

What is KOOS-12?

KOOS-12 is a 12-item measure derived from the original 42-item Knee injury and Osteoarthritis Outcome Score (KOOS) [1,2]. KOOS-12 contains 4 KOOS Pain items, 4 KOOS Function (Activities of Daily Living and Sport/Recreation) items, and 4 KOOS Quality of Life (QOL) items [3]. KOOS-12 reduces respondent burden by 70% from the original KOOS while providing scale scores for knee-specific Pain, Function and QOL, along with a summary measure of overall knee impact. As with the full-length KOOS survey, KOOS-12 is intended to elicit people's opinions about the difficulties they experience due to problems with their knee and covers aspects of pain, functional limitations and knee-related quality of life.

How was KOOS-12 developed?

KOOS-12 items were selected based on their content along with information from patients, clinicians, and international researchers about item importance and translatability [4]. Item response theory (IRT) models and real-data computerized adaptive test (CAT) simulations also were used to identify items that were best for patients at higher and lower levels of pain and function [4]. Data used for item selection came from a U.S. cohort of nearly 1400 patients with knee osteoarthritis (OA) before and after they underwent a total knee replacement (TKR). Reliability, validity and responsiveness of KOOS-12 scales were evaluated in a separate cohort of nearly 1400 U.S. TKR patients who had knee osteoarthritis [3].

How are KOOS-12 scales scored?

Each item is scored from 0 to 4, left to right, with 0 representing no knee problems and 4 representing extreme knee problems. The separate KOOS-12 Pain, Function and QOL scale scores are calculated using the method of summated ratings, in which item responses in a scale are simply summed. At least half of the items (i.e. a minimum of 2 items) in the scale must be answered to calculate a scale score, and a person-specific estimate is imputed for any missing item data. KOOS-12 scale scores are transformed so 0 is the worst possible and 100 is the best possible score. This is similar to the method used to score the original KOOS scales, which also are scored using the method of summated ratings and transformed to range from 0 to 100 [5].

The KOOS-12 Summary knee impact score is calculated as the average of the KOOS-12 Pain, KOOS-12 Function and KOOS-12 QOL scale scores. A Summary impact score is not calculated if any of the three scale scores are missing. The KOOS-12 Summary impact score also ranges from 0 to 100, where 0 is the worst possible and 100 is the best possible score.

An excel-file for calculation of KOOS-12 scores is available via [ePROVIDE™](#) following the reception of a license. This scoring file takes missing items into account, and will not calculate a score if more than 2 items are missing for a scale.

What are the measurement properties of KOOS-12?

Internal consistency reliability (Cronbach's alpha) of KOOS-12 scales ranged from 0.75-0.82 (KOOS-12 Pain), 0.78-0.82 (KOOS-12 Function) and 0.80-0.84 (KOOS-12 QOL) before to 6-12 months after TKR in the U.S. knee OA cohort [3]. Internal consistency reliability of the KOOS-12 Summary impact score ranged from 0.90 to 0.93 before to 6-12 months after TKR. Convergent and discriminant validity and responsiveness to TKR of the KOOS-12 Pain, Function and QOL scales were satisfactory and reached similar conclusions as comparable KOOS scales. The KOOS-12 Summary score had high effect sizes and standardized response means post-TKR [3].

In what patient populations has the KOOS-12 measurement properties been studied?

As of March 2019, KOOS-12 measurement properties have been studied in U.S. knee OA patients with end-stage disease who had total knee replacement. It had not been studied yet in patients with early-stage OA or patients with ligamentous injuries.

Are there any considerations when KOOS-12 is used with younger, more active patients?

KOOS-12 does not include the most difficult Sport and Recreation items such as running and jumping. These activities are not performed by some knee OA patients, particularly older patients, and for that reason these items were not included in the 4-item KOOS-12 Function scale. However, these activities can be important for younger, more active patients. Thus, it is recommended that the full KOOS Sport/Recreation scale be administered in addition to the KOOS-12 for patients who aspire to higher-level function, such as those undergoing ACL evaluation. Administering a total of 16 items (KOOS-12 plus 4 additional KOOS Sport/Recreation items) to younger and more active patients allows for calculation of KOOS-12 scale scores and the KOOS-12 Summary impact score along with the KOOS Sport/Recreation scale score. Calculating both the KOOS-12 Function and KOOS Sport/Recreation scales in these patients allows for long-term follow-up of patients who may decline in knee function over time. In these situations, the four items "squatting", "running", "jumping" and "kneeling" from the Sport/Rec scale should be added to the questionnaire after the function items and before the QOL items. The "twisting/pivoting" item from the Sport/Rec subscale is already included in KOOS-12.

Are KOOS-12 translations available?

The English and Swedish versions were developed concurrently. For a full list of available language versions please visit: <https://eprovide.mapi-trust.org/instruments/knee-injury-and-osteoarthritis-outcome-score-12-items>.

Do I need permission to use KOOS-12? Are there any costs associated with using it?

The KOOS is free to use for non-funded and funded academic users. A permission is however always required. Corresponding fees will be required, which is dependent on the type of user ranging from non-for-profit healthcare organizations, for-profit healthcare organizations and commercial users. Submit your request through Mapi Research Trust's [ePROVIDE™ platform](#).

References

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3. Gandek B, Roos EM, Franklin PD, Ware JE, Jr. A 12-item short form of the Knee injury and Osteoarthritis Outcome Score (KOOS-12): Tests of reliability, validity and responsiveness. *Osteoarthritis Cartilage* 2019;27:762-770.
4. Gandek B, Roos EM, Franklin PD, Ware JE, Jr. Item selection for 12-item short forms of the Knee injury and Osteoarthritis Outcome Score (KOOS-12) and Hip disability and Osteoarthritis Outcome Score (HOOS-12). *Osteoarthritis Cartilage* 2019;27:746-753.
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6. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine (Phila Pa 1976)*. 2000; 15:3186-91.