Reliability and Validity of the Persian Version of the ATEMPT Questionnaire for Assessing Exercise Adherence in Patients With Musculoskeletal Pain

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Received: 21 Jul. 2025; Accepted: 21 Feb. 2026

Abstract- Compliance with therapeutic exercises is an important factor determining the results in musculoskeletal pain patients; however, there are currently few tools available to assess compliance in a practical and valid manner. The Adherence to Exercise for Musculoskeletal Pain Tool (ATEMPT) is a short self-reporting questionnaire designed to determine the level of compliance with exercises in musculoskeletal pain patients. In this study, translation, cultural adaptation and preliminary evaluation of psychometric properties of the Persian version of the ATEMPT questionnaire have been performed. This pilot methodological study was carried out between July and December 2024 among patients with musculoskeletal problems. For translation, cultural adaptation, and testing of content validity, the 6-item questionnaire of the short form of the ATEMPT was translated into Persian via a forward-backward process and expert review. Content validity of the scale was evaluated by eight sports medicine specialists regarding CVR (Content Validity Ratio) and CVI (Content Validity Index). Face validity was tested in an interview with 30 patients. Cronbach's alpha was used for analysis of internal consistency, while Intraclass Correlation Coefficient (ICC) was applied for test-retest reliability over 1 week. Convergent validity was determined through correlation with the Persian version of Exercise Adherence Rating Scale (EARS). Thirty patients participated in the study (36.7% males, 63.3% females; mean age of 50.35±13.39 years). The content validity of all items was excellent with CVR of 1.00, Item Level CVI (I-CVI) ranging from 0.875 to 1.00 and scale-level CVI using the average approach (S-CVI/Ave) of 0.98 for all items. The Persian version of the ATEMPT had good internal consistency with Cronbach's alpha of 0.881 and good test-retest reliability with ICC of 0.880. There was a moderate relationship between the Persian ATEMPT and Persian EARS (r=0.54). The Persian version of the ATEMPT had satisfactory preliminary psychometric properties among patients with musculoskeletal conditions.

Acta Med Iran 2026;64(4):190-194.
https://doi.org/10.18502/acta.v64i4.21982

Keywords: Exercise therapy; Musculoskeletal pain; Patient compliance; Psychometrics

Introduction

Exercise therapy is an essential element for managing musculoskeletal (MSK) pain because of the significant evidence showing that exercises are beneficial to patients with MSK pain by relieving their pain and improving their functioning capacity and quality of life (1,2). Most of the clinical guidelines emphasize the importance of therapeutic exercises as a critical part of treatment management (3). Patient compliance is an important factor that can affect the outcome of exercise therapy because of the established link between non-adherence and poor results (2,4).

Compliance with therapeutic exercise programs refers to the extent to which a person's behavior conforms to medical recommendations agreed upon between the

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patient and their health professional (5). Higher compliance rates result in positive outcomes, including lower pain, improved physical functioning capacity and quality of life (2).

Nonetheless, adhering to therapeutic exercise programs is a multifactorial issue that is influenced not only by the patient but also by the health professionals and the environment as well (6). The absence of a reliable method for measuring adherence to therapeutic exercise programs also makes monitoring this aspect difficult (2).

Exercise Adherence Rating Scale (EARS) is a tool that was designed to measure adherence to home exercise prescriptions and has shown excellent internal consistency and test-retest reliability both in its original form and in Persian translations (7-9). Recently, there has been a new instrument designed to assess exercise adherence in MSK conditions, which is called the Adherence to Exercise for Musculoskeletal Pain Tool (ATEMPT) questionnaire. This questionnaire was developed by Bailey *et al*., and it is now considered an important step toward assessing exercise adherence in MSK patients (10,11).

The aim of this study was to translate, culturally adapt and assess the psychometric properties of the Persian version of the Adherence to Exercise for Musculoskeletal Pain Tool (ATEMPT) questionnaire in patients with musculoskeletal disorders.

Materials and Methods

This pilot methodological study took place during the period of July to December, 2024, on patients suffering from musculoskeletal disorders. The study received ethical approval from the Ethics Committee of Tehran University of Medical Sciences (IR.TUMS.MEDICINE.REC.1404.320). The participants were aware of the aim and procedure of the study and written informed consent was obtained from each of them before starting the study.

Instrument

Adherence to Exercise for Musculoskeletal Pain Tool (ATEMPT) is a unidimensional self-report measure containing 6 items that assess the adherence to the exercise regimen in patients experiencing musculoskeletal pain. The short form of the instrument was used due to lower participant burden. The questionnaire uses a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"), yielding a total score ranging between 6 and 30, the higher the score, the better adherence to exercise. Based on the original study, a change score of at least 4 points may indicate a genuine change above measurement errors (11).

Translation and cross-cultural adaptation

The translation and cross-cultural adaptation of the ATEMPT questionnaire was carried out in two phases.

In phase one, the English language original version of the scale was independently translated into Persian by two bilingual translators. One of the translators was a professional translator having no medical expertise and being unaware of the purpose of the study, while the other was a sports medicine specialist knowledgeable of the construct being measured. The two versions thus obtained were compared with each other and any differences that emerged were ironed out between the translators to form a single version in Persian language.

The preliminary version obtained above was further translated from Persian into English language by two bilingual translators not involved in the previous process. Comparison of the back-translated version with the original English version helped determine the conceptual equivalence.

In phase two, an expert committee comprised of eight sports medicine specialists with minimum 5 years of experience in managing musculoskeletal injuries evaluated the translated version.

Content validity

The content validity was determined using two measures: The Content Validity Ratio (CVR) and Content Validity Index (CVI). CVR was measured by assessing the essentiality of each item by the experts. In CVI, items were rated in terms of their relevance on a 4-point scale from 1 (not relevant) to 4 (highly relevant). Both item-level CVI (I-CVI) and scale-level CVI using the average approach (S-CVI/Ave) were computed.

Face validity

The face validity was established by interviewing 30 patients suffering from musculoskeletal pain among the target population regarding clarity, understandability, and interpretation of the items. Any item with an understanding rate higher than 20 percent was considered for possible modification or exclusion from the study.

Participants and data collection

For assessing the psychometric properties of the ATEMPT questionnaire, 30 patients with musculoskeletal disorders were invited to take part in a pilot study. They responded once to the questionnaire to examine internal consistency and convergent validity. Test-retest reliability was analyzed on the same

participants after one week interval from the previous session.

Reliability

To determine internal consistency, Cronbach's alpha was utilized. Test-retest reliability was assessed using ICC based on the two-way mixed-effects model with absolute agreement.

Convergent validity

The convergent validity of the Persian translation of the ATEMPT questionnaire was established through the measurement of the association between it and the Persian translation of the Exercise Adherence Rating Scale (EARS).

Statistical analysis

SPSS software version 25 (IBM Corp., Armonk, NY, USA) was used to analyze the collected data. Descriptive statistics were used for summarizing information about the participants. Internal consistency reliability was considered acceptable when Cronbach's alpha was 0.70 or above. The ICC score was evaluated based on being poor (<0.50), moderate (0.50-0.75), good (0.75-0.90), or excellent (>0.90). The association was tested using the Pearson correlation coefficient.

Results

Thirty patients responded to the Persian language version of the ATEMPT questionnaire. Among the respondents, 11 (36.7%) were men and 19 (63.3%) were women with a mean age of 50.35±13.39 years. As for pain localization, there were 15 (50.0%) respondents with upper extremity pain, 9 (30.0%) respondents with lower extremity pain, and 6 (20.0%) respondents with spinal pain. For educational level, there were 9 (30.0%) with primary school and 21 (70.0%) with university educational level.

Content validity

The panel for content validity assessment was made up of eight experts specialized in musculoskeletal pain and exercise compliance.

Content validity ratio

The eight experts agreed that all six items were important and therefore, their CVR score was 1.00. (Table 1)

Content validity index

For the item-level content validity index (I-CVI), all 8 experts gave scores of 3 or 4 to items 1, 2, 3, 4, and 6 leading to I-CVI of 1.00 for each of these items while item 5 received a score of 3 or 4 from seven of the eight experts giving I-CVI of 0.875. The average content validity index at the scale level (S-CVI/Ave) was 0.98.

Table 1. Content validity indices of the Persian version of the ATEMPT questionnaire. (CVR: Content Validity Ratio, I-CVI: Item-level Content Validity Index.)

Item	Number of Experts	CVR	I-CVI
Item 1	8	1.00	1.00
Item 2	8	1.00	1.00
Item 3	8	1.00	1.00
Item 4	8	1.00	1.00
Item 5	8	1.00	0.875
Item 6	8	1.00	1.00

Discussion

This study attempted to translate and culturally adapt the Persian version of the ATEMPT tool among patients with musculoskeletal conditions and evaluate the preliminary psychometrics of the questionnaire. Based on the results, the overall assessment reveals that the Persian ATEMPT appears to have acceptable preliminary measurement properties such as high internal consistency, adequate test-retest reliability, substantial content validity, and modest convergent validity with the Persian version of the EARS (4,8).

The internal consistency of the Persian ATEMPT was acceptable with a value of Cronbach's alpha=0.881, implying that the items were appropriately related and assessed the same construct. The result is consistent with past research concerning the validation of questionnaires associated with adherence including the EARS and other

rehabilitation adherence instruments, which have found the measurement properties to be acceptable to high (7,12). Since the ATEMPT tool is relatively short with just 6 questions, the internal consistency of the questionnaire was encouraging.

Test-retest reliability was also good, with an ICC of 0.880 over a 1-week interval. This finding suggests that the questionnaire produced stable scores over time in this sample. Reliable reproducibility is particularly important for adherence measures intended for use in clinical and research settings. Our result is broadly consistent with previous studies on Persian-language adherence instruments, including the Persian version of the EARS, which also demonstrated acceptable reproducibility after translation and adaptation (8,9).

The findings of the content validity assessment were also favorable. All items achieved acceptable CVR and CVI values, and the overall S-CVI/Ave was high. These results suggest that the expert panel considered the Persian items relevant and appropriate for assessing exercise adherence in patients with musculoskeletal disorders. The importance of expert review during translation and cultural adaptation has been highlighted in previous studies of adherence-related instruments, including the EARS and Regular Physical Exercise Adherence Scale (REPEAS) to ensure conceptual relevance and cultural appropriateness of questionnaire items (6,7).

Convergent validity was supported by a moderate positive correlation between the Persian ATEMPT and the Persian EARS (r=0.54). This level of association is acceptable, as both tools assess exercise adherence but differ in wording, structure, and scope. Rather than indicating redundancy, this finding suggests that the ATEMPT is related to an established adherence measure while still potentially capturing aspects of adherence that are particularly relevant in patients with musculoskeletal pain. Similar observations have been reported in the development and evaluation of other exercise adherence instruments, including REPEAS (5).

Even though these results were promising, there are various limitations that need to be taken into consideration while interpreting the outcomes of this research. Firstly, the sample size was rather small; therefore, the obtained results might lack precision and applicability. Thus, this study is more of a preliminary investigation of the psychometric properties of the questionnaire. Another limitation associated with this study is that the selected population was quite narrow, meaning that the findings of the study cannot be easily generalized to other Persian-speaking populations suffering from musculoskeletal disorders. Finally, due to the relatively small number of respondents in the study sample, the more sophisticated psychometric testing (e.g., factor analysis) could not be conducted. Future investigations involving larger sample sizes would help in confirming the dimensionality of the Persian ATEMPT and evaluating additional psychometric properties of the scale.

To conclude, the Persian translation of the ATEMPT is a promising measure to use when evaluating exercise adherence in patients with musculoskeletal disorders. Yet, further research involving larger samples should be conducted first.

The Persian form of the ATEMPT questionnaire demonstrated satisfactory psychometric characteristics in terms of content validity, internal consistency, reliability, and moderate convergent validity when compared with the Persian version of the EARS in patients with musculoskeletal conditions. These results indicate that the questionnaire can be a valuable and feasible method for evaluating exercise adherence in Persian-speaking patients with musculoskeletal pain. However, due to the limited number of participants and the exploratory nature of this study, caution must be exercised in interpreting these outcomes, and future studies involving large samples are warranted to establish the dimensionality and validity of the questionnaire.

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