typically, fatigue is assessed using standardized questionnaires that measure its severity, frequency, and impact on daily life.

Despite its prevalence, fatigue remains a multifaceted construct encompassing physical, cognitive, and emotional components. This study aligns with multidimensional models of fatigue, proposing that accurate assessment tools must distinguish among these domains to capture individual variability. Adapting the Chalder Fatigue Scale (CFS)

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↑What is "already known" in this topic:
Fatigue has a multifaceted construct encompassing physical, cognitive, and emotional components. Fatigue refers to a lack of energy that makes it challenging to initiate or maintain voluntary activities. The Chalder Fatigue Scale (CFS) is a tool designed to assess the severity of fatigue.

→What this article adds:
It is suggested that CSF questionnaire be used in future studies in patients with various illnesses where fatigue is one of their symptoms, to evaluate this questionnaire in different populations before and after treatment. The results indicate that the CFS is a reliable and valid tool for assessing fatigue, making it suitable for use in both research and clinical environments in Iran.

into Persian is therefore not only a linguistic endeavor but also a culturally nuanced examination of how fatigue manifests and is reported.

The Chalder Fatigue Scale (CFS) is a brief and effective instrument widely used for this purpose. The CFS (5), originally in English, is available in two versions: 11-items and 14-items. Meng-Juan-Jing and colleagues showed that the 11-item version is preferred over the 14-item version (6). Responses were measured using the Likert scoring method that ranges from 0 to 3, and the global score range is from 0 to 33 (7). The 11-item CFS is typically split into two parts: one assessing physical fatigue (CFS-PF, items 1-7) and the other evaluating mental fatigue (CFS-MF, items 8-11). Several studies have evaluated the reliability and validity of the CFS, indicating good reliability and validity (1, 5). This questionnaire has been applied in various conditions, including chronic fatigue syndrome (7) and among patients undergoing hemodialysis (8). For instance, the average Likert score for individuals with chronic fatigue syndrome was 24.4 (SD: 5.8), while the score for a community sample was 14.2 (SD: 4.6) (9).

As there is currently no Persian version of this questionnaire available for use, we aimed to undertake the process of validating it specifically within the context of Iran. This effort is essential because a validated Persian version would enable researchers and healthcare professionals in Iran to accurately assess and understand the experiences of fatigue among Persian-speaking populations.

Methods

This is a cross-sectional study that was conducted from October to November 2023. All procedures were performed in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards, and informed consent was obtained from all individual participants included in the study. In our study, all participants were coded to ensure anonymity, and data were stored securely, accessible only to the research team. Moreover, participants were informed about the confidentiality measures in place and their right to withdraw at any stage.

The translation process followed guidelines for cross-cultural adaptation of self-report measures (10). We employed a standard forward-backward procedure to translate the CFS from English to Persian. Initially, two professional translators independently translated the questionnaire into Persian. A specialist then reviewed these translations to create a single provisional version. This provisional Persian version was back-translated into English by two bilingual translators who were unaware of the original English text. Their English versions were reviewed by a bilingual physician, who selected one that closely matched the original CFS. A pilot test was conducted with 10 patients, who completed the questionnaire and were subsequently interviewed by a physician to clarify any confusing words or sentences. Based on their feedback, we revised the unclear terms, resulting in the final Persian version of the CFS.

The study population consisted of 70 employees from the Ministry of Health, as well as residents and staff from a sleep medicine clinic. Participants with acute or chronic illnesses, or those who had undergone surgical procedures in the past six months, were excluded from the study.

It is important to acknowledge that the sample was drawn from Ministry of Health employees and a sleep clinic, which may introduce occupational and clinical biases. These groups may have heightened awareness or reporting tendencies related to fatigue. Consequently, the generalizability of the findings to broader Persian-speaking populations may be limited.

Internal consistency was evaluated using Cronbach's α coefficient and item-total score correlations. The strength of the item-total correlation coefficient was categorized as negligible (< 0.20), low (0.20–0.40), moderate (0.40–0.70), high (0.70–0.90), and very high (> 0.90). A Cronbach's α value of 0.70 or higher is deemed acceptable; 0.80 indicates good consistency, while a value below 0.60 is considered poor or unacceptable (11). To assess the test-retest reliability of the questionnaire, participants completed it twice, with a two-week interval between assessments. The test-retest reliability of the CFS and its subscales was evaluated using the intraclass correlation coefficient (ICC). An ICC value of less than 0.50 indicates poor reliability; 0.50 to 0.75 indicates moderate reliability; 0.75 to 0.90 indicates good reliability; and greater than 0.90 indicates excellent reliability (12).

The construct validity of the CFS was evaluated through factor analysis, specifically using principal component analysis with varimax rotation. Factors were chosen based on eigenvalues greater than one, and factor loadings above 0.40 were deemed significant. Additionally, it was required that the selected factors explained at least 50% of the total variance.

The evaluation of the Content Validity Index (CVI) and Content Validity Ratio (CVR) for the Persian version of the CFS was conducted by a panel of 15 experts specializing in epidemiology and sleep medicine. Each expert assessed the relevance and necessity of the scale's items. The item-level CVI was calculated by determining the proportion of experts who rated an item as "Quite relevant" or "Highly relevant." To obtain the overall content validity of the scale, the scale-level CVI was computed by averaging all the item-level CVIs, resulting in a value between 0 and 1, with values higher than 0.80 indicating acceptable relevance (13). Similarly, the CVR for each item was calculated by evaluating the proportion of experts who considered the item essential, applying the CVR formula to ascertain the necessity of each item in the context of fatigue assessment. This CVR value ranges from -1 to 1, with scores higher than 0.78 being considered as good content validity (14).

Statistical methods

Several statistical tests were conducted to assess the psychometric properties of the Persian version of the CFS. Cronbach's alpha coefficient was calculated to evaluate internal consistency, while test-retest reliability was measured using the intraclass correlation coefficient. To explore the underlying factor structure of the scale, principal component analysis with varimax rotation was implemented. Additionally, the content validity index and content validity ratio were used to determine content validity. A p-value of less than 0.05 was considered significant. Statistical

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analyses were performed using SPSS version 22.

Results

The process of cross-cultural adaptation was carried out with no major difficulties. The participants had an average age of 38 years, with a standard deviation (SD) of 8.52. Among them, 22 (31.4%) were male.

Content validity analysis showed a scale-level CVI of 0.88, indicating acceptable relevance, and a CVR of 0.81, demonstrating good content validity. The item-level CVIs and CVRs are presented in Table 1.

Factor analysis revealed a two-factor solution for the Persian version of the CFS. Seven items (items 1–7) loaded onto Factor 1, with loadings ranging from 0.69 to 0.86, while four items (items 8–11) loaded onto Factor 2, with loadings from 0.59 to 0.91. The two factors had eigenvalues of 6.12 for the first factor and 1.39 for the second factor, together accounting for 68.33% of the observed variance (Table 1). This structure is consistent with previous international validations of the CFS. However, the use of confirmatory factor analysis (CFA) in future studies could further substantiate the two-dimensional interpretation and assess the model fit of the Persian version.

The Cronbach's alpha coefficient for the Persian version of the CFS was 0.89, indicating good internal consistency. The Cronbach's α-values were 0.88 and 0.75 for the CFS-PF and the CFS-MF, respectively. Item-total correlations were moderate to high, ranging from 0.48 to 0.77. Furthermore, the Cronbach's alpha values varied from 0.87 to 0.89 upon the deletion of individual items, suggesting that removing any item did not enhance the overall Cronbach's alpha of the scale (Table 2).

The average CFS score in the first administration was 12.50, compared to 12.22 in the second administration. The Intraclass Correlation Coefficient (ICC) for the CFS was 0.79 (95% confidence interval (CI): 0.66–0.87, $P < 0.001$), demonstrating good reliability. For the CFS-PF and CFS-MF, the ICC values with 95% CI were 0.80 (0.68–0.88) and 0.60 (0.36–0.75), respectively.

Discussion

The Chalder Fatigue Scale (CFS) is a concise and effective tool that is commonly utilized. This 11-item self-assessment scale was created by Chalder and her team to evaluate the intensity of fatigue. Research has shown that it possesses strong validity and internal reliability. The Chalder Fatigue Scale demonstrates strong internal consistency, evidenced by a split-half reliability of 0.85 and a Cronbach's alpha ranging from 0.86 to 0.92 (9).

De Vries et al. (2003) demonstrated that the CFQ exhibits good test-retest reliability and convergent validity, showing a strong correlation with other fatigue questionnaires. This finding was supported by Jason et al., who reported a significant correlation between the CFQ and the Fatigue

Table 1. Construct and content validity of Chalder Fatigue Scale

Item	Construct validity		Content validity	
	Factor1	Factor2	CVI	CVR
1. Do you have problems with tiredness?	0.83	0.18	0.78	0.84
2. Do you need to rest more?	0.82	0.08	1	0.69
3. Do you feel sleepy or drowsy?	0.69	0.35	0.89	0.97
4. Do you have problems starting things?	0.72	0.32	0.88	0.76
5. Do you lack energy?	0.78	0.33	0.74	0.78
6. Do you have less strength in your muscles?	0.77	0.18	0.86	0.83
7. Do you feel weak?	0.86	0.24	0.97	0.73
8. Do you have difficulty concentrating?	0.48	0.54	0.89	0.88
9. Do you make slips of the tongue when speaking?	0.22	0.82	0.91	0.93
10. Do you find it more difficult to find the correct word?	0.04	0.91	0.82	0.71
11. How is your memory?	0.46	0.59	0.93	0.76

CVI: Content Validity Index, CVR: Content Validity Ratio

Table 2. Internal consistency and test-retest reliability of the Persian version of Chalder Fatigue Scale

Item	Internal consistency			Test-retest reliability
	Cronbach's alpha	Corrected item-total correlation	Cronbach's alpha if Item deleted	ICC
1. Do you have problems with tiredness?		0.73	0.87	
2. Do you need to rest more?		0.61	0.88	
3. Do you feel sleepy or drowsy?		0.61	0.88	
4. Do you have problems starting things?		0.62	0.88	
5. Do you lack energy?		0.77	0.87	
6. Do you have less strength in your muscles?		0.58	0.88	
7. Do you feel weak?		0.77	0.87	
CSF-PF	0.88			0.80
8. Do you have difficulty concentrating?		0.48	0.89	
9. Do you make slips of the tongue when speaking?		0.59	0.88	
10. Do you find it more difficult to find the correct word?		0.48	0.89	
11. How is your memory?		0.58	0.88	
CSF-MF	0.75			0.60
CSF	0.89			0.79

CFS: Chalder Fatigue Scale, CFS-PF: Chalder Fatigue Scale - Physical Fatigue, CFS-MF: Chalder Fatigue Scale - Mental Fatigue, ICC: Intraclass Correlation Coefficient

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Severity Scale by Krupp et al. However, the correlation of the CFQ with other health measures has been inconsistent. Fong et al. noted a modest correlation between the CFQ and poor physical and mental quality of life, while Wong & Fielding found only a weak correlation with physical quality of life. Additionally, Jason et al. indicated that the CFQ had a poor correlation with typical CFS symptoms, such as post-exertional malaise (PEM) and muscle pain, when compared to another fatigue questionnaire (15-19).

The CFQ questionnaire was developed by Trudie Chalder's research team at King's College London to assess the level of fatigue in individuals with fatiguing conditions. This scale has been utilized in several randomized trials of behavioral interventions for patients with myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), including the controversial PACE trial. Although the scale demonstrates strong internal consistency and convergent validity, it has faced criticism for ceiling effects and other methodological issues (20).

There were few questionnaires related to sleep disorders, including OSA (21, 22) and sleepiness (23), which were validated in Iranian people. The purpose of this study was to evaluate the reliability and validity of the Persian translation of the Chalder fatigue scale questionnaire in the Iranian population.

This study contributes culturally specific insights by validating how fatigue items are interpreted by Persian speakers. Particular attention was given to translation nuances, especially for items that in prior literature showed overlap with sleepiness or motivational constructs. The findings reinforce the need to carefully contextualize fatigue measures when adapting them across linguistic boundaries.

Some researchers have raised concerns about the CFQ's effectiveness in measuring fatigue. Morris et al. (6) pointed out that the item “feeling sleepy or drowsy” appears to be more linked to sleepiness and difficulties in maintaining sleep at night rather than fatigue itself. Additionally, Tom Kindlon has suggested that the item “do you have problems starting things” is more indicative of motivation issues rather than fatigue (24). Both of these items received low ratings in a study involving ME patients (25).

In this research, we reported: Demographics including (Average Age: 38 years - Standard Deviation: 8.52), Gender Distribution: Male: 31.4% and Female: 68.6%. Reliability Assessments: Internal Consistency: Cronbach's Alpha = 0.83, Test-Retest Reliability: Spearman's Correlation = 0.87, and Paired T-Test Results: First Administration Mean Score: 11.14, Second Administration Mean Score: 11.53, and finally Content Validity: Content Validity Ratio (CVR): 0.81, Content Validity Index (CVI): 0.88.

In a Turkish version, the CFS demonstrated strong support for the two-factor structure, with excellent fit indices (CFI=0.963, RMSEA=0.06, SRMR=0.02). Internal consistency was robust, as indicated by a Cronbach’s α of 0.863, and the test–retest reliability was also good, with an ICC of 0.76. Out of 14 hypotheses tested, 13 were confirmed, resulting in a success rate of 92.9%. Additionally, the scale exhibited low to moderate correlations with other measurement instruments, ranging from r=0.31 to 0.51 (26).

Two methods of internal consistency and Spearman's correlation coefficient were used for reliability evaluation. Cronbach's alpha was 0.88, and since the coefficient above 0.7 represents an acceptable internal consistency and above 0.8 indicates good internal consistency (27), we conclude that there is good internal consistency in this questionnaire. In the study of Rossi Menezes and colleagues, the cross-cultural validity of this questionnaire was evaluated in Brazilian primary care; Cronbach’s alpha was 0.86 in the pilot study and 0.88 in the validation study (28), which is consistent with our results. The Spearman's correlation coefficient was 0.87. If absolute correlation values are less than 0.1, the correlation is negligible; between 0.1 to 0.3 is a weak correlation; and between 0.3 to 0.5 is a moderate correlation, while greater than 0.5 shows strong correlation (29). Therefore, the reliability of this Persian translation is excellent in test-retest.

As a limitation of our study, confirmatory factor analysis (CFA) was not performed to rigorously test and validate the proposed two-factor structure of the scale. While our exploratory analysis provided initial insights into the dimensionality of the Persian version, conducting CFA in future research is essential for confirming the factor model, assessing the adequacy of the model fit, and ensuring the scale's structural validity across different samples. Implementing CFA would offer stronger evidence for the robustness and generalizability of the scale's factorial structure, thereby enhancing its utility and credibility in both clinical and research settings. We thus strongly recommend that subsequent studies include CFA as part of their psychometric evaluation to substantiate our preliminary findings.

Conclusion

It is suggested that this questionnaire be used in future studies involving patients with various illnesses where fatigue is one of their symptoms, to evaluate this questionnaire in different populations before and after treatment. The results indicate that the CFS is a reliable and valid tool for assessing fatigue, making it suitable for use in both research and clinical environments in Iran.

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Conflict of Interests

The authors declare that they have no competing interests.

Authors’ Contributions

ZA contributed to the conceptualization, methodology, data curation and project administration. SA contributed to the conceptualization and methodology. KHS contributed to the project administration and supervision. AKH contributed to the methodology, data analysis and manuscript review and editing. LG contributed to the investigation, data curation and project administration. AR contributed to the conceptualization, methodology, project administration and manuscript review and editing. All authors read and approved the final manuscript.

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Ethical Considerations

These procedures were implemented in accordance with the ethical standards approved by the Tehran University of Medical Sciences Ethics Committee (IR.TUMS.MEDICINE.REC.1396.2915). All responses were anonymized, and participants were assured that their information would be kept confidential throughout the study, including the test-retest interval.

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Data availability

The data analyzed in this study is available from the corresponding author upon reasonable request.

AI Use Statement

The authors declare that they have used generative artificial intelligence in the writing of this manuscript.

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