PROSPERO International prospective register of systematic reviews

Knee Injury and Osteoarthritis Outcome Score (KOOS): a systematic review of measurement properties

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Citation

Natalie Collins, Ewa Roos, Else Bartels, Robin Christensen, Caroline Terwee, Sanna Prinsen. Knee Injury and Osteoarthritis Outcome Score (KOOS): a systematic review of measurement properties. PROSPERO 2011:CRD42011001603 Available from http://www.crd.york.ac.uk/PROSPERO_REBRANDING/display_record.asp?ID=CRD42011001603

Review question(s)

1. To conduct a systematic review and critical appraisal of the literature regarding measurement properties of the Knee Injury and Osteoarthritis Outcome Score (KOOS) and the KOOS Physical Function Shortform (KOOS-PS); specifically i) reliability; ii) validity; iii) responsiveness; and iv) interpretability.

2. To present measurement properties of the KOOS and KOOS-PS for different patient populations including age groups, knee conditions, and interventions, and make recommendations for their use in research and clinical practice based on findings.

3. To establish an expected mean and SD for each of the KOOS subscales, as well as the KOOS-PS, to serve as a reference for sample size calculations, if necessary for different groups and interventions.

4. To establish the minimal important change (MIC) for each KOOS subscale and KOOS-PS, if necessary for different groups and interventions.

5. To determine the influence of language adaptations on variation in measurement properties of the KOOS subscales and KOOS-PS, and establish whether recent and future language translations require validation.

Searches

A search strategy incorporating terms for “KOOS” and “knee” will be used to search six electronic databases with no language restrictions (MEDLINE via PubMed from 1966, EMBASE via OVID from 1980, CINAHL via EBSCO from 1981, Web of Science from 1900, PsycINFO via OVID from 1806, and Cochrane Central Register of Controlled Trials (CENTRAL)). Since KOOS was first published in 1998, databases will be searched from 1998. The search strategy will be deliberately simplified to ensure inclusion of all relevant papers, with all terms searched as free text and key words (where applicable):

(KOOS AND knee) OR (Knee Injury and Osteoarthritis Outcome Score).

Original published studies (full text and abstracts), as well as PhD theses that are identified by the search strategy, will be included. Potentially eligible papers will be manually reviewed for additional papers in reference lists, and their corresponding authors will be contacted regarding knowledge of other possible papers.

Link to search strategy

None

Types of study to be included

Any original published study evaluating measurement properties of the KOOS and/or KOOS-PS, including reliability, validity, responsiveness and interpretability, will be eligible for inclusion. This includes full text articles and published abstracts, as well as PhD theses identified by the search strategy. There will be no restrictions regarding language of KOOS or KOOS-PS used.

Condition or domain being studied

The KOOS is a commonly used tool to measure patients' opinions of their knee and associated problems. It comprises five domains: i) pain frequency and severity during functional activities; ii) symptoms such as stiffness, swelling and grinding; iii) difficulty during activities of daily living; iv) difficulty with sport and recreational activities; and v) knee-related quality of life. KOOS was intended for young and middle-aged individuals with post-traumatic osteoarthritis (OA), as well as those with injuries that may lead to post-traumatic OA (e.g. ACL, meniscal or chondral injury), and has been used to measure outcome in studies of various treatment modalities. To ensure validity for elderly subjects with knee OA, KOOS includes WOMAC Osteoarthritis Index LK 3.0 in its complete and original format (with permission). KOOS-PS was derived from the activities of daily living and sport/recreation subscales via Rasch analysis, as a short form to evaluate patients' opinions about the difficulties that they experience with physical activity due to their knee pain. For any measurement tool, it is important to establish whether it is reliable, valid, and responsive to change. While there is an increasing body of literature that has evaluated measurement properties of the KOOS and KOOS-PS, there has not been a systematic review to synthesise the published literature. This paper will utilise a systematic search strategy to compile the evidence regarding KOOS and KOOS-PS measurement properties, and critically appraise included studies to allow consideration of methodological quality when interpreting outcomes.

Participants/ population

Studies investigating measurement properties of KOOS and/or KOOS-PS in individuals suffering from any knee condition, as well as in asymptomatic controls, will be eligible for inclusion. No restriction will be placed on method of recruitment or study venue. Studies using KOOS or KOOS-PS for assessment of participants for which KOOS was not designed (e.g. hip or foot conditions) will be excluded.

Intervention(s), exposure(s)

Included studies must have evaluated at least one measurement property of the KOOS or KOOS-PS, in any language translation. This includes reliability, validity, responsiveness, and interpretability. Studies using KOOS or KOOS-PS to evaluate the efficacy of interventions will be excluded.

Comparator(s)/ control

Not applicable

Context

There will be no restrictions placed on recruitment method or setting.

Outcome(s)

Primary outcomes

To be eligible for inclusion, studies must have investigated at least one measurement property encompassing reliability, validity, responsiveness, or interpretability.

Secondary outcomes

Not applicable

Data extraction, (selection and coding)

Results of database searches will be imported into Reference Manager reference-handling system and screened for eligibility by two independent reviewers (NC, ER). Any discrepancies will be discussed to reach consensus, with unresolved cases taken to a third reviewer (CT). Data extraction will be performed independently by one reviewer (NC) on two occasions, using a predefined spreadsheet. A third reviewer (RC) will resolve any discrepancies.

Risk of bias (quality) assessment

Two reviewers (NC, SP), who will remain blind to authors, affiliations and publishing journal, will independently rate each study regarding its methodological quality using the COSMIN checklist. Any criteria for which consensus cannot be met will be taken to a third reviewer (CT) for resolution.

Strategy for data synthesis

Quantitative findings for each measurement property (reliability, validity, responsiveness, interpretability) will be summarised in tables. Interpretation of these will be based on predefined criteria used in previous systematic reviews

of psychometric properties (Terwee et al, 2007, J Clin Epidemiology, 60:34-42). Based on this, as well as methodological quality ratings, a level of evidence will be assigned to each measurement property (strong, moderate, limiting, conflicting, unknown).

Where possible, extracted data will be pooled using generic inverse variance (random effects) methodology. This will be conducted to determine an overall mean and standard deviation for each KOOS subscale and for the KOOS-PS, to assist researchers applying KOOS in prospective studies to calculate sample sizes. In the absence of appropriate or sufficient MIC data for meta-analysis, a best-evidence synthesis will be conducted.

Analysis of subgroups or subsets
Narrative synthesis of subgroups (age, knee condition, intervention, KOOS language) will be performed as indicated.

Dissemination plans
The manuscript reporting study outcomes will be submitted for publication in an appropriate high-impact, peer-reviewed journal.

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Details of any existing review of the same topic by the same authors
Not applicable

Anticipated or actual start date
10 October 2011

Anticipated completion date
31 December 2013

Funding sources/sponsors
None

Conflicts of interest
ER was involved in the development of the KOOS. To ensure no biases within the review based on this, methodological quality ratings and data extraction will be performed by two other reviewers (NC, SP). There are no

other known conflicts of interest to declare.

Language
English

Country
Australia, Denmark, Netherlands

Subject index terms status
Subject indexing assigned by CRD

Subject index terms
Disability Evaluation; Humans; Knee Injuries; Osteoarthritis, Knee; Questionnaires; Reproducibility of Results;

Stage of review
Ongoing

Date of registration in PROSPERO
11 October 2011

Date of publication of this revision
18 September 2013

DOI
10.15124/CRD42011001603

Stage of review at time of this submission	Started	Completed
Preliminary searches	Yes	Yes
Piloting of the study selection process	Yes	Yes
Formal screening of search results against eligibility criteria	Yes	Yes
Data extraction	Yes	Yes
Risk of bias (quality) assessment	Yes	No
Data analysis	No	No