Original article

Cross-cultural adaptation and validation of the Vietnamese version of the Knee Injury and Osteoarthritis Outcome Score (KOOS) in patients with knee osteoarthritis

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ABSTRACT

Background: Knee osteoarthritis (KOA) is common in Vietnam, affecting about 34 % of individuals over 40 years of age. The Knee Injury and Osteoarthritis Outcome Score (KOOS) is an internationally recognized patient-reported outcome used to assess the impact of KOA but it is not yet available in Vietnamese.
Objective: This study aimed to translate the KOOS into Vietnamese and assess the psychometric properties of the translation (KOOS-V).
Methods: The translation process involved forward/back translation, expert review and cognitive interviews for pretesting. Content validity was assessed by seven experts using the Content validity Index (CVI). A sample of 133 Vietnamese KOA patients (mean age: 63.7 years, 83 % female) completed the KOOS-V, Short Form 36 Health Survey (SF-36) and Numeric Pain Rating Scale (NPRS), and 67 of them were re-assessed after 5–8 days. Psychometric analyses included internal consistency, test-retest reliability, construct validity and cross-cultural comparison of KOOS-V subscales.
Results: KOOS-V exhibited excellent content validity (CVI = 0.86–1.00), satisfactory internal consistency (Cronbach's α = 0.70–0.98) and good to excellent test-retest reliability (ICC = 0.77–0.90). Construct validity was confirmed by moderate to strong correlations with SF-36 Physical Functioning (Spearman's ρ = 0.66 to 0.82) and moderate correlations with NPRS (ρ = −0.49 to −0.62). The cross-cultural comparison showed that the KOOS subscales in Vietnam presents the same challenge as in other cultures.
Conclusions: The KOOS-V is a reliable, valid tool for assessing the functional impact of KOA in Vietnamese patients, contributing to its broader use worldwide in clinical and research settings.

1. Introduction

Knee osteoarthritis (KOA) is a degenerative disease leading to pain, stiffness and reduced mobility. It is ranked as the fourth leading cause of disability and affects over 600 million people globally in 2020.[1] Assessing the functional status of people with KOA is crucial for determining the disease's impact, planning treatment and evaluating intervention effectiveness. Several instruments are commonly used to assess the functional impact of KOA, including the Knee Injury and Osteoarthritis Outcome Score (KOOS) or its short form, the Knee Outcome Survey Activities of Daily Living Scale (KOS-ADL), the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and the Activity Rating Scale.[2] Among these instruments, most only focus on specific aspects of knee function and/or pain level, while the KOOS stands out as a comprehensive patient-reported outcome measure covering pain, symptoms, activities of daily living and quality of life.[2]

The original KOOS exhibited good test-retest reliability (ICC = 0.75–0.93) and internal consistency (Cronbach's α = 0.71–0.95).[3] Construct validity is demonstrated by significant correlations with SF-36 subscales, with the KOOS showing stronger correlations with the SF-36

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physical function (r = 0.68), bodily pain (r = 0.69) and role physical (r = 0.55) than with mental health subscales, indicating good convergent and divergent validity.[3] Moreover, the KOOS is widely used for patients with KOA, having been employed in clinical and research settings for over 30 years and translated into 57 languages since its development.[4]

The KOOS is currently distributed by the Mapi Research Trust.[4,5] To date, 26 translations have undergone formal validation with 18 studies including patients with KOA.[6–22] The psychometric properties of the KOOS translations which were done on KOA population showed satisfactory internal consistency (Cronbach's α = 0.70–0.98) and good to excellent test-retest reliability (ICC = 0.76–0.94).[6,7,9,22] The construct validity of KOOS has been evaluated using various convergent and divergent assessments. Convergent validity was shown by moderate to strong correlation between the KOOS subscales and the Physical Functioning related subscales of the SF-36 (r = 0.49–0.83)[6,8–10,13,15,16,18–20,22] and between the KOOS Pain subscale and the NPRS (r = 0.51–0.79),[6,7,16,18,20] highlighting the ability of the KOOS to capture the various functional consequences of knee health problems. When compared with the Mental Health related subscales of the SF-36, the KOOS subscales display weak to moderate correlations (r = 0.02–0.43), underscoring the distinct domains assessed by both instruments.[6,13,22] The reliability and validity assessments of the KOOS underscore its current acceptance as a valuable tool for evaluating KOA across different languages and cultural adaptations.[6,8–10,13,15,16,18–20]

While KOA affects an average of 23 % of the global population,[1] its prevalence is even higher in certain countries, such as Vietnam, where its affects 34 % of individuals aged 40 years or more.[23] However, to date, there is no validated Vietnamese version of the KOOS, limiting its use in clinical and research settings. Therefore, a cross-sectional study was conducted to translate the KOOS into Vietnamese and assess the psychometric properties of the translation (KOOS-V) on patients with knee osteoarthritis in Vietnam.

2. Material and methods

2.1. Main outcome measure

KOOS is a self-administered survey including 42 items that cover five subscales: Pain (P, 9 items), Symptom (S, 7 items), Function in daily living (ADL, 17 items), Function in sports and recreational activities (Sport/Rec, 5 items) and Quality of Life (QoL, 4 items). A 5-level Likert scale is used to rate each item (e.g. 0 = None, 1 = Mild, 2 = Moderate, 3 = Severe, 4 = Extreme). Subscale scores are calculated as 100 – (mean of subscale items scores)/4 x 100, with higher scores indicating better condition.[3]

2.2. Translation and cross-cultural adaptation

Approval for the translation was obtained from the original developer, Professor Ewa Maria Roos, as well as from the official distributor via www.eprovide.mapi-trust.org, following the linguistic validation procedure outlined by Mapi Research Trust.[5] A translation contract was signed between the distributor and the author prior to the translation process.

The translation of the KOOS into Vietnamese included five stages according to the guidelines of the American Academy of Orthopaedic Surgeons[24]: forward translation (Stage I) by two independent native Vietnamese speakers, synthesis (Stage II) with one investigator together with the translators to reconcile both forward translations, back translation (Stage III) of the reconciled version by two native English speakers unfamiliar with the KOOS concepts, expert committee review (Stage IV) including seven experts to reconcile both back translations, produce the pre-final version and pretestand then cognitive interviews (Stage V) that involved 30 Vietnamese patients with KOA to assess and adjust the prefinal version to produce the final Vietnamese version of the KOOS (KOOS-V). The final version is now available at: https://eprovide.mapi-trust.org/instruments/knee-injury-and-osteoarthritis-outcome-score.

A group of experts was formed with seven physiotherapists to provide independent ratings on the relevance and clarity of the final KOOS-V questionnaire. Content validity, ensuring a comprehensive content representation, was assessed using a Content Validity Index (CVI). To compute the Item-CVI (I-CVI), the experts were asked to score each of the 113 translated parts of text, including the instructions, titles, item labels, response categories and scoring instructions. A 4-point scale was used to rate each translated text for relevance ("Not relevant"/"Somewhat relevant"/"Quite relevant"/"Highly relevant" scored as 1 to 4) and for clarity ("Not clear"/"Somewhat clear"/"Quite clear"/"Highly clear" scored as 1 to 4). The I-CVI was calculated for each translated text as the proportion of experts who scored the Vietnamese translations either 3 or 4; with scores above 0.79 indicating excellent content validity.[25] To compute an aggregate content validity index for the whole translation, a Scale-level CVI (S-CVI) was computed to assess either average agreement (S-CVI/Ave) or universal agreement (S-CVI/UA). The S-CVI/Ave was computed as the average of all I-CVI for each translated text and the S-CVI/UA as the proportion of the 113 translated texts that were scored 3 or 4 by all experts.

2.3. Participants

Participants diagnosed with KOA and undergoing medical or physiotherapy treatment was recruited in Vietnam, from 12 hospitals in Ho Chi Minh City, Dang Nang city and Hanoi city, between July and November 2023. The participants needed to be Vietnamese residents proficient in the Vietnamese language. The study adhered to the ethical standards delineated in the Declaration of Helsinki and approved by the Ethical committee of the University of Medicine and Pharmacy at Ho Chi Minh city, Vietnam (Approval number: 642/HDDD-DHYD, dated July 03, 2023). Written informed consent was obtained from all participants.

2.4. Validation questionnaires

The Vietnamese version of the SF-36 and the Numeric Pain Rating Scale (NPRS) were used to assess the construct validity of the KOOS-V. The SF-36 is a widely-used self-reported health questionnaire covering eight domains: physical functioning (PF, 10 items), physical role limitations (PR, 4 items), bodily pain (BP, 2 items), general health perception (GH, 5 items), energy/vitality (VT, 4 items), social functioning (SF, 2 items), emotional role limitations (ER, 3 items), mental health (MH, 5 items) and perceived health change (HC, 1 item). Each subscale score (0–100) is calculated as the average item score, with higher scores reflecting better health.[26] The NPRS, a generic pain assessment tool, was used to evaluate general knee pain. Participants were asked to rate their overall knee pain intensity on an 11-point scale (0–10), with higher scores indicating more pain. Scores of 1–3 denoted mild pain, 4–6 denoted moderate pain and scores of 7 or higher denoted severe pain.[27]

2.5. Procedures

The KOOS-V, SF-36 and NPRS were administered in a face-to-face interview. All 133 participants completed these three outcome measures at baseline. The participants were re-contacted by telephone after 5–8 days following the interview to assess the test-retest reliability of the KOOS-V. This time interval was selected to prevent any functional change and recall of the first assessment answers.[28]

2.6. Cross-cultural validation

The cross-cultural validity of the KOOS-V was evaluated by comparing the mean scores in Vietnam with the scores reported in other validated translations of the KOOS either in Asian or in European countries. Studies were included in the comparison only if the original subscales were unchanged as compared to the original KOOS. The Asian

versions included Arabic-Saudi Arabi,[6] Cantonese-Hong Kong,[7] Chinese-China,[9] Chinese–Singapore,[10] English-Singapore,[10] Hindi-India,[12] Japanese-Japan,[13] Indonesian-Indonesia,[19] and Urdu-Pakistan.[17] The European versions included French-France,[11] Portuguese-Portugal,[16] Finnish – Finland,[18] Dutch – Netherland,[20] Greek-Greece,[21] and Swedish–Sweden.[22]

2.7. Statistical analysis

For each subscale of the KOOS-V, SF-36 and NPRS, the mean score and standard deviation were computed and these scores were treated as continuous variables. For reliability evaluation, the internal consistency of the initial administration was assessed for each subscale of the KOOS-V using Cronbach's alpha and was considered to be acceptable if greater than 0.70.[28,29] Test-retest reliability for each subscale of the KOOS-V was evaluated with the intraclass correlation coefficient ($ICC_{3,1}$) for each subscale of the KOOS-V using a two-way mixed effect model for absolute agreement.[30] The ICC values were interpreted as follows: <0.5: poor reliability; 0.5–0.75: moderate reliability; 0.75-0.9: good reliability; >0.9: excellent reliability.[30] The standard error of measurement (SEM) for each subscale of the KOOS-V was computed as $SEM = s_p \times \sqrt{1 - ICC}$ where $s_p = \sqrt{0.5*(s_1^2 + s_2^2)}$ with s_1 being the standard deviation of the first test and s_2 being the standard deviation of the re-test.[31] The minimum detectable change (MDC_{95}) for each subscale of the KOOS-V, denoting the smallest change in a score that can be considered a 'real' change beyond measurement error, was computed as $MDC_{95} = 1.96 \times \sqrt{2} \times SEM$.[31]

For validity evaluation, the floor and ceiling effects were determined based on the number of participants scoring zero or 100, respectively. Construct validity was assessed as the relationship between the KOOS-V, the SF-36 and the NPRS using Spearman's correlation coefficients (ρ), interpreted as follows: ≤0.25: weak relation; 0.25–0.50: weak to moderate; 0.50 to 0.75: moderate and ≥0.75: strong relation.[31] All the results were presented with 95 % confidence intervals (CI). Two-tailed tests were used to assess statistical significance, with a p-value threshold of 0.05. All statistical analyses were performed using SPSS 29.0.1.0 (IBM, New York, USA).

3. Results

3.1. Translation and cross-cultural adaptation of the KOOS-V

Minor modifications were made to adapt the KOOS to the Vietnamese context. Indeed, item "Getting in/out of car" was adapted as "Getting in/out of vehicle" to better reflect the transportation context in Vietnam, where car usage is less common. Item "Getting in/out of bath" was changed to "Getting in/out of places where you clean yourself" based on participants' feedback and item "How much are you troubled with lack of confidence in your knee?" was changed to "How much are you troubled with lack of reassurance in your knee". Additionally, during the pretest of the ADL and Sport/Rec subscales, most participants misinterpreted the response "None" as not being able to perform the activity while this response intends to indicate that the patient perceives no difficulty. Therefore, the response label was changed from "None" to "No difficulty" for the final KOOS-V questionnaire.

All items were rated with an I-CVI score of 1.00 for clarity, leading to a scale-level content validity index of 1.00 for both S-CVI/ave and S-CVI/UA. For relevance, I-CVI scores ranged from 0.86 to 1.00, with corresponding S-CVI/ave and S-CVI/UA values of 1.00 and 0.99, respectively, indicating excellent content validity for the final KOOS-V.

3.2. Psychometric properties of the KOOS-V

A total of 133 patients with KOA were enrolled in this study. The demographic and clinical data of the participants are presented in

Table 1
Demographic and clinical characteristics of the participants (n = 133).

Parameter	Value
Age (years), mean ± SD, min-max	63.7 ± 9.7, 41-84
Gender, n (%)	
Female	110 (83 %)
Male	23 (17 %)
Body weight (kg), mean ± SD, min-max	58.2 ± 9.1, 36-88
Body Mass Index (kg/m², mean (SD), min-max	23.9 (3.3), 16.4–32.4
Duration of KOA, n (%)	
<1 year	28 (21 %)
1–3 years	38 (29 %)
3–5 years	15 (11 %)
5–7 years	13 (10 %)
>7 years	39 (29 %)
Level of pain, n (%)	
Mild (NPRS 1–3)	15 (11 %)
Moderate (NPRS 4–6)	65 (49 %)
Severe (NPRS 7–10)	53 (40 %)
Limb affected, n (%)	
Unilateral	48 (36 %)
Bilateral	85 (64 %)
Use of walking aid, n (%)	
No	115 (86 %)
Yes	18 (14 %)

KOA: Knee osteoarthritis, **NPRS**= Numeric Pain Rating Scale.

Table 1. No missing values were observed for the KOOS-V, SF-36, or the NPRS. The average score of the five KOOS-V subscales ranged from a maximum of 65.8 for ADL to a minimum of 32.7 for Sport/Recreation, as shown in Table 2. This indicates that participants generally reported the most difficulty with Sport/Recreation activities and the ADL activities were considered the least challenging. Among the participants, 18.1 % scored the lowest possible score (zero) on the Sport/Recreation subscale indicating a floor effect of this subscale. For the other subscales, the percentage of participants scoring zero ranged from 0 to 2.3 %. Additionally, the percentage of participants achieving the highest score (100) on any subscale ranged from 0 to 5.3 %. The internal consistency was acceptable in all subscales with Cronbach's α ranging from 0.70 to 0.98.

3.3. Test-retest reliability of the KOOS-V

A total of 71 participants were re-assessed. Four participants with a non-similar pain condition compared to the first assessment, as shown by a NRPS score change higher than 2 points, were excluded to ensure consistency in condition between the two assessments.[32] Hence, a total of 67 participants were retained for the test-retest reliability analysis. According to the COSMIN guidelines, this sample size is considered adequate for reliability studies, ensuring the validity of the reliability assessment.[33] A good reliability was observed for each subscale ($ICC_{3,1}$ from 0.77 to 0.90, Table 3). Additionally, the standard error of measurement (SEM) ranged from 6.4 to 10.1 and the minimum detectable

Table 2
Descriptive statistics and internal consistency for KOOS-V (n = 133).

KOOS-V subscale	Mean ± SD	Floor effect (%)	Ceiling effect (%)	Cronbach's α
Symptom	64.2 ± 21.1	0	5.3	0.82
Pain	57.4 ± 23.2	1.5	0	0.93
ADL	65.8 ± 25.4	2.3	1.5	0.98
Sport/ Recreation	32.7 ± 27.6	18.1	1.5	0.91
Quality of life	45.6 ± 19.2	0.8	0	0.70

KOOS-V: the Vietnamese version of the Knee Injury and Osteoarthritis Outcome Score.

Table 3
Average scores and test-retest reliability for KOOS-V subscale (n = 67).

KOOS-V subscale	Test Mean ± SD	Retest Mean ± SD	SEM	MDC$_{95}$	ICC$_{3,1}$ (95% CI)
Symptom	61.5 ± 20.5	62.1 ± 19.3	6.4	17.7	0.90
Pain	54.4 ± 21.6	57.2 ± 20.2	9.0	25.0	0.81
ADL	64.6 ± 24.0	66.1 ± 21.6	7.6	21.0	0.89
Sport/ Recreation	31.0 ± 28.2	31.9 ± 26.3	10.1	27.9	0.86
Quality of life	43.4 ± 17.6	45.8 ± 17.3	8.4	23.3	0.77

KOOS-V: the Vietnamese version of the Knee Injury and Osteoarthritis Outcome Score, SEM: standard error of measurement; MDC$_{95}$: minimum detectable change; ICC$_{3,1}$: intraclass correlation coefficient.

change (MDC$_{95}$) ranged from 17.7 to 27.9 (Table 3).

3.4. Construct validity of the KOOS-V

The correlations of the subscale scores of the KOOS-V with the SF-36 and NPRS are presented in Table 4. All subscales had a moderate to strong correlation with the SF-36 Physical Functioning subscale (ρ = 0.66–0.82), a moderate correlation with the Bodily Pain (ρ = 0.56–0.71) and with the Energy/vitality (ρ = 0.53–0.58) subscales, a weak to moderate correlation with the Physical role limitations (ρ = 0.40–0.59), General health perception (ρ = 0.33–0.50), Social functioning (ρ = 0.32–0.57), Emotional role limitations (ρ = 0.35–0.47) and Mental health (ρ = 0.38–0.49) subscales of the SF-36. All subscales of the KOOS-V also showed a moderate negative correlation with the NPRS (rho = −0.49 to −0.62). The p-values for all correlation coefficients were less than 0.001.

3.5. Cross-cultural validity of the KOOS-V

The mean score to the KOOS-V subscales demonstrated a pattern that is consistent with translations in other languages, indicating that the KOOS subscales followed a parallel trend across different countries (Fig. 1). Three subscales, Symptom, Pain and ADL consistently showed higher scores, indicating that these domains display lower or less frequent functional limitations. The Sport/Rec and Quality of life subscales consistently showed lower scores, indicating that these domains are relatively more challenging for patients with KOA whatever their country.

The Vietnamese scores to the KOOS subscales were in the top half of

Table 4
Spearman's correlation coefficients between the KOOS-V, SF-36 and NPRS.

	KOOS-V				
	Symptom	Pain	ADL	Sport/ Recreation	Quality of life
SF-36					
Physical functioning	**0.66**	**0.71**	**0.82**	**0.78**	**0.69**
Physical role limitations	0.44	**0.50**	**0.59**	0.49	0.40
Bodily pain	**0.60**	**0.64**	**0.71**	**0.61**	**0.56**
General health perception	0.33	0.42	**0.50**	0.44	0.47
Energy/ Vitality	**0.54**	**0.57**	**0.58**	**0.56**	**0.53**
Social functioning	0.47	0.49	**0.57**	0.45	0.32
Emotional role limitations	0.39	0.47	0.42	0.35	0.35
Mental health	0.44	0.49	0.49	0.38	0.39
NPRS	**−0.62**	**−0.59**	**−0.58**	−0.49	**−0.57**

All correlations were statically significant (p < 0.001, 2-tailed). Correlation coefficients greater than |0.50|, indicating a moderate or strong relationship, are highlighted in bold.
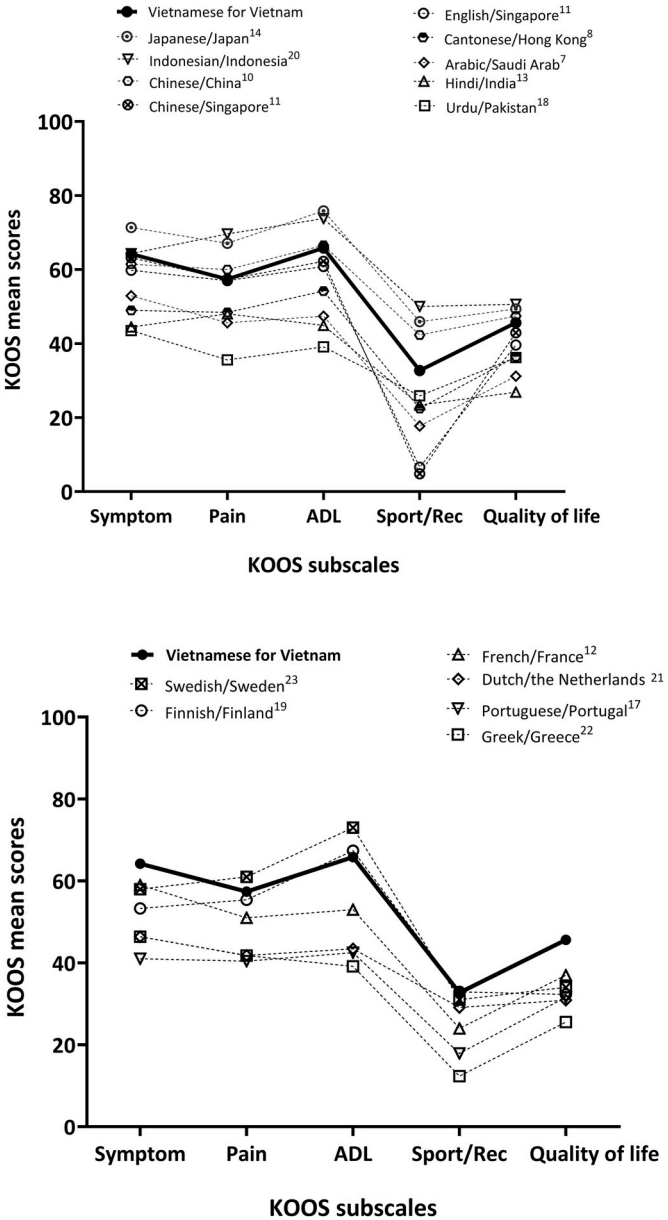

Fig. 1. Average scores to the KOOS subscales for the Vietnamese version (solid thick line) and for other Asian countries (thin dashed lines, upper panel) and for other European countries (thin dashed lines, lower panel).

all Asian countries, indicating a smaller challenge in Vietnam as compared to most other Asian countries (Fig. 1, upper panel). Compared to other European countries, the Vietnamese scores were close to the top of the score range, indicating that the KOOS subscales represent a higher challenge in Europe than in Vietnam (Fig. 1, lower panel). Together these observations indicate that the KOOS-V subscales follow the same trend in all studied European and Asian countries, even if KOA patients in Asian countries tend to report higher scores than in European countries and if the scores to the Sport/Rec subscale are relatively lower in some countries (e.g. Singapore).

4. Discussion

The aim of this study was to translate the KOOS to Vietnamese and to evaluate the psychometric properties of the Vietnamese version (KOOS-V). The translation demonstrated strong psychometric properties, including high content validity, satisfactory internal consistency and

good test-retest reliability. Construct and cross-cultural validity were also confirmed, showing that assessments with the KOOS-V in Vietnam convey the same clinical content as in other countries.

The translation process followed a comprehensive process recommended by Beaton and colleagues, encompassing forward and backward translations, synthesis, expert committee reviews and pretesting.[24] Similar challenges to those reported in prior studies were encountered. First, terminology related to transportation and bathing activities required further adjustments for cultural adaptation, as observed in the Finnish and Brazilian translation.[15,18] Second, the inclusion of the term "none" in the responses for the ADL and Sport/Recreation subscales aimed to improve clarity, aligning with adaptations made in the Saudi Arabian version of the KOOS.[6] These adjustments resulted in excellent content validity, with content validity indices ranging from 0.86 to 1.00, underscoring the relevance and clarity of the KOOS-V to assess KOA in the Vietnamese population. Among previous versions, only the Chinese version conducted a content validity analysis and similar results were reported.[7]

The reliability of the KOOS-V was assessed through internal consistency and test-retest analysis. The KOOS-V showed high internal consistency across the Symptoms (0.82), Pain (0.93), ADL (0.98) and Sport/Recreation (0.91) subscales compared to the original Swedish version (0.74, 0.84, 0.95 and 0.85 respectively) as other translated versions.[7,8,10–12,16,18,21,22] This indicates strong agreement among these items and consistent interpretation by Vietnamese patients. In contrast, the internal consistency of the Quality of Life subscale (0.70) was lower than other subscales but similar to the original KOOS (0.71) and versions adapted for Chinese (0.71), Singaporean (0.71) and Dutch (0.73) populations.[8–10,20,22] This may be attributed to the influence of Cronbach's alpha on subscale length, as longer subscales tend to yield higher reliability values.[34] However, the QoL subscale in Finnish, Japanese and Saudi Arabian KOOS adaptations exhibited much higher internal consistency compared to the KOOS-V.[6,13,18] This discrepancy may be explained by differences in socioeconomic conditions, health perspectives, or varying expectations about quality of life between Vietnamese patients and those in other cultural contexts.[35]

The KOOS-V demonstrated good to excellent test-retest reliability, with ICC values ranging from 0.77 to 0.90 across all subscales. These findings are comparable to the reliability reported for the original KOOS and other language adaptations, such as the Cantonese and French versions.[7,11,22] The Symptom, Pain, ADL and Sport/Recreation subscales exhibited particularly high ICC values, likely due to their more observable and less subjective nature. Furthermore, controlling the change in NPRS scores to no more than two points between assessments in the current study may have helped maintaining a consistent physical state during the test-retest period, thereby optimizing the ICC values for these subscales of the KOOS-V. In contrast, the Quality of Life subscale demonstrated a relatively lower ICC value of 0.77, reflecting the inherent variability in perceptions of quality of life that can be influenced by factors such as mood, stress and personal circumstances.[36]

The construct validity of the KOOS-V was consistent with previous research findings.[6,8–10,15,16] The five subscales of the KOOS-V exhibited moderate to strong correlations with the Physical Function and Bodily Pain domains of the SF-36, as well as moderate correlations with the NPRS. This suggests the KOOS-V demonstrates convergent validity in relation to other established measures. However, the correlations between the KOOS-V Pain subscale and the SF-36 Bodily Pain domain were moderate, comparable to the Portuguese version but higher than the Chinese, Singapore-English and Singapore-Chinese versions.[9,10,16] The correlations between the KOOS-V Pain subscale and the NPRS were also moderate, similar to the Portuguese version ($\rho = 0.51$).[16] These differences between the KOOS-V, SF-36 and NPRS instruments could be attributed to the fact that the Bodily Pain domain of the SF-36 and the NPRS assess pain in a general sense, whereas the Pain subscale of the KOOS is more specifically focused on pain experienced during knee-related functional activities.

The assessment of cross-cultural validity was conducted by comparing the mean scores of the KOOS-V with 15 other validated versions among patients diagnosed with KOA. Across all versions, the ADL, Symptoms and Quality of Life subscales consistently showed higher scores, indicating these activities were less challenging. In contrast, the Sport/Recreation subscale showed the lowest scores, indicating that high-impact activities are most affected by KOA. This trend was consistent across different cultures, suggesting that the difficulties caused by KOA are universally perceived. This could be because the KOOS was initially designed for younger and middle-aged individuals with ACL or meniscus injuries or posttraumatic osteoarthritis.[3] However, when applied to an elderly population with KOA, these activities are more challenging.

Comparing the Vietnamese version of the KOOS to other Asian countries, the mean scores were generally close to the average, though some discrepancies were observed. The Indonesian cohort had higher scores, likely due to their younger mean age (36.4 ± 16.7).The Japanese cohort also exhibited high scores despite an older mean age (68.9 ± 9.4), probably due to the effectiveness of their national health promotion program (Health Japan 21).[37] The similarity in scores for the Pain, Symptoms, ADL and Quality of Life subscales among Vietnam, China and Singapore may be attributed to shared Confucian cultural values that shape health perceptions and reporting.[38] In contrast, lower KOOS scores in Pakistan, India and Saudi Arabia compared to other Asian countries could be attributed to the limited access to quality healthcare, a common challenge in low- and middle-income nations.[39] Compared to European countries, the Vietnamese version's scores were among the highest, similar to the Swedish and Finnish versions. This may reflect cultural differences, where collectivistic principles influence more positive self-assessments.[40]

A potential limitation of this study concerns the assessment of the construct validity of the KOOS-V. While the subscales of the KOOS-V represent a participant's limitations in activities that specifically involve the knee, the SF-36 and the NPRS capture a more general, unspecific, perception of one's health condition. The SF-36 was the only instrument validated in Vietnamese at the time of the study, yet this difference in constructs between instruments may limit the correlations observed in this study. Although any difference in constructs between instruments should have a limited impact on the scores to the KOOS subscales, as shown by a similar scores pattern between Vietnam and other Asian and European countries, a further investigation of the specific construct captured by the subscales of the KOOS-V would be useful in future studies.

5. Conclusion

The KOOS-V demonstrates reliability and validity in assessing patients with KOA in Vietnam. The Vietnamese version of the KOOS developed in this study has demonstrated psychometric properties for patients with KOA that support its use in future clinical and research settings. Future research should also aim to validate the KOOS-V in other pathologies involving the knee.

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