

Cross-cultural adaptation and validation of the MSK-30 for the cuban healthcare system

Adaptación transcultural y validación del MSK-30 para el sistema
de salud de Cuba

Orisleidys Ramírez Cabañín^{1*} <https://orcid.org/0009-0009-5864-3301>

Arianny Velázquez Valentín¹ <https://orcid.org/0000-0002-9528-6165>

Bárbara Francisca Toledo Pimentel¹ <https://orcid.org/0000-0002-0359-4938>

Ivonne Cepero Rodríguez¹ <https://orcid.org/0000-0001-5026-5021>

Duniesky Verdecía Navarro¹ <https://orcid.org/0000-0003-2867-7251>

¹ Villa Clara University of Medical Sciences. Comandante Manuel Fajardo Rivero Military Hospital. Villa Clara. Cuba.

Corresponding author. Email: orisleidysrc@gmail.com

ABSTRACT

Background: given current evidence highlighting the need to optimize training on musculoskeletal disease, the MSK-30 questionnaire stands as a valid instrument to assess such knowledge.

Objective: to translate and adapt the MSK-30 scale to strengthen knowledge about musculoskeletal disease within the Cuban context of primary healthcare.

Methods: an instrumental study was conducted, including forward and backward translation from English to Spanish, evaluation by the researchers which modified three items from the original scale to incorporate a focus on prevention aligned with the competencies of family physicians in Cuba, content validation by seven experts using the Content Validity Index, and the assessment of internal consistency (Cronbach's Alpha) and feasibility in a pilot sample of 12 family physicians.

Results: an adapted version, the Cuban MSK-30, was developed, including 27 original items and three new items on prevention. Content validity was excellent, with 29 items exceeding a CVI ≥ 0.78 . Item 27 was reworked after an initially unfavorable evaluation. The scale demonstrated excellent internal consistency (Cronbach's Alpha = 0.89) and high feasibility, with an average response time of 12 minutes.

Conclusions: The study provides a valid, reliable, and culturally adapted tool to assess musculoskeletal knowledge among physicians in Cuba. The adapted version of the MSK-30 is a valuable resource for medical education and research, incorporating the essential preventive focus of primary care.

MeSH: muscle skeletal; health knowledge, attitudes, practice; health care levels; education, medical.

RESUMEN

Fundamento: ante la evidencia actual que subraya la necesidad de optimizar la formación sobre la enfermedad músculo-esquelética, el cuestionario MSK-30 se posiciona como un instrumento válido para evaluar dichos conocimientos.

Objetivo: traducir y adaptar la escala MSK-30 para fortalecer los conocimientos sobre la enfermedad músculo-esquelética en el contexto cubano de la atención primaria de salud.

Métodos: se realizó un estudio instrumental que incluyó la traducción directa e inversa del inglés al español, evaluación por los investigadores que modificó tres ítems de la escala original, para incorporar un enfoque en prevención alineado con las competencias del médico de familia en Cuba, validación de contenido por siete expertos mediante el Índice de Validez de Contenido, y la evaluación de la consistencia interna (Alfa de Cronbach) y factibilidad en una muestra piloto de 12 médicos de familia.

Resultados: se desarrolló una versión adaptada, la MSK-30 cubana, que incluye 27 ítems originales y tres ítems nuevos sobre prevención. La validez de contenido fue excelente, con 29 ítems superando un $IVC \geq 0.78$. El ítem 27 fue reelaborado tras una evaluación inicial desfavorable. La escala demostró una consistencia interna excelente (Alfa de Cronbach = 0.89) y una alta factibilidad, con un tiempo promedio de respuesta de 12 minutos.

Conclusiones: el estudio provee una herramienta válida, confiable y culturalmente adaptada para evaluar conocimientos músculo-esqueléticos en médicos de Cuba. La versión adaptada de la MSK-30 no solo sirve para diagnosticar deficiencias, sino también incorpora el enfoque preventivo esencial de la atención primaria, por lo que es un recurso valioso para la educación médica y la investigación.

DeSC: músculo esquelético; conocimientos, actitudes y práctica en salud; niveles de atención de salud; educación médica.

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INTRODUCTION

Musculoskeletal diseases are among the most common medical conditions treated by physicians in primary healthcare (PHC), accounting for over 20% of emergency department visits.⁽¹⁾ Despite the high prevalence and burden associated with MSDs, research indicates that physician training in musculoskeletal system disorders has historically been inadequate.⁽²⁾ Therefore, several authors^(3,4) propose international collaboration to design educational strategies and curricular initiatives that are applicable, effective on a global scale, and reproducible.

Various researchers^(5,6,7) have identified instruments to assess physicians' knowledge of MSDs, but none of these studies focus on Cuba. Consequently, the Musculoskeletal Scale-30

(MSK-30) was selected from the identified instruments. This scale was developed by Cummings *et al.*⁽⁷⁾ in 2019 in the United States. It assesses the basic musculoskeletal knowledge of physicians working in PHC. It is a multiple-choice questionnaire with 30 questions (MSK-30), aiming to identify the most common and critical conditions, choose appropriate initial management, and know when to refer a patient to a specialist. By exploring individual musculoskeletal knowledge, this clinical assessment tool identifies weaknesses and addresses knowledge gaps, allowing educators to use the exam results to guide curriculum development and individualized training.

The scale has been translated and validated in different countries: Italy,⁽⁸⁾ Ecuador (KSM 30-2.2 version)⁽⁹⁾ Overall, the instrument demonstrates validity and adequate reliability. Despite differences in the profiles of PHC physicians across countries, commonalities were identified regarding expected competencies and skills. This scale lays the groundwork for the adoption of internationally recognized musculoskeletal competencies and educational standards for family physicians.

The assessment process is the first step in medical decision-making, for which scales or questionnaires are fundamental instruments. A measurement/evaluation tool in one's own language or culture is not always available, making it necessary to develop one or modify a tool validated in another language or culture; this is known as cross-cultural adaptation.

Cross-cultural adaptation has two essential components: translation and adaptation. The use of one or both components depends on the differences or similarities between the source and target populations. It is acknowledged that in cross-cultural adaptation, sensitivity must consider the purpose (what is to be measured), comprehensibility, content and face validity, as well as the replicability and suitability of the scale.⁽¹⁰⁾ This article aims to translate and adapt the MSK-30 scale to strengthen knowledge about musculoskeletal disease within the Cuban context of primary healthcare.

METHODS

An instrumental cross-sectional validation study was conducted at the Comandante Manuel Fajardo Rivero Hospital from February to July 2025. The study involved seven specialists and twelve physicians specializing in Family Medicine.

A set of theoretical research methods guiding the different phases of the process was used. The historical-logical method was used to justify the selection of the original instrument and analyze the evolution of the construct to be measured. The analytical-synthetic method was the basis of the cross-cultural adaptation process, allowing for the deconstruction and reconstruction of items while preserving their meaning. The systemic-structural approach guided the design of the instrument as a coherent whole, while inductive-deductive reasoning guided the empirical validation phase, from observation to the pilot test.

The overall design for the translation, cultural adaptation, and psychometric validation of the instrument was carried out according to health research guidelines⁽¹⁾ to ensure the instrument maintained its semantic, idiomatic, conceptual, and psychometric equivalence.

Among empirical methods, expert criterion techniques (to assess content validity) and pilot testing (to assess comprehension and applicability) were used. For psychometric validation, the following statistical techniques were applied: Content Validity Index (CVI) for each item, confirmatory factor analysis to assess construct validity, and the calculation of Cronbach's alpha coefficient to determine internal consistency.

Translation from English to Spanish was performed by two bilingual translators whose native language is Spanish. One translator had prior experience translating technical texts and was aware of the instrument's objective and the underlying construct. The other translator had no prior knowledge of the instrument's objectives but had experience translating instruments. The two translations were compared, discrepancies were analyzed by the researchers in a meeting with the translators, and a consensus version was reached. An independent back-translation was performed by a bilingual translator whose native language was the same as the original instrument's author and who was unaware of the study objectives, the original version of the instrument, and the work done by the other translators.

The next step was to reach a consensus solution for the translation process (considering the original version, the translation, and the back-translation) with the research group and a bilingual translator specialized in translating instruments.

Based on the equivalent Spanish version, the research group identified that despite linguistic correspondence, the original questionnaire focused predominantly on the diagnosis and management of established conditions. They identified the need to incorporate the dimension of musculoskeletal injury prevention as a fundamental domain of PHC practice. The relevance of each item was evaluated, and the decision was made to replace three questions addressing complex differential diagnoses or specific imaging findings (original items 12, 21, and 24), considering their content more relevant to the specialized care setting. Three new items in Spanish (designed to replace the original items) were drafted to assess competencies in primary prevention, secondary prevention, and risk factor management. The preliminary version of the MSK-30 was created, integrating 27 items from the equivalent Spanish version and three new items.

This preliminary version was evaluated by a panel of seven specialists (second-degree specialists in Physical Medicine and Rehabilitation, Family Medicine, Orthopedics and Traumatology; all with senior academic rank and over 10 years of professional experience). They were sent the preliminary MSK-30 version and a form to evaluate each item in terms of clarity, relevance, and appropriateness (using a 1-5 Likert scale and fields for qualitative comments).

The CVI was calculated for each item. A cut-off point of $CVI \geq 0.78$ was established for acceptance. Items not reaching this value would be subject to revision. A thematic analysis of the comments was also conducted to refine wording and content. The result was the final version of the MSK-30, produced from specialist consensus and analysis.

Once content validity was established, the psychometric properties of the final 30-item version of the MSK-30 survey were evaluated in a sample of 12 family physicians. The internal consistency of the scale was determined using Cronbach's alpha coefficient.

Their comments on comprehension difficulties were collected, and response time was recorded. An instrument ready for large-scale application and psychometric validation studies (reliability, construct validity) was obtained.

Ethical considerations

The study adhered to the principles of the Helsinki Declaration. Informed consent was obtained from the specialists and the physicians participating in the pilot test, who were assured that their participation would not affect their employment status.

RESULTS AND DISCUSSION

Following an exhaustive analysis of the 30 questions comprising the original MSK-30 tool, it was identified that they are an excellent resource for assessing knowledge about the diagnosis and management of musculoskeletal injuries. However, the research group deemed it necessary to transform them to incorporate the preventive focus from PHC, which is the core competency of the family physician.

Three questions were identified as ideal for replacement, as they focus on very specific diagnoses or treatments that, while not incorrect, do not assess preventive competence. These were replaced by questions that test the ability to anticipate, educate, and prevent. Original questions 12, 21, and 24 were selected for replacement because:

- Question 12: focuses on a complex differential diagnosis post-trauma that usually requires a specialist.

(Replacement):

12. A father brings his asymptomatic 10-year-old son for a well-child visit. The child is sedentary and spends a lot of time in front of screens. From the perspective of primary

prevention of musculoskeletal injuries, what is the most important intervention and competency of the family physician in this case?

- A) Request a bone densitometry to rule out juvenile osteopenia.
- B) Order X-rays of both knees and ankles to establish a baseline.
- C) Promote the practice of at least 60 minutes of daily physical activity, including weight-bearing and strengthening exercises, to stimulate bone and muscle density.
- D) Refer to traumatology for a complete preventive orthopedic evaluation.

- Question 21: evaluates the recognition of a specific pathology (Sever's disease) which, once diagnosed, has a conservative management. This presents a good opportunity to shift the focus towards prevention in the pediatric age group.

(Replacement):

21. A 52-year-old woman, an office worker, comes for a routine check-up. She reports spending more than 8 hours a day sitting in front of a computer. On directed questioning, she mentions occasionally having 'tightness' in her neck and shoulders at the end of the workday. There is no acute pain. The most appropriate behavior, focused on prevention, is:

- A) Request a cervical spine MRI to rule out incipient disc pathology.
- B) Prescribe a course of muscle relaxants to use when the discomfort appears.
- C) Refer to physical therapy for exercises once the pain is established.
- D) Provide ergonomic advice for her workstation and teach her neck and shoulder stretching exercises to perform during active breaks.

Question 24: focuses on a specific radiological finding in a spondyloarthropathy, which is more specialized knowledge.

(Replacement):

24. A 45-year-old man, with obesity (BMI 32) and a sedentary lifestyle, consults for the first time due to intermittent mechanical pain in both knees. X-rays are normal for his age. In addition to initial symptomatic management, what is the fundamental preventive

intervention and competency of the family physician to modify the natural history of his condition?

- A) Prescribe the permanent use of elastic knee braces to provide support.
- B) Initiate treatment with chondroprotectants to slow cartilage wear.
- C) Immediately refer to orthopedics to assess for an arthroscopic cleanup.
- D) Design a gradual and supervised plan for weight loss and strengthening of the quadriceps muscle.

By replacing them, key competencies of the family physician can be assessed: anticipatory guidance, identification of modifiable risk factors, and promotion of healthy lifestyles.

By incorporating these three new questions, the modified MSK-30 survey achieves a much better balance between:

- Acute diagnosis and management (assessed by the 27 original questions that were retained).
- Primary and secondary prevention, and health promotion (assessed by the three new questions).

This more faithfully reflects the comprehensive practice of the family physician, who must not only be competent in solving present problems but also in anticipating them and empowering their patients to maintain their musculoskeletal health in the long term. The replacement of items responds not only to a content update but to the operationalization of a foundational principle of PHC: the proactive approach. While the original MSK-30 evaluates the physician as an acute problem-solver, the adapted version evaluates their role as a community health agent, capable of identifying risks and promoting musculoskeletal resilience from a longitudinal perspective.

With these three changes, the modified survey would assess:

- Tertiary prevention (chronicity management): Identifying risk factors for chronicity to act in time (substitution 1).

- Secondary prevention (acute management): Early educational interventions to prevent complications and negative behaviors (substitution 2).
- Primary prevention (health promotion): Anticipatory guidance and promotion of healthy lifestyles to prevent the occurrence of injury (substitution 3).

The adaptation of the MSK-30 survey represents a significant advancement for competency assessment in the PHC field. While the original survey is a valid tool for measuring knowledge about injury management, this adapted version incorporates the proactive and preventive approach that defines the essence of family medicine.^(12,13)

The adapted version transcends its function as a measurement instrument to become a lens that reveals whether medical training promotes professionals equipped for the anticipatory management of disease burden. Its routine application could guide specific educational interventions and measure the impact of prevention-oriented curriculum reforms.

The inclusion of items on primary prevention, ergonomic counseling, and management of osteoarthritis risk factors more faithfully reflects the daily activities of the family physician. This professional not only acts upon established illness but also plays a crucial role in health promotion, disability prevention, and empowering patients for self-care of their musculoskeletal health. The authors acknowledge that this decision aligns with the guidelines of international organizations, which emphasize the critical importance of prevention in the management of musculoskeletal conditions, a leading cause of years lived with disability globally.^(1,2) Furthermore, it reflects a paradigm shift in medical education, which seeks to train physicians with a comprehensive and proactive vision, capable of educating patients to prevent disability, not just treat established disease.

This refinement process continued with content validation by the specialists. It is crucial to note that the evaluation was performed on this preliminary modified version. Their consensus confirmed the validity of the 29 items that had not been substantially altered, as well as the three new items introduced by the research team. However, their analysis specifically identified a fourth item (item 27) that had remained unchanged from the original version as problematic in its wording, leading to its final reworking.

The CVI analysis showed that 29 of the 30 items achieved a CVI above the established cut-off point ($CVI \geq 0.78$), demonstrating excellent content validity. However, item 27 initially presented a CVI of 0.71, indicating the need for revision. The qualitative comments from the two experts who rated it unfavorably agreed that the wording could lead to ambiguity in its interpretation. The research group reviewed these comments, reworked the item by consensus, and the new version was unanimously accepted, after which the application proceeded.

The final version was administered to twelve family physicians, demonstrating excellent comprehension and high feasibility, with an average completion time of 12 minutes. A Cronbach's Alpha of 0.89 was obtained, indicating excellent internal consistency; this finding is consistent with the value reported by Vázquez Córdor.⁽⁹⁾ It suggests that the instrument's reliability remains robust across different cultural contexts.

As in previous adaptations of questionnaires in the musculoskeletal field,^(8,9,13) this study integrated the fundamental stages of initial conceptual adaptation, content validation through an expert committee, and assessment of reliability and feasibility in a pilot test.

However, this work transcends the usual goal of mere translation or linguistic adaptation. While the literature often focuses on achieving semantic and metric equivalence that preserves the original construct (a process often termed transculturation), this study went deeper. A substantive modification of the assessed construct was performed to align it with a central paradigm in modern clinical practice: the preventive and proactive approach of PHC. This decision is based on international guidelines that prioritize prevention.⁽¹²⁾

The replacement of three items focused on diagnosis and treatment with others that assess primary, secondary, and tertiary prevention responds to an identified need in educational literature: closing the gap between traditional biomedical knowledge and the competencies required for the anticipatory management of health. The authors agree with Roselló Añón *et al.*⁽¹³⁾ that the planning of training actions in MSDs should translate into an increase in the knowledge and skills necessary for their correct management, as this would influence better healthcare, greater system agility, and improved screening for specialist referrals.

The adapted tool thus becomes a bridge between the assessment of knowledge and the assessment of a desired practice model, serving as a diagnostic for curricular design and as an indicator of the quality of training in family medicine. These results are in line with reports in the literature on the need for greater exploration and evaluation of MSDs, as a crucial element to address and mitigate the growing global burden of these diseases.^(13,14)

As is common in this initial phase of instrumental development, the main validations focus on content and internal reliability. The literature on psychometric validation indicates that the next indispensable steps include performing a confirmatory factor analysis on a larger sample to empirically verify the postulated bidimensional structure (management vs. prevention) and establishing criterion validity by correlating scores on the new preventive items with direct observations of these competencies in simulated or real clinical settings.⁽¹⁵⁾

The authors believe that advancing in these directions would consolidate the instrument and allow for its comparative use in different training contexts, while also contributing to the scientific literature, not only with an adapted instrument, but with evidence on the evaluation of the preventive approach in PHC.

Scientific contribution

This article provides a valid, reliable, and culturally adapted tool for the Cuban healthcare context to assess musculoskeletal knowledge, specifically the MSK-30. It is made available to medical schools and postgraduate programs as a standardized instrument to diagnose specific deficiencies in this area of knowledge among students and physicians. Furthermore, it can be used to evaluate the impact of new interventions, courses, or curricular reforms.

CONCLUSIONS

The adapted version of the survey, the Cuban MSK-30, is not merely an assessment tool, but also a map of training needs. The topics it evaluates are the areas where family physicians may have knowledge gaps or where a shift in focus towards prevention needs to be reinforced. This study provides the Cuban medical community with a scientifically robust

tool to address the domain of musculoskeletal knowledge. The Cuban version of the MSK-30 is presented as a fundamental resource for the evaluation and improvement of clinical training in this essential domain. Its use in educational practice and research is recommended.

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Conflict of interest statement

The authors declare no conflicts of interest.

Author contributions

Data Curation: Orisleidys Ramírez Cabañín, Ivonne Cepero Rodríguez, Duniesky Verdecía Navarro

Formal Analysis: Orisleidys Ramírez Cabañín, Bárbara Francisca Toledo Pimentel

Project Administration: Orisleidys Ramírez Cabañín

Investigation: Orisleidys Ramírez Cabañín, Ivonne Cepero Rodríguez, Arianny Velázquez Valentín, Duniesky Verdecía Navarro, Bárbara Francisca Toledo Pimentel

Methodology: Orisleidys Ramírez Cabañín, Bárbara Francisca Toledo Pimentel

Resources: Orisleidys Ramírez Cabañín, Arianny Velázquez Valentín

Supervision: Orisleidys Ramírez Cabañín, Arianny Velázquez Valentín

Validation: Orisleidys Ramírez Cabañín, Duniesky Verdecía Navarro

Visualization: Orisleidys Ramírez Cabañín, Bárbara Francisca Toledo Pimentel

Writing – Original Draft, Review & Editing: Orisleidys Ramírez Cabañín, Ivonne Cepero Rodríguez

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