# **RESEARCH NOTE**

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# Translation and psychometric evaluation of the Persian version of the self-management behaviors questionnaire in patients with rheumatoid arthritis

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# Abstract

**Objective** Self-management behaviors play a critical role in controlling disease complications, improving treatment outcomes, and enhancing quality of life for Rheumatoid arthritis (RA) patients, a dedicated and comprehensive instrument with demonstrably strong validity and reliability is crucial for their assessment. To address this need, the present study undertook the translation and validation of the Persian version of the "Self-Management Behaviors Questionnaire" specifically for RA patients. Employing a cross-sectional research design, the study involved 334 participants from four Iranian cities. Following the meticulous translation of the original RA-SMBS instrument into Persian, a comprehensive evaluation of its psychometric properties was conducted using the established COSMIN criteria.

**Results** The exploratory factor analysis (EFA) revealed statistically significant factor loadings ranging from 0.62 to 0.89 for all 23 items, indicating a robust underlying factor structure. Furthermore, the instrument demonstrated excellent internal consistency, with a Cronbach's alpha coefficient of 0.92 for the entire scale. These findings collectively establish the Persian version of the Rheumatoid Arthritis Self-Management Behaviors Scale (RA-SMBS) as a reliable and valid tool. Consequently, healthcare administrators can confidently utilize this questionnaire to assess self-management behaviors in their RA patient population. This information can then be leveraged to develop and implement targeted programs and strategies aimed at enhancing self-management skills among individuals living with rheumatoid arthritis.

# Clinical trial number Not applicable.

Keywords Rheumatoid arthritis, Self-management, Psychometric assessment, Questionnaire

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# Introduction

Rheumatoid arthritis (RA) is a chronic, inflammatory autoimmune disease of unknown etiology that typically manifests between the ages of 20 and 40. While the reported global prevalence ranges from 0.3 to 1% [1], studies in Iran have estimated a prevalence of 0.37% [2]. Characterized by pain, swelling, stiffness, and limited range of motion in the joints, alongside general fatigue [3–5], RA can lead to severe joint destruction, disability, and even premature death [6]. These debilitating symptoms not only negatively impact a patient's quality of life by limiting daily activities and work capacity [7], but also significantly increase healthcare costs [8].

Rheumatoid arthritis (RA), an incurable disease, necessitates treatment strategies focused on disease control, disability reduction, and optimization of physical, emotional, and social well-being [3, 9]. Research has consistently demonstrated that, due to RA's chronic and progressive nature, high levels of self-management in patients can effectively mitigate symptoms, improve patient function, and enhance quality of life [5]. Barlow defines self-management as "the individual's ability to manage the symptoms, physical, psychological-social consequences, and lifestyle changes of a chronic illness" [10]. This concept extends beyond mere adherence to treatment regimens; it encompasses managing the psychological and social burdens associated with chronic illness. Patients must actively seek information about their disease, modify behaviors, and utilize strategies to minimize discomfort [1]. Self-management empowers patients to cope effectively with disease-related challenges and fosters long-term behavioral changes that maximize well-being [11]. While some RA patients recognize the importance of medication adherence and following physician recommendations, these represent just a portion of the necessary behaviors [12]. Patient engagement in self-management, on the other hand, manifests through behaviors such as physical activity, fatigue management, and medication adherence [13]. Given the critical role of self-management in RA patients, a comprehensive and reliable disease-specific scale is essential for assessing these behaviors. However, existing instruments for this purpose remain limited.

The chronic disease self-management study measures (CDSMS) developed by Lorig et al., stands as the most widely used scale worldwide for assessing self-management in patients with chronic conditions [5, 14]. Similarly, the Patient Activation Measure (PAM) serves as a valuable tool for evaluating patients with chronic diseases, specifically focusing on their knowledge, skills, and confidence in self-management practices [15].

The short self-management ability scale (SMAS-S) while exhibiting good psychometric properties, is more applicable for older adults and lacks specificity for rheumatoid arthritis (RA) patients, as do other existing scales like the Chronic Disease Self-Management Study Measures (CDSMS) and the Patient Activation Measure (PAM) [5, 14–16]. Although Naderian et al. developed the Self-Care Behaviors Scale (SCBS) specifically for RA patients, its internal consistency falls short, evidenced by Cronbach's alpha coefficients below 0.3 for its subscales [17]. Furthermore, the SCBS fails to comprehensively assess RA-specific self-management behaviors. Notably, the item development solely relied on a literature review, neglecting qualitative studies that capture patient experiences and understandings of the disease. Additionally, the tool overlooks crucial self-management areas such as attention to disease symptoms, emotional and mental health management, and joint maintenance and function [17].

To address the limitations of existing instruments, Chen et al. developed the Self-Management Behaviors Scale in Rheumatoid Arthritis Patients (RA-SMBS) specifically to assess self-management behaviors in this population [5]. This 23-item tool evaluates self-management across four key dimensions: medication management (items 1–6), symptom management (items 20–23), exercise and joint protection (items 14–19), and resource utilization and emotional management (items 7–13). Each item is scored on a 5-point Likert scale, ranging from 0 (never) to 4 (always), with higher scores reflecting greater self-management behaviors. The total score can range from 0 to 92, with a reported Cronbach's alpha coefficient of 0.908 for the overall scale, indicating strong internal consistency [5].

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Given the critical role of self-management in RA patients, a comprehensive and reliable disease-specific scale is essential for assessing these behaviors. However, existing instruments for this purpose remain limited. These limitations include the inability to capture crucial aspects like symptom awareness, joint management and functional preservation, treatment adherence, and mental and emotional well-being. Furthermore, existing questionnaires often rely solely on literature review and researcher perspectives, neglecting qualitative research that explores patients' beliefs, experiences, and perspectives. Finally, the importance of cultural adaptation in assessment tools due to societal variations is often overlooked. In light of these gaps, the present research team undertook a study to translate and validate the Persian version of the Rheumatoid Arthritis Self-Management

#### Main text

#### **Research design**

Undertaken between September 2023 and February 2024, this methodological study focused on the translation and cultural adaptation of the RA-SMBS for application among rheumatoid arthritis (RA) patients residing in Fars Province, Southern Iran.

# **Study participants**

While exploratory factor analysis (EFA) can be conducted with a minimum of 5–10 participants per item [18]. In the present study, according to the possibility of sample attrition, at least 14 participants per item were considered. Convenience sampling was employed, selecting participants from rheumatology centers in Fars Province, Southern Iran. Ultimately, 334 patients with RA participated in the EFA. Inclusion criteria ensured participant willingness, a minimum one-year RA diagnosis, comprehension of Persian (either fluency or native speaker status), and the absence of documented or self-reported psychological disorders. Exclusion criteria encompassed both non-returned questionnaires and incomplete responses exceeding half the questionnaire's items.

#### Data collection

To complement the RA-SMBS, a demographic information form was employed to gather data on participants' age, gender, educational level, marital status, place of residence, and disease duration. The study itself unfolded in two distinct phases: the initial translation of the RA-SMBS followed by a comprehensive psychometric evaluation of the instrument.

# Phase 1: translation of rheumatoid arthritis selfmanagement behaviors scale (RA-SMBS)

Following the acquisition of permission from the scale's developers, the translation process commenced, adhering to the established guidelines for translation and cross-cultural adaptation outlined by Beaton et al. [19]. Employing the forward-backward approach, the English version of the RA-SMBS was meticulously translated into Persian through a rigorous six-stage process.

The first stage, designated as the forward translation stage, involved two independent translations. Bilingual translators, fluent in both English and Persian and familiar with Iranian culture (one of whom was a general translator and the other a with expertise in RA), independently translated the English script into Persian. The second stage, a collaborative review process, involving two additional translators and the research team, synthesized the strengths of both initial translations, resulting in a single, unified Persian script. The three stage, to ensure translation accuracy and fidelity, a distinct bilingual translator then undertook the critical step of translating the Persian version back into English, commencing the backward stage of the process. The four stage, aimed to verify the translated content's equivalence to the original English version. An expert committee, comprised of instrument development experts, expertise in RA, patients with rheumatoid arthritis, and translators, meticulously reviewed the translated versions from the preceding stages. Through collaborative discussion and critical evaluation, they unanimously agreed upon a final version. The five stage, to gauge the comprehensibility and cultural appropriateness of the finalized Persian version, the instrument was presented to a group of 70 randomly selected patients diagnosed with rheumatoid arthritis. These individuals provided valuable feedback on the clarity and relevance of the questionnaire items. Their insights were then meticulously analyzed and incorporated to further refine and enhance the Persian scale. In the six stage, finally, the psychometric properties of the RA-SMBS were subjected to a rigorous evaluation process, employing the established COSMIN criteria. This comprehensive assessment encompassed various aspects, including face validity, content validity, reliability (encompassing both internal consistency and stability), and construct validity.

### Phase 2: psychometric analysis of NEDM-EOLCS

To comprehensively assess the suitability of the Persian RA-SMBS, a rigorous evaluation of its psychometric properties was undertaken, adhering to the COSMIN (COnsensus-based Standards for the selection of health status Measurement INstruments) criteria [20–21]. This evaluation encompassed content validity, reliability (internal consistency and stability), and construct validity (exploratory factor analysis).

# Face validity

#### Qualitative face validity

To assess the comprehensibility, relevance, and overall appropriateness of the RA-SMBS items, in-depth faceto-face interviews were conducted with a sample of 15 patients diagnosed with rheumatoid arthritis.

### Quantitative face validity

Content validity was further evaluated quantitatively. Fifteen experts, including five rheumatologists and ten individuals experienced in instrument development, were invited to rate the importance of each questionnaire item using a 5-point Likert scale (1 = not important at all, 5 = very important). This process ensured that only items

deemed crucial by these specialists, with an impact score exceeding 1.5, were retained [18, 22].

#### **Content validity**

# Qualitative content validity

To assess the translated RA-SMBS for grammar, sentence structure, comprehensibility, and cultural appropriateness within the Iranian context, the instrument was evaluated by a team of 30 individuals. This team comprised 15 experts specializing in rheumatology and instrument development (further divided into 10 instrument development specialists and 5 rheumatologists), along with 15 patients diagnosed with rheumatoid arthritis. Each participant was tasked with meticulously evaluating the questionnaire items, providing detailed comments next to each item regarding these specific criteria.

# Quantitative content validity

Building upon the initial translation process, the research team undertook a two-pronged approach to evaluate the content validity of the Persian RA-SMBS. First, content validity ratio (CVR) was assessed [22]. Experts rated the questionnaire items on a 3-point Likert scale (1=not necessary, 3 = necessary) in terms of their usefulness and necessity for patients with RA. This approach enabled the calculation of content validity for each individual item. Second, the revised version of the RA-SMBS was administered to a new sample of 30 participants to assess content validity index (CVI) [18, 22]. These participants evaluated each item on a 4-point Likert scale (1 = not relevant, 4 = completely relevant) based on its clarity, simplicity, and overall relevance to the self-management behaviors of RA patients. Both CVI for individual items and the overall CVI for the questionnaire were subsequently calculated. The study adopted established criteria for acceptable CVR (>0.33) and CVI (>0.8) [22].

Table 1	Frequency distribution	of demographic	c characteristics
(n = 334)			

Variable		N	%
Gender	Male	95	27.62
	Female	249	72.38
Education level	Under diploma	151	45.22
	Diploma	130	38.92
	High diploma	53	15.86
Living	Cites	236	68.61
	Ruale	108	31.39
Marital status	Single	84	24.42
	Married	260	75.58
Age	19–35	86	25
	36–50	198	57.55
	51-73	60	17.45

#### Construct validity (exploratory factor analysis)

The minimum sample size recommended for exploratory factor analysis (EFA) typically falls between 3 and 10 cases per questionnaire item [23]. In the present study, according to the possibility of sample attrition, at least 14 participants per item were considered. Exploratory Factor Analysis (EFA) employing the Varimax rotation method was conducted to assess construct validity, ensuring the instrument measured the intended self-management behaviors in RA patients. An eigenvalue greater than 1 and a factor loading exceeding 0.5 were considered optimal for achieving a robust factor structure. The adequacy of the sample size (n = 334) was verified using both the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test. Acceptable values for the KMO test and Bartlett's test are greater than 0.7 and less than 0.05 (p < 0.05), respectively. Reassuringly, all items exhibited factor loadings exceeding the 0.5 threshold, eliminating the need for item removal.

#### Reliability

The reliability of the Persian RA-SMBS was assessed using two established methods: internal consistency and test-retest reliability. Internal consistency was evaluated using Cronbach's alpha coefficient, with a value exceeding 0.7 considered acceptable [24]. Test-retest reliability was assessed by calculating the intra-class correlation coefficient (ICC) from data collected from 200 employed rheumatoid arthritis patients at a two-week interval. An ICC value greater than 0.80 signifies satisfactory instrument reliability [25].

# Results

This study included a total of 334 participants diagnosed with rheumatoid arthritis. The demographic characteristics revealed a predominantly female population (72.38%). The patients' ages ranged from 19 to 73 years, with a mean age of 36.05 years  $\pm$ 7.41 years. Disease duration also exhibited variability, averaging 9.54 years  $\pm$ 4.37 years. Further details regarding participant demographics are presented in Table 1.

# **Face validity**

During this phase, both patients and specialists participating in the study, including rheumatologists and instrument development experts, commended the questionnaire items for their clarity, conciseness, and direct relevance to the research topic. Furthermore, all items achieved an impact score exceeding the established threshold of 1.5.

### **Content validity**

Content validity was meticulously assessed using the Content Validity Ratio (CVR) and the Content Validity

Index (CVI). Thirty experts' opinions informed the CVR calculation, ensuring all RA-SMBS items achieved scores exceeding the recommended threshold of 0.33 according to Lawshe's table [22]. Consequently, no item removal was necessary based on CVR. Furthermore, individual item CVI scores and the overall Scale-Content Validity Index (SCVI)/Average Newell and Edmund's Factor Analysis Score (NEDM-EOLCS) all demonstrated exceptional results, ranging from 0.89 to 1 and reaching 0.98, respectively.

# **Construct validity**

Exploratory factor analysis (EFA) commenced with the calculation of the KMO test at 0.98, indicating sufficient sample adequacy. The Bartlett's test of Sphericity was significant ( $\chi 2 = 6871.297$ ; P < 0.001) indicating that the data is suitable for factor analysis. In the exploratory factor analysis, all 23 items exhibited factor loadings exceeding the 0.5 threshold and statistically significant factor loadings ranging from 0.62 to 0.89 for all 23 items. Therefore, none of the 23 items were eliminated. The EFA results revealed that four distinct factors (Medication management: items 1-6, Resource utilization and emotional management: items 7–13, Exercise and joint protection: items 14-19, Symptom management: items 20-23), with eigenvalues>1were identified, explaining 64.51% of the total variance of the Rheumatoid Arthritis Self-Management Behaviors Scale (RA-SMBS). Confirmation of the four-factor structure for the questionnaire was further supported by the Scree plot (Fig. 1). The factor loadings for individual items ranged from 0.62 to 0.89, as detailed in Table 2.

# Reliability (internal consistency and stability) Internal consistency

Demonstrating strong internal consistency, the instrument achieved a Cronbach's alpha coefficient of 0.92 (Table 3). This value signifies a high level of internal coherence among the questionnaire items.

#### Stability

Test-retest reliability was assessed by calculating the intra-class correlation coefficient (ICC) from data collected from 200 employed rheumatoid arthritis patients at a two-week interval. None of the participants withdrew or were eliminated during the two-week period. The intra-class correlation coefficient (ICC) for the four domains ranged from 0.87 to 0.94, and the overall ICC of 0.94. This indicates a high level of stability in repeated measurements (CI: 94%, 0.90-0.98, *p*-value < 0.05). (Table 4). The final questionnaire comprising 23-item evaluates self-management across four key dimensions: medication management (items 1-6), resource utilization and emotional management (items 7-13), exercise and joint protection (items 14-19), and symptom management (items 20-23). Each item is scored on a 5-point Likert scale, ranging from 0 (never) to 4 (always), with higher scores reflecting greater self-management behaviors. The total score can range from 0 to 92. The range of scores was categorized as follows: 0-45 (low self-management behaviors), 46-70 (moderate self-management behaviors), and 71-92 (high self-management behaviors). Supplementary file: Persian version of the Self-Management Behaviors Questionnaire.

# Discussion

This study undertook the translation and validation of the psychometric properties of a Persian version of the RA-SMBS for patients with rheumatoid arthritis residing in southern Iran. Face validity assessment indicated that all 23 items surpassed the established impact score threshold of 1.5, justifying their retention in the translated instrument. Content validity analysis yielded satisfactory results. The CVR (content validity ratio) for each item ranged from a highly acceptable 0.82 to a perfect score of 1.0 [25]. Similarly, the individual-level content validity index (I-CVI) fell between 0.88 and 1.0, and the scale-content validity index (S-CVI) reached a commendable value of 0.98 [22]. While Chen et al. reported a slightly higher S-CVI/Ave of 0.90 and an I-CVI exceeding 0.78,



Fig. 1 Scree plot of exploratory factor analysis for Persian version of Rheumatoid Arthritis Self-Management Behaviors Scale (RA-SMBS)

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Dimensions	No.	items	Factor loading
Medication	1	Take medications each time as the prescribed dose	0.78
management	2	Adhere to the medication dosing schedule as prescribed	0.69
	3	Take medications at the right methods as prescribed (e.g., before, with, or after a meal)	0.81
	4	Adhere to the prescribed medication regimens (take the full course of the medication and stop the medication only with the doctor's approval)	0.68
	5	Contact your healthcare providers if you have any questions about the medication you are taking, such as its proper use, schedules, and doses.	0.74
	6	Manage adverse events of the medication under the guidance of rheumatologists or nurses (such as timely con- sultation with doctors or nurses and making medical adjustments when developing symptoms such as nausea, abdominal pain, and skin rashes)	0.66
Resource	7	Have regular medical follow-up visits and keep your own medical records	0.89
utilization and	8	Prepare a list of questions before the outpatient follow-up visit with the doctor	0.67
emotional management	9	Communicate with others (e.g., healthcare professionals, patients, etc.) to share feelings and discuss disease information	0.73
	10	Seek help and support from family or friends to work through difficulties in managing the disease	0.81
	11	Obtain timely social support when coping with the disease (e.g., health insurance, social assistance policy, public welfare support, etc.)	0.80
	12	Take measures to manage emotions when you are feeling down (e.g., listening to music, etc.)	0.64
	13	Keep a positive attitude toward disease	0.68
Exercise and joint protection	14	Take part in daily exercise tailored to individuals needs and under the guidance of health professionals (e.g., jog- ging, walking, cycling, Tai Chi, etc.)	0.71
	15	Have exercise therapy (e.g., joint exercises) tailored to individuals needs and under the guidance of health professionals	0.69
	16	Tailor exercise to individual physical condition (exercise approach, exercise time, amount of exercise, etc.), stop exercising when necessary (such as having dizziness, nausea, chest pain, or other discomforts)	0.85
	17	Gradually increase the intensity of exercise and avoid over-exercising. Indicators of appropriate exercise intensity include the absence of increased joint discomfort (e.g., pain, swelling, etc.) and emotional instability	0.62
	18	Tailor the schedules, amount, and content of paid work and unpaid work (including housework) to the individual physical condition	0.77
	19	Take measures to protect your joints (e.g., lift heavy objects with your arms instead of your fingers, wear gloves when exposed to cold to keep your joints warm, etc.)	0.67
Symptom	20	Observe signs of swelling (such as the location of swollen joints and number of joints affected etc.)	0.83
management	21	Observe signs of tenderness (such as the location of tender joints, duration, the intensity of tenderness, etc.)	0.79
	22	Observe the duration of morning stiffness	0.70
	23	Apply measures to relieve pain, morning stiffness, and other discomforts (e.g., take moderate exercise or apply heat to the affected ioints)	0.68

**Table 3** Cronbach's alpha of subscales and the entire Persian version of rheumatoid arthritis Self-Management behaviors scale (RA-SMBS)

Factors	Subscale	Items	Cronbach's alpha
1	Medication management	6	0.89
2	Resource utilization and emotional management	7	0.94
3	Exercise and joint protection	6	0.92
4	Symptom management	4	0.90
Entire Questionnaire		23	0.92

**Table 4** Intraclass correlation coefficient (ICC) values for the domains of the Persian version of rheumatoid arthritis Self-Management behaviors scale (RA-SMBS)

Factor	Dimensions	Mean ± SD	ICC	Confidence interval	P-value
1	Medication management	25.89±4.32	0.90	0.92-0.94	p<0.05
2	Resource utilization and emotional management	$21.79 \pm 4.67$	0.87	0.83–0.91	p<0.05
3	Exercise and joint protection	$18.74 \pm 4.53$	0.89	0.87-0.94	p<0.05
4	Symptom management	$14.74 \pm 3.84$	0.94	0.90-0.97	p<0.05
Entire Quest	ionnaire (Total)	81.09±11.36	0.94	0.90-0.98	p<0.05

the present study's findings still provide strong evidence for the content validity of the translated scale.

Exploratory factor analysis (EFA) yielded results consistent with those reported by the instrument's developers, Chen et al. [5]. In the present study, four factors explained 64.51% of the variance, with individual item factor loadings ranging from 0.62 to 0.89, indicating satisfactory levels. Similarly, Chen et al. observed that four domains of the Chinese RA-SMBS version explained 61.89% of the variance in their study.

This study successfully confirms the reliability of the Persian RA-SMBS for assessing self-management behaviors in rheumatoid arthritis patients. Internal consistency analysis using Cronbach's alpha yielded values ranging from 0.89 to 0.94 for the instrument's four domains, with a high overall alpha of 0.92. Furthermore, the intra-class correlation coefficient (ICC) for the entire scale reached a commendable 0.94 [24]. These findings demonstrate comparable reliability to those reported by Chen et al. for the Chinese RA-SMBS version [5]. In their study, Cronbach's alpha coefficients for the four domains ranged from 0.87 to 0.94, and the overall ICC achieved a satisfactory level of 0.94.

# Limitations

confirmatory factor analysis was not employed in this study its inclusion is recommended for future investigations to further solidify the instrument's construct validity. In the present study, convenience sampling was used, which is possible due to selection bias. Although convenience sampling was used due to feasibility constraints, this may limit generalizability to the broader RA patient population in Iran. Therefore, it is recommended that other sampling methods, including random sampling, be used in future studies. The direct translation of the questionnaire from English to Persian may not be appropriate. The original version was developed in Chinese. The authors also translated Chinese RA-SMBS into English language, so the readers could understand the content of RA-SMBS well. Therefore, the English version might not meet the standard translation requirements for cross-cultural adaptations. This may be a limitation of this study.

# Conclusion

The psychometric evaluation of the Persian RA-SMBS revealed satisfactory validity and reliability, establishing its utility as a measurement tool for self-management behaviors in Iranian patients with rheumatoid arthritis.

# Abbreviations

of-life care scale
behaviors scale
ction of health

CVI Content validity index EFA Exploratory factor analysis

#### Supplementary Information

The online version contains supplementary material available at https://doi.or g/10.1186/s13104-025-07182-7.

Supplementary Material 1

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#### Author contributions

MR and HT, was involved in the conception and organization of the study. MB, EP, and HT, were involved in the execution and data collection of the study; MB, AD, EP and PM, participated in statistical analysis design and/or execution. All authors contributed to the preparation, critical review and all of them approved the final manuscript.

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#### Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

#### Declarations

#### Ethics approval and consent to participate

Prior to study participation, written informed consent was obtained from all participants. Assurances regarding anonymity and the confidentiality of their information were provided. The study protocol received ethical approval from the Institutional Research Ethics Committee of Fasa University of Medical Sciences, Fasa, Iran (Ethical code: IR.FUMS.REC.1402.082). All research methods were conducted in strict accordance with relevant guidelines and regulations, adhering to the ethical principles outlined in the Declaration of Helsinki.

#### **Consent for publication**

Not applicable.

#### **Competing interests**

The authors declare no competing interests.

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