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Number 77

Physical Therapy Interventions for Knee Pain Secondary to Osteoarthritis



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Physical Therapy Interventions for Knee Pain Secondary to Osteoarthritis

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Preface

The Agency for Healthcare Research and Quality (AHRQ) conducts the Effective Health Care Program as part of its mission to organize knowledge and make it available to inform decisions about health care. As part of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003, Congress directed AHRQ to conduct and support research on the comparative outcomes, clinical effectiveness, and appropriateness of pharmaceuticals, devices, and health care services to meet the needs of Medicare, Medicaid, and the Children's Health Insurance Program (CHIP).

AHRQ has an established network of Evidence-based Practice Centers (EPCs) that produce Evidence Reports/Technology Assessments to assist public- and private-sector organizations in their efforts to improve the quality of health care. The EPCs now lend their expertise to the Effective Health Care Program by conducting comparative effectiveness reviews (CERs) of medications, devices, and other relevant interventions, including strategies for how these items and services can best be organized, managed, and delivered.

Systematic reviews are the building blocks underlying evidence-based practice; they focus attention on the strength and limits of evidence from research studies about the effectiveness and safety of a clinical intervention. In the context of developing recommendations for practice, systematic reviews are useful because they define the strengths and limits of the evidence, clarifying whether assertions about the value of the intervention are based on strong evidence from clinical studies. For more information about systematic reviews, see www.effectivehealthcare.ahrq.gov/reference/purpose.cfm.

AHRQ expects that CERs will be helpful to health plans, providers, purchasers, government programs, and the health care system as a whole. In addition, AHRQ is committed to presenting information in different formats so that consumers who make decisions about their own and their family's health can benefit from the evidence.

Transparency and stakeholder input are essential to the Effective Health Care Program. Please visit the Web site (www.effectivehealthcare.ahrq.gov) to see draft research questions and reports or to join an email list to learn about new program products and opportunities for input. Comparative Effectiveness Reviews will be updated regularly.

We welcome comments on this CER. They may be sent by mail to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850, or by email to epc@ahrq.hhs.gov.

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Physical Therapy Interventions for Knee Pain Secondary to Osteoarthritis

Structured Abstract

Objectives. To assess the association between intermediate and patient-centered outcomes and harms with physical therapy interventions in community-dwelling adults with chronic knee pain secondary to osteoarthritis and to examine validity and minimum clinically important differences of the tools for outcome measurement.

Data sources. We searched major electronic bibliographic databases including MEDLINE, the Cochrane Library, the Physiotherapy Evidence Database, and Allied and Complementary Medicine and trial registries up to February 29, 2012.

Review methods. We performed a systematic review of randomized and nonrandomized studies published in English to synthesize rates or means of measured pain, function, and quality of life with physical therapy interventions. Observational studies provided evidence of the association between changes in knee joint functional tests and patient-centered outcomes and minimum clinically important differences in validated tools for outcome measures. We performed meta-analyses of standardized mean differences using random effects models to synthesize the evidence.

Results. Of 4,266 retrieved references, 154 eligible references examined the association between patient-centered and intermediate outcomes and 422 eligible references examined physical therapy interventions. Of these, 193 randomized controlled trials (RCTs) reported on knee pain, disability, quality of life, and functional outcomes after physical therapy interventions. Pooling criteria were met by 84 RCTs that provided evidence for 12 physical therapy interventions on pain ($n = 58$), physical function ($n = 36$), and disability ($n = 29$). Most studies reported physical therapy effects at followups of 3 months or less. Evidence on longer-term physical therapy effects was available for seven intervention-outcome pairs. Meta-analyses at the longest time of followup provided low-strength evidence that aerobic ($n = 11$) and aquatic exercise ($n = 3$) improved disability; aerobic exercise ($n = 19$), strengthening exercise ($n = 17$), and ultrasound ($n = 6$) reduced pain and improved function. Six of 11 individual RCTs demonstrated clinically important improvements in pain and disability with aerobic exercise. Pain relief was consistent in RCTs that reported physical therapist supervision of aerobic exercise. Diathermy, orthotics, and magnetic stimulation demonstrated no benefit. Limited direct comparative effectiveness evidence demonstrated similar benefits in disability measures with aerobic, aquatic, and strengthening exercise. Evidence from individual RCTs did not permit robust conclusions about which physical therapy interventions are most effective or whether differences in effect could be attributed to patient characteristics. Patients with high compliance to exercise tended to have better treatment responses. We found no association between the duration of examined interventions and better intermediate or patient-centered outcomes. Adverse events were uncommon and not severe enough to deter participants from continuing treatment. Gait, mobility restrictions, muscle strength, and range-of-motion measures were associated with disability measures in individual studies. Minimum clinically important differences in scales were determined for 26 tools but have not been used in RCTs to examine the clinical importance of improvements. The definition

of the Patient Acceptable Symptom State that accounts for patient satisfaction was available for the Western Ontario McMaster Universities Osteoarthritis Index, the Visual Analog Scale for Pain, and the Patient Global Assessment Scale.

Conclusions. Low-strength evidence suggested that core physical therapy interventions, including aerobic, aquatic, strengthening, and proprioception exercise, improved patient outcomes. Risk of bias in studies and heterogeneity in populations and physical therapy interventions downgraded the strength of evidence to low or moderate in most cases. Studies focused on a single modality of physical therapy rather than the combinations typically used in practice. Benefits with physical therapy interventions were not consistently evaluated according to the clinical importance of improvement in scales and tests. Adverse events were uncommon and not severe enough to deter participants from continuing treatment. Evidence about long-term adherence to and benefits of available physical therapy interventions is lacking.

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Executive Summary

Background

Osteoarthritis (OA), the most common form of arthritis,¹ is a progressive joint disorder characterized by gradual loss of cartilage.² Osteoarthritis of the knee afflicts 28 percent of adults over age 45³ and 37 percent of adults over age 65 in the United States.⁴ As a leading cause of disability among noninstitutionalized adults,⁴ OA's prevalence, effect on health, and economic consequences are expected to increase dramatically during the next few decades as the population ages.⁵

OA treatments aim to reduce or control pain, improve physical function, prevent disability, and enhance quality of life.⁶ Conservative treatment options include pain relievers, anti-inflammatory drugs, weight loss, general physical exercise, and physical therapy.^{7, 8} Optimal OA management combines pharmacologic treatments with physical therapy interventions⁷⁻¹⁰ and, when conservative treatments fail, surgery.^{7, 8} Surgical treatments for knee OA include realignment osteotomy and knee replacements.¹¹ In the United States, about 556,400 knee replacement surgeries are performed annually.¹¹ By 2030, that number is projected to increase by 600 percent.¹²

Comprehensive, up-to-date guidelines are available from the Osteoarthritis Research Society International (OARSI), the American Academy of Orthopedic Surgeons, and the National Institute for Health and Clinical Excellence. These guidelines recommend exercise (including local muscle strengthening and general aerobic fitness) as a core treatment for symptomatic osteoarthritis, regardless of patient age, comorbidity, pain severity, or disability.^{7, 8, 13} Effectiveness has not been clearly established for other nonpharmacologic physical therapy interventions as adjunct to core treatment (e.g., thermal, manipulation, electrical nerve stimulation, and orthotics).⁷

Patient-centered clinical outcomes include functional status, pain, and quality of life.⁸ Consumers judge the success of physical therapy interventions by improvement in patient-centered outcomes.^{14, 15} Some consensus exists that clinical trials for symptomatic knee OA should examine patient-centered clinical outcomes and joint imaging.¹⁶ However, published studies inconsistently define treatment success.¹⁷⁻²⁰ In practice, physical therapists evaluate treatment success using intermediate outcomes related to function, including instrumental measurements of gait, balance, and range of motion. Likewise, reimbursement is currently driven by functional outcomes, including gait, transfers, and activities of daily living. Yet, we are not certain whether these outcomes predict pain, disability, or quality of life.

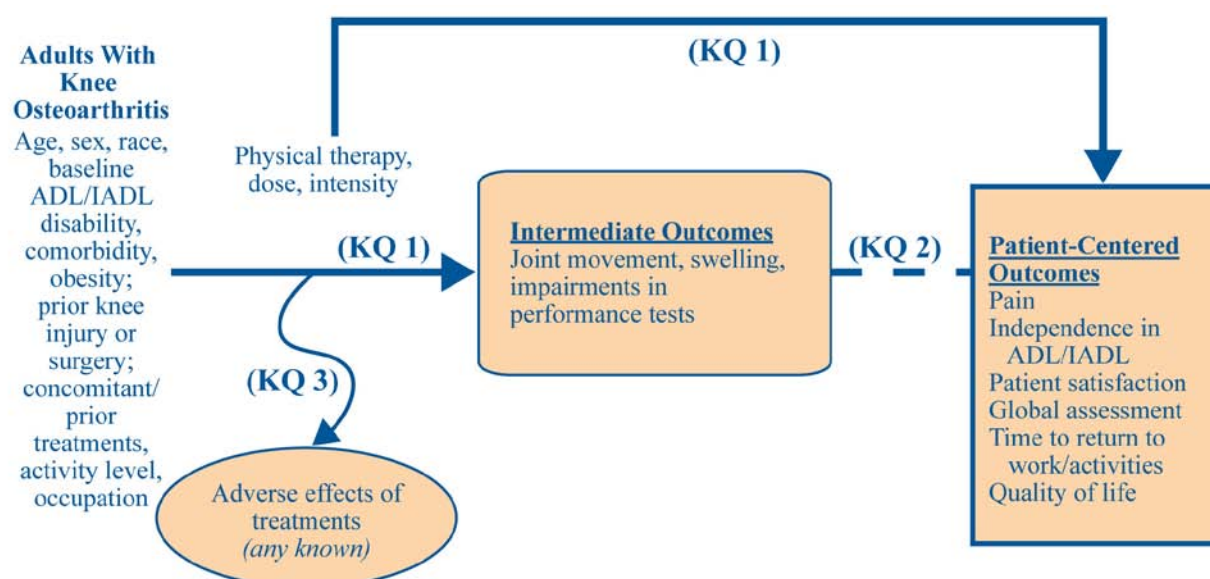
This report synthesizes published evidence about the effectiveness of physical therapy for pain secondary to knee OA in adults. We focused on community-dwelling adults in ambulatory care settings and on interventions applicable to physical therapy practice. Our systematic review is intended to help clinicians, consumers, and policymakers make informed decisions based on synthesized evidence and other relevant factors.

Input From Stakeholders

We developed our Key Questions with stakeholder input as part of the Effective Health Care Program. We developed an analytic framework (Figure A) after discussions with key informants. Research questions were posted for public comment. Key informants recommended that we focus on patient-centered outcomes and physical therapy interventions relevant for clinical

practice in the United States. Key informants also recommended that we review the intermediate outcomes with which physical therapists judge treatment success. Candidates to serve as Key Informants, technical experts, and Peer Reviewers were approved by the Task Order Officer from the Agency for Healthcare Research and Quality (AHRQ) after disclosure of conflicts of interest. We developed the protocol following Preferred Reporting Items for Systematic Reviews and Meta-Analyses_guidelines²¹ (www.effectivehealthcare.ahrq.gov/index.cfm/search-for-guides-reviews-and-reports/?productid=637&pageaction=displayproduct), with input from members of the Technical Expert Panel (TEP).

Figure A. Analytic framework



ADL = activities of daily living; IADL = instrumental activities of daily living; KQ = Key Question

Objectives

For the topic of physical therapy interventions for adults with knee OA, our goal was to conduct (1) a comprehensive review of the literature about the association between intermediate and patient-centered outcomes and (2) a comprehensive synthesis of evidence of the clinical efficacy and comparative effectiveness of the interventions. We followed the principles from the Methods Guide for Effectiveness and Comparative Effectiveness Reviews from AHRQ (<http://effectivehealthcare.ahrq.gov/search-for-guides-reviews-and-reports/?pageaction=displayproduct&productid=318>). We examined the following questions:

Key Question 1. What are the effectiveness and comparative effectiveness of available physical therapy interventions (without drug treatment) for adult patients with chronic knee pain due to OA on intermediate and patient-centered outcomes when compared to no active treatment or another active physical therapy modality?

- a. Which patient characteristics are associated with the benefits of examined interventions of physical therapy on intermediate and patient-centered outcomes?

- b. Do changes in intermediate and patient-centered outcomes differ by the dose, duration, intensity, and frequency of examined interventions of physical therapy?
- c. Do changes in intermediate and patient-centered outcomes differ by the time of followup?

Key Question 2. What is the association between changes in intermediate outcomes with changes in patient-centered outcomes after physical therapy interventions?

- a. What is the validity of the tests and measures used to determine intermediate outcomes of physical therapy on knee OA in association with patient-centered outcomes?
- b. Which intermediate outcomes meet the criteria of surrogates for patient-centered outcomes?
- c. What are the minimum clinically important differences of the tests and measures used to determine intermediate outcomes?

Key Question 3. What are the harms from physical therapy interventions available for adult patients with chronic knee pain due to osteoarthritis when compared to no active treatment or active controls?

- a. Which patient characteristics are associated with the harms of examined physical therapy interventions?
- b. Do harms differ by the duration of the treatment and time of followup?

Methods

Data Sources

We sought studies from a wide variety of sources, including MEDLINE[®] via OVID and PubMed[®], the Cochrane Library, the Physiotherapy Evidence Database (PEDro), SCIRUS, Allied and Complementary Medicine (AMED), and the Health and Psychosocial Instruments bibliography database up to February 29, 2012. We conducted manual searches of reference lists from systematic reviews and eligible studies. The grey literature search included regulatory documents, conducted clinical trials, and abstracts presented in scientific meetings.

Study Selection

At least two investigators independently evaluated each study for eligibility. Disagreements were resolved by consensus. We defined the target population, eligible independent and dependent variables, outcomes, time, and setting following the PICOTS (Population, Intervention, Comparator, Outcomes, Timing, and Settings) framework developed in the protocol. We included original studies of adults with knee OA published in English after 1970. Eligible trials enrolled community-dwelling adults with knee OA and reported pain as an inclusion criterion and/or outcome. Eligible interventions fell within the scope of physical therapy practice, whether or not the articles clearly described the involvement of physical therapists or physical therapist assistants in a given study.²² For analyses of efficacy, eligible comparators included sham stimulation, usual care, and no active treatment; for comparative effectiveness, eligible comparators were physical therapy interventions. Eligible patient-centered

outcomes included knee pain, disability, quality of life, perceived health status, and global assessments of treatment effectiveness. Eligible intermediate outcomes included composite function, joint function, gait function, strength, and transfers.

To minimize risk of bias and to obtain valid estimates of physical therapy benefits and harms, we focused on randomized controlled trials (RCTs). While randomization may distribute the effects of other treatments equally, their efficacy must still be taken into account. Moreover, some nonphysical therapy treatments, such as pain relievers, may in part mask the benefits of physical therapy, especially for pain. We also reviewed observational studies with multivariate adjustment for concomitant treatments and confounding factors.^{23, 24} We defined physical therapy and selected the interventions and methods to assess the outcomes in accordance with “Practice Pattern 4E: Impaired Joint Mobility, Motor Function, Muscle Performance, and Range of Motion Associated with Localized Inflammation” from the Guide to Physical Therapist Practice.²²

For Key Question 2, we included any observational studies that reported the association between intermediate and patient-centered outcomes.

We defined the target population as community-dwelling adults with knee pain secondary to knee OA. We excluded studies involving children, adolescents, hospitalized patients, or patients in long-term care facilities; studies that included patients with knee or hip OA that did not separately report the outcomes in patients with knee OA; and studies that aimed to examine surgical or pharmacologic treatments for knee OA. We also excluded studies that examined physical therapy delivered via rehabilitation programs for adults with knee OA who had undergone knee arthroplasty within 6 months before the study. For Key Question 2, we did not review validation of tests in populations with diseases other than knee OA.

We defined harms as a totality of all possible adverse consequences of an intervention.²⁵ We included published and unpublished evidence of adverse effects with eligible interventions, regardless of how authors perceived causality of treatments.²⁵ We did not contact the primary investigators for further information or clarification about the methodology or results of the trials.

Data Extraction

We used standardized forms to extract data. We conducted a double independent quality control for the data extracted from RCTs. One reviewer abstracted an article and a second reviewer checked the data for accuracy. We abstracted minimum datasets for therapeutic studies. For categorical variables, we abstracted the number of events among treatment groups. We abstracted means and standard deviations of continuous variables. For RCTs, we abstracted the number randomized to each treatment group. We abstracted the time when the outcomes were assessed as weeks from randomization and the time of followup after treatments; we categorized followups as less than 6 weeks, 6 to 13 weeks, 14 to 26 weeks, or more than 26 weeks. For observational studies, we extracted relative measures of the association (relative risk, hazard ratio, odds ratio) with standard error or 95% confidence interval (CI), and reported adjustments for patient characteristics.

For the studies about the association between intermediate and patient-centered outcomes for Key Question 2, we abstracted the number of positive (true and false) and negative (true and false) with index diagnostic tests when compared with the reference standard.

We abstracted baseline patient characteristics, including eligible and mean age; mean body mass index; proportion of women and minorities; proportion with disability; proportions with

severe knee OA, comorbidities, and multijoint OA; baseline physical activity level; occupation; and concomitant drug and physical therapy interventions. We abstracted settings and physical therapist supervision of the treatments. We abstracted type, dose, length, and intensity of physical therapy interventions when reported by the authors.

Risk of Bias Assessment and Strength of Evidence

Using a modified Cochrane risk of bias tool,²⁶ we evaluated risk of bias in individual studies according to their designs. We evaluated random allocation of the subjects to treatment groups, adequacy of randomization and allocation concealment, masking of the treatment status for the outcome assessment, and intention-to-treat principles. We examined sponsorship and conflict of interest but did not increase risk of bias by using this information.

We defined RCTs as having medium risk of bias if one criterion was not met and high risk of bias if two or more criteria were not met.

We evaluated diagnostic studies for Key Question 2 using criteria from the Quality Assessment of Diagnostic Accuracy Studies.²⁷

We assessed strength of evidence from therapeutic studies for each major outcome according to risk of bias, consistency, directness, and precision.²⁸ We focused on direct evidence from head-to-head RCTs. We downgraded strength of evidence if: (1) risk of bias was moderate or high; (2) heterogeneity was statistically significant; or (3) estimates were inconsistent or imprecise. We defined treatment effect estimates as precise when pooled estimates had reasonably narrow 95% CIs and pooled sample size was greater than 400. When appropriate, we included strength of association²⁸ and upgraded the strength of evidence if the standardized effect size was more than 0.8. We defined strength of evidence as low when evidence was limited to an individual study with low or medium risk of bias, and we defined evidence as insufficient if drawn from single studies with high risk of bias.²⁸ We judged whether the overall body of available evidence allowed for conclusions that were sufficiently robust and resistant to bias and errors to guide clinical decisionmaking.²⁶

We followed the criteria of the United States Preventive Services Task Force in assessing strength of evidence from observational studies that examined the association between patient-centered and intermediate outcomes.²⁹

Applicability

We estimated the applicability of the sample by evaluating the selection of adults in observational studies and clinical trials. For each intervention study, we also examined setting (including the involvement of physical therapists or physical therapist assistants) and exclusion criteria.

Data Synthesis and Analysis

We synthesized and presented the evidence according to the classification of physical therapy interventions from the American Physical Therapy Association's (APTA's) Guide to Physical Therapist Practice.²²

For categorical variables, we calculated rates, relative risk, and absolute risk differences. For continuous variables we calculated mean differences with 95% CI. We also calculated ratios of means that describe percentage differences in pain with active versus control interventions.³⁰ We

calculated estimates by applying intention-to-treat principles. If we found more than one study from a particular trial, we used the results from the latest published papers.

We examined and synthesized evidence of other nonsurgical treatments for knee OA if reported in the studies. We then compared effects of the examined physical therapy interventions across the studies according to reported concomitant drug treatments. We conducted sensitivity and subgroup analyses according to concomitant drug treatments when the available data were suitable for pooling.

Using a standard preplanned algorithm, we explored heterogeneity by characteristics of clinical diversity, including age, sex, race, and baseline activities of daily living (ADL), instrumental activities of daily living (IADL), comorbidity, obesity, and significant skeletal abnormality.³¹ We explored heterogeneity by treatment type, dose (when applicable), and duration, as well as by whether the control treatment included education or exercise. We performed subgroup analyses by the involvement of a physical therapist for all outcomes with aerobic or strengthening exercises but not with other interventions that were likely administered by physical therapists. We explored heterogeneity by disclosed conflict of interest³¹ and by individual risk of bias criteria of individual studies rather than using a global risk of bias score.^{32, 33}

We focused on patient-centered outcomes, including pain, disability, and quality of life.³⁴ We categorized intermediate outcomes as measurements of gait, strength, balance, transfers, endurance, joint function, or composite measure of functional performance. We reviewed validity and reliability of the tests within the scope of physical therapy practice. Evidence of the association between intermediate and patient-centered outcomes of physical therapy interventions was synthesized from observational studies that adjusted for treatments and confounding factors. We synthesized evidence from the studies that reported diagnostic values of intermediate outcomes to predict clinical outcomes. In a separate analysis, we synthesized the evidence of the association between intermediate and clinical outcomes from linear, logistic, or Cox regression models.

Using Meta-analyst³⁵ and STATA³⁶ software at a 95% CI, we calculated differences in relative risk and absolute risk from the abstracted events, and we calculated nonstandard mean differences in continuous variables from the reported means and standard deviations. We used correction coefficients, forced intention to treat, and calculations for missing data as recommended by guidelines.²⁶ Using Cohen's criteria, we defined magnitude of the effect as small, middle, and large, corresponding 0-0.5, 0.5-0.8, and >0.8 standardized mean differences in standard deviation units.³⁷ Pooling criteria for Key Questions 1 and 3 required that interventions and outcomes be similarly defined.

We categorized eligible physical therapy interventions according to the way in which they were defined and ordered in APTA's Guide to Physical Therapist Practice.²² To address differences in outcomes measures, we analyzed all eligible RCTs with the recommended standardization method instead of excluding valuable results from eligible RCTs that used different measures of the outcomes.³⁸ We calculated standardized mean differences (SMDs) for different measures of the same outcome with Cohen and Hedges methods. We back transformed SMDs to mean differences³⁸ with several instruments: for disability, we used EQ-5D, a multiattribute, preference-based health status measuring instrument;³⁹ for quality of life, we used the 36-Item Short-Form Health Survey (SF-36);⁴⁰ for pain, we used the Visual Analog Scale (VAS);⁴¹ for composite function, we used the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) function score;⁴² and for gait function, -we used walking

speed.⁴¹ We derived pooled standard deviations of EQ-5D and SF-36 from large population-based studies of noninstitutionalized adults.^{39 40-42} We multiplied the SMDs by the among-person standard deviation to yield an estimate of the difference in mean outcome scores (with, versus without, intervention) on EQ-5D (0.38),³⁹ SF-36 (10.9),⁴⁰ VAS (22 in scale of 0 to 100),⁴¹ WOMAC physical function (18.5),⁴² and walking speed (0.2 m/s).⁴¹ We categorized treatment effects from the studies by the clinical importance of differences in intermediate outcomes according to definitions of minimum clinically important differences (MCIDs) from published observational studies and evidence-based reports.⁴³ We categorized the results from each tested hypothesis as nonsignificant differences in continuous outcomes or as statistically significant differences of <20, 20–50, or >50 percent from control interventions.⁴⁴

We tested consistency of the results by comparing the direction and strength of the association²⁸ and assessed heterogeneity of results using Chi square and I square tests.^{45, 46} We also explored heterogeneity with meta-regression and sensitivity analysis. Using four followup time categories, we performed meta-analyses based on examined physical therapy modalities and their combinations. We conducted subgroup analyses to examine the association between each component and treatment effect size. We reported the results from random effects models only⁴⁷ and chose the random effects model to incorporate in the pooled analysis differences across trials in patient populations, concomitant treatments, and definitions of interventions and outcomes.³¹

We qualitatively synthesized the evidence from poorly reported RCTs and observational studies. For studies that included knee and hip OA, we included the results in pooled analyses if we could isolate knee cases.

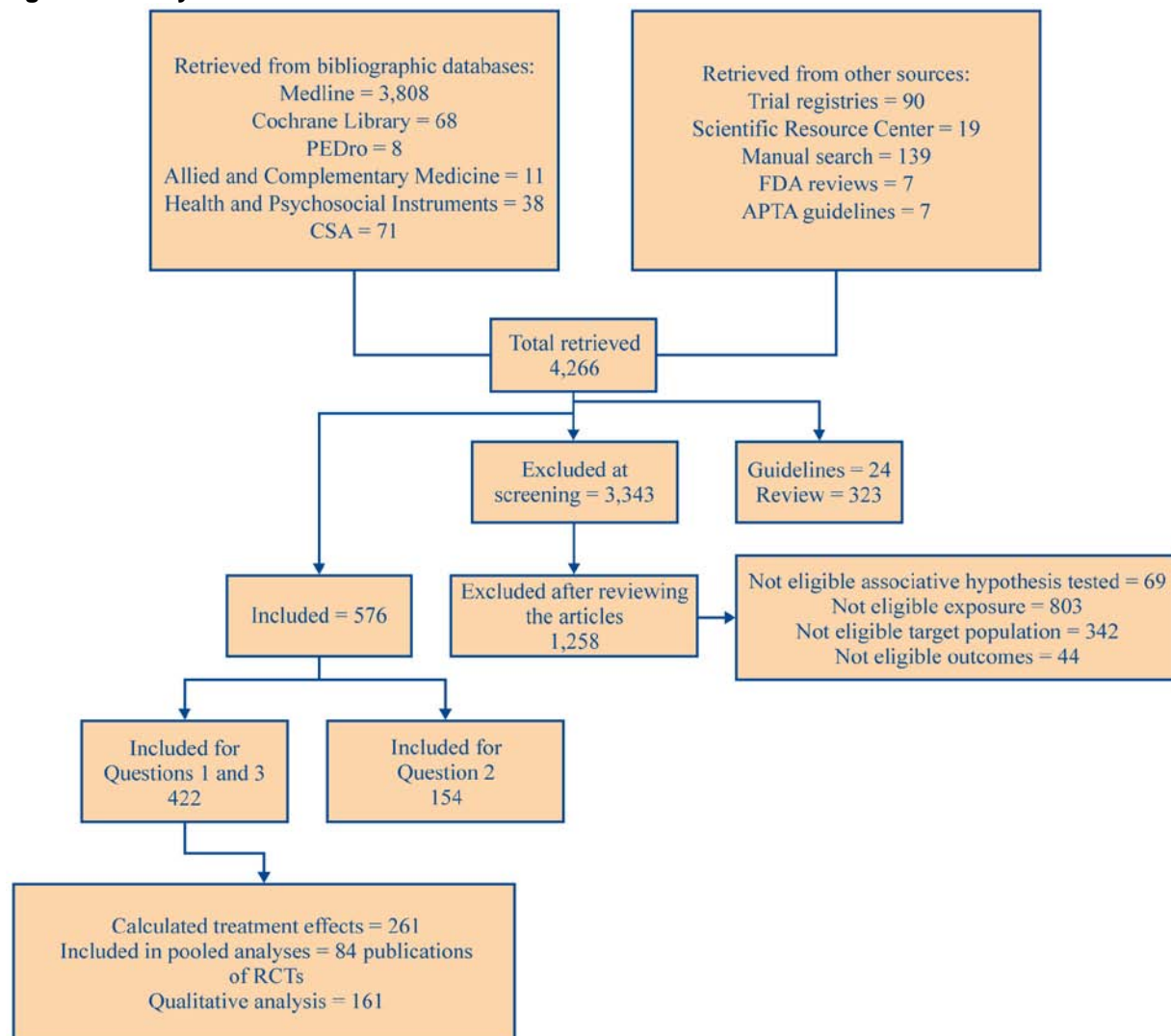
For Key Question 2, we summarized results of individual studies in evidence tables to analyze sensitivity, specificity, predictive values, diagnostic odds ratios, and predictive likelihood ratios, with a focus on the latter.^{48, 49} Ratios of 1 indicated that the tests did not provide a likelihood of accurate diagnosis.⁴⁹ Ratios of more than 10 provided large, and often conclusive, increases in the likelihood of an accurate diagnosis.⁴⁹

We tabulated each article for results of index diagnostic tests and reference standards. We evaluated validation and the proposed MCIDs in total scores when this information was available. To judge validity from the studies that reported correlation coefficients between index and reference methods, we categorized correlation as follows: weak correlations as <20 percent, medium correlation as 20-50 percent, strong correlation as 50-75 percent, and very strong correlation as >75 percent.³⁷ To answer the question of which intermediate outcomes met the criteria of surrogates for patient-centered outcomes, we used Outcome Measures in Rheumatoid Arthritis Clinical Trials (OMERACT) Criteria for Surrogate Endpoints.^{44, 50} We examined whether randomized trials of physical therapy interventions evaluated the association between intermediate outcome change and patient-centered outcome change.⁵⁰

Results

Of 4,266 identified references, we included 576 references for this review (Figure B). For Key Questions 1 and 3, we synthesized evidence from 422 references. We calculated treatment effect from 261 references including 212 publications of 193 RCTs, and qualitatively analyzed 161 studies. Only 84 RCTs met pooling criteria and were included into meta-analyses. Definitions of physical therapy interventions and outcomes varied dramatically among studies; thus, only a small proportion of comparisons met pooling criteria. We prioritized pooled analyses and results at longest time of followup over nonpooled results and short followups. Most studies lasted 4 to 6 weeks, with a followup of 6 months.

Figure B. Study flow



APTA = American Physical Therapy Association; CSA = Cambridge Scientific Abstracts; FDA = U.S. Food and Drug Administration; PEDro = Physiotherapy Evidence Database; RCT = randomized controlled trials

Overall, RCTs had good applicability to our target population because they primarily recruited older adults with knee OA. More than 70 percent of the participants were female. Body mass index (BMI) of participants averaged 29 kg/m². In 100 RCTs (52 percent), subjects were taking anti-inflammatory drugs or pain relievers. Half the studies provided no information about exact pharmacologic treatments. Few studies specified that they excluded patients with prior knee surgery, and most did not report participants' occupation, knee injury, comorbidity, or duration of condition, or the proportion of subjects with baseline disability or who had undergone surgery.

Because the studies used different tools to measure the same outcomes, we used standardization in all pooled analyses. The studies examined continuous measures of the outcomes and rarely categorized the patients according to clinical importance of the changes.

The most common reasons for increased risk of bias were unmasking of the treatment status and no planned intention-to-treat analyses. Most RCTs had medium risk of bias.

Key Questions

Key Question 1. Effectiveness of Physical Therapy Interventions

We found very few statistically significant differences in outcomes between active and control treatments. Tables A and C show how many studies examined each outcome, estimated effect sizes, and our level of confidence that the evidence reflects a true estimate of the treatment effect that is not likely to be changed by future research. Tables B and D present our conclusions about effectiveness of physical therapy interventions.

In pooled analyses, we found low-strength evidence that core physical therapy interventions, including aerobic and aquatic exercise, improved disability measures; aerobic exercise and strengthening exercise reduced pain and improved function. In addition, ultrasound reduced pain and improved function. Proprioception exercise reduced pain, and tai chi improved function at short-term but not long-term followup. No single physical therapy improved all outcomes. We observed no benefits from specific education programs, diathermy, orthotics, or magnetic stimulation. Individual (nonpooled) RCTs failed to show consistent statistically significant, strong, or clinically important changes in outcomes. Individual small RCTs may fail to show statistically significant effects due to low statistical power. Strength of evidence was downgraded due to study risk of bias and heterogeneity in populations, treatments, and definitions of outcomes.

We described the interventions according to definitions and classification from APTA's Guide to Physical Therapist Practice.²² For each examined intervention, we reported (1) the total number of eligible RCTs that contributed to our findings and (2) conclusions from the studies that contributed to the pooled analyses at the longest time of followup.

Table A. Effectiveness of physical therapy intervention on patient-centered outcomes (standardized mean differences [SMDs] pooled with random effects models, using standardized units of differences-standard deviations)

Outcome, Studies, Sample Size, References	Risk of Bias	Directness	Consistency	Precision	Strength of the Association	Strength of Evidence	Pooled Hedges Standard Mean Difference (95% CI) Converted Mean Difference (95% CI)
<i>Specific Education Programs</i>							
Pain 6-13 weeks Studies: 3; Subjects: 429 <small>76-78</small>	High	Direct	Inconsistent	Imprecise	NA	Low	0.09 (-0.42, 0.60) 2.0 (-9.2, 13.2)
Pain >26 weeks Studies: 2; Subjects: 511 <small>76, 79</small>	High	Direct	Consistent	Precise	NA	Low	-0.09 (-0.32, 0.14) -2.0 (-7.0, 3.1)
<i>Aerobic Exercise</i>							
Disability <6 weeks Studies: 2; Subjects: 117 <small>80, 81</small>	High	Direct	Inconsistent	Imprecise	Large	Low	-1.70 (-3.27, -0.13) -0.65 (-1.24, -0.05)
Disability 6-13 weeks Studies: 8; Subjects: 739 <small>77, 80-86</small>	High	Direct	Inconsistent	Imprecise	NA	Low	-0.44 (-0.94, 0.05) -0.17 (-0.36, 0.02)
Disability 13-26 weeks Studies: 2; Subjects: 277 <small>82, 83</small>	Medium	Direct	Consistent	Imprecise	NA	Low	0.12 (-0.11, 0.36) 0.05 (-0.04, 0.14)
Disability >26 weeks Studies: 4; Subjects: 806 <small>54, 83, 87, 88</small>	High	Direct	Consistent	Precise	Small	Low	-0.21 (-0.37, -0.04) -0.08 (-0.14; -0.02)
Psychological disability 6-13 weeks Studies: 4; Subjects: 271 <small>77, 81, 86, 89</small>	High	Direct	Inconsistent	Imprecise	NA	Low	-0.67 (-1.43, 0.1)
Pain <6 weeks Studies: 2; Subjects: 137 <small>79, 81</small>	High	Direct	Inconsistent	Imprecise	NA	Low	-0.98 (-2.19, 0.24) -21.6 (-48.2, 5.3)
Pain 6-13 weeks Studies: 12; Subjects: 1,242 <small>76, 77, 81-86, 89-92</small>	High	Direct	Inconsistent	Precise	Small	Low	-0.32 (-0.55, -0.08) -7.0 (-12.1, -1.8)
Pain 13-26 weeks Studies: 6; Subjects: 953 <small>79, 82, 83, 90-92</small>	High	Direct	Consistent	Precise	NA	Low	-0.06 (-0.19, 0.06) -1.3 (-4.2, 1.3)

Table A. Effectiveness of physical therapy intervention on patient-centered outcomes (standardized mean differences [SMDs] pooled with random effects models, using standardized units of differences-standard deviations) (continued)

Outcome, Studies, Sample Size, References	Risk of Bias	Directness	Consistency	Precision	Strength of the Association	Strength of Evidence	Pooled Hedges Standard Mean Difference (95% CI) Converted Mean Difference (95% CI)
<i>Aerobic Exercise (continued)</i>							
Pain >26 weeks Studies: 6; Subjects: 1,221 <small>54, 76, 79, 83, 87, 92</small>	High	Direct	Consistent	Precise	Small	Low	-0.21 (-0.35, -0.08) -4.6 (-7.7, -1.8)
Function composite 6-13 weeks Studies: 3; Subjects: 351 <small>64, 89, 92</small>	Medium	Direct	Inconsistent	Imprecise	Large	Low	-0.83 (-1.34, -0.32) -15.4 (- 24.8, -5.92)
Function composite >26 weeks Studies: 3; Subjects: 826 <small>54, 79, 92</small>	Medium	Direct	Inconsistent	Precise	NA	Low	-0.18 (-0.44, 0.08) -3.33 (-8.14, 1.48)
Gait function < 6 weeks Studies: 3; Subjects: 220 <small>80, 81, 90</small>	High	Direct	Consistent	Imprecise	Small	Low	-0.38 (-0.63, -0.13) -0.08 (-0.13, -0.03)
Gait function 6-13 weeks Studies: 8; Subjects: 632 <small>64, 80, 81, 86, 89-91, 93</small>	High	Direct	Consistent	Precise	Moderate	Low	-0.57 (-0.75, -0.39) -0.11 (-0.15, -0.08)
Gait function 13-26 weeks Studies: 3; Subjects: 459 <small>79, 90, 91</small>	High	Direct	Consistent	Precise	Small	Low	-0.44 (-0.62, -0.26) -0.09 (-0.12, -0.05)
Gait function >26 weeks Studies: 2; Subjects: 609 <small>54, 94</small>	Medium	Direct	Consistent	Precise	Moderate	Low	-0.56 (-0.86, -0.25) -0.11 (-0.17, -0.05)
Health perception 6-13 weeks Studies: 2; Subjects: 62 <small>81, 89</small>	High	Direct	Inconsistent	Imprecise	NA	Low	-1.38 (-3.08, 0.32)
Health perception >26 weeks Studies: 3; Subjects: 513 <small>83, 87, 88</small>	High	Direct	Consistent	Precise	NA	Low	-0.04 (-0.21, 0.14)

Table A. Effectiveness of physical therapy intervention on patient-centered outcomes (standardized mean differences [SMDs] pooled with random effects models, using standardized units of differences-standard deviations) (continued)

Outcome, Studies, Sample Size, References	Risk of Bias	Directness	Consistency	Precision	Strength of the Association	Strength of Evidence	Pooled Hedges Standard Mean Difference (95% CI) Converted Mean Difference (95% CI)
<i>Aquatic Exercise</i>							
Disability 6-13 weeks Studies: 2; Subjects: 99 68, 95	Medium	Direct	Consistent	Imprecise	NA	Low	0.06 (-0.36, 0.49) 0.02 (-0.14, 0.19)
Disability 13-26 weeks Studies: 2; Subjects: 303 95, 96	Medium	Direct	Consistent	Imprecise	Small	Low	-0.28 (-0.51, -0.05) -0.11 (-0.19, -0.02)
Pain 6-13 weeks Studies: 2; Subjects: 99 68, 95	Medium	Direct	Consistent	Imprecise	NA	Low	-0.25 (-0.64, 0.15) -5.5 (-14.1, 3.3)
Pain 13-26 weeks Studies: 2; Subjects: 303 95, 96	Medium	Direct	Consistent	Imprecise	NA	Low	-0.17 (-0.39, 0.06) -3.7 (-8.6, 1.3)
QL13-26 weeks Studies: 2; Subjects: 303 95, 96	Medium	Direct	Consistent	Imprecise	NA	Low	-0.10 (-0.32, 0.13) -1.06 (-3.51, 1.40)
Function composite 6-13 weeks Studies: 2; Subjects: 99 68, 95	Medium	Direct	Consistent	Imprecise	NA	Low	-0.03 (-0.51, 0.44) -0.56 (-9.44, 8.14)
<i>Strengthening Exercise</i>							
Disability 6-13 weeks Studies: 4; Subjects: 606 95, 97-99	Medium	Direct	Inconsistent	Imprecise	NA	Low	-0.08 (-0.51, 0.35) -0.03 (-0.19, 0.13)
Disability 13-26 weeks Studies: 3; Subjects: 490 95, 98, 100	Medium	Direct	Consistent	Precise	Small	Low	-0.19 (-0.36, -0.01) -0.07 (-0.14, -0.00)
Disability >26 weeks Studies: 2; Subjects: 687 54, 98	Medium	Direct	Inconsistent	Precise	NA	Low	-0.16 (-0.48, 0.16) -0.06 (-0.18, 0.06)
Pain 6-13 weeks Studies: 13; Subjects: 1,404 63, 95, 97-99, 101-108	High	Direct	Inconsistent	Precise	Moderate	Low	-0.63 (-0.87, -0.39) -13.9 (-19.1, -8.6)
Pain 13-26 weeks Studies: 4; Subjects: 592 95, 98, 100, 109 ^a	Medium	Direct	Consistent	Precise	Small	Low	-0.35 (-0.51, -0.18) -7.7 (-11.2, -4.0)

Table A. Effectiveness of physical therapy intervention on patient-centered outcomes (standardized mean differences [SMDs] pooled with random effects models, using standardized units of differences-standard deviations) (continued)

Outcome, Studies, Sample Size, References	Risk of Bias	Directness	Consistency	Precision	Strength of the Association	Strength of Evidence	Pooled Hedges Standard Mean Difference (95% CI) Converted Mean Difference (95% CI)
Strengthening Exercise							
Pain >26 weeks Studies: 3; Subjects: 786 54, 98, 105	Medium	Direct	Inconsistent	Precise	Moderate	Low	-0.68 (-1.23, -0.14) -15.0 (-27.1, -3.1)
QL 6-13 weeks Studies: 2; Subjects: 194 95, 99	Medium	Direct	Consistent	Imprecise	NA	Low	-0.32 (-0.72, 0.07) -3.52 (-7.80, 0.77)
Function composite 6-13 weeks Studies: 6; Subjects: 521 63, 95, 103, 105, 106, 108	Medium	Direct	Inconsistent	Precise	Large	Low	-0.84 (-1.13, -0.56) -15.5 (-20.9, -10.4)
Function composite 13-26 weeks Studies: 3; Subjects: 200 95, 100, 109	Medium	Direct	Consistent	Imprecise	Small	Low	-0.35 (-0.61, -0.09) -6.48 (-11.3, -1.67)
Function composite >26 weeks Studies: 2; Subjects: 394 54, 105	Medium	Direct	Inconsistent	Imprecise	Large	Low	-1.00 (-1.95, -0.05) -18.5 (-36.1, -0.93)
Gait function 6-13 weeks Studies: 9; Subjects: 958 63, 98, 101-103, 106-108, 110	High	Direct	Inconsistent	Precise	Small	Low	-0.47 (-0.78, -0.16) -0.09 (-0.16, -0.03)
Gait function 13-26 weeks Studies: 2; Subjects: 494 98, 109	Medium	Direct	Consistent	Precise	Small	Low	-0.46 (-0.84, -0.08) -0.09 (-0.17, 0.02)
Gait function >26 weeks Studies: 2; Subjects: 687 54, 98	Medium	Direct	Consistent	Precise	Small	Low	-0.39 (-0.59, -0.20) -0.08 (-0.12, -0.04)
Tai Chi							
Disability 6-13 weeks Studies: 2; Subjects: 85 65, 111	Medium	Direct	Consistent	Imprecise	NA	Low	-0.24 (-0.68, 0.2) -0.09 (-0.26, 0.08)
Disability 13-26 weeks Studies: 2; Subjects: 123 111, 112	Medium	Direct	Consistent	Imprecise	NA	Low	-0.27 (-0.95, 0.41) -0.10 (-0.36, 0.16)

Table A. Effectiveness of physical therapy intervention on patient-centered outcomes (standardized mean differences [SMDs] pooled with random effects models, using standardized units of differences-standard deviations) (continued)

Outcome, Studies, Sample Size, References	Risk of Bias	Directness	Consistency	Precision	Strength of the Association	Strength of Evidence	Pooled Hedges Standard Mean Difference (95% CI) Converted Mean Difference (95% CI)
<i>Tai Chi (continued)</i>							
Pain 6-13 weeks Studies: 2; Subjects: 85 65, 111	Medium	Direct	Consistent	Imprecise	NA	Low	-0.41 (-0.85, 0.03) -9.0 (-18.7, 0.7)
Function composite 6-13 weeks Studies: 2; Subjects: 85 65, 111	Medium	Direct	Consistent	Imprecise	Small	Low	-0.44 (-0.88, 0.00) -8.14 (-16.3, 0)
Function joint 6-13 weeks Studies: 2; Subjects: 85 65, 111	Medium	Direct	Consistent	Imprecise	NA	Low	-0.08 (-0.51, 0.36)
<i>Proprioception Exercise</i>							
Pain 6-13 weeks Studies: 3; Subjects: 198 105, 106, 113	High	Direct	Inconsistent	Imprecise	Moderate	Low	-0.71 (-1.31, -0.11) -15.6 (-28.8, -2.4)
Function composite 6-13 weeks Studies: 3; Subjects: 198 105, 106, 113	High	Direct	Inconsistent	Imprecise	NA	Low	-1.12 (-2.66, 0.41) -20.7 (-49.2, 7.59)
Gait function 6-13 weeks Studies: 3; Subjects: 181 106, 113, 114	High	Direct	Inconsistent	Imprecise	NA	Low	-0.96 (-2.00, 0.09) -0.19 (-0.4, 0.02)
<i>Massage</i>							
Function composite 6-13 weeks Studies: 2; Subjects: 94 115, 116	High	Direct	Consistent	Imprecise	Moderate	Low	-0.55 (-0.93, -0.18) -10.2 (-17.2, -3.33)
<i>Orthotics</i>							
Gait function <6 weeks Studies: 4; Subjects: 101 117-120	High	Direct	Consistent	Imprecise	NA	Low	-0.01 (-0.22, 0.20) 0.00 (-0.04, 0.04)
Function composite <6 weeks Studies: 2; Subjects: 138 56, 121	Medium	Direct	Inconsistent	Imprecise	NA	Low	-0.57 (-1.17, 0.02) -10.5 (-21.6, 0.37)
<i>Taping: Elastic Subtalar Strapping</i>							
Function composite 6-13 weeks Studies: 3; Subjects: 246 52, 122, 123	High	Direct	Consistent	Imprecise	Small	Low	-0.27 (-0.53, -0.02) -5.00 (-9.81, -0.37)

Table A. Effectiveness of physical therapy intervention on patient-centered outcomes (standardized mean differences [SMDs] pooled with random effects models, using standardized units of differences-standard deviations) (continued)

Outcome, Studies, Sample Size, References	Risk of Bias	Directness	Consistency	Precision	Strength of the Association	Strength of Evidence	Pooled Hedges Standard Mean Difference (95% CI) Converted Mean Difference (95% CI)
<i>Electrical Stimulation</i>							
Disability 6-13 weeks Studies: 2; Subjects: 98 124, 125	Low	Direct	Consistent	Imprecise	NA	Moderate	-0.27 (-0.68, 0.14) -0.10 (-0.26; 0.05)
Pain <6 weeks Studies: 7; Subjects: 301 104, 125-130	High	Direct	Consistent	Imprecise	Moderate	Low	-0.71 (-0.98, -0.43) -15.6 (-21.6, -9.5)
Pain 6-13 weeks Studies: 7; Subjects: 304 104, 124, 125, 128, 131-133	High	Direct	Consistent	Imprecise	NA	Low	-0.09 (-0.31, 0.14) -2.0 (-6.8, 3.1)
Pain 13-26 weeks Studies: 2; Subjects: 76 132, 133	High	Direct	Consistent	Imprecise	Moderate	Low	0.57 (0.09, 1.06) 12.5 (2.0, 23.3)
Global assessment 6-13 weeks Studies: 2; Subjects: 98 124, 125	Low	Direct	Consistent	Imprecise	Small	Low	-0.44 (-0.85, -0.02)
Function composite 6-13 weeks Studies: 3; Subjects: 138 124, 125, 131	Medium	Direct	Consistent	Imprecise	NA	Low	-0.08 (-0.43, 0.26) -1.48 (-7.96, 4.81)
Function joint <6 weeks Studies: 2; Subjects: 100 125, 130	Medium	Direct	Consistent	Imprecise	NA	Low	-0.25 (-0.61, 0.11)
Function joint 6-13 weeks Studies: 2; Subjects: 98 124, 125	Low	Direct	Consistent	Imprecise	NA	Moderate	-0.29 (-0.70, 0.12)
Gait function <6 weeks Studies: 4; Subjects: 191 110, 134-136	High	Direct	Inconsistent	Imprecise	NA	Low	-0.19 (-0.69, 0.30) -0.04 (-0.14, 0.06)
Gait function 6-13 weeks Studies: 3; Subjects: 164 110, 131, 133	High	Direct	Consistent	Imprecise	NA	Low	0.06 (-0.23, 0.35) 0.01 (-0.05, 0.07)

Table A. Effectiveness of physical therapy intervention on patient-centered outcomes (standardized mean differences [SMDs] pooled with random effects models, using standardized units of differences-standard deviations) (continued)

Outcome, Studies, Sample Size, References	Risk of Bias	Directness	Consistency	Precision	Strength of the Association	Strength of Evidence	Pooled Hedges Standard Mean Difference (95% CI) Converted Mean Difference (95% CI)
<i>Electrical Stimulation (continued)</i>							
Strength, measured as 120 degree extension 6-13 weeks Studies: 2; Subjects: 118 131, 133	Medium	Direct	Inconsistent	Imprecise	NA	Low	-0.41 (-0.83, 0.01)
Strength, measured as 60 degree extension 6-13 weeks Studies: 2; Subjects: 146 110, 131	High	Direct	Consistent	Imprecise	Moderate	Low	-0.55 (-0.88, -0.22)
<i>Pulsed Electromagnetic Fields</i>							
Pain <6 weeks Studies: 2; Subjects: 145 137, 138	Low	Direct	Consistent	Imprecise	NA	Moderate	0.01 (-0.41, 0.44) 0.2 (-9.0, 9.7)
Function composite <6 weeks Studies: 2; Subjects: 145 137, 138	Low	Direct	Consistent	Imprecise	NA	Moderate	-0.13 (-0.60, 0.35) -2.41 (-11.1, 6.48)
<i>Ultrasound</i>							
Disability <6 weeks Studies: 2; Subjects: 157 139, 140	Medium	Direct	Consistent	Imprecise	NA	Low	-0.39 (-0.79, 0.02) -0.15 (-0.30, 0.01)
Pain <6 weeks Studies: 2; Subjects: 157 139, 140	Medium	Direct	Inconsistent	Imprecise	Moderate	Low	-0.53 (-1.04, -0.03) -11.7 (-22.9, -0.7)
Pain 6-13 weeks Studies: 4; Subjects: 227 131, 141-143	Medium	Direct	Consistent	Imprecise	Moderate	Low	-0.52 (-0.84, -0.19) -11.4 (-18.5, -4.2)
Pain >26 weeks Studies: 2; Subjects: 160 141, 142	Medium	Direct	Consistent	Imprecise	Moderate	Low	-0.74 (-0.95, -0.53) -16.3 (-20.9, -11.7)
Function composite 6-13 weeks Studies: 4; Subjects: 227 131, 141-143	Medium	Direct	Inconsistent	Imprecise	NA	Low	-0.60 (-1.40, 0.20) -11.2 (-26.0, 3.72)

Table A. Effectiveness of physical therapy intervention on patient-centered outcomes (standardized mean differences [SMDs] pooled with random effects models, using standardized units of differences-standard deviations) (continued)

Outcome, Studies, Sample Size, References	Risk of Bias	Directness	Consistency	Precision	Strength of the Association	Strength of Evidence	Pooled Hedges Standard Mean Difference (95% CI) Converted Mean Difference (95% CI)
Ultrasound (continued)							
Function composite >26 weeks Studies: 2; Subjects: 160 ^{141, 142}	Medium	Direct	Consistent	Imprecise	Large	Low	-1.14 (-1.60, -0.69) -21.2 (-29.8, -12.8)
Gait function <6 weeks Studies: 2; Subjects: 157 ^{139, 140}	Medium	Direct	Inconsistent	Imprecise	NA	Low	-0.53 (-1.32, 0.25) -0.11 (-0.26, 0.05)
Gait function 6-13 weeks Studies: 4; Subjects: 227 ^{131, 141-143}	Medium	Direct	Inconsistent	Imprecise	Large	Low	-1.13 (-2.08, -0.17) -0.23 (-0.42, -0.03)
Gait function >26 weeks Studies: 2; Subjects: 160 ^{141, 142}	Medium	Direct	Inconsistent	Imprecise	Large	Low	-1.48 (-2.08, -0.89) -0.30 (-0.42, -0.18)
Diathermy							
Disability <6 weeks Studies: 4; Subjects: 259 ¹⁴⁴⁻¹⁴⁷	High	Direct	Consistent	Imprecise	NA	Low	-0.21 (-0.45, 0.02) -0.08 (-0.17, 0.01)
Disability 6-13 weeks Studies: 2; Subjects: 143 ^{146, 147}	High	Direct	Consistent	Imprecise	NA	Low	-0.04 (-0.34, 0.25) -0.02 (-0.13, 0.09)
Pain <6 weeks Studies: 4; Subjects: 259 ¹⁴⁴⁻¹⁴⁷	High	Direct	Inconsistent	Imprecise	Moderate	Low	-0.53 (-0.96, -0.10) -11.7 (-21.1, -2.2)
Pain 6-13 weeks Studies: 3; Subjects: 183 ^{131, 146, 147}	High	Direct	Consistent	Imprecise	NA	Low	-0.01 (-0.27, 0.26) -0.2 (-5.9, 5.7)
Function composite <6 weeks Studies: 3; Subjects: 229 ¹⁴⁵⁻¹⁴⁷	High	Direct	Inconsistent	Imprecise	NA	Low	-0.47 (-0.95, 0.02) -8.70 (-17.6, 0.37)
Function composite 6-13 weeks Studies: 3; Subjects: 183 ^{131, 146, 147}	High	Direct	Consistent	Imprecise	NA	Low	0.01 (-0.26, 0.27) 0.19 (-4.81, 5.00)

Table A. Effectiveness of physical therapy intervention on patient-centered outcomes (standardized mean differences [SMDs] pooled with random effects models, using standardized units of differences-standard deviations) (continued)

Outcome, Studies, Sample Size, References	Risk of Bias	Directness	Consistency	Precision	Strength of the Association	Strength of Evidence	Pooled Hedges Standard Mean Difference (95% CI) Converted Mean Difference (95% CI)
<i>Diathermy (continued)</i>							
Function joint <6 weeks Studies: 2; Subjects: 143 <small>146, 147</small>	High	Direct	Consistent	Imprecise	NA	Low	0.20 (-0.10, 0.49)
Function joint 6-13 weeks Studies: 2; Subjects: 143 <small>146, 147</small>	High	Direct	Consistent	Imprecise	NA	Low	0.16 (-0.14, 0.46)
Gait function <6 weeks Studies: 3; Subjects: 173 <small>144, 146, 147</small>	High	Direct	Consistent	Imprecise	NA	Low	-0.10 (-0.36, 0.17) -0.02 (-0.07, 0.03)
Gait function 6-13 weeks Studies: 3; Subjects: 183 <small>131, 146, 147</small>	High	Direct	Consistent	Imprecise	NA	Low	-0.14 (-0.40, 0.13) -0.03 (-0.08, 0.03)

CI = confidence interval; NA = not applicable; QL = quality of life

Note: Bold indicates significant differences when 95% CIs do not include 0; Negative value means improvement; Converted mean differences are in EQ-5D (0-1) for disability, in SF-36 (0-100) for quality of life, in Visual Analog Scale (0-100) for pain, in Western Ontario and McMaster Universities Osteoarthritis Index for physical function (0-100) for composite function, and in walking speed (m/s) for gait function

Table B. Summary of effectiveness of physical therapy interventions for knee osteoarthritis

Physical Therapy Intervention	Studies/Subjects	Conclusions/Strength of Evidence
Specific education programs	Studies=2/Subjects=511	Specific education programs improved health perception measures (L) but did not improve pain (L), disability (L), psychological disability (L), gait (L) and composite measures of function (L)
Aerobic exercises	Studies=11/Subjects=1,553	Aerobic exercises improved pain (L), disability (L), gait (L), and transfer (L) measures of function but did not improve psychological disability (L), global assessment (L), health perception (L), joint (L) and composite measures of function (L)
Aquatic exercises	Studies=3/Subjects=348	Aquatic exercises improved disability (L) but did not improve pain (L), psychological disability (L), quality of life (L), and composite measures of function (L)
Strengthening exercises	Studies=9/ Subjects=1,982	Strengthening exercises improved pain (L), global assessment (L), gait (L), transfer (L), and composite (L) function measures but did not improve disability (L), health perception (L), quality of life (L) and joint (L) function measures
Tai Chi	Studies=3/Subjects=167	Tai Chi improved psychological disability (L) and composite (L) function measures, but did not improve pain (L), disability (L), quality of life (L), gait (L), and joint (L) function measures
Proprioception exercises	Studies=4/Subjects=247	Proprioception exercises improved pain (L) but did not improve gait (L) and composite measures of function (L)
Massage	Studies=3/Subjects=162	Massage improved disability (L), joint (L), gait (L) and composite (L) function measures
Joint mobilization	Studies=2/Subjects=83	Joint mobilization improved disability (L) and global assessment (L) but did not improve pain (L) and gait (L) function measures
Joint mobilization with exercise	Studies=1/Subjects=134	Joint mobilization with exercise improved disability (L) but did not improve gait (L) function measures
Orthotics	Studies=7/Subjects=364	Orthotics improved pain (L), disability (L), psychological disability (L), quality of life (L), and joint measures of function (L) but did not improve global assessment (L), gait (L) and composite (L) function measures
Elastic subtalar strapping	Studies=3/Subjects=246	Elastic subtalar strapping improved composite function measures (L)
Taping	Studies=2/Subjects=105	Taping did not improve pain (L), disability (L), gait (L) and composite (L) function measures
E-stim	Studies=7/Subjects=390	E-stim improved global assessment (L), but worsened pain (L), and did not improve disability (M), health perception (L), and gait (L), joint (M), transfer (L), and composite (L) function measures,
PEMF	Studies=4/Subjects=267	PEMF improved global assessment (L) but did not improve pain (M), disability (L), and gait (L), joint (L) and composite (M) function measures
Ultrasound	Studies=6/Subjects=387	Ultrasound improved pain (L), gait (L) and composite (L) function measures but did not improve disability (L), and joint function measures (L)
Diathermy	Studies=5/Subjects=382	Diathermy did not improve pain (L), disability (L), psychological disability (L), global assessment (L), health perception (L), quality of life (L), and joint (L), gait (L) and composite (L) function measures
Heat	Studies=3/Subjects=126	Heat improved disability (L) and quality of life (L), but did not improve pain (L), gait (L), joint (L), and composite (L) function measures
Cryotherapy	Studies=2/Subjects=57	Cryotherapy did not improve disability (L), quality of life (L), and composite function measures (L)

E-stim = electrical stimulation; PEMF = pulsed electromagnetic fields;

Note: Strength of evidence as L = low, M = moderate. Strength of evidence was determined according to four domains (risk of bias, directness, consistency, and precision).

Table C. Comparative effectiveness of physical therapy intervention on patient-centered outcomes (standardized mean differences pooled with random effects models, using standardized units of differences-standard deviations)

Outcome, Studies, Sample Size, Reference	Risk of Bias	Directness	Consistency	Precision	Strength of the Association	Strength of Evidence	Pooled Hedges Standard Mean Difference (95% CI) Converted Mean Difference (95% CI)
<i>E-stim vs. Exercise</i>							
Pain <6 weeks Studies: 2; Subjects: 81 104, 148	High	Direct	Inconsistent	Imprecise	NA	Low	-1.28 (-2.95, 0.40) -28.2 (-64.9, 8.8)
Gait function <6 weeks Studies: 2; Subjects: 81 110, 148	Medium	Direct	Inconsistent	Imprecise	NA	Low	0.20 (-1.15, 1.55) 0.04 (-0.23, 0.31)
<i>Exercise Aquatic vs. Aerobic</i>							
Pain 6-13 weeks Studies: 2; Subjects: 110 95, 149	Medium	Direct	Inconsistent	Imprecise	NA	Low	-0.44 (-1.22, 0.35) -9.7 (-26.8, 7.7)
<i>Laterally vs. Neutrally Wedged Insole</i>							
Function composite 6-13 weeks Studies: 2; Subjects: 383 51, 52	Medium	Direct	Consistent	Imprecise	NA	Low	-0.01 (-0.25, 0.25) -0.19 (-4.63, 4.63)

CI = confidence interval; E-stim = electrical stimulation;

Note: Negative value means improvement; converted mean differences are in Visual Analog Scale (0-100) for pain, in Western Ontario and McMaster Universities Osteoarthritis Index for physical function (0-100) for composite function, and in walking speed (m/s) for gait function

Table D. Summary of comparative effectiveness of physical therapy interventions for knee osteoarthritis

Active vs. Control Physical Therapy Intervention	Studies/Subjects	Conclusions/Strength of Evidence
Aerobic exercises vs. strengthening exercises	Studies=1/Subjects=290	Aerobic exercises improved gait function measures (L) but did not improve pain (L), disability (L), transfer (L), and composite (L) function measures, compared to strengthening exercises
Aquatic exercises vs. aerobic exercises	Studies=2/Subjects=110	Aquatic exercises did not improve pain (L), disability (L), gait (L) and composite (L) function measures, compared to aerobic exercises
Proprioception exercises vs. strengthening exercises	Studies=1/Subjects=72	Proprioception exercises worsened composite function measures (L) and did not improve pain (L), gait function (L), compared to strengthening exercises
Tai Chi vs. stretching exercises	Studies=1/Subjects=40	Tai Chi improved disability (L), psychological disability (L), and transfer function (L) but did not improve pain (L), global assessment (L), gait (L), joint (L), and composite (L) function measures, compared to stretching exercise
Laterally vs. neutrally wedged insole	Studies=5/Subjects=613	Laterally wedged insole did not improve pain (L), disability (L), global assessment (L), quality of life (L), gait (L), joint (L), and composite function measures (L), compared to neutrally wedged insole
Orthotics vs. brace	Studies=1/Subjects=91	Orthotics did not improve pain (L) and composite function measures (L), compared to brace
E-stim vs. exercises	Studies=2/Subjects=81	E-stim improved joint (L) and composite (L) measures of function but did not improve pain (L) and gait (L) function, compared to exercises
E-stim vs. ultrasound	Studies=1/Subjects=40	E-stim did not improve pain (L), gait (L) and composite (L) measures of function, compared to ultrasound

E-stim = electrical stimulation

Note: Strength of evidence as L = low; strength of evidence was determined according to four domains (risk of bias, directness, consistency, and precision).

Specific Education Programs

We synthesized evidence from five RCTs; two RCTs with 511 participants contributed to the pooled analyses at the longest time of followup. The results of three articles from two RCTs that examined the effects of specific education programs provided low-strength evidence of no statistically significant effect on pain relief.

Aerobic Exercises

We synthesized evidence from 22 RCTs; 11 RCTs with 1,553 participants contributed to the pooled analyses at the longest time of followup. We found low-strength evidence that aerobic exercise resulted in statistically significant improvement in long-term pain and disability, but it did not improve psychological disability or health perception. Within 3 months, aerobic exercise improved composite function and gait function. At 12 months, the benefits of aerobic exercise continued for gait function, but not for composite function. A single RCT examined the effects of manual therapy combined with a standardized knee exercise program in the clinic and at home, and found statistically and clinically significant improvements in WOMAC total score and gait function.

Aquatic Exercises

We synthesized evidence from three RCTs with 348 participants that contributed to the pooled analyses at the longest time of followup. The studies provided low-strength evidence that aquatic exercise reduced disability, but it had no statistically significant effects on pain relief or quality of life.

Strengthening Exercises

We synthesized evidence from 17 RCTs; 9 RCTs with 1,982 participants contributed to the pooled analyses at the longest time of followup. Strengthening exercises had no statistically significant effect on disability (low-strength evidence). However, we observed a sustained improvement in pain relief, composite function, and gait function at 3 months through more than 12 months followup. Low-strength evidence demonstrated that strengthening exercises did not improve quality of life.

Tai Chi

Evidence from three RCTs with 167 participants contributed to the pooled analyses at the longest time of followup. Low-strength evidence from these small trials demonstrated that tai chi improved composite function measures around 3 months, but it had no statistically significant effect on pain or disability. Function did not improve further at 6 months followup.

Proprioception Exercises

Evidence from four RCTs with 247 participants contributed to the pooled analyses at the longest time of followup. These RCTs offered low-strength evidence that proprioception exercises led to pain relief, but they did not improve composite function or gait function.

Massage

Evidence from three RCTs with 162 participants contributed to the pooled analyses at the longest time of followup. We found low-strength evidence that massage somewhat improved composite function.

Joint Mobilization

We synthesized evidence from three RCTs with 217 participants, but were unable to perform pooled analyses due to differences in outcomes examined, reporting formats, and time to followup. Individual studies showed that joint mobilization with or without exercise reduced disability.

Orthotics

Evidence from seven RCTs with 364 participants contributed to the pooled analyses at the longest time of followup. These RCTs demonstrated low-strength evidence that orthotics had no effect on short-term outcomes of composite function or gait function.

Therapeutic Taping

Three RCTs with 119 participants examined the effects of therapeutic taping and found no benefits for pain, disability, composite function, or gait function. Different reporting formats precluded pooled analyses. Individual RCTs suggested that taping might provide short-term pain relief.

Electrical Stimulation

We synthesized evidence from 15 RCTs, and seven RCTs with 390 participants contributed to the pooled analyses at the longest time of followup. Electrical stimulation resulted in statistically significant improved pain short term and at 3 months after starting the intervention. However, pain worsened at 6 months. We found low-strength evidence that at 3 months followup, global assessment and muscle strength (measured at 60 degree extension) improved significantly with electrical stimulation treatment. These statistically significant findings were consistent without substantial heterogeneity across the studies. Pooled analyses provided moderate-strength evidence of no improvement on disability or joint function and low-strength evidence of no improvement on gait or composite functional measures.

Pulsed Electromagnetic Fields

Evidence from four RCTs with 267 participants contributed to the pooled analyses at the longest time of followup. These RCTs offered moderate-strength evidence that pulsed electromagnetic fields (PEMFs) neither reduced pain nor improved composite function.

Ultrasound

Evidence from six RCTs with 387 participants contributed to the pooled analyses at the longest time of followup. We found low-strength evidence that ultrasound resulted in statistically significant reduction in pain with a moderate effect size and significantly improved composite function and gait function with a large effect size. Low-strength evidence also demonstrated that ultrasound did not improve disability.

Diathermy

We synthesized evidence from seven RCTs; five RCTs with 382 participants contributed to the pooled analyses at the longest time of followup. Low-strength evidence demonstrated that diathermy resulted in a statistically significant decrease in pain at 1 month, but the effect was statistically insignificant at 3 months. Low-strength evidence demonstrated that diathermy did not improve disability, composite function, joint function, or gait function.

Heat

We synthesized evidence from three RCTs with 126 participants, but were unable to perform a pooled analysis to draw robust conclusions.

Cryotherapy

We synthesized evidence from two RCTs with 57 participants, but were unable to perform a pooled analysis to draw robust conclusions.

The Role of Physical Therapist Involvement in Benefits With Exercises

We performed subgroup analyses by involvement of a physical therapist for all outcomes with aerobic or strengthening exercises. For most comparisons, effect sizes with the involvement of a physical therapist were larger than those without. Furthermore, the results in the physical therapist involvement group tended to be consistent without heterogeneity. Although the sample size of the subgroup with physical therapist involvement was smaller than the sample size of all pooled studies, our conclusions remain the same.

Clinical Importance of Treatment Effects With Physical Therapy Interventions

Original studies used a wide variety of pain measurements and thus required standardization in pooled analyses. This lack of consistency prevented us from being able to assess whether specific interventions resulted in benefits that were of clinical importance. To assess the clinical importance of pain reduction with interventions, we performed subgroup analyses with a subset of the studies that used the same VAS instrument for pain measures. We then compared mean reduction in pain with the cutoff for MCIDs in VAS as reported in observational studies. We found that electrical stimulation, diathermy, and ultrasound resulted in clinically significant short-term pain reduction.

In long-term followup, however, only strengthening exercise reduced pain with an effect size that exceeded the threshold of MCID.

To assess the clinical importance of improvements in disability and quality of life with physical therapy interventions, we transformed SMDs to nonstandardized mean differences in EQ-5D or SF-36 (Table A).

Only aerobic and aquatic exercises led to statistically significant and clinically important benefits for disability (estimated EQ-5D improvements of 0.08 and 0.11, respectively). However, for quality of life, the benefits of aquatic and strengthening exercise were statistically insignificant (estimated SF-36 physical component summary improvements of 1.1 and 3.5, respectively).

As a part of the evidence synthesis, we also compared the differences in continuous measures of pain and disability reported in trials with the MCIDs determined in observational studies. We found few clinically important improvements. Aerobic exercise resulted in clinically important improvement in pain, disability, and joint function in the majority of individual RCTs.

Comparative Effectiveness of Physical Therapy Interventions

Single RCTs that examined comparative effectiveness of physical therapy interventions offered low-strength evidence for the majority of comparisons (Tables C and D). Aerobic and aquatic exercises had the same benefits for improving disability and pain, a finding consistent

with the similar effect sizes demonstrated by these two interventions in efficacy studies. Tables E and F show pain and disability outcomes associated with each physical therapy intervention by strength of evidence. One study found no statistically significant differences between aerobic and strengthening exercises for disability and composite function, but gait function improved more with aerobic exercise. One study demonstrated that tai chi was better than stretching exercise for disability, psychological disability, global assessment, and transfer function.

We found no statistically significant differences between laterally and neutrally wedged insoles on composite function^{51, 52} or between orthotics and brace on composite function. A recent study showed that pain, disability, global assessment, quality of life, and joint function did not differ between laterally and neutrally wedged insoles. Several small studies found no statistically significant difference between electrical stimulation and exercise for pain relief and gait function. One study showed statistically insignificant differences between electrical stimulation and ultrasound for composite and gait function.

The studies of combined physical therapy modalities demonstrated no statistically significant benefits on the outcomes when compared with aerobic, strength, or proprioception exercise alone. Manual therapy added to aerobic exercise provided benefits similar to aerobic exercise alone.

Key Question 1a. Role of Patient Characteristics on Outcomes

The majority of subgroup analyses in individual RCTs lacked robust evidence and thus failed to permit definitive conclusions about the most effective physical therapy treatments in association with patient characteristics.

Compliance

Three RCTs showed that subgroups with high compliance tended to have better outcomes for exercise (aerobic, aquatic, and strengthening). The higher exercise compliance group had the lowest risk of incident ADL disability, a lower average depression score, a higher mean Quality of Well-Being Scale score, and greater improvements in both 6-minute walking distance and disability.

Age

Robust evidence was lacking for how age differences affect treatment outcomes because three studies were inconsistent with active and control treatments, outcomes, and definitions of age subgroups.

Malalignment

Low-strength evidence from two RCTs did not permit robust conclusions about how malalignment affects treatment outcomes. The RCTs found greater benefit in patients with the genu varus group and in those without malalignment.

Body Mass Index

Two RCTs provided inconsistent evidence about the role of BMI in predicting treatment effects. Improvement in function by lateral wedge insoles was better in adults of normal weight, while very obese participants (defined by the top tertile) experienced similar benefits from aerobic exercise interventions and resistance training programs.

Comorbidity

Evidence from individual studies did not permit robust conclusions about how treatment effects may be modified by comorbidity.

Sex

Evidence from individual studies did not permit robust conclusions about how treatment effects may differ between men and women. The five studies that reported clinical outcomes in male and female subgroups for exercise and orthotics⁵²⁻⁵⁶ demonstrated no statistically significant differences in outcomes.

Race

Evidence from a single study was inconclusive for how racial differences affect treatment outcomes of exercise.

Severity

Baseline OA severity may modify the effects of physical therapy interventions on clinical outcomes. However, findings were inconsistent and varied across studies depending on the treatments, outcomes, and/or cutoff grades. Furthermore, RCTs reported post hoc analyses of changes from baseline in functional measures among patients with different baseline severity scores. Clinical outcomes in severity subgroups were reported in seven RCTs, involving brace, insole, exercise (strengthening or range of motion), and weight reduction and/or electrical stimulation. Three RCTs found no consistent modification effect of baseline severity.

Key Question 1b. Association Between Dose/Duration/Intensity/Frequency of Examined Interventions and Intermediate/Patient-Centered Outcomes

For the majority of comparisons, evidence did not permit robust conclusions about the association between the dose/duration/intensity/frequency of examined interventions and outcomes.

Exercise

Included studies variously defined intensity of exercise, yet indicated equal benefits from low- and high-intensity exercise. One study using exercise compliance to examine the potential dose-response relationship between exercise frequency and outcomes showed that exercise for patients with knee OA should be done three times each week.

Orthotics

For patients with genu varus deformity from OA, medium duration (between 5 and 10 hours each day) of insole with subtalar strapping wear was better than short duration (fewer than 5 hours) and long duration (more than 10 hours).

Electrical Stimulation

We found no short-term clinical difference between low-frequency (2 Hz) and high-frequency (80 Hz) electrical stimulation. However, noxious stimulation decreased pain intensity more than innocuous stimulation. In one study, Burst Mode and High Rate stimulation had

similar effects on stiffness and pain. Another study demonstrated that for reducing pain, 40 minutes was the optimal duration of electrical stimulation.

Ultrasound

Two RCTs showed that pulsed ultrasound was better than continuous ultrasound in improving disability, gait, and composite function measures.

Key Question 1c. Association Between Time of Followup and Intermediate/Patient-Centered Outcomes

The association between followup time and outcomes varied by treatments and outcomes of interest. The effects of aerobic, aquatic, and strengthening exercises and ultrasound did not differ at shorter versus longer followups. Further, in a combined analysis of aerobic, aquatic, strengthening, proprioception, and tai chi exercises, changes in intermediate and patient-centered outcomes did not differ by followup time (all p-values greater than 0.05). Results held consistent with or without inclusion of Tai Chi. Outcomes of pain, gait, and composite function after ultrasound did not differ by followup time. Electrical stimulation improved pain at short-term followup but significantly worsened pain at longer followups (p-value <0.001). In contrast, we observed that diathermy's benefits for disability increased with longer followups (p-value = 0.009).

Association Between Duration of Examined Interventions and Intermediate/Patient-Centered Outcomes

The duration of examined interventions varied broadly. For example, exercise programs ranged from 2 to 72 weeks. We found no statistically significant association between the duration of examined interventions and intermediate or patient-centered outcomes. In combined results for aerobic, aquatic, strengthening, proprioception, and tai chi exercises, changes in intermediate and patient-centered outcomes did not differ by the duration of the examined intervention, with all p-values greater than 0.05.

Key Question 2. Association Between Intermediate and Patient-Centered Outcomes

Evidence for the association between intermediate and clinical outcomes was limited to individual studies. We found substantial variability in definitions of index and reference methods, definitions of outcomes, and methods of examining diagnostic values and associations between intermediate and clinical outcomes.

We synthesized the evidence of association between intermediate and clinical outcomes from 43 studies that included 25,799 adults with knee OA. Disability measures were associated with gait, mobility restrictions, muscle strength, and range-of-motion measures, but the magnitude and clinical importance of the association were unclear.

Key Question 2a. Validity of the Tests and Measures Used To Determine Intermediate Outcomes of Physical Therapy on OA in Association With Patient-Centered Outcomes

Validation of the tests and measures used to determine intermediate outcomes of physical therapy on knee OA was reported in 66 studies of 14,563 adults. The studies used a variety of

reference methods to judge validity according to statistically significant correlation coefficients. Only a small proportion of the studies demonstrated a strong (more than 50 percent) correlation between index and reference method measurements. Strength of correlation varied across validity types.

Key Question 2b. Which Intermediate Outcomes Meet the Criteria of Surrogates for Patient-Centered Outcomes?

None of the intermediate outcomes met surrogate criteria for patient-centered outcomes as defined by the OMERACT Criteria for Surrogate Endpoints. TEP members proposed gait as a feasible candidate for a surrogate endpoint. However, no study analyzed the association between gait and patient-centered outcomes of physical therapy for adults with knee OA. One RCT did conclude that knee pain and self-efficacy mediated the effects of exercise on stair-climb time. A single longitudinal study of elderly adults demonstrated that impaired gait and the Physical Performance Test were independent predictors of nursing home placement. Three cohort studies (the Einstein Aging Study, the Chinese Elderly Cohort, and the Women's Health and Aging Study) examined the association between gait and nursing home placement. However, the studies included adults with any etiology of gait problem, including neurological diseases or heart failure. Further, the definitions of "impaired gait" and magnitude of the association differed across the studies.

Key Question 2c. What Are Minimum Clinically Important Differences of the Tests and Measures Used To Determine Intermediate Outcomes?

No RCTs of physical therapy interventions determined minimum clinically important differences (MCIDs). However, MCIDs in outcome measurements were reported in 30 observational studies of 13,138 adults. The studies used the anchor method, which compares patient perception of improvement with absolute change in scale score or with percentage difference from baseline levels. The percentage difference from baseline levels incorporated baseline severity of the diseases. MCIDs were available for 26 validated tools.

Few studies determined a Patient Acceptable Symptom State (PASS) for knee OA. PASS is defined as the highest level of symptom patients can tolerate and still be satisfied with treatment. The studies used the same anchor method for determining PASS as they did for determining MCIDs. The difference is in anchoring questions: MCID involves asking for patient perception of clinically important improvement while PASS involves asking patients whether they are satisfied with their functional status in relation to daily activities and quality of life. PASS was determined for three scales—WOMAC, VAS, and Patient Global Assessment.

Key Question 3. Harms From Physical Therapy Interventions Available for Adult Patients With Chronic Knee Pain Due to Osteoarthritis

Adverse events were uncommon and varied across interventions. Skin irritation was reported with brace, insole, taping, and electrical stimulation; swelling with brace, diathermy, and exercise; muscle soreness with electrical stimulation; throbbing sensation with diathermy, electrical stimulation, and PEMF; increased pain with diathermy, exercise, insole, and PEMF; falls with insole; and need for surgery with diathermy. Adverse events rates did not differ with

statistical significance among treatment groups. Adverse events were not severe enough to deter participants from continuing treatment.

Discussion

Our report of patient-centered outcomes, including pain, disability, and quality of life with physical therapy interventions for adults with knee OA has implications for clinical practice. Our findings generally agree with previously published guidelines^{8, 13} and systematic reviews^{17, 19, 57} that recommend exercise for adults with symptomatic knee OA. Few physical therapy interventions demonstrated any statistically significant effectiveness, and no single intervention improved all outcomes (Tables E and F). Pooled analyses demonstrated that diathermy, orthotics, and magnetic stimulation failed to show any benefits.

This review reflects the discrepancy between the recommended practice of physical therapy and the study designs used to examine the interventions. Current guidelines recommend that physical therapy be delivered with a combination of modalities.²² Published research has focused instead on the marginal effects of individual physical therapy interventions. Our effort was further complicated by the fact that clinical care for adults with knee OA includes pharmacologic interventions,⁵⁸⁻⁶⁰ while our review was limited to nonpharmacologic treatments. To address such complexity, we focused on randomized trials because these equally distribute concomitant treatments among treatment groups and thus provide valid estimates of effects of the examined interventions.

Randomized trials are the gold standard in establishing benefits from health care interventions.⁶¹ However, applicability of findings is limited to similar settings, treatments, and patient populations. In our review, for example, randomization might equally distribute the effect of pain relievers (a common concomitant treatment), but it would not prevent the dampening of potential effects from physical therapy interventions. The trials we examined rarely provided information about all other treatments patients might have received. Nor did the trials analyze outcomes separately in patient subgroups by concomitant treatments. We tried to examine the potential influence of pain medication on physical therapy outcomes for pain, but rare and inconsistent reporting of drug treatments impeded the evidence synthesis. Few studies provided information about sustained benefits at long-term followup. One recently published trial concluded sustained improvement in physical function at 30 months after a rehabilitation program combining self-management and exercise.⁶² Heterogeneity in populations, treatments, and definitions of the outcomes downgraded strength of evidence to low or moderate in most cases.

Low-strength evidence resulted mainly from risk of bias: frequent exclusion of patients from the analysis, inadequate allocation concealment, and unmasked outcome assessment. In addition, small trials did not provide precise estimates of the treatment effects. Few studies reported masking of the outcome assessments.⁶³⁻⁶⁸ We could not reproduce the results from several poorly reported studies, and we did not report evidence from individual studies with a high risk of bias. We did not synthesize the evidence from the trials that enrolled patients with knee or hip OA without separately reporting those outcomes. Many trials failed to provide sufficient detail about the nature and intensity of specific interventions or about the involvement of physical therapists, further impeding our ability to draw robust conclusions for decisionmaking.^{69, 70}

Variability in the definitions and measurements of outcomes presented another obstacle. Validated measurements of functional impairments relevant to physical therapy practice are listed in APTA's Guide to Physical Therapist Practice;²² however, APTA's Guide recommends

neither clinically important thresholds for such measures nor monitoring of treatment effects according to patient-centered outcomes. Most trials reported outcomes as average scores for all patients in each treatment group, with no evaluation of the clinical importance of the averages. Average scores do not reveal how many or which types of patients develop disability or experience clinically meaningful improvements in pain, function, or quality of life.

Furthermore, variability in the definitions of outcomes required us to calculate standardized mean differences. Statistically significant differences in this construct do not necessarily reflect the clinical importance of improvement in outcomes. OARSI has recommended evaluating treatment success according to patient-centered outcomes and clinically important differences in the WOMAC scale.^{44, 71} In addition, many studies have used the anchor method, which compares changes in scales with patient perception of improvement,^{72, 73} to determine MCIDs for the 26 validated tests. Yet, published studies of physical therapy interventions have not categorized patients according to meaningful improvements in pain, disability measures, or quality of life. Integrated approaches to evaluating the relationships between impairments in body structures and functions (e.g., strength, range of motion), physical activities (e.g., balance, walking), and participation in activities of daily living would allow better testing of patient-centered outcomes of disability and quality of life.

Treatment success should be measured not just by improvement in scales or performance tests, but by patient satisfaction with improvement in pain and function. The PASS tool is gaining favor as a valid and reliable approach across many areas of medical practice, including rheumatology.⁷⁴ PASS is used to identify the level of symptom state patients can tolerate while still considering their health satisfactory and their treatment successful. PASS is available for three scales: WOMAC, VAS for pain, and the Patient Global Assessment. Expanded use of PASS would help improve the quality of physical therapy practice, and increase the usefulness of studies examining physical therapy interventions.

Our report has implications for future research. First, consensus is needed regarding methods to judge benefits of physical therapy interventions.⁷⁵ Benefits should be defined as clinically important improvements in pain, independence in ADL, and quality of life. Treatment success should be estimated using rates of patient-centered outcomes. Through meta-analysis of individual patient data from previously conducted RCTs, researchers would be able to categorize patients according to the clinical importance of any changes they experienced. They would also be able to analyze rates of patient-centered outcomes. This would require that principal investigators of RCTs be willing to share their data. Individual patient data meta-analyses may also provide good estimates of treatment effects in patient subpopulations by age, comorbidity, severity of knee OA, and concomitant treatments. Future RCTs should examine comparative effectiveness of combined physical therapy treatments. Fully powered trials should examine comprehensive and multimodal interventions that more closely resemble physical therapy practice. Future studies should also analyze the effects of concomitant treatments such as pain relievers on pain and function.

Key Messages (see Tables E and F)

Key Question 1

- Effectiveness of physical therapy (PT) interventions.
 - Pooled analyses demonstrated the following results for core interventions:
 - Aerobic and aquatic exercise improved disability measures.

- Aerobic and strengthening exercise reduced pain and improved function.
 - Proprioception exercise reduced pain.
- Pooled analyses also found that:
 - Tai chi improved short-term function, but with no sustained benefit.
 - Ultrasound reduced pain and improved function.
- Pooled analyses demonstrated that the following physical therapy interventions failed to show any benefits:
 - Specific education program.
 - Diathermy.
 - Orthotics.
 - Magnetic stimulation (PEMF).
- Few physical therapy interventions were shown to be effective in general.
- No single physical therapy intervention was shown to improve all examined outcomes.
- Research focused on individual physical therapy interventions, in contrast with the common physical therapy practice of combining interventions.
- Individual (nonpooled) randomized controlled trials (RCTs) failed to show consistent, statistically significant, strong, or clinically important changes in outcomes.
- Comparative effectiveness of physical therapy interventions.
 - Evidence about comparative effectiveness of physical therapy interventions was limited.
 - Pooled analyses demonstrated that:
 - Pain did not differ between aerobic and aquatic exercises.
 - Pain did not differ between electrical stimulation and exercise in pooled analyses.
 - Individual RCTs of other treatment comparisons found no consistent clinically important differences in outcomes and did not support robust conclusions about the best treatment option.
- Which patient characteristics are associated with the benefits of examined physical therapy interventions on intermediate and patient-centered outcomes?
 - Evidence from individual randomized controlled clinical trials did not support robust conclusions about differences in physical therapy effects by patient characteristics. Patients with high compliance tended to have a better treatment response with exercise interventions.
- Do changes in intermediate and patient-centered outcomes differ by the dose, duration, intensity, and frequency of examined physical therapy interventions?
 - The duration of examined interventions was not associated with better intermediate or patient-centered outcomes.
 - Evidence regarding the association between the dose/intensity/frequency of examined interventions and outcomes was not available for the majority of comparisons.
- Do changes in intermediate and patient-centered outcomes differ by the time of followup?
 - The effects of the treatments that significantly improved outcomes, including exercise (aerobic, aquatic, and strengthening) and ultrasound did not differ at shorter versus longer followup times.

- Electrical stimulation provided short-term pain improvement, but significantly worsened pain at a longer followup.
- Study risk of bias and heterogeneity in populations and treatments, including concomitant treatments, decreased the strength of evidence to low or moderate in most cases.

Key Question 2

- What is the association between changes in intermediate outcomes and changes in patient-centered outcomes after physical therapy interventions?
 - Gait, mobility restrictions, muscle strength, and range of motion measures were associated with disability measures.
 - Individual observational studies failed to provide strong evidence for determining which intermediate outcomes strongly and consistently predict patient-centered outcomes.
- What is the validity of the tests and measures used to determine intermediate outcomes of physical therapy on osteoarthritis (OA) in association with patient-centered outcomes?
 - Many articles reported validation, but few demonstrated a strong (more than 50 percent) correlation between index and reference method measurements.
 - Original studies concluded that tests are valid based on significance, not strength of correlation.
- Which intermediate outcomes meet the criteria of surrogates for patient-centered outcomes?
 - None of the intermediate outcomes met surrogate criteria for patient-centered outcomes.
- What are minimum clinically important differences (MCIDs) of the tests and measures used to determine intermediate outcomes?
 - MCIDs of the tests were determined using the anchor method, which compares changes in scales with patient perception of improvements. MCIDs were available as absolute change in score or as relative change as a percentage difference from baseline levels, the latter accounting for baseline severity of the disease.
 - The definition of Patient Acceptable Symptom State (PASS) that accounted for patient satisfaction was available for Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Visual Analog Scale (VAS) for pain, and for the Patient Global Assessment Scale. PASS defines the highest level of symptom state patients can tolerate and still be satisfied with their treatment.
 - Validated tools defined threshold values of clinical importance for evaluating treatment success in adults with knee OA. However, more often studies used continuous measures of the outcomes, providing an average score for all patients in each treatment group, with no evaluation of the clinical importance of these averages. Average scores do not reveal how many or which patients develop disability or experience clinically meaningful improvement in pain, function, or quality of life.

Key Question 3

- What are the harms from physical therapy interventions available for adult patients with chronic knee pain due to OA when compared with no active treatment or active controls?

- Adverse events were uncommon, varied across interventions, and included skin irritation with brace/insole/tape/electrical stimulation; swelling with brace/diathermy/exercise; muscle soreness with electrical stimulation; warming/throbbing sensation with diathermy/electrical stimulation/PEMF; increased pain with diathermy/exercise/insole/PEMF; and falls with insole. Adverse events were not severe enough to deter participants from continuing treatment.

Table E. Summary of pain outcome associated with each physical therapy intervention by strength of evidence

Physical Therapy Intervention	Moderate Strength of Evidence	Low Strength of Evidence
Education program		No improvement
Aerobic exercises		Improvement
Aquatic exercises		No improvement
Strengthening exercises		Improvement
Tai Chi		No improvement
Proprioception exercises		Improvement
Massage		
Joint mobilization		No improvement*
Joint mobilization + exercise		
Orthotics		Improvement*
Elastic subtalar strapping		
Taping		No improvement*
E-stim		Worse
PEMF	No improvement	
Ultrasound		Improvement
Diathermy		No improvement
Heat		No improvement*
Cryotherapy		

E-stim = electrical stimulation; PEMF = pulsed electromagnetic fields

Note: Bold = improvement

*Result based on a single study

Table F. Summary of disability outcome associated with each physical therapy intervention by strength of evidence

Physical Therapy Intervention	Moderate Strength of Evidence	Low Strength of Evidence
Education program		No improvement*
Aerobic exercises		Improvement
Aquatic exercises		Improvement
Strengthening exercises		No improvement
Tai Chi		No improvement
Proprioception exercises		
Massage		Improvement*
Joint mobilization		Improvement*
Joint mobilization + exercise		Improvement*
Orthotics		Improvement*
Elastic subtalar strapping		
Taping		No improvement*
E-stim	No improvement	
PEMF		No improvement*
Ultrasound		No improvement
Diathermy		No improvement
Heat		Improvement*
Cryotherapy		No improvement*

E-stim = electrical stimulation; PEMF = pulsed electromagnetic fields

Note: Bold = improvement

*Result based on a single study

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Abbreviations

ADL	Activities of Daily Living
AHRQ	Agency for Healthcare Research and Quality
AMED	Allied and Complementary Medicine`
APTA	American Physical Therapy Association
BMI	Body Mass Index
CI	Confidence Interval
EQ-5D	European Quality of Life-5 Dimension
E-stim	Electrical Stimulation
IADL	Instrumental Activities of Daily Living
MCID	Minimal Clinically Important Difference
OA	Osteoarthritis
OARSI	Osteoarthritis Research Society
OMERACT	Outcomes Measures in Rheumatoid Arthritis Clinical Trials
PASS	Patient Acceptable Symptom State
PEDro	Physiotherapy Evidence Database
PEMF	Pulsed Electromagnetic Fields
PICOTS	Population, Intervention, Comparator, Outcome, Timing, and Setting
PT	Physical Therapy
RCT	Randomized Controlled Trial
SF-36	Medical Outcomes Study 36-Item Short-Form Health Survey
SMD	Standard Mean Difference
STATA	Statistics and Data Analysis Software
TEP	Technical Expert Panel
VAS	Visual Analog Scale
WOMAC	Western Ontario and McMaster Universities Osteoarthritis Index

Introduction

Osteoarthritis (OA), the most common form of arthritis,¹ is a progressive disorder in which gradual cartilage loss causes bony spurs and cysts to develop at the surface and margins of the joints. Inflammation, pain, stiffness, limited movement, and possible deformity of the joint may result.² OA of the knee affects 28 percent of adults over age 45³ and 37 percent of adults over age 65 in the United States.³⁻⁶ Already, OA is a leading cause of disability among noninstitutionalized adults;⁴ those affected by it have slower gait velocities and use more assistive walking devices and nonsteroidal anti-inflammatory drugs and narcotics than those not affected. The Centers for Disease Control and Prevention anticipates that the prevalence, health impact, and economic consequences of OA will surge during the next few decades as the population ages.⁷

Treatments for OA aim to reduce or control pain, improve physical function, prevent disability, and enhance quality of life—all of which constitute clinical outcomes of importance to patients.^{8,9} Treatment options include pain relievers, anti-inflammatory drugs, weight loss, general physical exercise, physical therapy, and, when conservative treatments fail, surgery.^{9, 10}

Surgical treatments for knee OA include realignment osteotomy and total knee arthroplasty revisions (knee replacements).¹¹ In the United States, about 556,400 knee replacement surgeries are performed annually,¹¹ a figure that increased by nearly 300 percent between 1990 and 2004.^{7, 11, 12} By 2030, the annual number of total knee arthroplasty revisions in the United States is projected to increase 600 percent.¹²

The Osteoarthritis Research Society International (OARSI) asserts that optimal OA management combines nonpharmacologic and pharmacologic modalities.^{9, 10, 13, 14} However, with the exception of exercise, scant evidence exists for the efficacy of adjunct therapies for knee OA.^{15, 16} Based on the findings of one systematic review,^{9, 17} OARSI and the American Academy of Orthopedic Surgeons recommend a variety of physical therapy interventions, including low-impact aerobic fitness exercises, range-of-motion/flexibility exercises, quadriceps strengthening, and patellar taping for short-term pain relief.^{9, 17} The National Institute for Health and Clinical Excellence guidelines¹⁰ agree that exercise (including local muscle strengthening and general aerobic fitness) should be a core treatment for osteoarthritis regardless of patient age, comorbidity, pain severity, or disability. The National Institute for Health and Clinical Excellence also suggests other nonpharmacologic physical therapy interventions as adjunct to core treatment.¹⁰

Many systematic reviews, including three from the Cochrane Collaboration,¹⁸⁻²⁰ have synthesized data on physical therapy interventions for adult patients with knee OA. However, each published review examines a specific intervention instead of examining and comparing a range of available physical therapies. Most existing studies focus on exercise therapy; however, studies currently underway include physical therapy components such as insole treatment, knee bracing, wedged orthoses, manual therapy, weight loss, home-based exercises, strength training, knee stability training, electrical stimulation, and ultrasound. Publication of substantial new research evidence may alter the calculated risk-benefit ratio for some OA physical therapies and thus necessitate the updating of research evidence.^{13, 21}

Measuring Outcomes of Physical Therapy Interventions

Measurement of physical therapy benefits should address patient-centered outcomes rather than the results of instrumental tests.²² Additionally, clinicians and policymakers should consider patient-centered outcomes when making treatment and reimbursement decisions.

We need to recognize the importance of the relationship between patient-centered and intermediate outcomes for adult patients with knee OA.²³ Intermediate outcome measures, such as measures of gait, muscle strength, or joint function, are helpful to develop individualized treatment plans and to document gradual progress in function. These measures may also help with patient adherence/compliance to the exercise program, and ultimately promote success in achieving desired patient-centered outcomes such as prevention of disability. Research based on patient-centered outcomes provides patients and clinicians valuable information for making decisions about physical therapy and other health care services.²⁴

Patient-centered outcomes for adults with pain secondary to knee OA include reduction in pain and improvement in functional disability and quality of life.²⁵ Some consensus exists that clinical trials for knee OA should examine pain, physical function, patient global assessment, and joint imaging.²⁶ However, published studies have inconsistently interpreted and defined improvement and treatment success.^{18, 19, 27, 28} Clinical trials have estimated the benefits and harms of physical therapy with validated scales of pain, function, and quality of life.^{29, 30} Clinicians and researchers have used statistically significant changes in scale scores to define treatment success, without accounting for whether these score changes have clinical importance. Score changes that equate to benefits patients recognize as important are known as minimum clinically important differences, or MCIDs. MCIDs have been determined by individual studies, but have not been systematically reviewed.

Further, studies of physical therapy interventions have examined intermediate outcomes. These outcomes have been defined as improvement (as measured by a variety of assessment tools) in tests of balance, knee joint range of motion, gait speed, or muscle strength. Yet, validation of such measurements of functional impairments has not been systematically reviewed. In addition, clinical trials have concluded benefits with physical therapy interventions according to absolute changes in functional measurements, while ignoring the clinical importance of such changes. Likewise, reimbursement for physical therapy services is currently driven by measurements of gait, transfers, and activities of daily living (ADLs), regardless of how patients perceive improvements.

No systematic reviews or primary studies of physical therapy for adult patients with knee OA have specifically examined the relationship between changes in intermediate outcomes and meaningful changes in patient-centered outcomes, such as disability in activities of daily living, quality of life, or lost work time. Quality of care could be improved by evaluating how clinical effects are measured and documented, as well as by reviewing outcomes information for research.

Our review intends to contribute to evidence-based recommendations by synthesizing published efficacy evidence for physical therapy interventions for knee pain secondary to OA. We systematically reviewed studies that examined physical therapy interventions and assessed intermediate and patient-centered outcomes.

The Key Questions used to guide this study are shown below.

Key Question 1

What are the effectiveness and comparative effectiveness of available physical therapy interventions (without drug treatment) for adult patients with chronic knee pain due to OA on intermediate and patient-centered outcomes, compared to no active treatment or another active physical therapy modality?

- a. Which patient characteristics are associated with the benefits of examined interventions of physical therapy on intermediate and patient-centered outcomes?
- b. Do changes in intermediate and patient-centered outcomes differ by the dose, duration, intensity, and frequency of examined interventions of physical therapy?
- c. Do changes in intermediate and patient-centered outcomes differ by duration of examined interventions of physical therapy and the time of followup?

Key Question 2

What is the association between changes in intermediate outcomes with changes in patient-centered outcomes after physical therapy interventions?

- a. What is the validity of the tests and measures used to determine intermediate outcomes of physical therapy on OA in association with patient-centered outcomes?
- b. Which intermediate outcomes meet the criteria of surrogates for patient-centered outcomes?
- c. What are minimum clinically important differences of the tests and measures used to determine intermediate outcomes?

Key Question 3

What are the harms from physical therapy interventions available for adult patients with chronic knee pain due to osteoarthritis when compared to no active treatment or active controls?

- a. Which patient characteristics are associated with the harms of examined physical therapy interventions?
- b. Do harms differ by the duration of the treatment and time of followup?

Methods

Topic Refinement and Review Protocol

We developed the Key Questions with stakeholder input as part of the Effective Health Care Program. We developed an analytic framework after discussions with key informants. Research questions were posted for public comment. Key informants recommended that we focus on patient-centered outcomes and physical therapy interventions relevant for clinical practice in the United States. Key informants also recommended that we review the intermediate outcomes with which physical therapists judge treatment success. Candidates to serve as key informants, technical experts, and peer reviewers were approved by the Task Order Officer from the Agency for Healthcare Research and Quality (AHRQ) after disclosure of conflicts of interest. We developed the protocol following Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines³¹ (www.effectivehealthcare.ahrq.gov/index.cfm/search-for-guides-reviews-and-reports/?productid=637&pageaction=displayproduct) with input from experts who served on the Technical Expert Panel (TEP).

Literature Search Strategy

We sought studies from a wide variety of sources, including MEDLINE® (via OVID and PubMed®), the Cochrane Library, the Physiotherapy Evidence Database (PEDro), SCIRUS, Allied and Complementary Medicine (AMED), and the Health and Psychosocial Instruments bibliography database up to February 29, 2012. We conducted manual searches of reference lists from systematic reviews and eligible studies.³² We searched for unpublished literature including regulatory documents, conducted clinical trials, and abstracts presented in scientific meetings. We searched clinical trial registries including ClinicalTrials.gov and World Health Organization Clinical Trials for completed trials related to the Key Questions. To find closed studies of physical therapy interventions for adults with knee OA, we searched the website www.clinicaltrials.gov in March 2011.

Our Evidence-based Practice Center (EPC) search strategy used relevant medical subject headings (MeSH) terms, text words, and weighted word frequency algorithms to identify related articles. Members of our TEP and peer reviewers suggested additional published studies. We documented each recommended, included, and excluded study. Our evidence search involved several steps: (1) conduct a comprehensive literature search in the databases listed above to retrieve references in the EndNote reference management software; (2) screen abstracts against pre-established inclusion/exclusion criteria; and (3) retrieve and review full articles on eligible studies to determine potential inclusion in the evidence synthesis. The search strategies for the three research questions are described in Appendix A.

We present the excluded references in Appendix B and our analysis of the results from ongoing studies in Appendix C.

Inclusion Criteria

For Key Questions 1 and 3 we included:

1. Original epidemiologic studies, including randomized clinical trials (RCTs), nonrandomized multicenter clinical trials, and observational studies that used the strategies to reduce bias (adjustment, stratification, matching, propensity scores).

2. Publication in English after 1970.
3. Target population of community-dwelling adults with knee OA.
4. Eligible intermediate (impaired performance tests) and patient-centered outcomes including pain, disability, and quality of life.
5. Eligible interventions as listed in Table 1.

Table 1. Physical therapy interventions eligible for review

General Modality	Specific Intervention	Definition
<i>Patient/Client-Related Instruction</i>		
Therapeutic exercise	Current condition Enhancement of performance Health, wellness, and fitness Plan of care Risk factors for pathology/ pathophysiology, impairments, functional limitations, or disabilities	
	Aerobic capacity/endurance conditioning or reconditioning	Increased workload over time Walking programs Aquatic therapy
	Flexibility exercises	Muscle lengthening Range of motion Stretching
	Gait and locomotion training	Gait training Implement and device training
	Strength, power, and endurance training for limb muscles	Active assistive, active, and resistive exercises Quadriceps strengthening Aquatic programs Standardized, programmatic, complementary exercise approaches Task-specific performance training Body mechanics and postural stabilization Body mechanics training
	Balance, coordination, and agility training	Neuromuscular education or re-education Posture awareness training
	Muscle relaxation technique for pain management	
Functional training in self-care, home management, work, community, and leisure integration or reintegration (including ADL, IADL, work hardening, and work conditioning)	ADL training	
	Devices and equipment use and training	Assistive and adaptive device or equipment training during ADL and IADL Orthotic, protective, or supportive device or equipment training during ADL and IADL
	Functional training programs	Simulated environments and tasks Task adaptation
	IADL training	
	Injury prevention or reduction	Injury prevention education during self-care, home management, work, community, and leisure integration or reintegration Injury prevention or reduction with use of devices and equipment Safety awareness training during self-care, home management, work, community, and leisure integration and reintegration

Table 1. Physical therapy interventions eligible for review (continued)

General Modality	Specific Intervention	Definition
<i>Patient/Client-Related Instruction (continued)</i>		
Manual therapy techniques (Including mobilization/ manipulation)	Detailed examination to reveal impaired movements	
	Manual techniques with reinforcing exercise to improve movement	
	Manual traction	
	Massage	Connective tissue massage Therapeutic massage
	Mobilization/manipulation	Soft tissue Knee joint, other joints
	Passive range of motion	
Prescription, application of devices and equipment	Adaptive devices	Raised toilet seats
	Orthotic devices	Braces Shoe inserts Splints
	Protective devices	Braces Protective patellar taping
	Supportive devices	Supportive taping
Electrotherapeutic interventions	Electrical stimulation	Electrical muscle stimulation Functional electrical stimulation High-voltage pulsed current Neuromuscular electrical stimulation Transcutaneous electrical nerve stimulation
Physical agents and mechanical interventions	Nonthermal agents	Pulsed electromagnetic fields
	Aquatic therapy	Pools
	Sound agents	Ultrasound
	Thermotherapy	Dry heat Hot packs Diathermy Cold modalities
	Cryotherapy	Cold packs Ice massage

ADL = activities of daily living; IADL = instrumental activities of daily living

For Key Question 2, we included all studies that examined the association between intermediate and patient-centered outcomes of physical therapy interventions.

We included observational studies when no trial data were available to estimate treatment benefits and harms.³³

We included RCTs with subjects who had both knee and hip OA if outcomes for the two groups were reported separately. For Key Question 2, we included studies of tests and measures of functional outcomes in adults with knee OA.

Exclusion Criteria

1. Studies that involved children, adolescents, hospitalized patients, or patients in long-term care facilities.
2. Studies that included patients with knee or hip OA but did not separately report the outcomes.
3. Studies that involved surgical treatments or pharmacologic treatments for knee OA.
4. Studies that examined physical therapy delivered via rehabilitation programs for adults with knee OA who had undergone knee arthroplasty within 6 months before the study.

5. Studies that validated tests and measures in populations with other diseases.
6. Studies that reported absolute values of the diagnostic tests in adults with knee OA.
7. Studies that did not test associative hypotheses or that did not provide adequate information on tested hypotheses (e.g., least square means, relative risk).
8. Case series when the evidence was available from RCTs or controlled observational studies.
9. Secondary data analyses, nonsystematic reviews, letters, or comments.

We excluded studies that examined drugs as an independent variable, but included them if existing medications were maintained as constant as possible during the physical therapy intervention study.

To assess harms of treatments, we followed the recommendations from the Methods Guide for Effectiveness and Comparative Effectiveness Reviews from AHRQ³⁴ and included published and unpublished evidence of the adverse effects of eligible interventions.

We defined harms as a totality of all possible adverse consequences of an intervention.³⁴ We analyzed harms regardless of how authors perceived causality of treatments.

We did not contact the primary investigators of the studies. The Scientific Resource Center requested Scientific Information Packets from appropriate manufacturers per usual procedures.

Study Selection

At least two investigators evaluated each study for eligibility according to recommendations from the Cochrane Handbook for Systematic Reviews of Interventions.³⁵ We developed an algorithm to define study eligibility for each research question. We followed the guidelines to select evidence from controlled trials and observational studies.³⁶ We defined the target population, eligible independent and dependent variables, outcomes, time, and setting following the Population, Intervention, Comparator, Outcome, Timing, and Setting (PICOTS) framework (Appendix D). Eligible trials enrolled community-dwelling adults with knee OA and reported pain as an inclusion criterion and/or outcome. Disagreements about the appropriateness of an article were resolved through discussion.

Eligible interventions fell within the scope of physical therapy practice whether or not the articles clearly described physical therapists' or physical therapist assistants' involvement in a given study.³⁷ Eligible comparators included sham stimulation, usual care, and no active treatment for analyses of efficacy, and physical therapy interventions for the analysis of comparative effectiveness. Eligible patient-centered outcomes included knee pain, disability, quality of life, perceived health status, and global assessments of treatment effectiveness. Eligible intermediate outcomes included composite function, joint function, gait function, strength, and transfers.

To minimize risk of bias and to obtain valid estimates of benefits and harms, we focused on RCTs. While randomization may distribute the effects of other treatments equally, their impacts still need to be taken into account. Pain relievers and nonsteroidal anti-inflammatory drugs may mask the benefits of physical therapy, especially for pain. Thus, we also reviewed observational studies with multivariate adjustment for concomitant treatments and confounding factors.^{33, 36, 38}

We reviewed the evidence of the efficacy and comparative effectiveness of physical therapy interventions for knee pain secondary to OA. We defined physical therapy and selected interventions and methods to assess the outcomes according to the classifications in the Practice Pattern 4E: Impaired Joint Mobility, Motor Function, Muscle Performance, and Range of Motion

Associated with Localized Inflammation from the American Physical Therapy Association's (APTA's) Guide to Physical Therapist Practice.³⁷

Data Extraction

We used the standard abstraction form to extract the data. One reviewer abstracted an article and a second reviewer checked the data for accuracy. We assessed errors in data extractions by comparing established ranges for each variable and the data charts with the original articles. Any detected discrepancies were discussed. We abstracted information relevant to the PICOT framework for each question. We abstracted minimum datasets to reproduce the results presented by the authors. For categorical variables, we abstracted a number of events among treatment groups. For continuous variables, we abstracted means and standard deviations.

For RCTs, we abstracted the number randomized to each treatment group as the denominator and calculated estimates by applying intention-to-treat principles. We abstracted the time when the outcomes were assessed as weeks from randomization and the time of followup after treatments. We categorized followup times as less than 6 weeks, 6 to 13 weeks, 14 to 26 weeks, or more than 26 weeks. For observational studies we extracted relative measures of the association (relative risk, hazard ratio, odds ratio) with standard error or 95% confidence interval (CI) and reported adjustments for patient characteristics.

For diagnostic studies we abstracted the number of positive (true and false) and negative (true and false) with index diagnostic tests when compared with gold standard.

Data abstraction forms are shown in Appendix E and can be found at https://netfiles.umn.edu/xythoswfs/webui/_xy-20731563_1-t_wzpHYqhT.

We abstracted sponsorship of the studies and conflict of interest by the authors. We abstracted baseline patient characteristics, including eligible and mean age; mean body mass index (BMI); proportion of women and minorities, subjects with disability, severe knee OA, comorbidities, and/or multi-joint OA; baseline physical activity level; occupation; and concomitant drug and physical therapy interventions. We abstracted the proportions of patients taking anti-inflammatory and analgesic medications and the types and doses of the drugs. We abstracted settings and supervision of treatments by physical therapists. We abstracted type, dose, length, and intensity of interventions when reported by the authors.

Risk of Bias Assessment

We evaluated risk of bias in the studies according to recommendations from the Methods Guide for Effectiveness and Comparative Effectiveness Reviews from the Evidence-based Practice Center Program at AHRQ (www.effectivehealthcare.ahrq.gov)³⁸ and the Cochrane Handbook for Systematic Reviews of Interventions.³⁵

We classified the studies by design to distinguish randomized and nonrandomized controlled clinical trials from observational studies. Then we abstracted predefined criteria for critical appraisal of risk of bias. We evaluated risk of bias with criteria of internal validity. For interventional studies, we used criteria from the AHRQ Methods Guide³⁸ and from the Cochrane risk of bias tool.³⁵

Risk of bias criteria for therapeutic studies included randomization, adequacy of randomization and allocation concealment, masking of the outcomes assessment, and intention-to-treat principles.³⁵ We evaluated disclosure of conflict of interest by the authors of individual studies and funding sources but did not use this information to downgrade quality of individual

studies. We did not downgrade methodological quality of poorly reported studies; however, we separately synthesized evidence from these studies.

For observational studies, we evaluated strategies to reduce bias in study design and analysis, including adjustment for confounding and valid outcome measurements. For diagnostic studies, we applied the Quality Assessment of Diagnostic Accuracy Studies (QUADAS) criteria.^{39, 40}

Rather than using a global risk of bias score, we assessed individual risk of bias criteria.^{41, 42}

We defined well-designed RCTs with adequate allocation concealment, intention-to-treat principles in analysis, and adequate randomization as studies with low risk of bias. We defined RCTs as having medium risk of bias if one risk of bias criterion was not met. We defined RCTs as having high risk of bias when two or more criteria were not met.

Applicability

We evaluated applicability with criteria of external validity. We estimated applicability of the population by evaluating subject selection in observational studies and clinical trials.⁴³ Studies of community-dwelling adults with knee OA recruited from the general population had high applicability. Large observational cohorts based on national registries, population-based effectiveness trials, and nationally representative administrative and clinical databases had higher applicability, as did studies of interventions conducted by physical therapists and studies with followup times of 3 months, 6 months, or longer.

Data Synthesis

We synthesized and presented the evidence according to the classification of physical therapy interventions and modalities from APTA's Guide to Physical Therapist Practice. We summarized the results into evidence tables (Appendix F).

For categorical variables, we calculated rates, relative risk, and absolute risk differences. For continuous variables, we calculated mean differences with 95% CI. We also calculated ratios of means that describe percentage differences in pain with active versus control interventions.⁴⁴ If we found more than one study from a particular trial, we used the results from the latest published paper.

We addressed the role of concomitant treatments in association with patient outcomes and synthesized the evidence according to other nonsurgical treatments for knee OA reported in the studies. We then compared the effects of the examined physical therapy interventions across the studies according to the reported proportion of patients taking concomitant drugs and the types of drugs. We conducted sensitivity and subgroup analyses according to concomitant drug treatments when the available data were suitable for pooling. Using a standard preplanned algorithm, we explored heterogeneity by clinical diversity⁴⁵ (age, sex, race, baseline ADL, IADL, comorbidity, and obesity). We explored heterogeneity by type, dose (when applicable), duration of treatment, and whether the control treatment included education or exercise. We performed subgroup analyses by the involvement of a physical therapist for all outcomes with aerobic or strengthening exercises since other interventions were likely administered by physical therapists. We performed meta-analyses based on examined physical therapy modalities and their combinations and using four followup time categories. We conducted subgroup analyses to examine the association between each physical therapy modality and physical therapy intervention effect size.

Rather than using the global risk of bias score, we explored heterogeneity by risk of bias criteria of individual studies and by the disclosed conflict of interest.^{42, 45, 46}

Following guidelines and recommendations from key informants and TEP members, we focused on patient-centered outcomes including pain, disability, and quality of life.²⁴ We categorized intermediate outcomes as measurements relevant to the practice of physical therapy such as gait, strength, balance, transfers, endurance, joint function, and composite measure of function. We synthesized evidence depending on measurements of the outcomes with validated scales.

We reviewed validity and reliability of the tests within the scope of physical therapy practice. Evidence of the association between intermediate and patient-centered outcomes was synthesized from observational studies that adjusted for treatments and confounding factors. We synthesized evidence from the studies that reported diagnostic values of intermediate outcomes to predict clinical outcomes. In a separate analysis, we synthesized the evidence of the association between intermediate and clinical outcomes from linear, logistic, and Cox regression models.

We calculated differences in relative risk and absolute risk from the abstracted events using Meta-analyst⁴⁷ and STATA⁴⁸ software at a 95% CI. We used correction coefficients and forced intention-to-treat to estimate treatment effects among all randomized patients regardless of the authors' exclusion of subjects from the analyses.³⁵ We calculated nonstandard mean differences in continuous variables from the reported means and standard deviations by using Meta-analyst⁴⁷ and STATA⁴⁸ software at a 95% CI. We defined magnitude of the effect using Cohen's criteria of small, medium, and large effect corresponding to 0-0.5, 0.5-0.8, and >0.8 standardized mean differences in the units of standard deviations.⁴⁹ We analyzed the adjusted regression coefficients with a standard error of association between intermediate and patient-centered outcomes.

Pooling criteria for Key Questions 1 and 3 required that definitions of physical therapy interventions and outcomes be the same. We grouped different measure instruments within reasonably similar content and structure with respect to pain, disability, quality of life, and composite function. We categorized treatments according to the way in which they were defined and ordered in the Guide to Physical Therapist Practice.³⁷ To address differences in outcomes measures, we analyzed all eligible RCTs with the recommended standardization method, instead of excluding valuable results from eligible RCTs that used different measures of the outcomes.⁵⁰

We calculated standardized mean differences for different measures of the same outcome with Cohen and Hedges methods. We back transformed standard mean differences (SMDs) to mean differences⁵⁰ for disability using EQ-5D, a multi-attribute, preference-based health status measuring instrument,⁵¹ and for quality of life using the 36-Item Short-Form Health Survey (SF-36).⁵² We back transformed SMDs to mean differences using several instruments: for pain we used the Visual Analog Scale (VAS),⁵³ for composite function we used the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) function score, and for gait function we used walking speed.⁵³ We derived pooled standard deviations of EQ-5D and SF-36 from large population-based studies of noninstitutionalized adults.^{51 52-54} We multiplied the SMDs by the among-person standard deviation to yield an estimate of the difference in mean outcome scores (with versus without intervention) on EQ-5D (0.38⁵¹), SF-36 (10.9⁵²), VAS (22 in scale 0 to 100),⁵³ WOMAC physical function (18.5),⁵⁴ and walking speed (0.2 m/s).⁵³ We categorized treatment effects by the clinical importance of differences in intermediate outcomes. We used definitions of MCIDs from published studies and evidence-based reports.⁵⁵ We categorized the results from each tested hypothesis as either nonsignificant differences in continuous outcomes, or as statistically significant with <20, 20-50, or >50 percent differences from the control interventions.⁵⁶

We tested consistency in the results by comparing the direction and strength of the association⁵⁷ and used Chi square and I square tests to assess heterogeneity in study results.^{58, 59} We explored heterogeneity with meta-regression and sensitivity analysis, and reported the results from random effects models only.⁶⁰ We chose the random effects model because it incorporates in the pooled analysis differences across trials in patient populations, baseline rates of the outcomes, and definitions of interventions and outcomes.⁴⁵

We assumed the presence of publication bias and did not use statistical tests for bias (defined as the tendency to publish positive results).^{35, 61}

We used several strategies to reduce study selection bias, including a comprehensive literature search of published and unpublished evidence in several databases, reference lists of systematic reviews, proceedings of scientific meetings, contacts with experts for additional references, and agreement on the eligibility status by several investigators. We examined publication rates among studies registered in ClinicalTrials.gov that examined physical therapy interventions in adults with knee osteoarthritis.

The numbers needed to treat to achieve one event of patient-centered outcome were calculated as reciprocals of the absolute risk differences in rates of outcome events in the active and control groups.^{48, 62} The number of avoided or excess events (respectively) per population of 1,000 was the difference between the two event rates multiplied by 1,000. We calculated means and 95% CI for treatment events per 1,000 treated, multiplying pooled absolute risk difference by 1,000.⁶³

For Key Question 2, we summarized results of individual studies in evidence tables to analyze sensitivity, specificity, predictive values, diagnostic odds ratios, and predictive likelihood ratios. We focused on the latter.^{64, 65} Ratios of 1 indicated that the tests did not provide likelihood of accurate diagnosis.⁶⁶ Ratios of more than 10 provided large and often conclusive increases in the likelihood of accurate diagnosis.⁶⁶ We tabulated each article for results of index diagnostic tests and reference standards. We evaluated validation and the proposed MCIDs in total scores when this information was available. To judge validity from the studies that reported correlation coefficients between index and reference methods, we categorized correlation into the following categories: weak correlation as <20 percent, medium correlation as 20-50 percent, strong correlation as 50-75 percent, and very strong correlation as >75 percent.⁴⁹

To answer the question of which intermediate outcomes meet the criteria of surrogates for patient-centered outcomes, we used Outcome Measures in Rheumatoid Arthritis Clinical Trials (OMERACT) Criteria for Surrogate Endpoints.^{56, 67} We examined whether randomized trials evaluated the association between intermediate and patient-centered outcomes.⁶⁷

Grading the Evidence for Each Key Question

We assessed strength of evidence by following the guidelines from AHRQ's Methods Guide and the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) criteria.⁵⁷ We judged the strength of evidence for each major outcome according to risk of bias, consistency, directness, and precision.⁵⁷

For pooled analyses, we defined overall risk of bias according to most common risk of bias in individual studies. We focused on direct evidence from head-to-head RCTs. We defined treatment effects as consistent when statistical heterogeneity was insignificant. We defined treatment effect estimates as precise when pooled estimates had reasonably narrow 95% CIs and pooled sample size was greater than 400.⁶⁸ Specifically, because side effects of physical therapy are rare and not serious, we defined the effect size to be precise if the 95% CI of effect size did

not include 0. For cases where 95% CI of estimated standardized effect size did include 0, the 95% CI had to be within ± 0.5 to be precise enough that we would not miss potential benefits/harms.

When appropriate, we included dose-response association, presence of confounders that would diminish an observed effect, or strength of association. We defined magnitude of the effect using Cohen's criteria as small, middle, and large effect corresponding to >0.5 and >0.8 standardized mean differences in standard deviation units.⁴⁹

We assigned high strength of evidence from low risk of bias RCTs that reported consistent precise findings for which future research would be very unlikely to change the estimate of effect. We assigned a moderate strength of evidence if one criterion mentioned above was not met. We assigned a low strength of evidence if at least two criteria mentioned above were not met, or evidence was limited to an individual study with low or medium risk of bias; these are findings for which further research is likely to change the estimate. We defined insufficient evidence as that limited to an individual study with a high risk of bias. We judged whether the overall body of available evidence allowed for conclusions that were sufficiently robust and resistant to bias and errors to inform clinical decisionmaking.³⁵

We followed the criteria of the United States Preventive Services Task Force in assessing strength of evidence from observational studies that examined the association between patient-centered and intermediate outcomes.⁶⁹

We graded the strength of evidence for primary outcomes across therapeutic studies as illustrated in Table 2.

Table 2. Strength of evidence for primary outcomes across therapeutic studies

Grade	Definition	Operationalization
High	High confidence that the evidence reflects the true effect. Further research is very unlikely to change our confidence in the estimate of effect.	Low risk of bias, consistency, precision, and, when appropriate, large effect size.
Moderate	Moderate confidence that the evidence reflects the true effect. Further research may change our confidence in the estimate of effect and may change the estimate.	If one criterion mentioned above was not met.
Low	Low confidence that the evidence reflects the true effect. Further research is likely to change the confidence in the estimate of effect and is likely to change the estimate.	If at least two criteria mentioned above were not met or evidence is limited to an individual study that is low or medium risk of bias.
Insufficient	Evidence does not permit a conclusion.	Evidence is limited to an individual study with high risk of bias. No studies provided evidence.

Applicability

We estimated applicability of the population by evaluating subject selection in observational studies and clinical trials.⁴³ Studies of community-dwelling adults with knee OA recruited from the general population had high applicability. Large observational cohorts based on national registries, population-based effectiveness trials, and nationally representative administrative and clinical databases had higher applicability, as did studies of interventions conducted by physical therapists and studies with followup times of 3 months, 6 months, or longer.

Results

Of 4,266 identified references, we included 576 references for this review. We excluded 1,258 references (Appendix B).

Detailed evidence tables with all included studies can be found at https://netfiles.umn.edu/xythoswfs/webui/_xy-20731563_1-t_wzpHYqhT. Eligible references included published results from individual studies, abstracts presented in scientific meetings, and FDA statistical reviews of several studies (Appendix Table F1). Our search of www.clinicaltrials.gov for completed studies identified 18 publications of 69 relevant studies (26 percent publication rate) (Appendix Table F2). We received no response from manufacturers of physical therapy equipment in response to our requests for scientific information packages (Appendix Table F3).

Key Question 1. What are the effectiveness and comparative effectiveness of available physical therapy interventions (without drug treatment) for adult patients with chronic knee pain due to OA on intermediate and patient-centered outcomes when compared to no active treatment or another active physical therapy modality?

For Key Questions 1 and 3, we synthesized evidence from 422 references. We calculated treatment effect from 261 references and qualitatively analyzed 161 studies (Appendix Table F4). We evaluated risk of bias and treatment effects but ultimately did not pool the results from RCTs of adults with knee or hip OA that failed to report those outcomes separately (Appendix Table F5). Finally, 212 eligible articles of 193 RCTs contributed to our conclusions, while only 84 RCTs met pooling criteria and were included into meta-analyses.

Most, but not all, studies reported consent of the subjects and ethical approval (Appendix Table F6). Almost half of the studies did not report a funding source; 17 were sponsored exclusively by industry. The studies recruited an average of 103 (standard deviation 110) adults (Appendix Table F7).

Most RCTs had medium risk of bias (55 percent). We could not evaluate risk of bias in poorly reported studies (Appendix Table F6). Most frequently, high risk of bias was due to exclusion of patients from the analyses and differences among treatment groups at baseline (inadequate randomization) (Appendix Table F8).

The studies overall had good applicability to our target population because they primarily recruited older adults with knee OA. On average, women constituted more than 70 percent of the participants. BMI of participants averaged at $29 \pm 3 \text{ kg/m}^2$ (Appendix Table F7). Most studies did not report race of participants (Appendix Table F9). Adults in 100 RCTs were taking anti-inflammatory drugs or pain relievers. Half of the studies provided no information about exact pharmacologic treatments. Most studies did not report participants' occupation, knee injury, comorbidity, duration of condition, or the proportion of subjects with baseline disability. Few studies explicitly stated that they excluded patients with prior knee surgery (Appendix Table F9). Most studies did not report the proportion of patients who had undergone surgery.

For two reasons, we concluded that the studies overall had low applicability to the actual practice of physical therapy. First, most examined an isolated intervention, which is inconsistent with recommended delivery of combined physical therapy modalities. Second, many of the interventions studied were physical agents/modalities (i.e., orthotics, ultrasound, taping, etc.).

This also contradicts the recommended practice of physical therapy, in which physical agents/modalities are infrequently used in isolation, but rather combined with other more “active” interventions (i.e., exercises).

Among the studies for pooled analyses, electrical stimulation, strength exercise, and aerobic exercise were the most frequently studied treatments (Appendix Table F10). Outcomes were categorized by comparisons, domains of outcomes, and followup times. The actual instruments used for pain, disability, quality of life, and composite function are presented in Appendix Table F11. Definitions of physical therapy interventions and outcomes varied dramatically among studies; thus, only a small proportion of comparisons met pooling criteria. We prioritized pooled analyses and results at longest time of followup over nonpooled results and short followups (Appendix Table F12).

Effectiveness of Physical Therapy Interventions

We found very few statistically significant differences in outcomes between active and control treatments. Table A in the Executive Summary shows how many studies examined each outcome, estimated effect sizes, and our level of confidence that the evidence reflects the true effect of the treatment and that the estimate is unlikely to be changed by future research (Appendix Table F13). No single physical therapy intervention improved all outcomes (Table 3). Individual small RCTs may fail to show statistically significant effects due to low statistical power.

Pooled analyses provided low-strength evidence that aerobic and aquatic exercise improved disability measures; aerobic exercise, strengthening exercise, and ultrasound reduced pain and improved function; at short- but not long-term followup, proprioception exercise reduced pain and Tai Chi improved function (Table 4). We observed no benefits from specific education programs, diathermy, orthotics, or magnetic stimulation. Individual (nonpooled) RCTs failed to show consistent statistically significant, strong, or clinically important changes in outcomes (Appendix Table F14). Strength of evidence was downgraded due to study risk of bias and heterogeneity in populations, treatments, and definitions of outcomes.

Specific Education Programs

We synthesized evidence from five RCTs;⁷⁰⁻⁷⁴ two RCTs with 511 participants contributed to the pooled analyses at the longest time of followup. The results of three articles from two RCTs that examined the effects of specific education programs provided low-strength evidence of no statistically significant effect on pain relief.^{72, 73}

Aerobic Exercises

We synthesized evidence from 22 RCTs;^{70-73, 75-92} 11 RCTs with 1,553 participants contributed to the pooled analyses at the longest time of followup.^{70-73, 76, 80, 82-86, 91, 92} We found low-strength evidence that aerobic exercise resulted in statistically significant improvement in long-term pain^{72, 73, 82-84, 86} and disability^{71, 82-84} but not psychological disability^{70, 76, 80, 85} or health perception.^{71, 82, 84} Within 3 months, aerobic exercise also improved composite function⁸⁵⁻⁸⁷ and gait function.^{75, 76, 78, 80, 85, 87, 90} At 12 months the benefits of aerobic exercise continued for gait function^{83, 91} but not for composite function.^{72, 83, 86}

Magnitude of the effect was generally consistent across the studies, although a few did show statistically significant heterogeneity in pooled estimates. We conducted a meta-regression analysis exploring heterogeneity in pain relief after about 3 months of aerobic exercise compared

Table 3. Outcomes with physical therapy interventions from randomized controlled clinical trials, pooled with random effects models standardized mean differences—using standard deviations as units of the differences

Treatment	Outcome (Sorted by Importance of the Outcomes); Weeks of Followup	Randomized Trials; Subjects	Cohen Standard Mean Difference (95% CI) (Hedges SMD not shown) Heterogeneity Statistics
Efficacy			
Education program	Pain 6-13 weeks	Studies: 3 ^{70, 73, 74} Subjects: 429	0.091 (-0.423, 0.604) I-squared=0.826, p-value=0.001
Education program	Pain >26 weeks	Studies: 2 ^{72, 73} Subjects: 511	-0.09 (-0.318, 0.138) I-squared=0.415, p-value=0.181
Aerobic exercise	Pain <6 weeks	Studies: 2 ^{76, 78} Subjects: 137	-1.00 (-2.25, 0.25) I-squared=0.926, p=0
Aerobic exercise	Pain 6-13 weeks	Studies: 12^{70, 73, 76-82, 85, 86, 89} Subjects: 1242	-0.326 (-0.567, -0.085) I-squared=0.752, p=0
Aerobic exercise	Pain 14-26 weeks	Studies: 6^{72, 78, 81, 86, 89} Subjects: 953	-0.063 (-0.187, 0.062) I-squared=0.828, p=0
Aerobic exercise	Pain >26 weeks	Studies: 6^{72, 73, 82, 84, 86, 83} Subjects: 1221	-0.211 (-0.346, -0.075) I-squared=0.284, p-value=0.211
Aerobic exercise	Disability <6 weeks	Studies: 2^{75, 76} Subjects: 117	-1.737 (-3.359, -0.114) I-squared=0.899, p=0.002
Aerobic exercise	Disability 6-13 weeks	Studies: 8^{70, 75-77, 79-82} Subjects: 739	-0.46 (-0.963, 0.044) I-squared=0.9, p-value=0
Aerobic exercise	Disability 14-26 weeks	Studies: 2 ^{81, 82} Subjects: 277	0.124 (-0.112, 0.36) I-squared=0, p-value=0.57
Aerobic exercise	Disability >26 weeks	Studies: 4^{71, 82-84} Subjects: 806	-0.208 (-0.372, -0.043) I-squared=0.255, p-value=0.252
Aerobic exercise	Psychological disability 6-13 weeks	Studies: 4 ^{70, 76, 80, 85} Subjects: 271	-0.687 (-1.473, 0.1) I-squared=0.873, p-value=0
Aerobic exercise	Health perception 6-13 weeks	Studies: 2 ^{76, 85} Subjects: 62	-1.415 (-3.152, 0.322) I-squared=0.889, p-value=0.003
Aerobic exercise	Health perception >26 weeks	Studies: 3 ^{71, 82, 84} Subjects: 513	-0.038 (-0.211, 0.135) I-squared=0, p-value=0.466
Aerobic exercise	Function composite 6-13 weeks	Studies: 3⁸⁵⁻⁸⁷ Subjects: 351	-0.841 (-1.358, -0.325) I-squared=0.785, p-value=0.003
Aerobic exercise	Function composite >26 weeks	Studies: 3 ^{72, 83, 86} Subjects: 826	-0.182 (-0.444, 0.08) I-squared=0.717, p-value=0.014
Aerobic exercise	Gait function <6 weeks	Studies: 3^{75, 76, 78} Subjects: 220	-0.382 (-0.629, -0.134) I-squared=0, p-value=0.542
Aerobic exercise	Gait function 6-13 weeks	Studies: 8^{75, 76, 78, 80, 85, 87, 89, 90} Subjects: 632	-0.575 (-0.756, -0.393) I-squared=0.271, p-value=0.194
Aerobic exercise	Gait function 14-26 weeks	Studies: 3^{72, 78, 89} Subjects: 459	-0.445 (-0.624, -0.267) I-squared=0, p-value=0.811
Aerobic exercise	Gait function >26 weeks	Studies: 2^{83, 91} Subjects: 609	-0.558 (-0.862, -0.254) I-squared=0.7, p=0.036
Aquatic exercise	Pain 6-13 weeks	Studies: 2 ^{94, 95} Subjects: 99	-0.25 (-0.646, 0.147) I-squared=0, p=0.376
Aquatic exercise	Pain 14-26 weeks	Studies: 2 ^{93, 94} Subjects: 303	-0.168 (-0.394, 0.058) I-squared=0, p-value=0.34
Aquatic exercise	Disability 6-13 weeks	Studies: 2 ^{94, 95} Subjects: 99	0.065 (-0.364, 0.495) I-squared=0.15, p=0.278
Aquatic exercise	Disability 14-26 weeks	Studies: 2^{93, 94} Subjects: 303	-0.281 (-0.507, -0.054) I-squared=0, p-value=0.511
Aquatic exercise	Function composite 6-13 weeks	Studies: 2 ^{94, 95} Subjects: 99	-0.034 (-0.52, 0.452) I-squared=0.33, p=0.22

Table 3. Outcomes with physical therapy interventions from randomized controlled clinical trials, pooled with random effects models standardized mean differences—using standard deviations as units of the differences (continued)

Treatment	Outcome (Sorted by Importance of the Outcomes); Weeks of Followup	Randomized Trials; Subjects	Cohen Standard Mean Difference (95% CI) (Hedges SMD not shown) Heterogeneity Statistics
<i>Efficacy (continued)</i>			
Aquatic exercise	QL 14-26 weeks	Studies: 2 ^{93, 94} Subjects: 303	-0.098 (-0.323, 0.128) I-squared=0, p-value=0.953
Strengthening exercise	Pain 6-13 weeks	Studies: 13 ^{94, 96-98, 100-104, 106, 108, 109} Subjects: 1404	-0.64 (-0.886, -0.394) I-squared=0.782, p-value=0
Strengthening exercise	Pain 14-26 weeks	Studies: 4 ^{94, 97, 99, 105} Subjects: 592	-0.348 (-0.518, -0.179) I-squared=0.049, p-value=0.379
Strengthening exercise	Pain >26 weeks	Studies: 3 ^{83, 97, 104} Subjects: 786 (885 knees)	-0.688 (-1.239, -0.137) I-squared=0.937, p-value=0
Strengthening exercise	Disability 6-13 weeks	Studies: 4 ^{94, 96-98} Subjects: 606	-0.083 (-0.513, 0.347) I-squared=0.78, p-value=0.004
Strengthening exercise	Disability 14-26 weeks	Studies: 3 ^{94, 97, 99} Subjects: 490	-0.187 (-0.364, -0.009) I-squared=0, p-value=0.941
Strengthening exercise	Disability >26 weeks	Studies: 2 ^{83, 97} Subjects: 687	-0.158 (-0.478, 0.162) I-squared=0.775, p-value=0.035
Strengthening exercise	QL 6-13 weeks	Studies: 2 ^{94, 98} Subjects: 194	-0.324 (-0.72, 0.071) I-squared=0.397, p-value=0.198
Strengthening exercise	Function composite 6-13 weeks	Studies: 6 ^{94, 100-104} Subjects: 521	-0.85 (-1.138, -0.562) I-squared=0.65, p-value=0.004
Strengthening exercise	Function composite 14-26 weeks	Studies: 3 ^{99, 94, 105} Subjects: 200	-0.355 (-0.613, -0.097) I-squared=0, p-value=0.89
Strengthening exercise	Function composite >26 weeks	Studies: 2 ^{83, 104} Subjects: 394	-1.012 (-1.971, -0.053) I-squared=0.932, p-value=0
Strengthening exercise	Gait function 6-13 weeks	Studies: 9 ^{97, 100-103, 106-109} Subjects: 958	-0.479 (-0.797, -0.161) I-squared=0.784, p-value=0
Strengthening exercise	Gait function 14-26 weeks	Studies: 2 ^{97, 105} Subjects: 494	-0.464 (-0.841, -0.087) I-squared=0.664, p-value=0.051
Strengthening exercise	Gait function >26 weeks	Studies: 2 ^{83, 97} Subjects: 687	-0.392 (-0.586, -0.198) I-squared=0.388, p-value=0.201
Tai chi	Pain 6-13 weeks	Studies: 2 ^{111, 112} Subjects: 85	-0.416 (-0.858, 0.027) I-squared=0, p-value=0.716
Tai chi	Disability 6-13 weeks	Studies: 2 ^{111, 112} Subjects: 85	-0.244 (-0.684, 0.195) I-squared=0, p-value=0.483
Tai chi	Disability 14-26 weeks	Studies: 2 ^{112, 113} Subjects: 123	-0.269 (-0.954, 0.416) I-squared=0.697, p-value=0.069
Tai chi	Function composite 6-13 weeks	Studies: 2 ^{111, 112} Subjects: 85	-0.447 (-0.89, -0.005) I-squared=0, p-value=0.937
Tai chi	Function joint 6-13 weeks	Studies: 2 ^{111, 112} Subjects: 85	-0.077 (-0.515, 0.361) I-squared=0, p-value=0.661
Proprioception exercise	Pain 6-13 weeks	Studies: 3 ^{100, 104, 114} Subjects: 198 (264 knees)	-0.716 (-1.315, -0.116) I-squared=0.811, p-value=0.005
Proprioception exercise	Function composite 6-13 weeks	Studies: 3 ^{100, 104, 114} Subjects: 198	-1.68 (-2.659, 0.402) I-squared=0.955, p=0
Proprioception exercise	Gait function 6-13 weeks	Studies: 3 ^{100, 114, 115} Subjects: 181	-0.973 (-2.039, 0.093) I-squared=0.909, p=0
Massage	Function composite 6-13 weeks	Studies: 2 ^{116, 117} Subjects: 94	-0.566 (-0.946, -0.187) I-squared=0, p=0.703
Orthotics	Function composite <6 weeks	Studies: 2 ^{122, 123} Subjects: 138	-0.583 (-1.191, 0.024) I-squared=0.75, p=0.07

Table 3. Outcomes with physical therapy interventions from randomized controlled clinical trials, pooled with random effects models standardized mean differences—using standard deviations as units of the differences (continued)

Treatment	Outcome (Sorted by Importance of the Outcomes); Weeks of Followup	Randomized Trials; Subjects	Cohen Standard Mean Difference (95% CI) (Hedges SMD not shown) Heterogeneity Statistics
<i>Efficacy (continued)</i>			
Orthotics	Gait function <6 weeks	Studies: 4 ¹²⁴⁻¹²⁷ Subjects: 101	-0.009 (-0.22, 0.203) I-squared=0, p=1
Elastic subtalar strapping	Function composite 6-13 weeks	Studies: 3 ¹²⁹⁻¹³¹ Subjects: 246	-0.276 (-0.528, -0.025) I-squared=0, p-value=0.546
E-stim	Pain <6 weeks	Studies: 7 ^{141, 148-150, 151, 143} Subjects: 301	-0.741 (-1.025, -0.456) I-squared=0.339, p-value=0.119
E-stim	Pain 6-13 weeks	Studies: 7 ^{140-142, 147, 150, 152} Subjects: 304	-0.086 (-0.311, 0.14) I-squared=0, p-value=0.752
E-stim	Pain 14-26 weeks	Studies: 2 ^{147, 152} Subjects: 76	0.585 (0.087, 1.082) I-squared=0.136, p-value=0.282
E-stim	Disability 6-13 weeks	Studies: 2 ^{140, 141} Subjects: 98	-0.275 (-0.687, 0.138) I-squared=0, p-value=0.958
E-stim	Global assessment 6-13 weeks	Studies: 2 ^{140, 141} Subjects: 98	-0.43 (-0.862, -0.006) I-squared=0, p-value=0.373
E-stim	Function composite 6-13 weeks	Studies: 3 ¹⁴⁰⁻¹⁴² Subjects: 138	-0.083 (-0.426, 0.26) I-squared=0, p-value=0.608
E-stim	Function joint <6 weeks	Studies: 2 ^{141, 143} Subjects: 100	-0.256 (-0.616, 0.103) I-squared=0, p-value=0.81
E-stim	Function joint 6-13 weeks	Studies: 2 ^{140, 141} Subjects: 98	-0.294 (-0.707, 0.119) I-squared=0, p-value=1
E-stim	Gait function <6 weeks	Studies: 4 ^{107, 144-146} Subjects: 191	-0.19 (-0.697, 0.317) I-squared=0.68, p-value=0.008
E-stim	Gait function 6-13 weeks	Studies: 3 ^{107, 142, 147} Subjects: 164	0.065 (-0.225, 0.355) I-squared=0, p-value=0.743
E-stim	Strength, 120 degree extension, 6-13 weeks	Studies: 2 ^{142, 147} Subjects: 118	-0.416 (-0.843, 0.011) I-squared=0.26, p-value=0.259
E-stim	Strength, 60 degree extension, 2 weeks	Studies: 2 ^{107, 142} Subjects: 146	-0.56 (-0.894, -0.227) I-squared=0, p-value=0.427
PEMF	Pain <6 weeks	Studies: 2 ^{154, 155} Subjects: 145	0.013 (-0.417, 0.442) I-squared=0.396, p=0.198
PEMF	Function composite <6 weeks	Studies: 2 ^{154, 155} Subjects: 145	-0.127 (-0.607, 0.354) I-squared=0.513, p=0.152
Ultrasound	Pain <6 weeks	Studies: 2 ^{160, 161} Subjects: 157	-0.539 (-1.051, -0.027) I-squared=0.669, p-value=0.049
Ultrasound	Pain 6-13 weeks	Studies: 4 ^{142, 158, 159, 162} Subjects: 227 (360 knees)	-0.52 (-0.85, -0.19) I-squared=0.617, p-value=0.034
Ultrasound	Pain >26 weeks	Studies: 2 ^{142, 158, 159} Subjects: 160 (320 knees)	-0.744 (-0.952, -0.536) I-squared=0, p-value=0.466
Ultrasound	Disability <6 weeks	Studies: 2 ^{160, 161} Subjects: 157	-0.392 (-0.803, 0.018) I-squared=0.496, p-value=0.138
Ultrasound	Function composite 6-13 weeks	Studies: 4 ^{142, 158, 159, 162} Subjects: 227	-0.61 (-1.411, 0.024) I-squared=0.892, p-value=0
Ultrasound	Function composite >26 weeks	Studies: 2 ^{158, 159} Subjects: 160	-1.154 (-1.613, -0.695) I-squared=0.545, p-value=0.111
Ultrasound	Gait function <6 weeks	Studies: 2 ^{160, 161} Subjects: 157	-0.542 (-1.341, 0.258) I-squared=0.861, p-value=0.001
Ultrasound	Gait function 6-13 weeks	Studies: 4 ^{142, 158, 159, 162} Subjects: 227	-1.139 (-2.11, -0.168) I-squared=0.915, p-value=0

Table 3. Outcomes with physical therapy interventions from randomized controlled clinical trials, pooled with random effects models standardized mean differences—using standard deviations as units of the differences (continued)

Treatment	Outcome (Sorted by Importance of the Outcomes); Weeks of Followup	Randomized Trials; Subjects	Cohen Standard Mean Difference (95% CI) (Hedges SMD not shown) Heterogeneity Statistics
<i>Efficacy (continued)</i>			
Ultrasound	Gait function >26 weeks	Studies: 2^{158, 159} Subjects: 160	-1.503 (-2.111, -0.896) I-squared=0.711, p-value=0.031
Diathermy	Disability <6 weeks	Studies: 4 ¹⁶³⁻¹⁶⁶ Subjects: 259	-0.216 (-0.456, 0.025) I-squared=0.139, p-value=0.324
Diathermy	Disability 6-13 weeks	Studies: 2 ^{164, 165} Subjects: 143	-0.046 (-0.342, 0.251) I-squared=0, p=0.667
Diathermy	Pain <6 weeks	Studies: 4¹⁶³⁻¹⁶⁶ Subjects: 259	-0.541 (-0.978, -0.104) I-squared=0.716, p-value=0.002
Diathermy	Pain 6-13 weeks	Studies: 3 ^{142, 164, 165} Subjects: 183	-0.007 (-0.274, 0.26) I-squared=0, p-value=0.962
Diathermy	Function composite <6 weeks	Studies: 3 ¹⁶⁴⁻¹⁶⁶ Subjects: 229	-0.475 (-0.964, 0.014) I-squared=0.756, p-value=0.003
Diathermy	Function composite 6-13 weeks	Studies: 3 ¹⁶³⁻¹⁶⁵ Subjects: 183	0.007 (-0.26, 0.273) I-squared=0, p-value=0.998
Diathermy	Function joint <6 weeks	Studies: 2 ¹⁶³⁻¹⁶⁵ Subjects: 143	0.197 (-0.104, 0.499) I-squared=0.026, p=0.358
Diathermy	Function joint 6-13 weeks	Studies: 2 ^{164, 165} Subjects: 143	0.162 (-0.134, 0.459) I-squared=0, p=0.871
Diathermy	Gait function <6 weeks	Studies: 3 ¹⁶³⁻¹⁶⁵ Subjects: 173	-0.096 (-0.364, 0.171) I-squared=0, p-value=0.949
Diathermy	Gait function 6-13 weeks	Studies: 3 ^{142, 164, 165} Subjects: 183	-0.138 (-0.406, 0.129) I-squared=0, p-value=0.934
<i>Comparative Effectiveness</i>			
Aquatic exercise vs. aerobic exercise	Pain 6-13 weeks	Studies: 2 ^{173, 194} Subjects: 110	-0.447 (-1.245, 0.35) I-squared=0.762, p-value=0.04
Laterally vs. neutrally wedged insole	Function composite 6-13 weeks	Studies: 2 ^{131, 175} Subjects: 383	-0.005 (-0.257, 0.246) I-squared=0.516, p-value=0.083
E-stim vs. exercise	Pain <6 weeks	Studies: 2 ¹⁷⁸ Subjects: 81	-1.298 (-2.992, 0.396) I-squared=0.913, p=0.001
E-stim vs. exercise	Gait function <6 weeks	Studies: 2 ^{107, 178} Subjects: 81	0.198 (-1.181, 1.577) I-squared=0.888, p=0.003

CI = confidence interval; E-stim = electrical stimulation; QL= quality of life; PEMF = pulsed electromagnetic fields; SMD = standard mean differences

Note: Bold indicates statistically significant changes when 95%CI do not include 0.

Table 4. Narrative evidence summary of effectiveness of physical therapy interventions for knee osteoarthritis

Comparison	Outcomes at the Longest Time of Followup	Conclusions/Strength of Evidence
Education program	Pain/studies=2, subjects=511	An education program did not improve pain measures/Low
	Disability/studies=1, subjects=72	An education program did not improve disability measures/Low
	Psychological disability/studies=1, subjects=316	An education program did not improve psychological disability measures/Low
	Health perception/studies=1, subjects=316	An education program improved health perception measures/Low
	Composite function/studies=1, subjects=316	An education program did not improve composite function measures/Low
	Gait function/studies=1, subjects=316	An education program did not improve gait function measures/Low
		<i>An education program improved health perception measures (L) but did not improve pain (L), disability (L), psychological disability (L), gait (L) and composite measures of function (L)</i>
Aerobic exercises	Pain/studies=6, subjects=1,221	Aerobic exercises improved pain measures/Low
	Disability/studies=4, subjects=806	Aerobic exercises improved disability measures/Low
	Psychological disability/studies=4, subjects=271	Aerobic exercises did not improve psychological disability measures/Low
	Global assessment/studies=1, subjects=217	Aerobic exercises did not improve global assessment measures/Low
	Health perception/studies=3, subjects=513	Aerobic exercises did not improve health perception measures/Low
	Composite function/studies=3, subjects=826	Aerobic exercises did not improve composite function measures/Low
	Joint function/studies=1, subjects=28	Aerobic exercises did not improve joint function measures/Low
	Gait function/studies=2, subjects=609	Aerobic exercises improved gait function measures/Low
	Transfer function/studies=1, subjects=293	Aerobic exercises improved transfer function measures/Low
		<i>Aerobic exercises improved pain (L), disability (L), gait (L), and transfer (L) measures of function but did not improve psychological disability (L), global assessment (L), health perception (L), joint (L), and composite measures of function (L)</i>
Aquatic exercises	Pain/studies=2, subjects=303	Aquatic exercises did not improve pain measures/Low
	Disability/studies=2, subjects=303	Aquatic exercises improved disability measures/Low
	Psychological disability/studies=1, subjects=249	Aquatic exercises did not improve psychological disability measures/Low
	Quality of life/studies=2, subjects=303	Aquatic exercises did not improve quality of life measures/Low
	Composite function/studies=1, subjects=45	Aquatic exercises did not improve composite function measures/Low
		<i>Aquatic exercises improved disability (L) but did not improve pain (L), psychological disability(L), quality of life (L), and composite measures of function (L)</i>

Table 4. Narrative evidence summary of effectiveness of physical therapy interventions for knee osteoarthritis (continued)

Comparison	Outcomes at the Longest Time of Followup	Conclusions/Strength of Evidence
Strengthening exercises	Pain/studies=3, subjects=786 (885 knees)	Strengthening exercises improved pain measures/Low
	Disability/studies=2, subjects=687	Strengthening exercises did not improve disability measures/Low
	Psychological disability/studies=1, subjects=46	Strengthening exercises improved psychological disability measures/Low
	Global assessment/studies=1, subjects=68	Strengthening exercises improved global assessment measures/Low
	Health perception/studies=1, subjects=46	Strengthening exercises did not improve health perception measures/Low
	Quality of life/studies=2, subjects=194	Strengthening exercises did not improve quality of life measures/Low
	Composite function/studies=2, subjects=394	Strengthening exercises improved composite function measures/Low
	Joint function/studies=1, subjects=105	Strengthening exercises did not improve joint function measures/Low
	Gait function/studies=2, subjects=687	Strengthening exercises improved gait function measures/Low
	Transfer function/studies=1, subjects=295	Strengthening exercises improved transfer function measures/Low
		<i>Strengthening exercises improved pain (L), psychological disability (L), global assessment (L), gait (L), transfer (L), and composite (L) function measures but did not improve disability (L), health perception (L), quality of life (L), and joint (L) function</i>
Tai Chi	Pain/studies=2, subjects=85	Tai Chi did not improve pain measures/Low
	Disability/studies=2, subjects=123	Tai Chi did not improve disability measures/Low
	Psychological disability/studies=1, subjects=44	Tai Chi improved psychological disability measures/Low
	QOL/studies=1, subjects=44	Tai Chi did not improve quality of life measures/Low
	Composite function/studies=2, subjects=85	Tai Chi improved composite function measures/Low
	Joint function/studies=2, subjects=85	Tai Chi did not improve joint function measures/Low
	Gait function/studies=1, subjects=44	Tai Chi did not improve gait function measures/Low
		<i>Tai Chi improved psychological disability (L) and composite (L) function measures, but did not improve pain (L), disability (L), quality of life (L), gait (L), and joint (L) function measures</i>
Proprioception exercises	Pain/studies=3, subjects=198 (264 knees)	Proprioception exercises improved pain measures/Low
	Composite function/studies=3, subjects=198	Proprioception exercises did not improve composite function measures/Low
	Gait function/studies=3, subjects=181	Proprioception exercises did not improve gait function measures/Low
		<i>Proprioception exercises improved pain (L) but did not improve gait (L) and composite measures of function (L)</i>
Massage	Disability/studies=1, subjects=68	Massage improved disability measures/Low
	Composite function/studies=2, subjects=94	Massage improved composite function measures/Low
	Joint function/studies=1, subjects=68	Massage improved joint function measures/Low
	Gait function/studies=1, subjects=68	Massage improved gait function measures/Low
		<i>Massage improved disability (L), joint (L), gait (L) and composite (L) function measures</i>

Table 4. Narrative evidence summary of effectiveness of physical therapy interventions for knee osteoarthritis (continued)

Comparison	Outcomes at the Longest Time of Followup	Conclusions/Strength of Evidence
Joint mobilization	Pain/studies=1, subjects=43	Joint mobilization did not improve pain measures/Low
	Disability/studies=1, subjects=43	Joint mobilization improved disability measures/Low
	Global assessment/studies=1, subjects=43	Joint mobilization improved global assessment measures/Low
	Gait function/studies=1, subjects=40	Joint mobilization did not improve gait function measures/Low
		<i>Joint mobilization improved disability (L) and global assessment (L), but did not improve pain (L) and gait function measures (L)</i>
Joint mobilization with exercise	Disability/studies=1, subjects=134	Joint mobilization with exercise improved disability measures/Low
	Gait function/studies=1, subjects=134	Joint mobilization with exercise did not improve gait function measures/Low
		<i>Joint mobilization with exercise improved disability (L) but did not improve gait (L) function measures</i>
Orthotics	Pain/studies=1, subjects=57	Orthotics improved pain measures/Low
	Disability/studies=1, subjects=57	Orthotics improved disability measures/Low
	Psychological disability/studies=1, subjects=57	Orthotics improved psychological disability measures/Low
	Global assessment/studies=1, subjects=125	Orthotics did not improve global assessment measures/Low
	QOL/studies=1, subjects=57	Orthotics improved quality of life measures/Low
	Composite function/studies=2, subjects=138	Orthotics did not improve composite function measures/Low
	Joint function/studies=1, subjects=57	Orthotics improved joint function measures/Low
	Gait function/studies=4, subjects=101	Orthotics did not improve gait function measures/Low
		<i>Orthotics improved pain (L), disability (L), psychological disability (L), quality of life (L), and joint (L) measures but did not improve global assessment (L), gait (L) and composite (L) function measures</i>
Elastic subtalar strapping	Composite function/studies=3, subjects=246	Elastic subtalar strapping improved composite function measures/Low
Taping	Pain/studies=1, subjects=58	Taping did not improve pain measures/Low
	Disability/studies=1, subjects=58	Taping did not improve disability measures/Low
	Composite function/studies=1, subjects=58	Taping did not improve composite function measures/Low
	Gait function/studies=1, subjects=18	Taping did not improve gait function measures/Low
		<i>Taping did not improve pain (L), disability (L), gait (L) and composite (L) function measures</i>

Table 4. Narrative evidence summary of effectiveness of physical therapy interventions for knee osteoarthritis (continued)

Comparison	Outcomes at the Longest Time of Followup	Conclusions/Strength of Evidence
E-stim	Pain/studies=2, subjects=76	E-stim worsened pain measures/Low
	Disability/studies=2, subjects=98	E-stim did not improve disability measures/Moderate
	Global assessment/studies=2, subjects=98	E-stim improved global assessment measures/Low
	Health perception/studies=1, subjects=40	E-stim did not improve health perception measures/Low
	Composite function/studies=3, subjects=138	E-stim did not improve composite function measures/Low
	Joint function/studies=2, subjects=98	E-stim did not improve joint function measures/Moderate
	Gait function/studies=3, subjects=164	E-stim did not improve gait function measures/Low
	Strength/studies=2, subjects=146	E-stim improved strength measures/Low
	Transfer function/studies=1, subjects=38	E-stim did not improve transfer function measures/Low
		<i>E-stim improved global assessment (L) and strength (L) measures, but worsened pain (L), and did not improve disability (M), health perception (L), and gait (L), joint (M), transfer (L), and composite (L) function measures,</i>
PEMF	Pain/studies=2, subjects=145	PEMF did not improve pain measures/Moderate
	Disability/studies=1, subjects=86	PEMF did not improve disability measures/Low
	Global assessment/studies=1, subjects=36	PEMF improved global assessment measures/Low
	Composite function/studies=2, subjects=145	PEMF did not improve composite function measures/Moderate
	Joint function/studies=1, subjects=90	PEMF did not improve joint function measures/Low
	Gait function/studies=1, subjects=36	PEMF did not improve gait function measures/Low
		<i>PEMF improved global assessment (L) but did not improve pain (M), disability (L), and gait (L), joint (L) and composite (M) function measures</i>
Ultrasound	Pain/studies=2, subjects=160 (320 joints)	Ultrasound improved pain measures/Low
	Disability/studies=2, subjects=157	Ultrasound did not improve disability measures/Low
	Composite function/studies=2, subjects=160	Ultrasound improved composite function measures/Low
	Joint function/studies=1, subjects=67	Ultrasound did not improve joint function measures/Low
	Gait function/studies=2, subjects=160	Ultrasound improved gait function measures/Low
		<i>Ultrasound improved pain (L), gait (L) and composite (L) function measures but did not improve disability (L), and joint function measures (L)</i>

Table 4. Narrative evidence summary of effectiveness of physical therapy interventions for knee osteoarthritis (continued)

Comparison	Outcomes at the Longest Time of Followup	Conclusions/Strength of Evidence
Diathermy	Pain/studies=3, subjects=183	Diathermy did not improve pain measures/Low
	Disability/studies=2, subjects=143	Diathermy did not improve disability measures/Low
	Psychological disability/studies=1, subjects=40	Diathermy did not improve psychological disability measures/Low
	Global assessment/studies=1, subjects=113	Diathermy did not improve global assessment measures/Low
	Health perception/studies=1, subjects=40	Diathermy did not improve health perception measures/Low
	Quality of life/studies=1, subjects=55	Diathermy did not improve quality of life/Low
	Composite function/studies=3, subjects=183	Diathermy did not improve composite function measures/Low
	Joint function/studies=2, subjects=143	Diathermy did not improve joint function measures/Low
	Gait function/studies=3, subjects=183	Diathermy did not improve gait function measures/Low
		<i>Diathermy did not improve pain (L), disability (L), psychological disability (L), global assessment (L), health perception (L), quality of life (L), and joint (L), gait (L) and composite (L) function measures</i>
Heat	Disability/studies=1, subjects=34	Heat improved disability measures/Low
	Quality of life/studies=1, subjects=34	Heat improved quality of life measures/Low
	Composite function/studies=1, subjects=52	Heat did not improve composite function measures/Low
	Gait function/studies=1, subjects=40	Heat did not improve gait function measures/Low
	Pain/studies=1, subjects=34	Heat did not improve pain measures/Low
	Joint function/studies=1, subjects=52	Heat did not improve joint function measures/Low
		<i>Heat improved disability (L) and quality of life (L), but did not improve pain (L), gait (L), joint (L) and composite (L) function measures</i>
Cryotherapy	Disability/studies=1, subjects=34	Cryotherapy did not improve disability measures/Low
	Quality of life/studies=1, subjects=34	Cryotherapy did not improve quality of life measures/Low
	Composite function/studies=1, subjects=34	Cryotherapy did not improve composite function measures/Low
		<i>Cryotherapy did not improve disability (L), quality of life (L), and composite function measures (L)</i>

E-stim = electrical stimulation; PEMF = pulsed electromagnetic fields; QOL =quality of life

Note: Bold indicates findings with moderate or high strength of evidence. Strength of evidence as L = low; M = moderate; I = insufficient; Strength of evidence was determined according to four domains. (risk of bias, directness, consistency, and precision)

with placebo. We found no factor that could have consistently modified physical therapy effects (Appendix Table F15). Pain relief around 3 months was consistent in RCTs that reported aerobic exercise under supervision by a physical therapist (Appendix Table F16). By contrast, improvement in composite function 3 months after aerobic exercise was larger in RCTs that reported no physical therapist supervision (Appendix Table F17). A single RCT examined the effects of manual therapy combined with a standardized knee exercise program in the clinic and at home, and found statistically and clinically significant improvements in WOMAC total score and gait function.⁷⁵

Aquatic Exercises

Evidence from three RCTs with 348 participants contributed to the pooled analyses at the longest time of followup.⁹³⁻⁹⁵ These RCTs examined the effects of aquatic exercise. Two studies showed low-strength evidence that aquatic exercise reduced disability, but had no statistically significant effects on pain relief or quality of life.^{93, 94}

Strengthening Exercises

We synthesized evidence from seventeen RCTs;^{83, 94, 96-110} nine RCTs with 1,982 participants contributed to the pooled analyses at the longest time of followup.^{83, 88, 94, 97-99, 104-106}

Strengthening exercise had no statistically significant effect on disability (low-strength evidence).^{83, 97} However, we observed sustained improvement in pain relief, composite function, and gait function at 3 months through more than 12 months followup.^{83, 94, 96-110} Low-strength evidence demonstrated that strengthening exercise did not improve quality of life.^{94, 98} Magnitude of the effect differed across the studies.

Meta-regression exploring heterogeneity in gait function or composite function at 3 months after strengthening exercise compared with placebo found no factor that could explain the heterogeneity (Appendix Tables F18-F19). Meta-regression exploring heterogeneity in pain relief around 3 months after strengthening exercise indicated that younger participants had significantly better outcomes (Appendix Table F20). We explored heterogeneity by the involvement of a physical therapist and by study quality and found no consistent association with outcomes (Appendix Tables F21-F24).

Tai Chi

Evidence from three RCTs with 167 participants contributed to the pooled analyses at the longest time of followup.¹¹¹⁻¹¹³ Low-strength evidence from these small trials demonstrated that Tai Chi improved composite function measures around 3 months but had no statistically significant effects on pain or disability. Improvement in function was not sustained at the 6-month followup.

Proprioception Exercises

Evidence from four RCTs^{100, 104, 114, 115} with 247 participants contributed to the pooled analyses at the longest time of followup.^{100, 104, 114, 115} These RCTs offered low-strength evidence that proprioception exercise led to pain relief but did not improve composite function or gait function. Magnitude of the effect varied across the studies with statistically significant heterogeneity in pooled estimates. Sensitivity analysis restricted to two studies with low risk of bias revealed a larger effect size.^{100, 104} One study suggested that proprioception exercises improved knee reposition error.¹⁰⁰

Massage

Evidence from three RCTs with 162 participants contributed to the pooled analyses at the longest time of followup.¹¹⁶⁻¹¹⁸ We found low-strength evidence that massage somewhat improved composite function.^{116, 117} Individual studies showed that massage also improved pain,¹¹⁶ disability,¹¹⁸ health perception,¹¹⁶ and gait function;¹¹⁸ however, this evidence did not support robust conclusions.

Joint Mobilization

We synthesized evidence from three RCTs with 217 participants¹¹⁹⁻¹²¹ but were unable to perform pooled analyses to support robust conclusions about the impact of joint mobilization. Individual studies showed that joint mobilization with or without exercise reduced disability.^{119, 120} However, joint mobilization, with or without exercise, did not improve gait function.^{120, 121}

Orthotics

Evidence from seven RCTs with 364 participants contributed to the pooled analyses at the longest time of followup.¹²²⁻¹²⁸ These RCTs demonstrated low-strength evidence that orthotics had no effect on short-term outcomes of composite function or gait function. Evidence from three Japanese studies offered low-strength evidence that an orthotic intervention involving elastic subtalar strapping improved composite function around 3 months.¹²⁹⁻¹³¹

Brace

We synthesized evidence from five RCTs¹³²⁻¹³⁶ but were unable to perform a pooled analysis to draw robust conclusions. In one study, unloader brace improved disability and composite, joint, and gait functions.¹³⁶

Therapeutic Taping

Three RCTs with 119 participants^{126, 137, 138} examined the effects of taping and found that pain, disability, composite function, and gait function did not differ with therapeutic taping.^{137, 138} Different reporting formats precluded pooled analyses. Individual RCTs suggested that taping might provide short-term pain relief.¹³⁷⁻¹³⁹

Electrical Stimulation

We synthesized evidence from fifteen RCTs.^{107, 140-153} Seven RCTs with 390 participants contributed to the pooled analyses at the longest time of followup.^{107, 140-142, 147, 152, 153} Electrical stimulation resulted in statistically significant improvement in short-term pain^{110, 141, 143, 148-151} and at 3 months after starting the intervention^{110, 140-142, 147, 150, 152} but worsened pain at 6 months.^{147, 152} We found low-strength evidence that global assessment^{140, 141} and muscle strength (measured at 60 degree extension)^{107, 142} improved significantly with electrical stimulation around 3 months. These statistically significant findings were consistent without substantial heterogeneity across the studies. Pooled analyses provided moderate-strength evidence of no improvement on disability or joint function and low-strength evidence of no improvement on measures of gait or composite function.^{107, 140-145, 147, 151}

Pulsed Electromagnetic Fields

Evidence from four RCTs with 267 participants contributed to the pooled analyses at the longest time of followup.¹⁵⁴⁻¹⁵⁷ Pulsed electromagnetic fields (PEMF) neither reduced pain nor

improved composite function (moderate strength evidence). One study showed that PEMF resulted in statistically significant increase in subjective success.¹⁵⁷

Ultrasound

Evidence from six RCTs with 387 participants contributed to the pooled analyses at the longest time of followup.^{142, 158-162} We found low-strength evidence that ultrasound resulted in statistically significant reduction in pain with a moderate effect size and significantly improved composite function and gait function with a large effect size.^{142, 158, 159} Low-strength evidence also demonstrated that ultrasound did not improve disability.^{160, 161} Magnitude of the effect on gait function at 3 months varied across the studies, with statistically significant heterogeneity in pooled estimates. We were unable to examine heterogeneity due to the small number of studies.

Diathermy

We synthesized evidence from seven RCTs.^{142, 163-168} Five RCTs with 382 participants contributed to the pooled analyses at the longest time of followup.^{142, 164-166, 168} Low-strength evidence demonstrated that diathermy resulted in a statistically significant decrease in pain at 1 month,¹⁶³⁻¹⁶⁶ but the effect was statistically insignificant at 3 months.^{142, 164, 165} Low-strength evidence demonstrated that diathermy had no effect on disability, composite function, joint function, or gait function.^{142, 163-166} A single study also demonstrated no beneficial effects on psychological disability, global assessment, or health perception.^{165, 168}

Heat

We synthesized evidence from three RCTs with 126 participants^{142, 169, 170} but were unable to perform a pooled analysis to draw robust conclusions. In one study, heat improved disability and quality of life¹⁶⁹ but had no effect on composite function and gait function.¹⁴²

Cryotherapy

We synthesized evidence from two RCTs with 57 participants^{151, 169} but were unable to perform a pooled analysis from which to draw robust conclusions. Individual studies showed no statistically significant effects.^{151, 169}

The Role of Physical Therapist Involvement on Effects With Exercises

We performed subgroup analyses by the involvement of a physical therapist for all outcomes with aerobic or strengthening exercises. We found that for most comparisons, effect sizes with physical therapist involvement were statistically larger than those without. Furthermore, the results in the physical therapist involvement group tended to be consistent without heterogeneity. Although the sample size of the physical therapist involvement subgroup was smaller than the sample size of all pooled studies, the significance of the association and our conclusions remain the same (Appendix Table F25).

Clinical Importance of Treatment Effects With Physical Therapy Interventions

Original studies used a wide variety of pain measurements, and thus required standardization in pooled analyses. This lack of consistency prevented us from being able to assess whether

specific interventions resulted in benefits that were of clinical importance. To assess the clinical importance of pain reduction with interventions, we performed subgroup analyses with a subset of the studies that used the same VAS instrument for pain measures. We then compared the mean reduction in pain with the cutoff for MCIDs in VAS as reported in observational studies. We found that electrical stimulation, diathermy, and ultrasound resulted in clinically significant short-term pain reduction (Appendix Table F26). In long-term followup, however, only strengthening exercise reduced pain with an effect size that exceeded the minimum clinically importance difference. Since we had to exclude studies that used other instruments for pain measurements, we lost power to detect statistically significant findings.

To assess the clinical importance of improvements in disability and quality of life with physical therapy interventions, we transformed SMDs to nonstandardized mean differences in EQ-5D or SF-36. Only aerobic and aquatic exercises led to statistically significant and clinically important benefits for disability (estimated EQ-5D improvements of 0.08 and 0.11, respectively). For quality of life, the benefits of aquatic and strengthening exercise were statistically insignificant (estimated SF-36 physical component summary improvements of 1.1 and 3.5, respectively).

Few individual RCTs categorized patients by clinical importance of the changes in measured pain, disability, or joint function, and most studies failed to demonstrate consistent improvement with physical therapy interventions (Appendix Table F27). Rates of patient-rated treatment success were greater with a brace,¹³⁶ electrical stimulation,^{140, 171} mud pack,¹⁷² and PEMF.¹⁵⁷ Individual RCTs provided no strong evidence for robust conclusions about clinically important improvement with physical therapy interventions.

As a part of planned evidence synthesis, we also compared the differences in continuous measures of pain and disability reported in trials with the MCIDs determined in observational studies and found few clinically important improvements. Aerobic exercise resulted in clinically important improvement in pain, disability, and joint function in the majority of individual RCTs (Appendix Table F28).

Comparative Effectiveness of Physical Therapy Interventions

Limited direct evidence of comparative effectiveness of physical therapy interventions from single studies was low-strength for the majority of comparisons (Table 5). Aerobic and aquatic exercises had the same benefits on pain,^{94, 173} a finding consistent with the similar effect sizes demonstrated by these two interventions in efficacy studies. Direct comparisons showed no statistically significant differences between aerobic and strengthening exercises on disability and composite function.⁸³ One study found aerobic exercise was better than strengthening exercise in gait function.⁸³ One study demonstrated that Tai Chi was better than stretching exercises for disability, psychological disability, global assessment, and transfer function.¹⁷⁴

Laterally and neutrally wedged insoles demonstrated similar effects on gait function,^{131, 175} as did orthotics and brace on composite function.¹⁷⁶ A recent study showed that pain, disability, global assessment, quality of life, and joint function did not differ between laterally and neutrally wedged insoles.¹⁷⁷ Several small studies found no statistically significant difference between electrical stimulation and exercise for pain relief and gait function.^{107, 110, 147, 178} One study showed statistically insignificant differences between electrical stimulation and ultrasound on composite and gait function.¹⁴²

The studies of combined physical therapy modalities demonstrated no statistically significant benefits on the outcomes when compared with aerobic, strength, or proprioception exercise

alone. Manual therapy added to aerobic exercise provided benefits similar to aerobic exercise alone.

Table 5. Narrative evidence summary of comparative effectiveness of physical therapy interventions for knee osteoarthritis

Comparison	Outcomes at the Longest Time of Followup	Conclusions/Strength of Evidence
Aerobic exercises vs. strengthening exercises	Pain/studies=1, subjects=290	Aerobic exercises did not improve pain measures, compared to strengthening exercises/Low
	Disability/studies=1, subjects=290	Aerobic exercises did not improve disability measures, compared to strengthening exercises/Low
	Composite function/studies=1, subjects=290	Aerobic exercises did not improve composite function measures, compared to strengthening exercises/Low
	Gait function/studies=1, subjects=290	Aerobic exercises improved gait function measures, compared to strengthening exercises/Low
	Transfer function/studies=1, subjects=290	Aerobic exercises did not improve transfer function measures, compared to strengthening exercises/Low
		<i>Aerobic exercises improved gait function measures (L) but did not improve pain (L), disability (L), transfer (L), and composite (L) function measures, compared to strengthening exercises</i>
Aquatic exercises vs. aerobic exercises	Disability/studies=1, subjects=64	Aquatic exercises did not improve disability measures, compared to aerobic exercises/Low
	Pain/studies=2, subjects=110	Aquatic exercises did not improve pain measures, compared to aerobic exercises/Low
	Composite function/studies=1, subjects=64	Aquatic exercises did not improve composite function measures, compared to aerobic exercises/Low
	Gait function/studies=1, subjects=64	Aquatic exercises did not improve gait function measures, compared to aerobic exercises/Low
		<i>Aquatic exercise did not improve disability (L), pain (L), gait (L) and composite (L) function measures, compared to aerobic exercise</i>
Proprioception exercise vs. strengthening exercise	Composite function/studies=1, subjects=72	Proprioception exercises worsened composite function measures, compared to strengthening exercises/Low
	Gait function/studies=1, subjects=72	Proprioception exercises did not improve gait function measures, compared to strengthening exercise/Low
	Pain/studies=1, subjects=72	Proprioception exercises did not improve pain measures, compared to strengthening exercise/Low
		<i>Proprioception exercises worsened composite function measures (L) but did not improve pain (L) and gait function (L), compared to strengthening exercises</i>

Table 5. Narrative evidence summary of comparative effectiveness of physical therapy interventions for knee osteoarthritis (continued)

Comparison	Outcomes at the Longest Time of Followup	Conclusions/Strength of Evidence
Tai Chi vs. stretching exercises	Pain/studies=1, subjects=40	Tai Chi did not improve pain measures, compared to stretching exercise/Low
	Disability/studies=1, subjects=40	Tai Chi improved disability measures, compared to stretching exercise/Low
	Psychological disability/studies=1, subjects=40	Tai Chi improved psychological disability measures, compared to stretching exercise/Low
	Global assessment/studies=1, subjects=40	Tai Chi did not improve global assessment measures, compared to stretching exercise/Low
	Composite function/studies=1, subjects=40	Tai Chi did not improve composite function measures, compared to stretching exercise/Low
	Joint function/studies=1, subjects=40	Tai Chi did not improve joint function measures, compared to stretching exercise/Low
	Gait function/studies=1, subjects=40	Tai Chi did not improve gait function measures, compared to stretching exercise/Low
	Transfer function/studies=1, subjects=40	Tai Chi improved transfer function measures, compared to stretching exercise/Low
		<i>Tai Chi improved disability (L), psychological disability (L), and transfer function (L) but did not improve pain (L), global assessment (L), gait (L), joint (L), and composite (L) function measures, compared to stretching exercise</i>
Laterally vs. neutrally wedged insole	Pain/studies=1, subjects=200	Laterally wedged insole did not improve pain measures, compared to neutrally wedged insole/Low
	Disability/studies=1, subjects=200	Laterally wedged insole did not improve disability measures, compared to neutrally wedged insole/Low
	Global assessment/studies=1, subjects=200	Laterally wedged insole did not improve global assessment measures, compared to neutrally wedged insole/Low
	Quality of life/studies=1, subjects=200	Laterally wedged insole did not improve quality of life measures, compared to neutrally wedged insole/Low
	Composite function/studies=2, subjects=383	Laterally wedged insole did not improve composite function measures, compared to neutrally wedged insole/Low
	Gait function/studies=1, subjects=45	Laterally wedged insole did not improve gait function measures, compared to neutrally wedged insole/Low
	Joint function/studies=1, subjects=200	Laterally wedged insole did not improve joint function measures, compared to neutrally wedged insole/Low
		<i>Laterally wedged insole did not improve pain (L), disability (L), global assessment (L), quality of life (L), joint (L), gait (L), and composite (L) function measures, compared to neutrally wedged insole</i>
Orthotics vs. brace	Pain/studies=1, subjects=91	Orthotics did not improve pain measures, compared to brace/Low
	Composite function/studies=1, subjects=91	Orthotics did not improve composite function measures, compared to brace/Low
		<i>Orthotics did not improve pain (L) and composite (L) function measures, compared to brace</i>

Table 5. Narrative evidence summary of comparative effectiveness of physical therapy interventions for knee osteoarthritis (continued)

Comparison	Outcomes at the Longest Time of Followup	Conclusions/Strength of Evidence
E-stim vs. exercises	Pain/studies=2, subjects=81	E-stim did not improve pain measures, compared to exercise/Low
	Composite function/studies=1, subjects=50	E-stim improved composite function measures, compared to exercise/Low
	Joint function/studies=1, subjects=50	E-stim improved joint function measures, compared to exercise/Low
	Gait function/studies=2, subjects=81	E-stim did not improve gait function measures, compared to exercise/Low
		<i>E-stim improved joint (L) and composite (L) measures of function but did not improve pain (L) and gait (L) function, compared to exercise</i>
E-stim vs. ultrasound	Pain/studies=1, subjects=40	E-stim did not improve pain measures, compared to ultrasound/Low
	Composite function/studies=1, subjects=40	E-stim did not improve composite function measures, compared to ultrasound/Low
	Gait function/studies=1, subjects=40	E-stim did not improve gait function measures, compared to ultrasound/Low
		<i>E-stim did not improve pain (L), gait (L) and composite (L) function measures, compared to ultrasound</i>

E-stim = electrical stimulation

Note: Strength of evidence as L = low; Strength of evidence was determined according to four domains (risk of bias, directness, consistency, and precision).

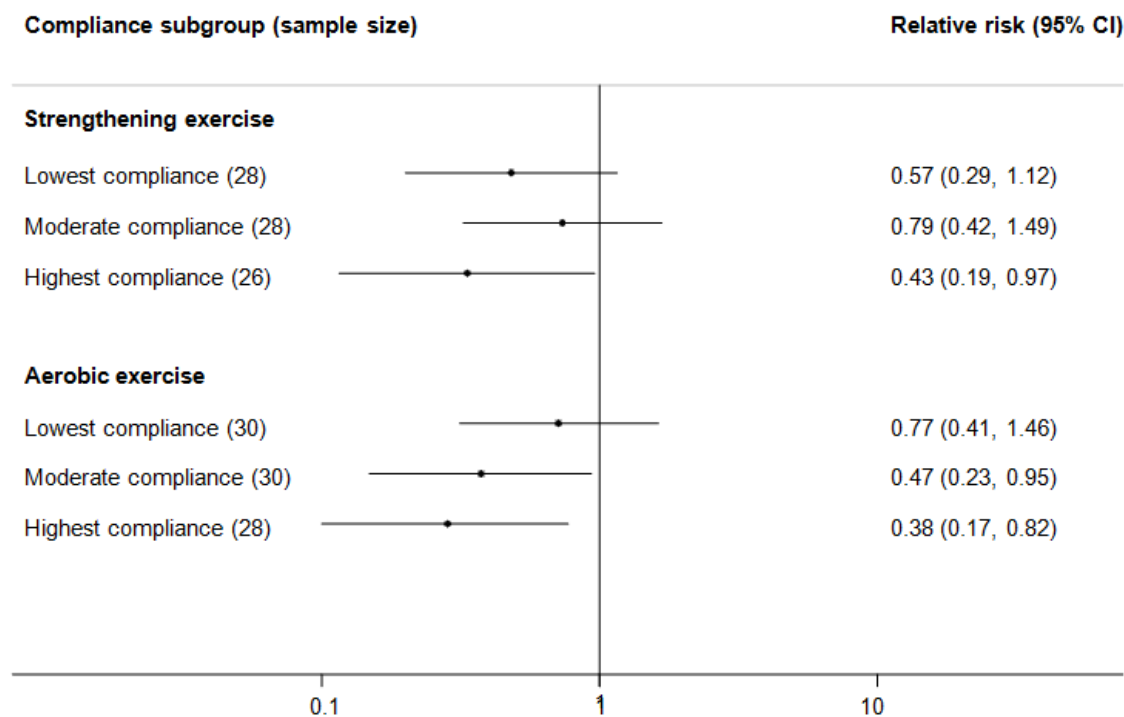
Key Question 1a. Role of Patient Characteristics on Outcomes

Compliance

Studies used the percentage of class attendance to capture compliance or adherence. Moderate-strength evidence from three RCTs demonstrated that subgroups with high compliance tended to have better outcomes for exercise (aerobic, aquatic, and strengthening).^{93, 179-182} The higher compliance group had the lowest risk of incident ADL disability,¹⁷⁹ a lower average depression score,¹⁸⁰ a higher mean Quality of Well-Being Scale score,⁹³ and greater improvements in both 6-minute walking distance and disability.¹⁸²

Three articles came from the Fitness Arthritis and Seniors Trial (FAST), which investigated the effects of two exercise programs (aerobic and strengthening) for adults 60 and older.¹⁷⁹⁻¹⁸¹ The authors examined dose-response effects between exercise frequency and three outcome variables: knee pain, self-reported difficulties with ADL, and ADL performance.¹⁸¹ The results indicated that exercise for patients with knee OA should be three times each week with moderate duration (35 minutes). The authors defined exercise compliance for both types of exercise by the percentage of exercise sessions attended and found the lowest risk of ADL disability and a lower average depression score for those in the highest compliance tertile (Figure 1).^{179, 180} One study performed an economic evaluation of aquatic exercise for persons with osteoarthritis; the mean Quality of Well-Being Scale (QWB) score for adherers was significantly higher than for nonadherers or controls.⁹³ Using multiple linear regression models among an Arthritis, Diet, and Activity Promotion Trial subsample, the authors found that higher exercise compliance was associated with greater improvements in 6-minute walking distance and in disability.¹⁸²

Figure 1. Risk of developing disability in activities of daily living in compliance subgroups



Note: The attention control group is used as the reference.

Age

Evidence did not permit conclusions about how age differences affect treatment outcomes. Three studies reported clinical outcomes by age subgroup for bracing, exercise (aerobic or strengthening), or PEMF.^{83, 134, 155} Heterogeneity across studies (different active and control treatments, outcomes, and definitions of age subgroups) precluded robust conclusions.

In 117 knee OA patients, explorative subgroup analyses showed that patients younger than 60 experienced a slightly better effect of the brace for knee function (measured by an estimated improvement of 3.38 on the Hospital for Special Surgery or HSS score) than patients 60 years and older (estimated HSS score improvement 2.48).¹³⁴ Pain severity with bracing showed a similar modest trend. Using a cut-off age of 70, the FAST trial found that participants of all ages who were randomized in aerobic or strengthening exercise programs improved in self-reported disability, pain, and 6-minute walk distance compared with the health education group.

While PEMF demonstrated no beneficial symptomatic effect in all patients, those younger than 65 improved significantly after 2 weeks in stiffness¹⁵⁵ but not in ADL or pain.

Malalignment

Two RCTs did not provide robust evidence for how malalignment affects treatment outcomes. RCTs found greater benefits for patients in the genu varus group¹³⁴ and for those without malalignment.¹⁰²

Stratified by the alignment, the genu varus group (n = 95) showed a better and statistically significant effect of the brace for knee function score (estimated HSS score improvement 4.15; P

= 0.03) compared with the genu valgus group (n = 22) (estimated HSS score improvement 0.20; P = 0.96).¹³⁴ For pain relief, this trend was similar, but not as prominent.

One study examined the impact of malalignment on the way strengthening exercise affects knee adduction moment, pain, and function.¹⁰² The results indicated that strengthening exercise did not significantly alter the knee adduction moment or function in either the more malaligned or the more neutral group, but the latter experienced statistically significant pain reduction.

Body Mass Index

Evidence for the role of BMI in predicting treatment effects was inconsistent in two studies.^{83, 183} One study compared treatment with and without a lateral wedge insole and found that those with a BMI of less than 30 kg/m² had a 29 point improvement in the WOMAC Pain subscale, compared with an improvement of only 6 points in those whose BMI was more than 30 kg/m².¹⁸³ In contrast, the very obese participants (defined by the top tertile) who were assigned to the aerobic exercise or resistance training programs improved in self-reported disability, pain, and 6-minute walk distance compared with the health education group.

Comorbidity

Evidence from individual studies did not permit robust conclusions about any modifying effect of comorbidity. The FAST study of 439 older adults with knee OA investigated the effects of comorbidity on the benefits of resistance or aerobic exercise.¹⁸⁴ The authors defined comorbidity as the presence of knee OA plus other two or more clinical conditions. The results indicated that aerobic exercise improved function and reduced pain irrespective of the presence of comorbidity.

Depression

Individual studies did not permit robust conclusions about differences in benefits between patients with and without depression. The FAST study investigated the effects of depression on the benefits of exercise.¹⁸⁰ Aerobic or resistance exercise significantly improved disability, pain, and walking speed regardless of baseline depressive symptoms. In addition, aerobic (but not resistance) exercise significantly lowered depressive symptoms at 18 months of followup compared with the control educational group. The authors concluded that depression had no substantial impact on the benefits of exercise.

Sex

Evidence from individual studies did not permit robust conclusions about differences in benefits between men and women. Five studies that reported clinical outcomes of exercise and orthotics in male and female subgroups^{83, 123, 131, 185, 186} demonstrated no statistically significant difference in effects.

Race

Evidence from a single study did not permit robust conclusions about differences in benefits between racial groups. This study performed subgroup analysis between whites and African Americans;⁸³ and both groups assigned to the aerobic exercise interventions or the resistance training program improved in self-reported disability, pain, and 6-minute walk distance compared with the health education group.

Severity

Baseline OA severity may affect the impact of physical therapy interventions on clinical outcomes. However, findings were inconsistent and varied across studies depending on the treatments, outcomes, and/or cut-off grades. Furthermore, RCTs reported *post hoc* analyses of changes from baseline in functional measures among patients with different baseline severity scores. Six RCTs used the Kellgren and Lawrence Scale (K/L) to grade severity, and one categorized severity according to the Ahlback score.¹³⁴ Clinical outcomes in severity subgroups were reported in seven RCTs involving brace,^{134, 176} insole,^{126, 127, 176, 183} exercise (strengthening or range of motion (ROM)),¹⁸⁶ and weight reduction and/or electrical stimulation.¹⁸⁷ Three RCTs found no consistent modification effect of baseline severity.^{126, 127, 183} One RCT found pain reduction to be greater in patients with severe OA than in those with mild.¹³⁴

These inconsistent findings may be due to inconsistent outcomes and/or cutoff grades in the original studies. In a group of 221 older adults randomized to strength training or ROM exercises, the WOMAC Pain subscale did not differ between K/L grade 2–3 and grade 0–1.¹⁸⁶ Interestingly, percentage of joint space narrowing >0.5mm after a 30-month followup was higher in the strength training arm than in the range of motion arm in subgroup of K/L grade 0–1, but not grade 2–3. This finding is unexplained; further confirmation is warranted.

One study evaluated the effect of weight reduction and/or electrical stimulation on patients with knee osteoarthritis and obesity.¹⁸⁷ The study found that subgroups with severity grades 3 and 4 had more pain decrease than the group with grade 2, regardless of whether the treatment arms received weight reduction, electrical stimulation, or weight reduction plus electrical stimulation. However, the study did not examine whether baseline severity modified benefits with manual therapy. Further, patients whose OA severity varied also had different baseline scores in the VAS pain scale.

Key Question 1b. Association between the dose/intensity/frequency of examined interventions and intermediate/patient-centered outcomes

For the majority of possible comparisons, we found no robust evidence for determining the association between the dose/intensity/frequency of examined interventions and outcomes.

Exercise

Although definitions of intensity differed among studies, evidence indicated similar benefits for low- and high-intensity exercise (defined by one study as 40 percent and 70 percent heart rate reserve, respectively).¹⁸⁸ In one study, low- and high-intensity exercises similarly improved function, gait, and pain.¹⁸⁸ Another study found that the effects of high-resistance strength training (>60 percent of one repetition maximum) appeared larger than those of low-resistance strength training (10 percent of one repetition maximum), but the differences were statistically insignificant.¹⁰¹ One study examined exercise compliance in order to determine any dose-response effects between exercise frequency and outcomes.¹⁸¹ The results indicated that exercise for patients with knee OA should be three times each week with moderate duration (35 minutes). One study compared frequency of physical therapist visits for patients receiving home-based exercise over 24 weeks, and found no statistically significant difference between groups who received six visits or two visits.¹⁸⁹

Orthotics

For patients with genu varus deformity from OA, medium duration (5-10 hours daily) of insole with subtalar strapping wear was better than short duration (less than 5 hours) and long duration (more than 10 hours).¹²² One study suggested better comfort and effectiveness for an 8- or 12mm elevated wedged insole than a 16mm elevated wedge.¹⁹⁰ Another study also found better comfort for a 5° than a 10° wedge, although the effect of the 5° wedge was smaller.¹²⁶ Future researchers should consider these findings in designing their studies.

Electrical Stimulation

We found no short-term clinical difference between low frequency (2 Hz pulse trains) and high frequency (80 Hz) electrical stimulation.¹⁹¹ However, noxious stimulation decreased pain intensity more than innocuous stimulation.¹⁹² In one study, Burst Mode and High Rate stimulation had similar effects on stiffness and pain.¹⁴³ Another study demonstrated that for reducing pain, 40 minutes was the optimal duration of electrical stimulation.¹⁹³

Diathermy

Two studies found no statistically significant differences between high and low intensity diathermy on disability and gait function.^{163, 164}

Ultrasound

In two studies, pulsed ultrasound appeared to be better than continuous ultrasound in improving disability, gait, and composite function.^{158, 161}

Key Question 1c. Association between the duration of examined interventions and intermediate/patient-centered outcomes

The duration of examined interventions varied broadly. For example, exercise programs ranged from 2 to 72 weeks. We found no statistically significant association between the duration of examined interventions and intermediate or patient-centered outcomes. In combining aerobic, aquatic, strengthening, proprioception, and Tai Chi exercises, changes in intermediate and patient-centered outcomes did not differ by the duration of interventions, with all p-values greater than 0.05 (Appendix Figure F1). For this analysis we used the longest followup standardized effect size in each study. While these results might seem to suggest that a 2-week exercise program is sufficient, we emphasize that exercise should be continuous and that higher compliance to exercise led to better improvement. Evidence did not permit robust conclusions about other treatments.

Association Between Time of Followup and Intermediate/Patient-Centered Outcomes

The association between the time of followup and outcomes differed by examined treatments and outcomes. Outcomes did not differ by followup times for treatments that demonstrated statistically significant benefits (aerobic, aquatic, and strengthening exercises and ultrasound). Nor did intermediate or patient-centered outcomes differ by followup time when the effects of aerobic, aquatic, strengthening, proprioception, and Tai Chi exercises were combined (all p-values greater than 0.05) (Appendix Figure F2). The combined results remained consistent with or without inclusion of Tai Chi. Ultrasound's effects did not differ by time of followup for pain,

gait, and composite function (Appendix Figure F3). Electrical stimulation improved pain at short followups but significantly worsened pain at longer followups (p-value < 0.001) (Appendix Figure F4). In contrast, we observed that diathermy's benefits for disability increased with longer followups (p-value = 0.009) (Appendix Figure F5).

Key Question 2. What is the association between changes in intermediate outcomes with changes in patient-centered outcomes after physical therapy interventions?

Evidence for the association between intermediate and clinical outcomes was limited to individual observational studies, which did not show a strong or consistent association between changes in intermediate and patient centered outcomes (Table 6). Substantial variability occurred between index and reference methods, definitions of outcomes, methods of examining diagnostic values, and associations between intermediate and clinical outcomes. Delineating between patient-centered and intermediate outcomes was somewhat artificial. For example, pain (a patient-centered outcome) is an explanatory factor for several intermediate outcomes including gait, range of motion, and balance. Likewise, patient-centered outcomes such as disability, self-reported pain, and observed IADL dependency were determined by composite measures of objective tests including WOMAC or Arthritis Impact Measurement Scale (Appendix Table F29) (intermediate outcomes). Finally, certain associations between patient-centered outcomes are clinically important for predicting treatment effects—for instance, pain or function may predict disability.

We synthesized the evidence of association between intermediate and clinical outcomes from 43 studies of 25,799 adults with knee OA. Mean age averaged 65, and ranged from 55 to 80 (Appendix Table F30). Women constituted 70 percent of participants. Sample size of the studies varied with a median of 149 and mean of 600 participants. Half of all published studies were American or British (13 and seven respectively). Minorities were included only in the American studies, which did not report those results separately.

The studies used different statistical concepts to examine the relationship between outcomes. First, the studies examined sensitivity, specificity, or positive predictive likelihood of index tests for correct identification of the outcomes according to reference tests. When the outcomes—for example, functional disability—were measured with scales, the studies defined thresholds in numeric score to categorize patients as disabled or not. Studies of diagnostic value had only fair quality (Appendix Table F31).

Second, the studies used linear regression to examine association as changes in measurements of patient-centered outcomes corresponding to changes in measurements of intermediate outcomes. Regression coefficients presented a magnitude of the change in continuous measures of patient-centered outcomes (such as pain) corresponding to one unit change in continuous measures of intermediate outcomes (such as muscle strength). However, it is not clear whether such estimates of the association between outcomes have clinical importance.

Third, the studies used logistic or Cox regression to examine association as rates or odds of patient-centered outcomes corresponding to rates or odds of functional impairments. For statistically significant associations, we judged a magnitude as high when relative risk or odds ratio was more than 2 or less than 0.5. Few studies adjusted the regression models to lower the risk of bias. Some studies failed to distinguish patients with definitive diagnoses of knee OA from those with self-reported OA or knee pain.

Some studies examined the association between outcomes at the same time points without collecting followup data. These cross-sectional analyses could point out the association between functional impairments and pain or disability at one time point but could not predict future changes in the outcomes. In contrast, prospective studies examined the association between baseline functional impairments and patient-centered outcomes at future time of followup. Those studies predicted patient-centered outcomes based on the association with intermediate outcomes, after adjustment for confounding factors.

Fourth, some cross-sectional studies calculated the correlation between continuous measurements in the outcomes. Correlation coefficients ranged from -1 (negative correlation) to 0 (no correlation) to 1 (positive correlation). The correlation simply reflected the same linear direction of the changes in intermediate and clinical outcomes, with no consideration of the units of measured outcomes or of the clinical importance of the measures.

Table 6. Association between intermediate and clinical outcomes; low strength of evidence from individual observational studies

Clinical Outcome	Intermediate Outcome	Conclusion
Disability	Physical performance	Physical function assessed with SF-36 and WOMAC tools have conclusive diagnostic value for work limitations
Disability	Physical performance	Several functional tests (VAS: restriction; TUG test; Step test; Walking speed) were associated with impaired adjusted daily activity score
Disability	OA severity	Severity of OA assessed with Osteoarthritis of the Knee Severity Index was negatively associated with role functioning
Disability	Range of motion	Increased range of motion was negatively associated with observed and self reported disability
Disability	Strength	Muscle strength was negatively associated with observed and self reported disability
Physical performance	Balance	Impaired balance was associated with poor physical performance
Pain	Gait	Gait speed was associated with WOMAC pain severity
Pain	Function	Joint laxity (knee instability) was not associated with walking time
Pain	OA severity	Severity of OA assessed with Osteoarthritis of the Knee Severity Index was negatively associated with body pain assessed using SF-36
Function	Balance	Impaired single-leg standing balance was not associated with poor WOMAC function
Function	Disease severity	Self-reported swelling was associated with poor WOMAC function scale
Function	Joint alignment	Fixed flexion deformity was not associated with poor WOMAC function
Function	Joint alignment	Intercondylar and intermalleolar gap in standing were not associated with poor functional outcome
Function	Joint mobility	Duration of morning stiffness was associated with poor WOMAC function
Function	Joint mobility	Hip rotation was not associated with poor WOMAC function
Function	Joint mobility	Knee flexion range of movement was not associated with poor WOMAC function
Function	Joint mobility	Locking: Pseudo-locking was not associated with poor WOMAC function
Function	Joint stability	Anteroposterior instability was not associated with poor WOMAC function
Function	Joint stability	Laxity (knee instability) was associated with poor WOMAC function
Function	Joint stability	Positive Giving Way Test was associated with poor WOMAC function
Function	OA severity	Severity of OA assessed with Osteoarthritis of the Knee Severity Index was negatively associated with physical functioning assessed using SF-36
Function	Proprioception	Proprioceptive inaccuracy was not associated with poor WOMAC function
Function	Strength	Force (quadriceps femoris muscle strength) <20kg was associated with poor WOMAC function
Function	Strength	Hamstring strength(mm Hg): ≤ 100 vs. ≥ 185 was associated with poor WOMAC function
Function	Strength	Muscle strength and laxity (knee instability) were associated with reduced walking time
Function	Strength	Muscle strength but not laxity (knee instability) was associated with poor WOMAC function
Function	Strength	Quadriceps strength (mm Hg): ≤ 140 vs. ≥ 300 was associated with poor WOMAC function

OA = osteoarthritis; SF-36 = 36-Item Short-Form Health Survey; TUG = timed up and go; VAS = Visual Analog Scale;

WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index

Note: Strength of evidence was downgraded because single observational studies did not provide strong consistent and unbiased estimates

Diagnostic Value of Outcomes

Few studies reported the diagnostic values of intermediate outcomes.

The Cohort Hip and Cohort Knee study (CHECK) found that an SF-36 physical function score <60 had conclusive diagnostic value for work limitations as determined by the Functional Capacity Evaluation.¹⁹⁵ Adults with SF-36 physical function score <60 had a large (>10) positive likelihood ratio of work limitations.

In one prospective cohort study, a Pain Numeric Rating Scale score of <4 had a conclusive diagnostic value for patient perception of clinically significant improvement (Appendix Table F32).¹⁹⁶ The study examined both absolute and relative changes in pain scores in each of three categories based on cut points using a numeric rating scale and found that clinically significant changes in pain were not uniform across the scale. A reduction of 15 percent in the Pain Numeric Rating Scale score represented minimum clinically important changes, while a reduction of 33 percent represented “much better” improvement in the patient’s global impression of change.¹⁹⁶

Another prospective study, Clinical Assessment Study of the Knee (CAS(K)), demonstrated that bilateral knee pain, duration of morning stiffness, and inactivity gelling (stiffness after inactivity) had conclusive diagnostic value for poor WOMAC function at 18 months of followup (positive likelihood ratio = 42 and the area under the receiver operating characteristic curve = 0.73).¹⁹⁷

Association Between Intermediate and Clinical Outcomes Examined With Regression Models

Measures of functional impairment were associated with poor patient-centered outcomes in individual studies (Table 7). Studies were inconsistent in defining intermediate and patient-centered outcomes and in adjusting for confounding factors. The studies examined the association with logistic or Cox regression reporting hazard rate ratios or odds ratios of categorical patient-centered outcomes (Table 8). Patient-centered outcomes were categorized according to clinically important thresholds in scales. Most studies examined the association with linear regression and reported differences in continuous measures of the outcomes corresponding to one unit increase in the measures of intermediate outcomes. No clinical importance of such changes was evident unless the studies proposed regression models estimating quality-of-life index or other patient-centered outcomes based on WOMAC scores.¹⁹⁸

Gait

Gait measurements were associated with pain and poor functional outcomes (Appendix Table F33). Baseline stance time on stairs was positively associated with time to climb stairs at followup in a randomized trial of older adults with knee OA.¹⁹⁹ In one cross-sectional study, gait speed was positively associated with maximal activity profile (the highest oxygen-demanding activity the participant is still able to perform).²⁰⁰ Adults with pain due to mild to moderate, clinically diagnosed medial-compartment knee OA had impaired walking speed.²⁰¹ A prospective Multicenter Osteoarthritis Study found that intense pain was associated with 70 percent greater risk of clinically important decline in walking speed.²⁰²

Table 7. Regression association between intermediate and clinical outcomes; low strength of evidence from individual observational studies

Intermediate Outcomes	Disability Studies/ N=Patients Estimate	Function Studies/Patients Estimate	Pain Studies/Patients Estimate
Balance		Harrison, 2004 ²⁰⁹ / N=50 -0.5* Thomas, 2008 ¹⁹⁷ / N=621 Not significant HR	
Gait speed	Bennell, 2004²⁰⁰ / N=259*	Nebel, 2009 ²⁴⁸ / N=179 Not significant*	Astephen Wilson, 2011²⁰¹ / N=40*
Range of motion	van Baar, 1998²⁰⁶ / N=185*	Thomas, 2008 ¹⁹⁷ / N=621 Not significant HR	Van Der Esch, 2006²⁰⁷ / N=86*
Strength	van Baar, 1998²⁰⁶ / N=185*	Thomas, 2008 ¹⁹⁷ / N=621 1.5 HR Wood, 2008 ²⁰⁴ N=741 5.2 OR Sharma, 2003 ²⁰⁵ N=257 NS OR O'Reilly, 1998 ²⁰³ N=300 7.1 OR	O'Reilly, 1998²⁰³ / N=300 18.8 OR
Swelling		Thomas, 2008¹⁹⁷ / N=621 1.3 HR	

HR = hazard rate ratio; OR = odds ratio

Note: Bold = statistically significant association

*Linear regression; strength of evidence was downgraded because single observational studies did not provide strong consistent and unbiased estimates

Table 8. Relative measure of association between intermediate outcomes and functional disability; low strength of evidence from individual observational studies

Author, Year Design Months of Followup	Intermediate Outcome	Definition of Intermediate Outcome	Adjustment	Estimate Mean (95% CI)	Area Under the Receiver Operating Characteristic Curve (ROC)
Thomas*, 2008 ¹⁹⁷ prospective cohort Months of followup: 72	Balance	Single-leg standing balance(s): <4 vs. 30	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, inactivity gelling, local tender point count	HR 1.21 (0.85 to 1.72)	0.77
	Balance	Single-leg standing balance(s): <4 vs. 30	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, inactivity gelling, local tender point count, prevalent knee radiographic OA	HR 1.21 (0.85 to 1.73)	0.77
	Balance	Single-leg standing balance(s): <4 vs. 30	Local tender point count	HR 1.49 (1.09 to 2.04)	0.68
	Balance	Single-leg standing balance(s): 10- 29 vs. 30	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, inactivity gelling, local tender point count	HR 1.12 (0.8 to 1.55)	0.77
	Balance	Single-leg standing balance(s): 10- 29 vs. 30	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, inactivity gelling, local tender point count, prevalent knee radiographic OA	HR 1.1 (0.79 to 1.54)	0.77
	Balance	Single-leg standing balance(s): 10- 29 vs. 30	Local tender point count	HR 1.27 (0.92 to 1.74)	0.68
	Balance	Single-leg standing balance(s): 4-9 vs. 30	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, inactivity gelling, local tender point count	HR 1.22 (0.88 to 1.67)	0.77
	Balance	Single-leg standing balance(s): 4-9 vs. 30	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, inactivity gelling, local tender point count, prevalent knee radiographic OA	HR 1.22 (0.89 to 1.68)	0.77
	Balance	Single-leg standing balance(s): 4-9 vs. 30	Local tender point count	HR 1.5 (1.12 to 2.01)	0.68

Table 8. Relative measure of association between intermediate outcomes and functional disability; low strength of evidence from individual observational studies (continued)

Author, Year Design Months of Followup	Intermediate Outcome	Definition of Intermediate Outcome	Adjustment	Estimate Mean (95% CI)	Area Under the Receiver Operating Characteristic Curve (ROC)
Thomas, 2008 ¹⁹⁷ prospective cohort Months of followup: 72	Range of motion	Duration of morning stiffness (min): ≤30 vs. none	Bilateral knee pain, inactivity gelling	HR 1.47 (1.13 to 1.89)	0.69
	Range of motion	Duration of morning stiffness (min): >30 vs. none	Bilateral knee pain, inactivity gelling	HR 1.55 (0.99 to 2.43)	0.69
	Range of motion	Duration of morning stiffness (min): ≤30 vs. none	BMI, anxiety, inactivity gelling, bilateral knee pain, age	HR 1.32 (1.01 to 1.73)	0.76
	Range of motion	Duration of morning stiffness (min): ≤30 vs. none	BMI, anxiety, inactivity gelling, bilateral knee pain, age, local tender point count, single-leg standing balance	HR 1.25 (0.95 to 1.65)	0.77
	Range of motion	Duration of morning stiffness (min): ≤30 vs. none	BMI, anxiety, inactivity gelling, bilateral knee pain, age, local tender point count, single-leg standing balance, prevalent knee radiographic OA	HR 1.25 (0.95 to 1.65)	0.77
	Range of motion	Duration of morning stiffness (min): ≥30 vs. none	BMI, anxiety, inactivity gelling, bilateral knee pain, age	HR 1.22 (0.75 to 2)	0.76
	Range of motion	Duration of morning stiffness (min): ≥30 vs. none	BMI, anxiety, inactivity gelling, bilateral knee pain, age, local tender point count, single-leg standing balance	HR 1.15 (0.7 to 1.89)	0.77
	Range of motion	Duration of morning stiffness (min): ≥30 vs. none	BMI, anxiety, inactivity gelling, bilateral knee pain, age, local tender point count, single-leg standing balance, prevalent knee radiographic OA	HR 1.16 (0.7 to 1.91)	0.77
	Range of motion	Inactivity gelling: Yes vs. no	Bilateral knee pain, duration of morning stiffness	HR 1.34 (0.98 to 1.83)	NR
	Range of motion	Inactivity gelling: Yes vs. no	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age	HR 1.23 (0.89 to 1.71)	0.69

Table 8. Relative measure of association between intermediate outcomes and functional disability; low strength of evidence from individual observational studies (continued)

Author, Year Design Months of Followup	Intermediate Outcome	Definition of Intermediate Outcome	Adjustment	Estimate Mean (95% CI)	Area Under the Receiver Operating Characteristic Curve (ROC)
Thomas, 2008 ¹⁹⁷ prospective cohort Months of followup: 72 (continued)	Range of motion	Inactivity gelling: Yes vs. no	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, local tender point count, single- leg standing balance	HR 1.19 (0.86 to 1.66)	0.76
	Range of motion	Inactivity gelling: Yes vs. no	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, local tender point count, single- leg standing balance, prevalent knee radiographic OA	HR 1.19 (0.85 to 1.65)	0.77
Thomas, 2008 ¹⁹⁷ prospective cohort Months of followup: 72	Strength	Hamstring strength (mm Hg): ≤100 vs. ≥185	Unadjusted	HR 1.51 (1.12 to 2.02)	NR
	Strength	Hamstring strength (mm Hg): 101-139 vs. ≥185	Unadjusted	HR 1.31 (0.97 to 1.76)	NR
	Strength	Hamstring strength (mm Hg): 140-184 vs. ≥185	Unadjusted	HR 1.1 (0.81 to 1.5)	NR
	Strength	Quadriceps strength (mm Hg): 141-200 vs. ≥300	Unadjusted	HR 1.27 (0.93 to 1.73)	NR
	Strength	Quadriceps strength (mm Hg) ≤140 vs. ≥300	Unadjusted	HR 1.52 (1.12 to 2.06)	NR
	Strength	Quadriceps strength (mm Hg):200-299 vs. ≥300	Unadjusted	HR 1.08 (0.79 to 1.47)	NR
Wood*, 2008 ²⁰⁴ cross-sectional Months of followup: NA	Strength	≤10 kg of force (quadriceps femoris muscle strength) vs. >30 kg	NR	OR 5.17 (3.01 to 8.86)	NR
	Strength	10-20 kg of force (quadriceps femoris muscle strength) vs. >30kg	NR	OR 2.37 (1.57 to 3.59)	NR
	Strength	20-30 kg of force (quadriceps femoris muscle strength) vs. >30kg	NR	OR 1.29 (0.83 to 2.01)	NR

Table 8. Relative measure of association between intermediate outcomes and functional disability; low strength of evidence from individual observational studies (continued)

Author, Year Design Months of Followup	Intermediate Outcome	Definition of Intermediate Outcome	Adjustment	Estimate Mean (95% CI)	Area Under the Receiver Operating Characteristic Curve (ROC)
Sharma, 2003 ²⁰⁵ prospective cohort Months of followup: 72	Strength	Quadriceps strength, ft-lbs	Age, BMI, knee pain intensity, and disease severity (higher K/L grade of the 2 knees)	OR 0.88/20 ft-lbs (0.7 to 1.11)	NR
	Strength	Hamstring strength, ft-lbs	Age, BMI, knee pain intensity, and disease severity (higher K/L grade of the 2 knees)	OR 0.86/20 ft-lbs (0.6 to 1.23)	NR
O'Reilly**,1998 ²⁰³ nested case- control Months of followup: NA	Strength	MVC (Maximum voluntary contraction of quadriceps) (kgF): 20-30 vs. >30	Age, sex, BMI, depression, anxiety, activation (percent), radiographic score	OR 1.48 (0.37 to 5.93)	NR
	Strength	MVC (Maximum voluntary contraction of quadriceps) (kgF): 10-20 vs. >30	Age, sex, BMI, depression, anxiety, activation (percent), radiographic score	OR 4.88 (1.18 to 20.14)	NR
	Strength	MVC (Maximum voluntary contraction of quadriceps) (kgF): ≤10 vs. >30	Age, sex, BMI, depression, anxiety, activation (percent), radiographic score	OR 8.23 (1.53 to 44.38)	NR
	Strength	MVC (Maximum voluntary contraction) (kgF): 30-40 vs. >40	Age, sex, BMI, depression, anxiety, activation (percent), radiographic score	OR 3.04 (0.86 to 10.71)	NR
	Strength	MVC (Maximum voluntary contraction) (kgF): 20-30 vs. >40	Age, sex, BMI, depression, anxiety, activation (percent), radiographic score	OR 3.77 (1.02 to 13.91)	NR
	Strength	MVC (Maximum voluntary contraction) (kgF): ≤20 vs. >40	Age, sex, BMI, depression, anxiety, activation (percent), radiographic score	OR 4.98 (1.08 to 22.97)	NR

Table 8. Relative measure of association between intermediate outcomes and functional disability; low strength of evidence from individual observational studies (continued)

Author, Year Design Months of Followup	Intermediate Outcome	Definition of Intermediate Outcome	Adjustment	Estimate Mean (95% CI)	Area Under the Receiver Operating Characteristic Curve (ROC)
O'Reilly, 1998 ²⁰³ nested case-control Months of followup: NA	Strength	MVC (Maximum voluntary contraction of quadriceps) (kgF): 30-40 vs. >40	Age, sex, BMI, depression, anxiety, activation, radiographic score	OR 1.49 (0.56 to 3.96)	NR
	Strength	MVC (Maximum voluntary contraction of quadriceps) (kgF): 20-30 vs. >40	Age, sex, BMI, depression, anxiety, activation, radiographic score	OR 3.17 (1.22 to 8.26)	NR
	Strength	MVC (Maximum voluntary contraction of quadriceps) (kgF): 10-20 vs. >40	Age, sex, BMI, depression, anxiety, activation, radiographic score	OR 7.1 (2.43 to 20.68)	NR
	Strength	MVC (Maximum voluntary contraction of quadriceps) (kgF): ≤10 vs. >40	Age, sex, BMI, depression, anxiety, activation, radiographic score	OR 18.83 (4.79 to 74.08)	NR
Thomas, 2008 ¹⁹⁷ prospective cohort Months of followup: 72	Swelling	Self-reported dramatic swelling: Yes vs. no	Unadjusted	HR 1.09 (0.83 to 1.44)	NR
	Swelling	Self-reported swelling in past month: Yes vs. no	Unadjusted	HR 1.27 (1.03 to 1.56)	NR

BMI = Body Mass Index; HR = hazard rate ratio; NA = not applicable; NR = not reported; OA = osteoarthritis; OR = odds ratio; Strength of evidence was downgraded because single observational studies did not provide strong consistent and unbiased estimates;

*Thomas, 2008¹⁹⁷; Wood, 2008²⁰⁴ - functional disability was defined using Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) function scale;

**O'Reilly, 1998²⁰³ functional disability was defined using WOMAC functional score >19 or SF-36 functional score <90

Muscle Strength

Muscle strength was positively associated with better function, but the significance and magnitude of the association differed depending on measures of strength and outcomes (Appendix Table F34). The studies demonstrated the importance of appropriate cut points to categorize muscle strength, and reported a statistically significant relationship between impairments in muscle strength and disability at the higher but not lower levels of impairment.²⁰³

The strongest association was reported in one large cross-sectional study of more than 6,000 older adults with knee OA.²⁰⁴ Patients with maximal isometric quadriceps femoris muscle strength (force-generating capacity) of 10-20kg had 137 percent relative risk increase of poor function compared with those with >30kg of force after controlling for age, sex, and BMI.²⁰⁴ The

association was dose responsive with a greater than 417 percent relative risk increase of poor function in adults with weaker muscles (≤ 10 kg of Force).²⁰⁴ The CAS(K) prospective cohort found that adults with weaker quadriceps or hamstring muscle strength had a 50 percent higher relative risk of poor WOMAC functional outcome.²⁰⁴

Another prospective cohort study, Mechanical Factors in Arthritis of the Knee (MAK), found no statistically significant association between quadriceps and hamstring muscle strength after adjustment for age, BMI, pain intensity, and disease severity.²⁰⁵ This study defined a physical function outcome as a clinically important change in chair-stand performance.²⁰⁵

One cross-sectional study found muscle strength to be negatively associated with both observed and self-reported disability measures.²⁰⁶ Functional disability, as assessed by total WOMAC score, was negatively associated with greater muscle strength.²⁰⁷ The association between muscle strength and functional disability was stronger in patients with high knee joint laxity.²⁰⁷

A single study found statistically significant association between quadriceps torque and balance performance (center of pressure path length) after controlling for disease severity, symptom bother, and WOMAC pain.²⁰⁸

Impaired Balance Measurements

Impaired balance measurements demonstrated inconsistent association with functional status. A single prospective cohort study of older adults (CAS(K))¹⁹⁷ found no statistically significant association between the impaired single-leg standing balance test and poor WOMAC functional outcomes after adjustment for age, BMI, knee pain, and stiffness (Appendix Table F35).¹⁹⁷ In contrast, a cross-sectional study of older women found a statistically significant association between balance and outcomes of a functional test consisting of walking for 20 meters, climbing up and down nine stairs, and going from sitting to standing for five repetitions.²⁰⁹ Physical performance time improved in association with better balance.²⁰⁹ We cannot be certain whether study design, population, or balance measurements contributed to different conclusions in the studies.

Range of Motion

Among other intermediate outcomes, increased range of motion was negatively associated with observed and self-reported disability (Appendix Table F36).²⁰⁶ A small cross-sectional study of 86 adults with knee OA found a statistically significant interaction between joint range of motion, muscle strength, and walking speed.²⁰⁷ A prospective cohort, the CAS(K),¹⁹⁷ demonstrated that morning stiffness of 1-30 minutes predicted a 47 percent increase in relative risk of poor function at 18 months followup.¹⁹⁷ Another prospective cohort study, the MAK, demonstrated a 58 percent increase in relative risk of poor function at 3 years followup per 3 degree increase in joint laxity after controlling for age, BMI, pain intensity, and disease severity.²⁰⁵

Knee Mobility and Stability

Knee mobility and stability were weak predictors of functional performance. Joint mobility measures were not associated with poor WOMAC function (Appendix Table F37).¹⁹⁷ Joint stability measures demonstrated a weak but statistically significant association with poor WOMAC function (Appendix Table F38).^{197, 205, 207, 208, 210} Adults with a positive Giving Way Test had a 33 percent relative increase in having a poor WOMAC Function Score.¹⁹⁷ Knee

instability or laxity was associated with a 58 percent relative increase in having a poor WOMAC Function Score.^{205, 210}

Patient-centered outcomes were associated with a variety of tests (Table 6). Pain was associated with impaired functional status in adults with knee OA (Appendix Table F38). Adults with bilateral knee pain had a 46 percent relative risk increase of having a poor WOMAC Function Score (Appendix Table F39).¹⁹⁷ An increased WOMAC Pain Score was also associated with a poor WOMAC Function Score.²¹⁰ At followup, VAS pain intensity was associated with a 48 percent relative increase in risk of having a poor WOMAC Function Score (Appendix Table F40).²⁰⁵ In contrast, self-reported knee pain²¹¹ or local tender point counts were not associated with poor function (Appendix Table F41).¹⁹⁷

Disability measures were associated with gait, mobility restrictions, muscle strength, and range of motion (Table 6). Several mobility restriction tests (VAS, Timed up and go [TUG] Test, Step Test, Gait Speed) were associated with impaired adjusted daily activity scores (Appendix Table F42). Mobility restrictions and the TUG Test were negatively associated with Adjusted Activity Score.²⁰⁰ Increased gait speed and step test were positively associated with adjusted daily activity score.²⁰⁰ Greater muscle strength and range of motion of the affected knee(s) were negatively associated with self-reported or observed disability (Appendix Table F36).²⁰⁶ Patients with more severe knee OA had impaired role function with physical limitations.²¹²

We found no studies that reported time to return to work or activities. Patients with self-reported disability had increased risk of total joint replacement within a year of followup (Appendix Table F43). Patients with severe OA according to their Lequesne score had a 137 percent relative risk increase of having knee surgery within 1 year of followup (Adjusted OR 2.37, 95% CI, 1.71 to 3.25).²¹³ Patients who considered themselves disabled had a 57 percent relative risk increase of total joint replacement within 1 year of consultation.²¹³

Several studies examined the importance of self-efficacy and mental health for adults with knee OA (Table 9). Self-efficacy was defined as how patients perceive their ability to manage chronic arthritis, and it was measured using the Arthritis Self-Efficacy Scale.²⁰⁵ The Arthritis Self-Efficacy Scale function subscale is a self-rating of degree of certainty in one's ability to walk 100 feet on flat ground in 20 seconds, walk down 10 steps in 7 seconds, and get out of an armless chair without using hands for support.²⁰⁵ Higher values correspond to better self-efficacy.²⁰⁵ Adults with good self-efficacy had an 11 percent relative decrease in risk of poor WOMAC function (Table 9).²⁰⁵

Self-reported health outcomes, including anxiety, depression, and fatigue, were associated with poor functional status. Older adults with knee pain and anxiety had higher risk of having poor WOMAC function compared with adults without anxiety (Appendix Table F44).¹⁹⁷

Table 9. Regression association between psychological and clinical outcomes; low strength of evidence from individual observational studies

Intermediate Outcomes	Disability Studies/N=Patients Estimate	Function Studies/Patients Estimate	Pain Studies/Patients Estimate	Quality of Life Studies/Patients Estimate
Anxiety	O'Reilly, 1998 ²⁰³ / N=300 NS OR	Thomas, 2008¹⁹⁷ / N=621 1.3 HR O'Reilly, 1998 ²⁰³ / N=300*	O'Reilly, 1998 ²⁰³ / N=300 NS OR	
Baseline self-efficacy		Rejeski, 1998¹⁹⁹ / N=439* Maly, 2006²⁴⁶ / N= 54 *		
Depression	O'Reilly, 1998²⁰³ / N=300 6.2 OR	Wolfe, 1999²³¹ / N=2115 * WOMAC function Wolfe, 1999²³¹ / N=2115 * WOMAC stiffness O'Reilly, 1998²⁰³ / N=300*	Wolfe, 1999²³¹ / N=2115* O'Reilly, 1998²⁰³ / N=300 2.4 OR	
Fatigue		Wolfe, 1999²³¹ / N=2115 * WOMAC function Wolfe, 1999²³¹ / N=2115 * WOMAC stiffness	Wolfe, 1999²³¹ / N=2115*	
Mental health score		Sharma, 2003 ²⁰⁵ / N=257 0.6 OR		
Role functioning emotional score		Sharma, 2003 ²⁰⁵ / N=257 NS OR		
Psychological well being: cheerfulness			van Baar, 1998²⁰⁶ / N=185*	
Self-efficacy score		Sharma, 2003²⁰⁵ / N=257 0.89/2.5points in OR		
Functional self-efficacy				Harrison, 2004 ²⁰⁹ / N=50 NS*

HR = hazard rate ratio; OR = odds ratio; WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index;

Note: Bold = statistically significant association at 95% confidence level

*Linear regression; Strength of evidence was downgraded because single observational studies did not provide strong consistent and unbiased estimates

Adults with good mental health had lower risk of having poor WOMAC function.²⁰⁵ Adults with greater social support had lower risk of having poor WOMAC function.²⁰⁵ Several studies found that depression and frustration demonstrated strong positive correlation with poor functional status (Appendix Table F45).^{206, 211, 214-219}

In summary, disability measures were associated with gait, mobility restrictions, muscle strength, and range of motion measures, but the magnitude and clinical importance of the associations remain unclear. Individual studies did not offer strong and consistent evidence for determining which intermediate outcomes strongly and consistently predict patient-centered outcomes.

Key Question 2a. What is the validity of the tests and measures used to determine intermediate outcomes of physical therapy on OA in association with patient-centered outcomes?

Validation of the tests and measures used to determine intermediate outcomes of physical therapy on knee OA was reported in 66 studies of 14,563 adults. Many articles reported validation, but few demonstrated a strong (more than 50 percent) correlation between index and reference method measurements (Appendix Table F46). The studies used a variety of reference methods and judged validity on the basis of statistically significant correlation coefficients. Strength of correlation varied across validity types (Appendix Table F47).

We synthesized the evidence of the correlation between intermediate and patient-centered outcomes. Mean age averaged around 64 years, and ranged from 29 to 67 (Appendix Table F48). Women constituted 64 percent of the participants. Sample size of the studies varied with a median of 109 and a mean of 254 participants. The American studies were the only ones to include minorities, but they did not separately report those results. Some studies did not distinguish patients with diagnosed knee OA from those with self-reported OA or knee pain. The studies analyzed correlation coefficients between index and reference methods and did not use strategies to reduce bias.

The correlation strength varied across measurements and reference standards for intermediate outcomes (Appendix Table F49). Balance measures with Standing Balance Test correlated with radiographic degenerative changes.²²⁰ The Knee Proprioception Test (quantified as the ability to replicate target knee joint angles using a computerized dynamometer) did not correlate with radiographic degenerative changes.²²⁰ Knee range of motion was assessed as self-reported morning stiffness,²²¹ Arthritis Impact Measurement Scale dexterity subscale,²²² Knee Patient-Specific Index,²²³ Lequesne index,²²⁴ or WOMAC stiffness subscale²²⁴ (Appendix Table F49). A strong correlation was reported for the Knee Patient-Specific Index with the WOMAC Stiffness scale²²³ and for the Lequesne Index with the WOMAC Stiffness subscale.²²⁴ A strong correlation was demonstrated for range of motion to ipsilateral hip abduction with knee flexion on the affected side.²²⁵ Other tests demonstrated very weak or no correlation with patient-centered outcomes (Appendix Table F50). Measurements of pain and function in relation to symptom bother were validated with the Short Form Health Questionnaire,²²⁶ The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale,²²⁷ or the Global Functional Rating²²⁸ (Appendix Table F51).

Many studies used validated WOMAC subscales as a reference standard (Appendix Table F52). The WOMAC scale is recommended to measure clinical outcomes in trials involving adults with knee OA^{56, 229} because it is a validated instrument with different subscales for pain and stiffness as well as for physical, social, and emotional function.^{54, 230-232} Several studies

examined whether the WOMAC satisfied the Rasch model (Rasch Item Response Theory) (Appendix Table F53). To satisfy Rasch criteria, subscales must be unidimensional by measuring the anticipated concept of pain and function and not have redundant items counting repeatedly toward the overall score. One study of 655 patients with osteoarthritis of the knee or hip concluded that pain and function subscales were unidimensional and did not collect redundant information.²³³ The second study of 158 patients with knee or hip OA found that pain and function items may represent the same construct and introduce redundancy for calculation of overall score.²³⁴ A prospective cohort followed 1,151 adults with knee OA or hip OA for 1 year after arthroplasty.²³⁵ The authors concluded that prospectively collected responses evaluate changes in functional status. The study suggested that when monitoring treatment effects with WOMAC, certain items should be omitted, including night pain and pain on standing, heavy domestic duties, getting in and out of the bath, and getting on and off the toilet.²³⁵ All studies recommended using WOMAC to measure patient-centered outcomes in adults treated for knee OA.

Key Question 2b. Which intermediate outcomes meet the criteria of surrogates for patient-centered outcomes?

In order to be considered surrogates for patient-centered outcomes, measurements in functional impairments are expected to predict patient-centered outcomes. However, none of the intermediate outcomes met this criterion. TEP members proposed gait as a feasible candidate for a surrogate endpoint; however, no studies examined the association between gait and patient-centered outcomes in adults with knee OA treated with physical therapy interventions. While a single RCT concluded that knee pain and self-efficacy mediated the effects of exercise on stair climb time,¹⁹⁹ no evidence supported an association or predictive power between gait change and patient-centered outcome change. A single longitudinal study of older adults demonstrated that impaired gait and Physical Performance Test were independent predictors of nursing home placement.²³⁶ Three cohort studies, including The Einstein Aging Study,²³⁷ the Chinese Elderly Cohort,²³⁸ and the Women's Health and Aging Study,²³⁹ examined the association between gait and nursing home placement (Appendix Table F54). However, these studies included adults with any etiology of gait problem, including neurological diseases or heart failure. Moreover, definitions of impaired gait and magnitude of the association were inconsistent across the studies.

Key Question 2c. What are minimum clinically important differences of the tests and measures used to determine intermediate outcomes?

MCIDs refer to thresholds of change in outcomes measurements that result in statistically significant changes in clinical outcomes. Such thresholds were determined comparing the changes in performance measure with patient perception of improvement. Establishing accurate MCIDs helps to clarify whether statistically significant changes in outcome measures actually equate with patient opinions about treatment success and improved quality of life. MCIDs are necessary for evaluating whether changes in commonly used outcomes measurements or scales are of actual clinical importance to patients.

Thirty studies of 13,138 adults reported MCIDs. The studies used the anchor method, which compares changes in scales with patient perception of improvements. MCIDs were available for 26 tools as absolute change in score or relative change as a percent difference from baseline levels. The latter method incorporated baseline severity of the diseases (Appendix Table F55).

Only a few studies defined MCID with the distribution method, which is based on distribution of changes in outcomes measurements and defined MCID as an upper quartile of the distribution.

We identified 16 studies that determined (with slight variation) MCIDs in WOMAC scales and subscales (Appendix Table F55). The Osteoarthritis Research Society International Standing Committee for Clinical Trials determined that patient perception of “high” improvement in pain corresponded to at least a 40 percent relative change in WOMAC with a minimum absolute improvement of 20 to 30 NU (normalized units).²⁴⁰ Patients noticed improvement when WOMAC subscales changed by a margin of 17 to 22 percent of baseline scores.²⁴¹

Few studies determined Patient Acceptable Symptom State (PASS) for knee OA. PASS is defined as the highest level of symptom patients can tolerate and still be satisfied with their treatment. The studies that determined PASS used the same anchor method as they did for determining MCIDs. However, the anchor questions used by these studies differed by specifically asking patients whether they were satisfied with their functional status in relation to daily activities and quality of life. PASS was determined for three scales (WOMAC, VAS for pain, and the Patient Global Assessment) (Appendix Table F56).²⁴²

MCIDs in SF-36 were determined for patients with severe knee OA before or after surgery (Appendix Table F57).²⁴³⁻²⁴⁵ In the SF-36, MCIDs were 12.83 for pain, 0.11 for general health, 0.76 for mental health, and 10.04 for physical functioning.²⁴⁴ At 6 months followup, mean changes of 22 in an SF-36 bodily pain score and of 38 in physical functioning equated to patient reports of feeling “a great deal better.”²⁴⁵ A variety of other tests and scales proposed MCIDs to judge clinical effectiveness of treatments (including the Timed Up and Go,^{246, 247} the 6-Minute Walk Test,^{246, 247} and the Short Physical Performance Battery)²⁴⁷ (Appendix Table F58).

Summary

In individual studies, muscle strength, range of motion, mobility restrictions, and gait were associated with patient-centered outcomes, but individual studies did not provide consistent strong evidence for robust conclusions. Many articles reported validation, but few demonstrated a strong (more than 50 percent) correlation between index and reference method measurements.

Original studies concluded that tests were valid based on significance, not strength of correlation. None of the intermediate outcomes met surrogate criteria for patient-centered outcomes.

Validated tools defined threshold values of clinical importance for evaluating treatment success, but studies more often used continuous measures of outcomes, providing an average score for all patients in each treatment group with no evaluation of clinical importance. Average scores, however, do not reveal how many patients develop disability, or experience clinically meaningful improvement in pain, function, or quality of life.

Key Question 3. What are the harms from physical therapy interventions for adult patients with chronic knee pain due to osteoarthritis, when compared to no active treatment or active controls?

- a. Which patient characteristics are associated with the harms of examined physical therapy interventions?
- b. Do harms differ by the duration of the treatment and time of followup?

Adverse events were uncommon and varied across interventions. Skin irritation was reported with brace, insole, tape, and electrical stimulation; swelling with brace, diathermy, and exercise;

muscle soreness with electrical stimulation; grumbling, warming, or throbbing sensation with diathermy, electrical stimulation, and PEMF; increased pain with diathermy, exercise, insole, and PEMF; falls with insole; and need for surgery with diathermy. Rates of adverse events did not differ significantly between treatment groups (Table 10). Nor were adverse events severe enough to deter participants from continuing treatment.

Only four statistically significant findings were reported. Lund et al. found that adverse events were six times more likely following land-based exercise than aquatic exercise, yet insignificantly led to discontinuation.⁹⁴ Use of a 16mm lateral wedged insole resulted in more pain than an 8mm lateral wedge.¹⁹⁰ Compared with neutrally wedged insoles, laterally wedged insoles led to more back pain, foot pain, and other discomfort.¹⁷⁷ Hinman et al. reported that skin irritation was more likely with therapeutic tape than control tape.¹³⁷ Two studies compared skin reactions with active electrical stimulation and inactive sham stimulation. The pooled analysis^{140, 171} showed that electrical stimulation did not increase risk of skin irritation.

Table 10. Adverse events reported with physical therapy for knee osteoarthritis

Treatment	Definition of Adverse Events	Studies	Patients	Relative Risk Number Needed To Treat To Harm	Strength of Evidence
Diathermy vs. placebo	Adverse event including mild pain, mild swelling, feeling of vasodilatation, deterioration of pain, or needed operation	1 ¹⁶⁸	113	1.13 (0.30 to 4.31)	Low
E-stim vs. placebo	Mild skin reaction	2 ^{140, 171}	136	1.02 (0.53 to 1.97)	Low
Interferential (IF) and patterned muscle stimulation vs. low-current transcutaneous electrical nerve stimulation	Adverse event including skin irritation, skin burns, muscle soreness, electrical shock, and unanticipated adverse events	1 ²⁴⁹	109	0.57 (0.20 to 1.58)	Low
Aquatic exercise vs. land-based exercise	Increased pain during and after exercise, or swollen knees	1⁹⁴	52	0.25 (0.08 to 0.80) 3 (2 to 10)	Low
Aquatic exercise vs. land-based exercise	Discontinuation due to adverse effects	1 ⁹⁴	52	0.14 (0.01 to 2.54)	Low
Home based progressive exercise vs. home based control exercise	Adverse event, not specified	1 ²⁵⁰	179	0.60 (0.21 to 1.78)	Low
8 mm laterally wedged insole vs. 12 mm laterally wedged insole	Popliteal pain, low back pain, or foot sole pain	1 ¹⁹⁰	41	0.7 (0.13 to 3.76)	Low
8 mm laterally wedged insole vs. 16 mm laterally wedged insole	Popliteal pain, low back pain, or foot sole pain	1¹⁹⁰	41	0.23 (0.06 to 0.95) 3 (2 to 13)	Low
12 mm laterally wedged insole vs. 16 mm laterally wedged insole	Popliteal pain, low back pain, or foot sole pain	1 ¹⁹⁰	42	0.33 (0.10 to 1.06)	Low
Strapped insole vs. Inserted insole	Popliteal pain, low back pain, or foot sole pain	1 ¹²⁹	90	5.74 (0.72 to 45.77)	Low
5 degree lateral wedge insole vs. neutrally wedged insole	Musculoskeletal symptoms	1 ¹⁸³	180	0.6 (0.231 to 1.58)	Low
5 degree lateral wedge insole vs. neutrally wedged insole	Blisters	1 ¹⁸³	180	0.2 (0.02 to 1.68)	Low
5 degree lateral wedge insole vs. neutrally wedged insole	Falls	1 ¹⁸³	180	1.33 (0.31 to 5.79)	Low
5 degree laterally wedged insole vs. neutrally wedged insole	Self reported problems with insoles	1¹⁷⁷	179	2.02 (1.31 to 3.12) 4(3 to 10)	Low
5 degree laterally wedged insole vs. neutrally wedged insole	Back pain	1¹⁷⁷	179	9.10 (1.18 to 70.35) 11 (6 to 42)	Low
5 degree laterally wedged insole vs. neutrally wedged insole	Foot pain	1¹⁷⁷	179	2.31 (1.33 to 4.03)	Low
5 degree laterally wedged insole vs. neutrally wedged insole	Uncomfortable or difficulty fitting in shoes	1¹⁷⁷	179	3.79 (1.31 to 10.99) 5 (3 to 13)	Low
5 degree laterally wedged insole vs. neutrally wedged insole	Increased knee pain	1 ¹⁷⁷	179	0.40 (0.08 to 2.031)	Low
5 degree laterally wedged insole vs. neutrally wedged insole	Felt unstable	1 ¹⁷⁷	179	0.34 (0.01 to 8.16)	Low

Table 10. Adverse events reported with physical therapy for knee osteoarthritis (continued)

Treatment	Definition of Adverse Events	Studies	Patients	Relative Risk Number Needed To Treat To Harm	Strength of Evidence
5 degree laterally wedged insole vs. neutrally wedged insole	Any discomfort	1¹⁷⁷	163	1.79 (1.17 to 2.74)	Low
Medial insole vs. neutrally wedged insole	Mild discomfort	1 ¹⁷⁷	30	0.29 (0.01 to 6.69)	Low
PEMF vs. placebo	Grumbling or throbbing sensation	1 ¹⁵⁵	90	1 (0.27 to 3.75)	Low
PEMF vs. placebo	Warming sensation	1 ¹⁵⁵	90	6 (0.75 to 47.85)	Low
PEMF vs. placebo	Aggravation of the osteoarthritic pain in the study knee	1 ¹⁵⁵	90	2 (0.19 to 21.28)	Low
Therapeutic tape vs. control tape	Skin irritation	1¹³⁷	58	8 (1.07 to 59.95) 4 (2;15)	Low

E-stim = electrical stimulation; PEMF = pulsed electromagnetic fields

Note: Bold = statistically significant association at 95% confidence level

Summary and Discussion

Key Findings

A number of important findings emerged from this review.

Efficacy of Physical Therapy Interventions

- Pooled analyses demonstrated (Figures 2 and 3) that core physical therapy interventions, including aerobic and aquatic exercise, improved disability measures.
 - Aerobic and strengthening exercise reduced pain and improved function.
 - Proprioception exercise reduced pain.
- Pooled analyses also found that Tai Chi improved short-term function, but with no sustained benefit, and ultrasound reduced pain and improved function.
- Pooled analyses demonstrated that education programs, diathermy, orthotics, and magnetic stimulation (PEMF) failed to show any benefits.
- The relative reduction in pain or disability with physical therapy interventions was less than 30 percent (Figure 4).
- Research focused on individual physical therapy interventions, whereas typical physical therapy practice uses combined interventions.
- Few physical therapy interventions were effective.
- No single physical therapy intervention improved all outcomes.
- Individual (nonpooled) RCTs failed to show consistent statistically significant, strong, or clinically important changes in outcomes.

Comparative Effectiveness of Physical Therapy Interventions

We found limited evidence about comparative effectiveness of physical therapy interventions:

- Pain measures did not differ between aerobic and aquatic exercises in pooled analyses.
- Pain did not differ between electrical stimulation and exercise in pooled analyses.
- Individual RCTs of other treatment comparisons found no consistent clinically important differences in outcomes and did not support robust conclusions about the best treatment option.

Role of Patient Characteristics in Modifying Treatment Effects

- Evidence from individual RCTs did not permit e robust conclusions about differences in physical therapy effects by patient characteristics.
- Patients with high compliance to exercise tended to have better benefits.

Role of Duration or Intensity of Treatment

- The duration of examined interventions was not associated with better intermediate or patient-centered outcomes.

- Evidence regarding the association between the dose/intensity/frequency of examined interventions and outcomes did not permit robust conclusions for the majority of comparisons.
- The treatments that demonstrated statistically significant benefits (aerobic, aquatic, and strengthening exercises and ultrasound) did not differ in effect at shorter versus longer times of followup.
- Electrical stimulation improved pain short term but significantly worsened pain at longer followup.

Adverse Effects of Physical Therapy Interventions

- Adverse events were uncommon and not severe enough to deter patients from continuing treatment.
- Adverse events varied across intervention and included: skin irritation with brace/insole/tape/electrical stimulation, swelling with brace/diathermy/exercise, muscle soreness with electrical stimulation, warming/throbbing sensation with diathermy/electrical stimulation/PEMF, increased pain with diathermy/exercise/insole/PEMF, and falls with insole.

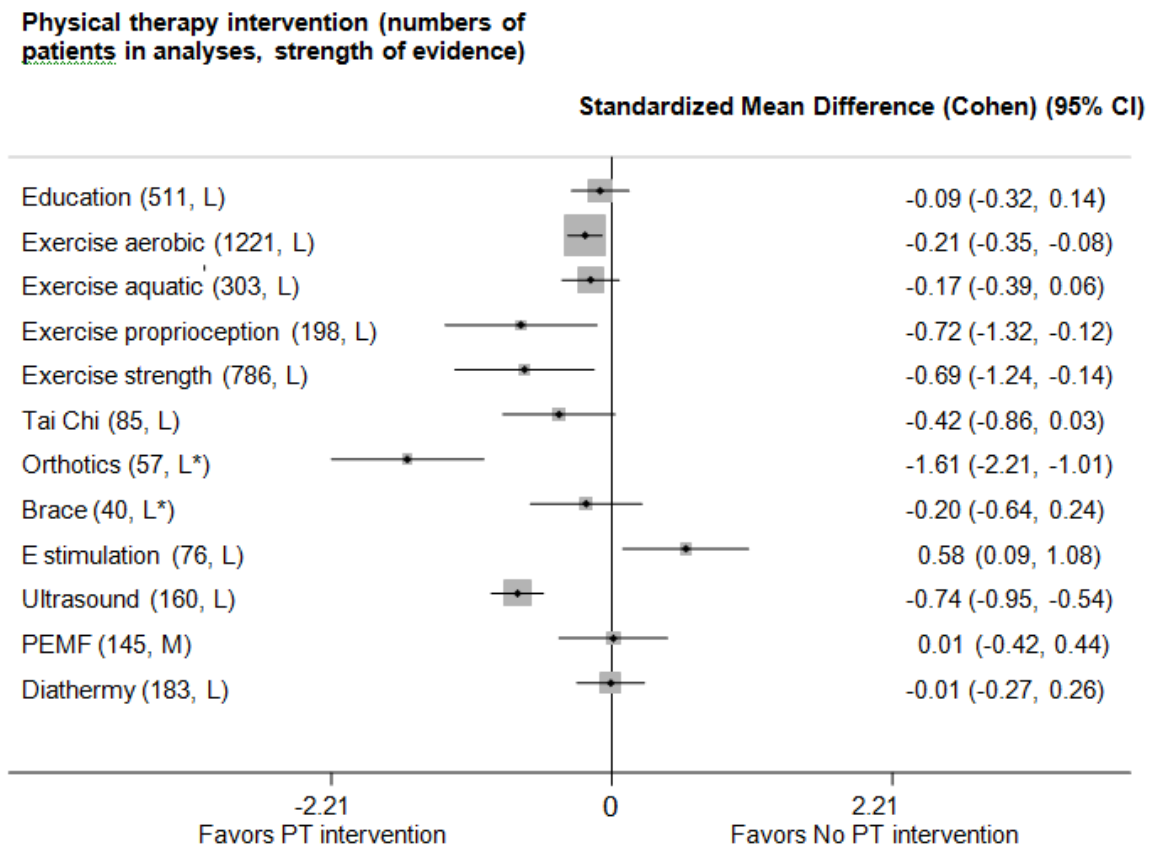
Association Between Intermediate and Patient-Centered Outcomes

- Gait, mobility restrictions, muscle strength, and range-of-motion measures were associated with disability measures.
- Individual studies did not offer strong evidence for determining which intermediate outcomes strongly and consistently predict patient-centered outcomes.
- Many articles reported validation, but few demonstrated a strong (more than 50 percent) correlation between index and reference method measurements.
- Original studies concluded that tests are valid based on significance, not strength of correlation.
- None of the intermediate outcomes met surrogate criteria for patient-centered outcomes.

Minimum Clinically Important Differences

- Minimum clinically important differences of the tests were determined using the anchor method, which compares changes in scales with patient perception of improvements.
- Minimum clinically important differences were available as absolute change in score or relative change as a percent difference from baseline levels, which accounts for baseline severity of the disease.
- Patient Acceptable Symptom State (PASS), defined as the highest level of symptom patients can tolerate and still be satisfied with their treatment, was determined for three scales (WOMAC, VAS for pain, and the Patient Global Assessment Scale).
- Validated tools defined threshold values of clinical importance for evaluating treatment success in adults with knee OA. In contrast, more often studies used continuous measures of the outcomes, and provided an average score for all patients in each treatment group. Clinical importance of such averages was not evaluated. Average scores do not provide information how many patients develop disability or experience clinically meaningful improvements in pain, function, or quality of life.

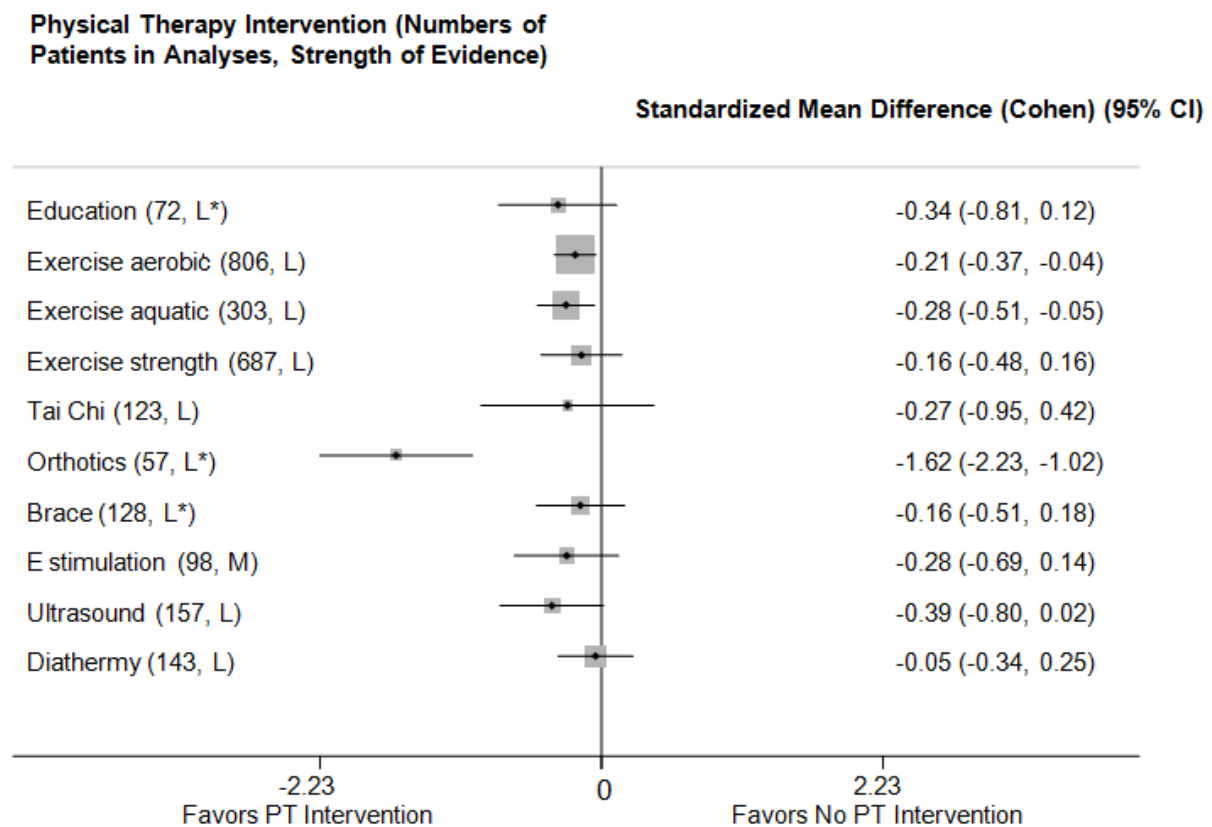
Figure 2. Reduction in pain with physical therapy interventions vs. no active treatments at the longest time of followup in adults with knee osteoarthritis, pooled with random effects standardized mean difference from randomized controlled clinical trials



CI = confidence interval; L = low; M = moderate; Large magnitude of effect when reduction is more than 0.8 standard deviations

*The estimate was based on an individual study

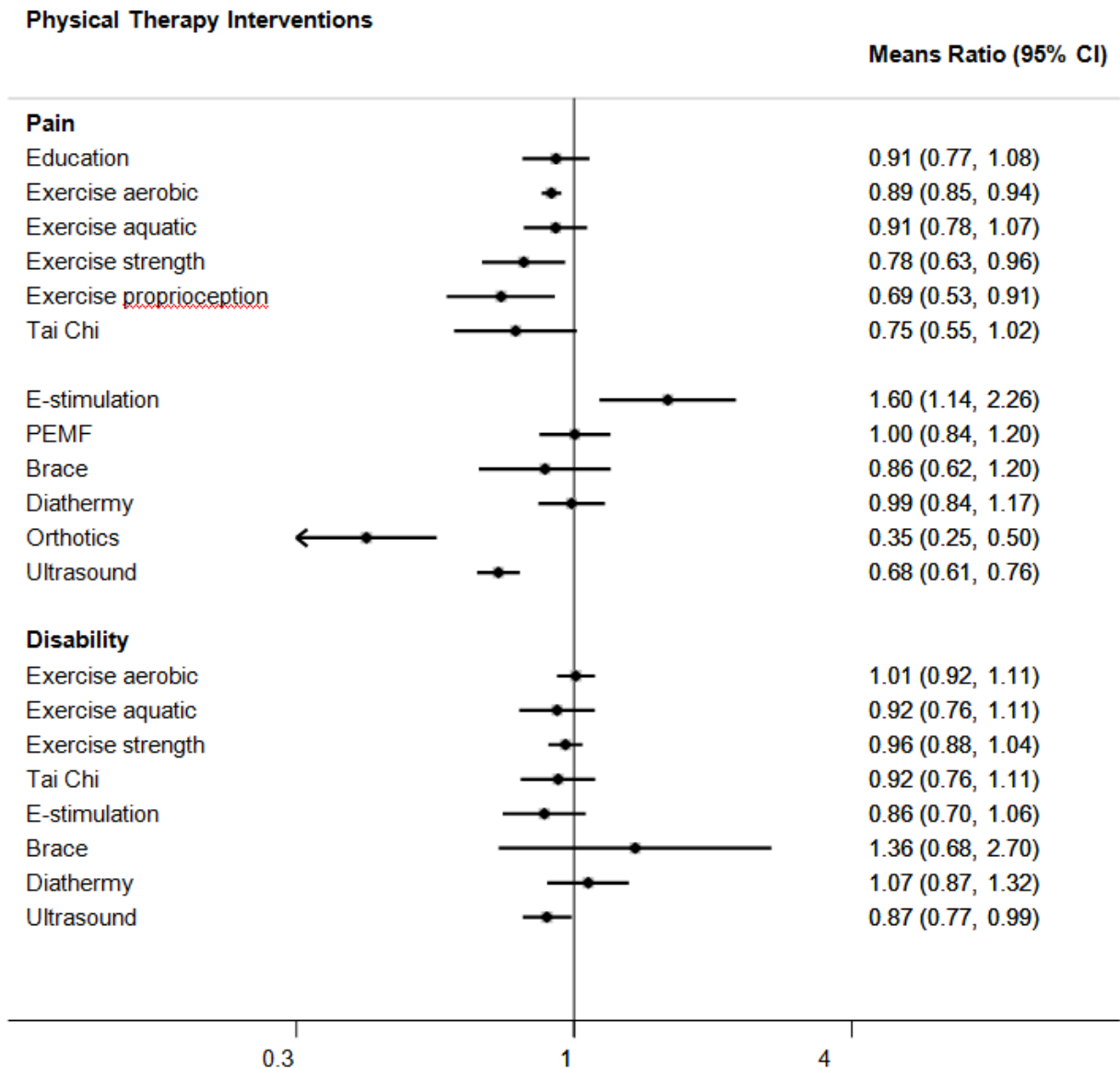
Figure 3. Reduction in disability with physical therapy intervention vs. no active treatment in adults with knee osteoarthritis, pooled with random effects standardized mean difference from randomized controlled clinical trials



CI = confidence interval; L = low; M = moderate; PT = physical therapy; Large magnitude of effect when reduction is more than 0.8 standard deviations

*The estimate was based on an individual study.

Figure 4. Reduction in pain and disability with physical therapy interventions vs. no active treatments at the longest time of followup in adults with knee osteoarthritis, pooled with random effects ratio of means from randomized controlled clinical trials



Note: Means ratio of less than 1 means reduction in pain or disability.

Our report addresses patient-centered outcomes including pain, disability, and quality of life with physical therapy interventions for adults with knee OA. Our findings agree with previously published guidelines^{9, 17} and systematic reviews¹⁸⁻²⁰ that recommend exercise as an effective physical therapy intervention. However, our analyses demonstrated that few physical therapy interventions were effective, and no single intervention improved all outcomes.

Several factors affected the applicability of the research base. This lessened the degree to which our synthesis can fully and accurately address the efficacy and comparative effectiveness of physical therapy interventions for knee OA. Most important, current standards of physical therapy practice involve combined interventions, whereas published studies have examined individual physical therapy interventions. Our focus on randomized clinical trials, which equally distribute concomitant treatments among groups to accurately estimate the effect of an examined intervention, could not mitigate the impact of this discrepancy for several reasons. First, the trials rarely tested combinations of therapies or provided information about all other treatments or reported outcomes separately in patient subgroups by concomitant treatments. Second, clinical care for adults with knee OA includes pharmacologic interventions, while our review is limited to nonpharmacologic therapies,²⁵¹⁻²⁵³ thus further complicating our efforts. We tried to examine how pain relievers (an extremely common concomitant treatment) may influence physical therapy outcomes for pain, but rare and inconsistent reporting of drug treatments impeded synthesis of evidence. Finally, heterogeneity in populations, treatments, and definitions of the outcomes hampered strength of evidence to low or moderate in most cases.

Most often, strength of evidence was low due to exclusion of patients from the analyses, inadequate allocation concealment, or unmasked outcome assessment. Few studies reported that the researchers who assessed outcomes were unaware of the treatment status of the patients.^{87, 95, 103, 111, 254, 255} The majority of trials had moderate risk of bias. We explored how risk of bias could modify treatment effect with meta-regression and subgroup analyses and found no consistent statistically significant changes. We excluded from pooled analyses studies with poorly reported results, as well as trials that enrolled patients with knee or hip OA without separately reporting the outcomes. Many trials failed to provide sufficient details about the interventions themselves, their intensity, or the involvement of a physical therapist.^{256, 257}

Examined physical therapy interventions included balance and coordination training, biofeedback and muscle relaxation techniques, strength, power, and endurance training, and functional training in self-care (Table 11). We tabulated the number of studies that described individual physical therapy modalities as part of physical therapy interventions. Yet, since very few studies precisely described modality type and intensity, we found it difficult to assess how individual modalities contributed to treatment benefits.

Even when original studies did describe individual modalities, they rarely examined or reported the role of physical therapists or physical therapist assistants (Figure 5). Fewer than half of the studies described patient education or self-training, two essential components of physical therapy practice.

The majority of strength exercises reported that physical therapists administered the interventions (Figure 6). In contrast, fewer than half of the trials with aquatic exercise, and only 28 percent of trials of aerobic exercise stated that physical therapists administered interventions. Future efforts are needed to improve reporting quality of physical therapy studies. Consolidated Standards of Reporting Trials of nonpharmacologic treatments²⁵⁸ recommends that studies include a detailed description of the interventional components and, when applicable, individualized treatment recommendations as well as details about standardization of

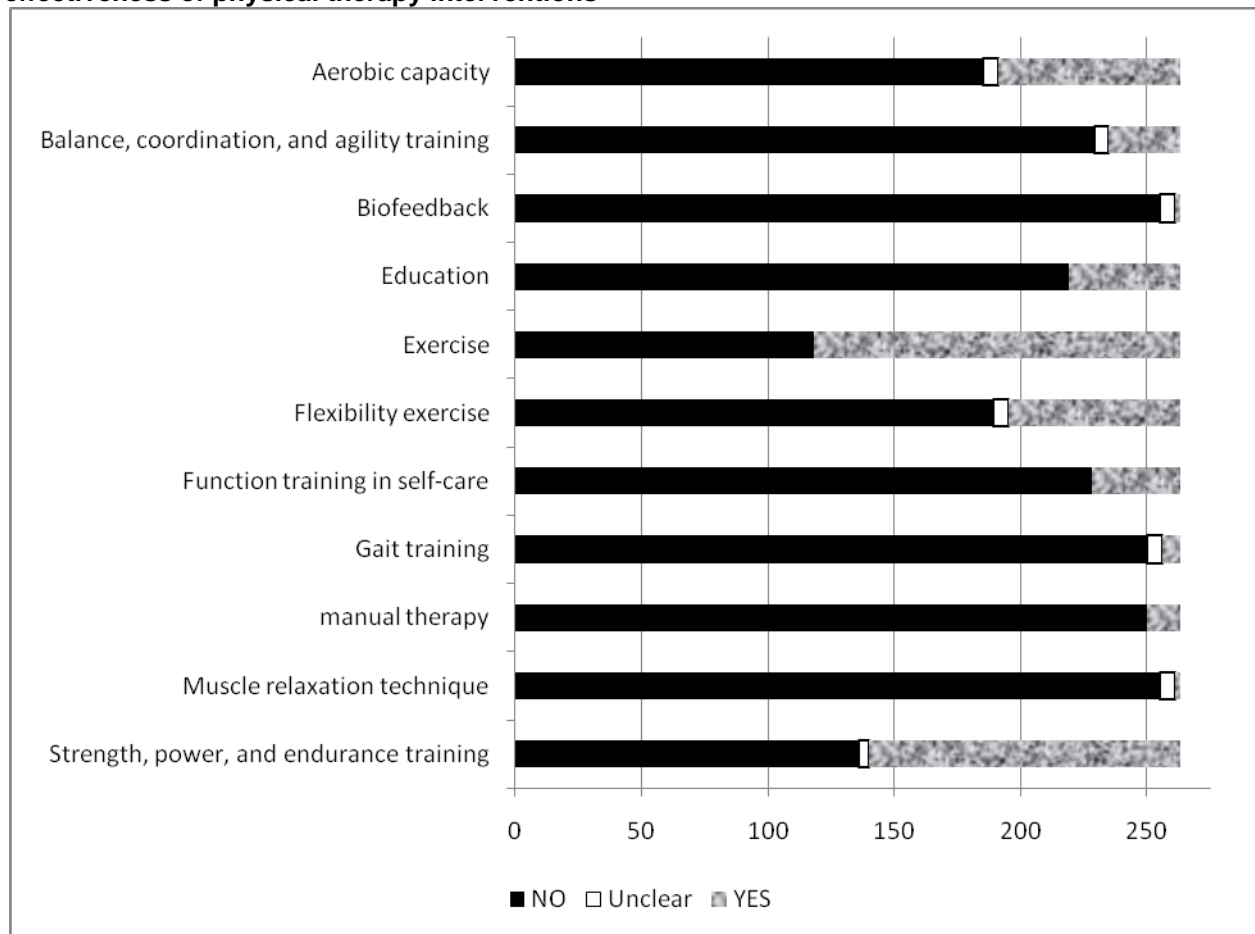
interventions and adherence of care providers with the protocol.²⁵⁸ Such detailed reporting would shed light on how the direct involvement of physical therapists in treatment may contribute to benefits from exercise in adults with knee OA.

Table 11. Reported physical therapy modalities as components of the examined physical therapy interventions

Components of the Intervention (Modalities)	Reporting Intervention Components	Exercise + Education (# of Studies)	Exercise Aerobic (# of Studies)	Exercise Aquatic (# of Studies)	Exercise Proprioception (# of Studies)	Exercise Strength (# of Studies)	Exercise Strength (CER) (# of Studies)
Aerobic capacity	No	6	3	2	4	19	12
Aerobic capacity	Unclear	3	0	0	0	0	0
Aerobic capacity	Yes	1	29	9	0	6	0
Balance, coordination, and agility training	No	7	29	8	1	22	10
Balance, coordination, and agility training	Unclear	3	0	0	0	0	0
Balance, coordination, and agility training	Yes	0	3	3	3	3	2
Education	No	3	17	10	2	24	11
Education	Yes	7	15	1	2	1	1
Exercise	No	5	1	0	0	2	0
Exercise	Yes	5	31	11	4	23	12
Flexibility exercise	No	7	16	5	4	14	5
Flexibility exercise	Unclear	3	0	0	0	0	0
Flexibility exercise	Yes	0	16	6	0	11	7
Functional training in self-care	No	4	22	11	4	20	9
Functional training in self-care	Yes	6	10	0	0	5	3
Gait training	No	7	31	11	3	23	12
Gait training	Unclear	3	0	0	0	0	0
Gait training	Yes	0	1	0	1	2	0
Manual therapy	No	10	31	11	4	24	12
Manual therapy	Yes	0	1	0	0	1	0
Muscle relaxation technique	No	7	32	11	4	25	12
Muscle relaxation technique	Unclear	3	0	0	0	0	0
Muscle relaxation technique	Yes	0	0	0	0	0	0
Strength, power, and endurance training	No	7	4	1	2	2	0
Strength, power, and endurance training	Unclear	3	0	0	0	0	0
Strength, power, and endurance training	Yes	0	28	10	2	23	12
	Total	10	32	11	4	25	12
		3.89	12.45	4.28	1.56	9.73	4.67

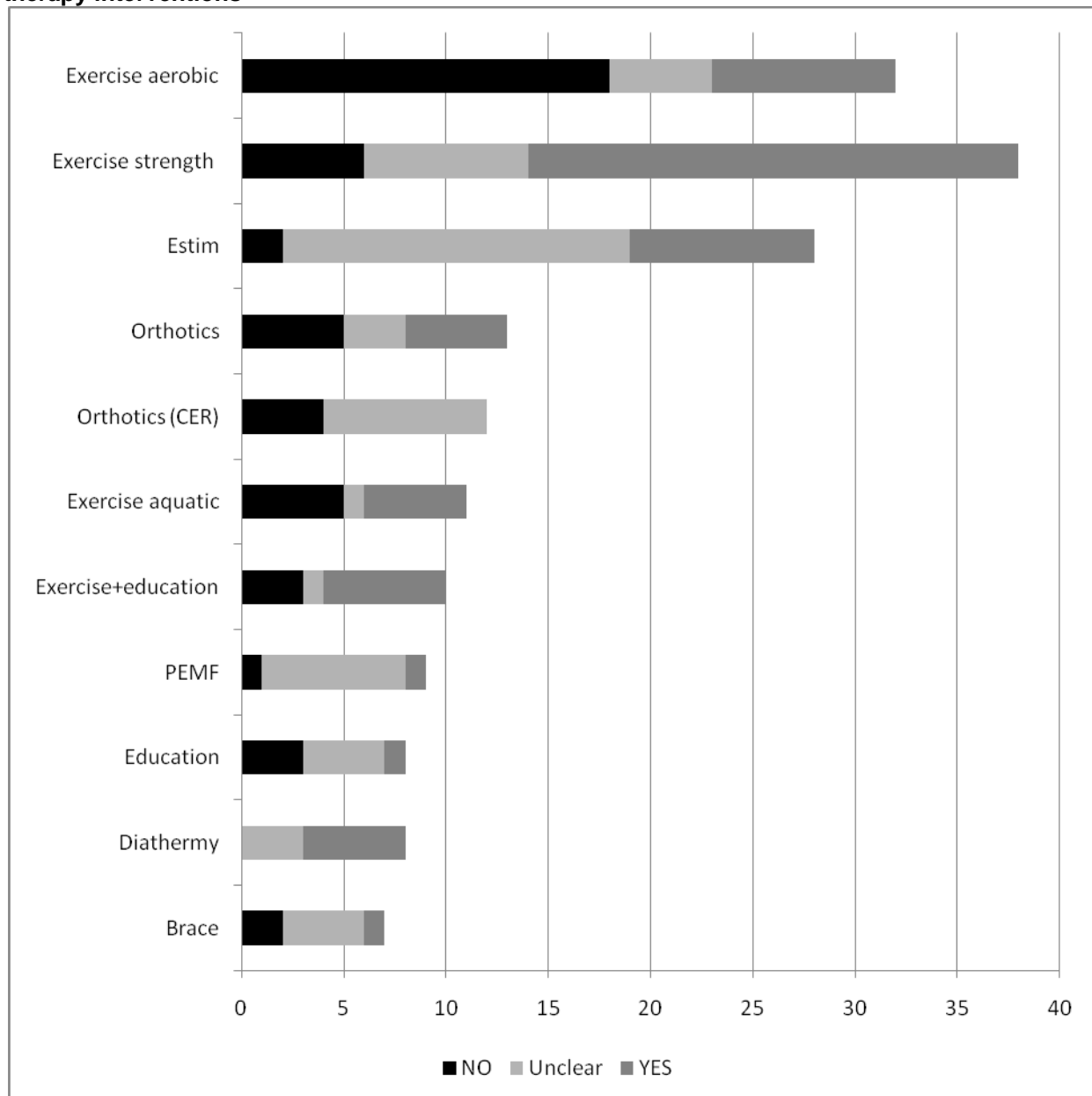
CER = Comparative effectiveness review

Figure 5. Physical therapists' involvement in administering modalities in trials that examined the effectiveness of physical therapy interventions



Note: Horizontal axis-number of studies that reported physical therapists' involvement in administering each listed physical therapy modality.

Figure 6. Physical therapists' involvement in trials that examined the effectiveness of physical therapy interventions



CER = comparative effectiveness review; Estim = electrical stimulation; PEMF = pulsed electromagnetic fields

Note: Horizontal axis=percentage of studies that reported physical therapists' involvement in administering each listed physical therapy intervention.

Monitoring Treatment Success

Patients judge treatment success by reduction in pain²⁵⁹ and improvement in quality of life.²⁴ Clinical trials of nonpharmacologic treatments focused on pain and various measures of function.²⁶⁰ Reimbursement for physical therapy practice is currently driven by the validated measures of functional impairments recommended by the American Physical Therapy Association's (APTA) Guide to Physical Therapist Practice.³⁷ However, APTA's Guide recommends neither clinically important thresholds of change for such measures nor the monitoring of treatment effects according to patient-centered outcomes. Thus, the Guide provides no clear direction regarding routine assessment of patient-centered outcomes for physical therapists in clinical practice.

Variability in definitions and measurements of outcomes affected our synthesis of evidence. Although outcomes were reported as average scores for all patients in each treatment group, the clinical importance of such averages was not evaluated. Average scores do not reflect how many patients develop disability or experience clinically meaningful improvements in pain, function, or quality of life. OARSI, however, has recommended that treatment success be evaluated according to patient-centered outcomes and clinically important differences in the WOMAC scale.^{56, 229}

MCIDs refer to thresholds of change in outcomes measurements that result in clinically significant improvements in pain, disability, quality of life, and patient satisfaction with treatment. The studies described clinically important differences of 26 validated tests using the anchor method, which compares changes in scales with patient perceptions of improvement.^{261, 262} A tool that measures patient satisfaction (the Patient Acceptable Symptom State, or PASS) was determined for three scales (WOMAC, VAS for pain, and the Patient Global Assessment). PASS is used to identify the maximum level of symptom state that patients can tolerate and still consider their health satisfactory and their treatment successful. PASS is gaining recognition as a valid and reliable approach across many areas of medical practice, including rheumatology.²⁶³ Expanded use of PASS could help to improve both the quality of physical therapy practice and the impact of studies examining physical therapy interventions.

In contrast, the studies we examined did not categorize patients according to meaningful improvement in pain, disability measures, or quality of life. Meaningful improvements in patient-centered outcomes should define treatment success in physical therapy practice. Evidence was lacking to determine the association between patient-centered outcomes and the measurement of functional impairment that currently drive reimbursement for physical therapy services. Future use of WOMAC in clinical trials, along with routine monitoring of treatment success in physical therapy practice, would produce robust cumulative evidence of the benefits of physical therapy modalities and interventions.

Limitations

Our report has several limitations. We relied on published information and did not contact the principal investigators of poorly reported or unpublished studies. We evaluated selective outcome reporting as described in the methods sections. Very few trials examined quality of life as a clinical outcome. We did not contact the authors to clarify whether the trials did in fact measure quality of life but did not report the results. When articles did not mention quality of life assessment in methods sections, we assumed that the investigators did not aim to examine this important outcome. Future research should identify minimum patient-oriented outcomes for use

in clinical trials. All clinical trials examining physical therapy interventions should register in Clinicaltrials.gov and provide a detailed protocol and links to associated publications.

Despite an exhaustive literature search, we cannot precisely estimate publication bias. We found that less than 30 percent of eligible studies in ClinicalTrials.gov were published.

Several additional factors limited the research on this topic. Evidence to answer research questions was low-strength in most cases. Due to variability in definitions of the outcomes, we had to calculate standardized mean differences. Statistically significant differences in this construct do not necessarily reflect the clinical importance of improvement in outcomes. Evidence about treatment effects in patient subgroups did not permit robust recommendations for individualized treatment. Minorities and patients with comorbidities are at higher risk of disability and yet were underrepresented in clinical trials.

We did not evaluate adverse effects related to unmet patient expectations, insufficient use of patient and provider time and resources, or treatments that were not cost effective. Nor did our review include studies of postsurgical physical therapy treatments, where potential late benefits of physical therapy interventions could be evident.

Future Research

Our report has implications for future research.²⁶⁴ Benefits from physical therapy interventions should be defined as clinically important improvement in pain, independence in ADL, and quality of life. Treatment success should be estimated using rates of the patient-centered outcomes.

Many physical therapy treatments are interventions directed at reducing disability. To best guide future studies, research should address an accepted theoretical framework that describes the relationship between impairments and disability.

Through meta-analyses of individual patient data from previously conducted RCTs, researchers could categorize patients according to the clinical importance of the changes they experience and analyze rates of patient-centered outcomes. Assuming investigators were willing to share their data, meta-analyses of individual patient data could also provide good estimates of treatment effects in patient subpopulations by age, comorbidity, severity of knee OA, and concomitant treatments.

Future RCTs should examine comparative effectiveness of combined physical therapy treatments that consist of effective individual modalities or interventions. Finally, researchers should further examine the extent to which the benefits of exercise for adults with knee OA are affected by the supervision provided by physical therapists or physical therapist assistants.

Our report points to areas for future research. Table 12 links a research agenda with each Key Question.

Table 12. Future research recommendations

Key Question	Results of Literature Review	Types of Studies Needed To Answer Question	Future Research Recommendation
What are the effectiveness and comparative effectiveness of available physical therapy interventions (without drug treatment) for adult patients with chronic knee pain due to OA on intermediate and patient-centered outcomes when compared to no active treatment or another active physical therapy modality?	<p>Few physical therapy interventions were shown to be effective.</p> <p>No single physical therapy intervention was shown to improve all outcomes.</p> <p>Research focused on individual physical therapy interventions, in contrast with common physical therapy practice of combining interventions.</p> <p>Pooled analyses demonstrated that:</p> <ul style="list-style-type: none"> - Aerobic and aquatic exercise improved disability measures - Aerobic and strengthening exercise reduced pain and improved function - Proprioceptive exercise reduced pain - Ultrasound improved function <p>Pooled analyses also demonstrated that the following physical therapy interventions failed to show any benefits:</p> <ul style="list-style-type: none"> - Specific education program - Tai Chi - Diathermy - Orthotics - Magnetic stimulation <p>Individual (nonpooled) RCTs failed to show consistent statistically significant, strong, or clinically important changes in outcomes.</p> <p>Evidence about comparative effectiveness of physical therapy interventions was limited.</p> <p>Pooled analyses demonstrated that:</p> <ul style="list-style-type: none"> - Disability measures did not differ with aerobic exercise vs. aquatic or vs. strengthening exercise - Pain did not differ with electrical stimulation vs. exercise in pooled analyses <p>Individual RCTs of other treatment comparisons did not find consistent clinically important differences in outcomes and did not permit robust conclusions about the best treatment option.</p>	<p>Meta-analyses of individual patient data</p> <p>Randomized controlled clinical trials</p> <p>Pragmatic trials</p>	<p><i>Categorize patient outcomes according to clinically important improvement in pain, disability, function, and quality of life.</i></p> <p>Examine combined interventions that reflect practice.</p> <p><i>Provide detailed information about fidelity of the treatments and involvement of physical therapists and physical therapist assistants.</i></p> <p>Examine preventive exercise interventions and self-management of OA on incidence of disability in community, primary care, and physical therapy settings.</p> <p><i>Assess the patient-centered outcomes with robust validated scales (WOMAC) and according important (to patients) improvements in pain, function, and quality of life.</i></p>

Table 12. Future research recommendations (continued)

Key Question	Results of Literature Review	Types of Studies Needed To Answer Question	Future Research Recommendation
Which patient characteristics are associated with the benefits of examined interventions of physical therapy on intermediate and patient-centered outcomes?	Evidence from individual RCTs did not permit robust conclusions about differences in effects by patient characteristics. Better treatment response was consistently reported in exercise subgroups with high compliance.	Meta-analyses of individual patient data Randomized controlled clinical trials Observational studies	<i>Subgroup analyses by patient age, severity of OA, multi-joint OA, prior and concomitant treatments.</i> The association between patient modifiable risk factors for disability due to knee OA and incidence of pain, disability, and impaired quality of life.
Do changes in intermediate and patient-centered outcomes differ by the dose, duration, intensity, and frequency of examined interventions of physical therapy?	The duration of examined interventions was not associated with better intermediate/patient-centered outcomes. Evidence regarding the association between the dose/intensity/frequency of examined interventions and outcomes was very limited for the majority of comparisons and did not permit robust conclusions.	Meta-analyses of individual patient data Randomized controlled clinical trials Observational studies	<i>Request from the authors detailed information about dose, included modalities, duration, intensity, and frequency of examined interventions. Re-analyze the conducted studies according to this information.</i> <i>Design trials that have enough power to detect differences in patient-centered outcomes according to dose, included modalities, duration, intensity, and frequency of examined interventions.</i> Use administrative database to analyze treatment utilization (drug, surgery) according to dose, included modalities, duration, intensity, and frequency of physical therapy interventions.
Do changes in intermediate and patient-centered outcomes differ by the time of followup?	Among those treatments that demonstrated statistically significant improvement in outcomes, the effects of aerobic, aquatic, and strengthening exercises and ultrasound did not differ at shorter vs. longer time of followup. Electrical stimulation improved pain at short term of followup but significantly worsened pain at longer time of followup.	Randomized controlled clinical trials. Observational studies	<i>Design trials that have enough power to detect differences in long-term patient-centered outcomes</i> Analyze treatment utilization (drug, surgery) according to time of followup after physical therapy interventions. Explore whether changes in intermediate outcomes precede changes in disability measures and, if so, by how much.

Table 12. Future research recommendations (continued)

Key Question	Results of Literature Review	Types of Studies Needed To Answer Question	Future Research Recommendation
What is the association between changes in intermediate outcomes with changes in patient-centered outcomes after physical therapy interventions?	Gait, mobility restrictions, muscle strength, and range of motion measures were associated with disability measures. Individual observational studies did not offer strong and consistent evidence for determining which intermediate outcomes strongly and consistently predict patient-centered outcomes.	Meta-analyses of individual patient data Randomized controlled clinical trials Observational studies	<i>Examine the association between responses in intermediate outcomes with responses in patient-centered outcomes. Response must be defined as clinically important changes in measurements and scales.</i> Use administrative databases in prospective and/pr retrospective analyses of treatment utilization (drug, surgery) and incidence of disability according to response in intermediate outcomes driving reimbursement for physical therapy services.
What is the validity of the tests and measures used to determine intermediate outcomes of physical therapy on OA in association with patient-centered outcomes?	Validation was reported in many articles but few demonstrated a strong (more than 50%) correlation between index and reference method measurements. Original studies concluded that tests are valid based on significance, not strength of correlation.	Observational validation studies	<i>Define validity according to strength of the association and diagnostic value of the tests.</i> <i>Explore nonlinear association between intermediate and patient-centered outcomes determining clinically important thresholds in measurements and their predictive value for disability and improved quality of life.</i>
Which intermediate outcomes meet the criteria of surrogates for patient-centered outcomes?	None of the intermediate outcomes met surrogate criteria for patient-centered outcomes.	Randomized controlled clinical trials	Examine the responses in intermediate measurements for predicting patient-centered outcomes with physical therapy interventions. Response must be defined as clinically important changes in measurements and scales. Categorize the changes in intermediate outcomes according to thresholds of clinical importance rather than using linear regression that results on statistically significant coefficients with questionable clinical importance.

Table 12. Future research recommendations (continued)

Key Question	Results of Literature Review	Types of Studies Needed To Answer Question	Future Research Recommendation
What are minimum clinically important differences of the tests and measures used to determine intermediate outcomes?	<p>Minimum clinically important differences of the tests were determined using the anchor method that compared changes in scales with patient perception of improvements. Minimum clinically important differences were available as absolute change in score or relative change as a percent difference from baseline levels counting for baseline severity of the disease.</p> <p>Definition of the PASS that accounted for patient satisfaction was available for WOMAC scale, VAS for pain, and for Patient Global Assessment Scale.</p> <p>Validated tools defined threshold values of clinical importance for evaluating treatment success in adults with knee OA. In contrast, more often studies used continuous measures of the outcomes providing an average score for all patients in each treatment group. Clinical importance of such averages was not evaluated. Average scores did not provide information on how many patients developed disability or experienced clinically meaningful improvement in pain, function, or quality of life.</p>	<p>Randomized controlled clinical trials</p> <p>Observational studies</p> <p>Policy evaluation</p>	<p>Define PASS for intermediate outcomes driving reimbursement for physical therapy services.</p> <p>Examine whether payment decisions based on clinically important improvement in quality of life reduce incidence of disability.</p>
What are the harms from physical therapy interventions available for adult patients with chronic knee pain due to osteoarthritis when compared to no active treatment or active controls?	<p>Adverse events were uncommon and varied across interventions. They included: skin irritation with brace/insole/tape/e-stim, swelling with brace/diathermy/exercise, muscle soreness with e-stim, warming/throbbing sensation with diathermy/e-stim/PEMF, increased pain with diathermy/exercise/insole/PEMF, and falls with insole. Adverse events were not severe enough to deter participants from continuing treatment.</p>	<p>Randomized controlled clinical trials</p> <p>Observational studies</p> <p>Cost effectiveness analyses</p>	<p>Collect information about all undesirable events patient experienced irrespective of provider opinion about relevance to physical therapy interventions.</p>

CER = comparative effectiveness review; OA = osteoarthritis; PASS = patient acceptable symptom state; PEMF = pulsed electromagnetic fields; RCT = randomized clinical trials; VAS = Visual Analog Scale

Note: Methodological recommendations are shown in italics.

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Abbreviations

ADL	Activities of Daily Living
AHRQ	Agency for Healthcare Research and Quality
AMED	Allied and Complementary Medicine
APTA	American Physical Therapy Association
BMI	Body Mass Index
CAS(K)	Clinical Assessment Study of the Knee
CHECK	Cohort Hip and Cohort Knee Study
CI	Confidence Interval
EQ-5D	European Quality of Life-5 Dimensions
FAST	Fitness Arthritis and Seniors Trial
FDA	Food and Drug Administration
HSS	Hospital for Special Surgery
IADL	Instrumental Activities of Daily Living
K/L	Kellgren and Lawrence Scale
MAK	Mechanical Factors in Arthritis of the Knee
MCID	Minimum Clinically Important Difference
MeSH	Medical Subject Heading
MVC	Maximum voluntary contraction of quadriceps
OA	Osteoarthritis
OARSI	Osteoarthritis Research Society International
OMERACT	Outcomes Measures in Rheumatoid Arthritis Clinical Trials
OR	Odds Ratio
PASS	Patient Acceptable Symptom State
PEDro	Physiotherapy Evidence Database
PEMF	Pulsed Electromagnetic Fields
PICOT	Population, Intervention, Comparison, Outcomes, Timing
PT	Physical Therapy
QUADAS	Quality Assessment of Diagnostic Accuracy Studies
QWB	Quality of Well Being
RCT	Randomized Controlled Trial
ROC	Receiver Operating Characteristic
ROM	Range of Motion
SF-36	36-Item Short Form Health Survey
SMD	Standard Mean Difference
TEP	Technical Expert Panel
TUG	Timed Up and Go Test
VAS	Visual Analog Scale
WOMAC	Western Ontario and McMaster Universities Osteoarthritis Index

Appendix A. Literature Search Strings

June 7, 2010

AMED (Allied and Complementary Medicine)

knee osteoarthritis.mp. or exp Osteoarthritis Knee	446
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Health and Psychosocial Instruments

knee osteoarthritis.mp. or exp Osteoarthritis Knee	34
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Ovid Medline (R)

1	exp Treatment Outcome/ or exp Physical Therapy Modalities/ or exp "Outcome Assessment (Health Care)"/ or exp Questionnaires/		761338
2	knee osteoarthritis.mp. or exp Osteoarthritis, Knee/		6740
3	1 and 2		2296
4	limit 3 to (abstracts and English language and full text and journal article and ("therapy (sensitivity)" or "therapy (specificity)" or "therapy (optimized)" or "diagnosis (sensitivity)" or "diagnosis (specificity)" or "diagnosis (optimized)" or "prognosis (sensitivity)" or "prognosis (specificity)" or "prognosis (optimized)") and last 15 years)	Ovid 1	309

PubMed Medline

Search "Physical Therapy Modalities"[Mesh] AND "Osteoarthritis, Knee"[Mesh] Limits: Humans, Journal Article, English	373
Search "Physical therapy" AND knee osteoarthritis Limits: Humans, Journal Article, English	336

July 22, 2010

Search Disability AND "knee osteoarthritis" Limits: Humans, Journal Article, English	472
Search "Disability Evaluation"[Mesh] AND "knee osteoarthritis" Limits: English	208

Cochrane Library "Physical Therapy Modalities and Osteoarthritis, Knee in Cochrane Database of Systematic Reviews" -75 records

Ovid Technologies, Inc. Email Service

Search for: limit 19 to (english language and yr="1990 -Current")

Database: Ovid Medline (R) <1950 to May Week 4 2010>

Search Strategy:

1	exp Osteoarthritis, Knee/rh, the [Rehabilitation, Therapy]	921
2	exp Pain/rh, the [Rehabilitation, Therapy]	36659
3	exp osteoarthritis, knee/	6253
4	2 and 3	155
5	1 or 4	947
6	exp Physical Therapy Modalities/	97923
7	3 and 6	467
8	5 or 7	1012
9	exp "Outcome and Process Assessment (Health Care)"/	494044
10	exp Pain Measurement/	43738
11	exp "Quality of Life"/	82913
12	exp "Activities of Daily Living"/	40273
13	exp Patient Satisfaction/	43917
14	exp Muscle Strength/	9567
15	exp "Recovery of Function"/	18157
16	outcome\$.mp.	937806
17	exp "Range of Motion, Articular"/	23800
18	9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17	1110826
19	8 and 18	685
20	limit 19 to (english language and yr="1990 -Current")	619

June 10 PubMed, Medline

Search Osteoarthritis[Corporate Author]	24
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October 25, 2010

Search predictor disability knee osteoarthritis Limits: Humans, Journal Article, English	20
Search specificity AND knee osteoarthritis Limits: Humans, Journal Article, English	439

November 12, 2010

Search Manual AND "knee osteoarthritis"	71
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December 10 2010

Search patient acceptable symptom state	46
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July 14, 2011

Ovid, Medline

1	Osteoarthritis, Knee/rh, the [Rehabilitation, Therapy]	1089
2	exp Osteoarthritis, Knee/	7250
3	exp Health Education/	121363
4	exp Patient Education as Topic/	62111
5	exp Health Knowledge, Attitudes, Practice/	55919
6	exp Counseling/	28798
7	3 or 4 or 5 or 6	188826
8	2 and 7	109
9	limit 8 to english language	98
10	limit 9 to (case reports or editorial)	6
11	9 not 10	92
12	exp Osteoarthritis, Knee/	7250
13	exp Exercise Therapy/	23285
14	exp Exercise/	56182
15	exp Exercise Movement Techniques/	4172
16	exp Physical Endurance/	20397
17	(aerobic capacity or aerobic endurance).mp.	2845
18	(conditioning or reconditioning).mp.	78552
19	propulsion.mp.	2246
20	aquatic.mp.	16488
21	(gait training or locomotor training).mp.	549
22	increased workload.mp.	355
23	exp "Range of Motion, Articular"/	26254
24	muscle lengthening.mp.	143
25	stretching.mp.	11962
26	locomotion training.mp.	9
27	exp Physical Therapy Modalities/	104002
28	(implement training or device training or perceptual training).mp.	140
29	exp Muscle Strength/	11677
30	(strength training or power training or endurance training).mp.	4712
31	exp Postural Balance/	11197
32	body mechanics.mp.	153
33	(balance training or coordination training or agility training).mp.	412
34	exp Relaxation Therapy/	6332
35	13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34	322420
36	12 and 35	1564
37	limit 36 to english language	1435
38	limit 37 to humans	1419
39	limit 38 to (case reports or editorial)	59
40	38 not 39	1360
41	exp Osteoarthritis, Knee/rh, the [Rehabilitation, Therapy]	1089
42	exp Self Care/	33911
43	exp "Activities of Daily Living"/	43159

44	exp Orthopedic Equipment/	67082
45	functional training.mp.	161
46	exp "Wounds and Injuries"/pc [Prevention & Control]	39788
47	42 or 43 or 44 or 45 or 46	180570
48	41 and 47	227
49	limit 48 to english language	208
50	limit 49 to (case reports or editorial)	10
51	49 not 50	198
52	exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy]	1089
53	(assistive device\$ or adaptive device\$).mp.	894
54	equipment training.mp.	65
55	device training.mp.	26
56	exp Occupational Therapy/	8942
57	exp Leisure Activities/	123365
58	exp Accidents, Occupational/pc [Prevention & Control]	4338
59	exp Occupational Diseases/pc [Prevention & Control]	17424
60	53 or 54 or 55 or 56 or 57 or 58 or 59	153349
61	52 and 60	113
62	limit 61 to english language	100
63	limit 62 to (case reports or editorial)	4
64	62 not 63	96
65	exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy]	1089
66	manual therap\$.mp.	782
67	(mobilization or manipulation).mp.	82551
68	exp Traction/	5318
69	exp Musculoskeletal Manipulations/	10444
70	exp Manipulation, Orthopedic/	3183
71	exp "Range of Motion, Articular"/	26254
72	passive range of motion.mp.	491
73	66 or 67 or 68 or 69 or 70 or 71 or 72	118016
74	65 and 73	144
75	limit 74 to english language	136
76	limit 75 to (case reports or editorial)	6
77	75 not 76	130
78	exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy]	1089
79	exp Self-Help Devices/	7276
80	exp Orthopedic Equipment/	67082
81	exp Bandages/	17549
82	(adaptive device\$ or assistive device\$).mp.	894
83	orthotic device\$.mp.	4469
84	protective device\$.mp.	10325
85	supportive device\$.mp.	39
86	79 or 80 or 81 or 82 or 83 or 84 or 85	101256
87	78 and 86	128
88	limit 87 to english language	115
89	limit 88 to (case reports or editorial)	7
90	88 not 89	108
91	exp osteoarthritis, knee/	7250
92	exp Iontophoresis/	6454
93	exp Electric Stimulation/	111391
94	exp Electric Stimulation Therapy/	50317
95	92 or 93 or 94	165802
96	91 and 95	80
97	(ems or fes or hvpc or nmes or tens).mp.	14879
98	91 and 97	25
99	96 or 98	82
100	limit 99 to english language	70
101	limit 100 to (case reports or editorial)	3
102	100 not 101	67

103	exp osteoarthritis, knee/	7250
104	exp Physical Therapy Modalities/	104002
105	exp Magnetic Field Therapy/	4751
106	exp Cryotherapy/	18562
107	exp Hydrotherapy/	16153
108	exp Ultrasonic Therapy/	7694
109	exp Hot Temperature/tu [Therapeutic Use]	2591
110	exp Hyperthermia, Induced/	20568
111	exp Bandages/	17549
112	exp Intermittent Pneumatic Compression Devices/	286
113	exp Stockings, Compression/	661
114	exp Motion Therapy, Continuous Passive/	485
115	104 or 105 or 106 or 107 or 108 or 109 or 110 or 111 or 112 or 113 or 114	159321
116	103 and 115	633
117	limit 116 to english language	556
118	limit 117 to (case reports or editorial)	28
119	117 not 118	528
120	exp osteoarthritis, knee/	7250
121	exp Treatment Outcome/	499636
122	treatment duration.mp.	3753
123	treatment intensity.mp.	567
124	exp Patient Care Team/	47915
125	exp Patient Care Planning/ or exp "Continuity of Patient Care"/ or exp Case Management/	57332
126	coordinated care.mp.	412
127	exp Combined Modality Therapy/	174206
128	exp Interdisciplinary Communication/	6510
129	interdisciplinary.mp.	20982
130	121 or 122 or 123 or 124 or 125 or 126 or 127 or 128 or 129	747717
131	120 and 130	1936
132	limit 131 to english language	1727
133	limit 132 to (case reports or editorial)	73
134	132 not 133	1654
135	exp osteoarthritis, knee/	7250
136	lower extremity functional scale.mp.	54
137	lefs.mp.	56
138	arthritis impact measurement scale.mp.	108
139	patient specific functional scale.mp.	40
140	psfs.mp.	143
141	outpatient physical therapy improvement in movement assessment log.mp.	2
142	(optimal and log).mp.	1320
143	gait speed.mp.	899
144	single leg stance.mp.	213
145	tandem stance.mp.	74
146	manual muscle test.mp.	126
147	manual therapy.mp. or exp musculoskeletal manipulations/	10730
148	exp synovitis/us	260
149	muscle relaxation.mp. or exp muscle relaxation/	27533
150	quadriceps strengthening.mp.	70
151	exp quadriceps muscle/	1335
152	strengthening.mp.	10222
153	151 and 152	35
154	150 or 153	91
155	patellar taping.mp.	52
156	exp patella/	7389
157	taping.mp.	716
158	156 and 157	55
159	155 or 158	71
160	functional training.mp.	161
161	medical device\$.mp.	5440

162	exp "equipment and supplies"/	991094
163	device\$.mp.	192212
164	162 and 163	100683
165	161 or 164	103180
166	patient education.mp. or exp patient education/	68929
167	exp hydrotherapy/ or aquatic therapy.mp.	16169
168	136 or 137 or 138 or 139 or 140 or 141 or 142 or 143 or 144 or 145 or 146 or 147 or 148 or 149 or 154 or 159 or 160 or 165 or 166 or 167	227807
169	135 and 168	408
170	limit 169 to english language	370

Updated search Ovid MEDLINE(R) 1946 to December Week 4, 2011

#	Searches	Results
1	exp Arthrometry, Articular/	399
2	exp Biological Markers/	517639
3	exp "Predictive Value of Tests"/	114791
4	exp "Sensitivity and Specificity"/	342804
5	exp exercise test/	44821
6	exp Osteoarthritis, Knee/	7686
7	exp Osteoarthritis, Hip/	4847
8	6 or 7	11636
9	1 or 2 or 3 or 4 or 5	865620
10	8 and 9	922
11	exp Prognosis/	896179
12	exp Disease Progression/	94240
13	exp Treatment Outcome/	517052
14	clinical outcome\$.mp.	56645
15	exp "Quality of Life"/	94592
16	exp Pain/	267912
17	exp Disability Evaluation/	33526
18	exp Disabled Persons/	40737
19	disabilit\$.mp.	146918
20	11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19	1438823
21	10 and 20	343
22	limit 21 to (humans and yr="1990 -Current")	336
23	limit 22 to updatetype="mesz(20120104112127-20120104112127]"	0

#	Searches	Results
1	exp osteoarthritis, knee/	7686
2	lower extremity functional scale.mp.	54
3	lefs.mp.	57
4	arthritis impact measurement scale.mp.	110
5	patient specific functional scale.mp.	41
6	psfs.mp.	148
7	outpatient physical therapy improvement in movement assessment log.mp.	2
8	(optimal and log).mp.	1362
9	gait speed.mp.	918
10	single leg stance.mp.	220
11	tandem stance.mp.	80
12	manual muscle test.mp.	134
13	manual therapy.mp. or exp musculoskeletal manipulations/	11060
14	exp synovitis/us	285
15	muscle relaxation.mp. or exp muscle relaxation/	27605
16	quadriceps strengthening.mp.	74
17	exp quadriceps muscle/	1406
18	strengthening.mp.	10584
19	17 and 18	39
20	16 or 19	95
21	patellar taping.mp.	51

22	exp patella/	7602
23	taping.mp.	715
24	22 and 23	54
25	21 or 24	70
26	functional training.mp.	165
27	medical device\$.mp.	5591
28	exp "equipment and supplies"/	1001959
29	[limit 35 to english language]	0
30	exp osteoarthritis, knee/	7686
31	lower extremity functional scale.mp.	54
32	lefs.mp.	57
33	arthritis impact measurement scale.mp.	110
34	patient specific functional scale.mp.	41
35	psfs.mp.	148
36	outpatient physical therapy improvement in movement assessment log.mp.	2
37	(optimal and log).mp.	1362
38	gait speed.mp.	918
39	single leg stance.mp.	220
40	tandem stance.mp.	80
41	manual muscle test.mp.	134
42	manual therapy.mp. or exp musculoskeletal manipulations/	11060
43	exp synovitis/us	285
44	muscle relaxation.mp. or exp muscle relaxation/	27605
45	quadriceps strengthening.mp.	74
46	exp quadriceps muscle/	1406
47	strengthening.mp.	10584
48	46 and 47	39
49	45 or 48	95
50	patellar taping.mp.	51
51	exp patella/	7602

1	exp osteoarthritis, knee/	7686
2	exp Iontophoresis/	6461
3	exp Electric Stimulation/	111459
4	exp Electric Stimulation Therapy/	50928
5	2 or 3 or 4	166488
6	1 and 5	83
7	(ems or fes or hvpc or nmes or tens).mp.	15294
8	1 and 7	25
9	6 or 8	86
10	limit 9 to english language	73
11	limit 10 to (case reports or editorial)	3
12	10 not 11	70
13	exp Osteoarthritis, Knee/	7686
14	exp Health Education/	122790
15	exp Patient Education as Topic/	62839
16	exp Health Knowledge, Attitudes, Practice/	57696
17	exp Counseling/	29099
18	14 or 15 or 16 or 17	191995
19	13 and 18	113
20	limit 19 to english language	103
21	limit 20 to (case reports or editorial)	6
22	20 not 21	97
23	exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy]	1159
24	exp Self Care/	33912
25	exp "Activities of Daily Living"/	43836
26	exp Orthopedic Equipment/	68716
27	functional training.mp.	165
28	exp "Wounds and Injuries"/pc [Prevention & Control]	40720

29	24 or 25 or 26 or 27 or 28	183761
30	23 and 29	248
31	limit 30 to english language	228
32	limit 31 to (case reports or editorial)	12
33	31 not 32	216
34	exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy]	1159
35	(assistive device\$ or adaptive device\$).mp.	918
36	equipment training.mp.	68
37	device training.mp.	28
38	exp Occupational Therapy/	9182
39	exp Leisure Activities/	126029
40	exp Accidents, Occupational/pc [Prevention & Control]	4414
41	exp Occupational Diseases/pc [Prevention & Control]	17597
42	35 or 36 or 37 or 38 or 39 or 40 or 41	156505
43	34 and 42	115
44	limit 43 to english language	102
45	limit 44 to (case reports or editorial)	4
46	44 not 45	98
47	exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy]	1159
48	manual therap\$.mp.	825
49	(mobilization or manipulation).mp.	83447
50	exp Traction/	5455
51	exp Musculoskeletal Manipulations/	10753
52	exp Manipulation, Orthopedic/	3297
53	exp "Range of Motion, Articular"/	27623
54	passive range of motion.mp.	500
55	48 or 49 or 50 or 51 or 52 or 53 or 54	120477
56	47 and 55	149
57	limit 56 to english language	139
58	limit 57 to (case reports or editorial)	7
59	57 not 58	132
60	exp osteoarthritis, knee/	7686
61	exp Iontophoresis/	6461
62	exp Electric Stimulation/	111459
63	exp Electric Stimulation Therapy/	50928
64	61 or 62 or 63	166488
65	60 and 64	83
66	(ems or fes or hvpc or nmes or tens).mp.	15294
67	60 and 66	25
68	65 or 67	86
69	limit 68 to english language	73
70	limit 69 to (case reports or editorial)	3
71	69 not 70	70

1	exp osteoarthritis, knee/	7686
2	exp Iontophoresis/	6461
3	exp Electric Stimulation/	111459
4	exp Electric Stimulation Therapy/	50928
5	2 or 3 or 4	166488
6	1 and 5	83
7	(ems or fes or hvpc or nmes or tens).mp.	15294
8	1 and 7	25
9	6 or 8	86
10	limit 9 to english language	73
11	limit 10 to (case reports or editorial)	3
12	10 not 11	70
13	exp Osteoarthritis, Knee/	7686
14	exp Health Education/	122790
15	exp Patient Education as Topic/	62839

16	exp Health Knowledge, Attitudes, Practice/	57696
17	exp Counseling/	29099
18	14 or 15 or 16 or 17	191995
19	13 and 18	113
20	limit 19 to english language	103
21	limit 20 to (case reports or editorial)	6
22	20 not 21	97
23	exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy]	1159
24	exp Self Care/	33912
25	exp "Activities of Daily Living"/	43836
26	exp Orthopedic Equipment/	68716
27	functional training.mp.	165
28	exp "Wounds and Injuries"/pc [Prevention & Control]	40720
29	24 or 25 or 26 or 27 or 28	183761
30	23 and 29	248
31	limit 30 to english language	228
32	limit 31 to (case reports or editorial)	12
33	31 not 32	216
34	exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy]	1159
35	(assistive device\$ or adaptive device\$).mp.	918
36	equipment training.mp.	68
37	device training.mp.	28
38	exp Occupational Therapy/	9182
39	exp Leisure Activities/	126029
40	exp Accidents, Occupational/pc [Prevention & Control]	4414
41	exp Occupational Diseases/pc [Prevention & Control]	17597
42	35 or 36 or 37 or 38 or 39 or 40 or 41	156505
43	34 and 42	115
44	limit 43 to english language	102
45	limit 44 to (case reports or editorial)	4
46	44 not 45	98
47	exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy]	1159
48	manual therap\$.mp.	825
49	(mobilization or manipulation).mp.	83447
50	exp Traction/	5455
51	exp Musculoskeletal Manipulations/	10753
52	exp Manipulation, Orthopedic/	3297
53	exp "Range of Motion, Articular"/	27623
54	passive range of motion.mp.	500
55	48 or 49 or 50 or 51 or 52 or 53 or 54	120477
56	47 and 55	149
57	limit 56 to english language	139
58	limit 57 to (case reports or editorial)	7
59	57 not 58	132
60	exp osteoarthritis, knee/	7686
61	exp Iontophoresis/	6461
62	exp Electric Stimulation/	111459
63	exp Electric Stimulation Therapy/	50928
64	61 or 62 or 63	166488
65	60 and 64	83
66	(ems or fes or hvpc or nmes or tens).mp.	15294
67	60 and 66	25
68	65 or 67	86
69	limit 68 to english language	73
70	limit 69 to (case reports or editorial)	3
71	69 not 70	70
72	Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy]	1159
73	exp Osteoarthritis, Knee/	7686
74	exp Exercise Therapy/	23991

75	exp Exercise/	90305
76	exp Exercise Movement Techniques/	4266
77	exp Physical Endurance/	20700
78	(aerobic capacity or aerobic endurance).mp.	2897
79	(conditioning or reconditioning).mp.	78627
80	propulsion.mp.	2263
81	aquatic.mp.	17409
82	(gait training or locomotor training).mp.	564
83	increased workload.mp.	361
84	exp "Range of Motion, Articular"/	27623
85	muscle lengthening.mp.	145
86	stretching.mp.	12145
87	locomotion training.mp.	9
88	exp Physical Therapy Modalities/	107756
89	(implement training or device training or perceptual training).mp.	151
90	exp Muscle Strength/	12275
91	(strength training or power training or endurance training).mp.	4793
92	exp Postural Balance/	11506
93	body mechanics.mp.	154
94	(balance training or coordination training or agility training).mp.	430
95	exp Relaxation Therapy/	6378
96	74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 or 83 or 84 or 85 or 86 or 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 or 95	354657
97	73 and 96	1835
98	limit 97 to english language	1685
99	limit 98 to humans	1670
100	limit 99 to (case reports or editorial)	64
101	99 not 100	1606
102	exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy]	1159
103	exp Self-Help Devices/	7333
104	exp Orthopedic Equipment/	68716
105	exp Bandages/	17498
106	(adaptive device\$ or assistive device\$).mp.	918
107	orthotic device\$.mp.	4561
108	protective device\$.mp.	10548
109	supportive device\$.mp.	41
110	103 or 104 or 105 or 106 or 107 or 108 or 109	103142
111	102 and 110	141
112	limit 111 to english language	127
113	limit 112 to (case reports or editorial)	8
114	112 not 113	119
115	exp osteoarthritis, knee/	7686
116	exp Physical Therapy Modalities/	107756
117	exp Magnetic Field Therapy/	4963
118	exp Cryotherapy/	18239
119	exp Hydrotherapy/	16297
120	exp Ultrasonic Therapy/	7813
121	exp Hot Temperature/tu [Therapeutic Use]	2594
122	exp Hyperthermia, Induced/	20909
123	exp Bandages/	17498
124	exp Intermittent Pneumatic Compression Devices/	294
125	exp Stockings, Compression/	695
126	exp Motion Therapy, Continuous Passive/	487
127	116 or 117 or 118 or 119 or 120 or 121 or 122 or 123 or 124 or 125 or 126	163035
128	115 and 127	659
129	limit 128 to english language	576
130	limit 129 to (case reports or editorial)	30
131	129 not 130	546
132	exp osteoarthritis, knee/	7686

133	exp Treatment Outcome/	517052
134	treatment duration.mp.	3887
135	treatment intensity.mp.	572
136	exp Patient Care Team/	48713
137	exp Patient Care Planning/ or exp "Continuity of Patient Care"/ or exp Case Management/	58119
138	coordinated care.mp.	422
139	exp Combined Modality Therapy/	177227
140	exp Interdisciplinary Communication/	7056
141	interdisciplinary.mp.	21869
142	133 or 134 or 135 or 136 or 137 or 138 or 139 or 140 or 141	769089
143	132 and 142	2125
144	limit 143 to english language	1908
145	limit 144 to (case reports or editorial)	81
146	144 not 145	1827
147	exp osteoarthritis, knee/	7686
148	lower extremity functional scale.mp.	54
149	lefs.mp.	57
150	arthritis impact measurement scale.mp.	110
151	patient specific functional scale.mp.	41
152	psfs.mp.	148
153	outpatient physical therapy improvement in movement assessment log.mp.	2
154	(optimal and log).mp.	1362
155	gait speed.mp.	918
156	single leg stance.mp.	220
157	tandem stance.mp.	80
158	manual muscle test.mp.	134
159	manual therapy.mp. or exp musculoskeletal manipulations/	11060
160	exp synovitis/us	285
161	muscle relaxation.mp. or exp muscle relaxation/	27605
162	quadriceps strengthening.mp.	74
163	exp quadriceps muscle/	1406
164	strengthening.mp.	10584
165	163 and 164	39
166	162 or 165	95
167	patellar taping.mp.	51
168	exp patella/	7602
169	taping.mp.	715
170	168 and 169	54
171	167 or 170	70
172	functional training.mp.	165
173	medical device\$.mp.	5591
174	exp "equipment and supplies"/	1001959
175	device\$.mp.	196430
176	174 and 175	102928
177	173 or 176	105509
178	patient education.mp. or exp patient education/	69851
179	exp hydrotherapy/ or aquatic therapy.mp.	16313
180	148 or 149 or 150 or 151 or 152 or 153 or 154 or 155 or 156 or 157 or 158 or 159 or 160 or 161 or 166 or 171 or 172 or 177 or 178 or 179	231690
181	147 and 180	432
182	limit 181 to english language	390
183	drug management.mp.	453
184	exp patient care team/	48713
185	exp delivery of health care, integrated/	6888
186	integrated care.mp.	1018
187	exp managed care programs/	37913
188	(managed care or coordinated care).mp.	28145
189	exp Patient Education as Topic/	62839
190	exp Health Education/	122790

191	drug surveillance.mp.	428
192	exp drug monitoring/	11592
193	183 or 184 or 185 or 186 or 187 or 188 or 189 or 190 or 191 or 192	226362
194	exp patient compliance/	44452
195	exp patient satisfaction/	49973
196	exp patient care management/	459932
197	194 or 195 or 196	536805
198	exp migraine disorders/dt	5882
199	193 and 198	111
200	197 and 198	353

Updated search in February 29, 2012
Ovid Technologies, Inc. Email Service

Search for: limit 305 to english language
Results: 100

Database: Ovid MEDLINE(R) <1946 to February Week 4 2012>
Search Strategy:

1 Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy] (1190)
2 exp Osteoarthritis, Knee/ (7907)
3 exp Health Education/ (123620)
4 exp Patient Education as Topic/ (63339)
5 exp Health Knowledge, Attitudes, Practice/ (58629)
6 exp Counseling/ (29342)
7 3 or 4 or 5 or 6 (193764)
8 2 and 7 (114)
9 limit 8 to english language (104)
10 limit 9 to (case reports or editorial) (6)
11 9 not 10 (98)
12 exp Osteoarthritis, Knee/ (7907)
13 exp Exercise Therapy/ (24372)
14 exp Exercise/ (91673)
15 exp Exercise Movement Techniques/ (4330)
16 exp Physical Endurance/ (20945)
17 (aerobic capacity or aerobic endurance).mp. (2938)
18 (conditioning or reconditioning).mp. (79440)
19 propulsion.mp. (2288)
20 aquatic.mp. (17727)
21 (gait training or locomotor training).mp. (578)
22 increased workload.mp. (365)
23 exp "Range of Motion, Articular"/ (28011)
24 muscle lengthening.mp. (146)
25 stretching.mp. (12308)
26 locomotion training.mp. (9)
27 exp Physical Therapy Modalities/ (108793)
28 (implement training or device training or perceptual training).mp. (153)
29 exp Muscle Strength/ (12626)
30 (strength training or power training or endurance training).mp. (4846)
31 exp Postural Balance/ (11704)
32 body mechanics.mp. (156)
33 (balance training or coordination training or agility training).mp. (439)
34 exp Relaxation Therapy/ (6427)
35 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or
32 or 33 or 34 (358887)
36 12 and 35 (1902)
37 limit 36 to english language (1749)
38 limit 37 to humans (1733)
39 limit 38 to (case reports or editorial) (73)
40 38 not 39 (1660)

41 exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy] (1190)
 42 exp Self Care/ (34322)
 43 exp "Activities of Daily Living"/ (44317)
 44 exp Orthopedic Equipment/ (69264)
 45 functional training.mp. (167)
 46 exp "Wounds and Injuries"/pc [Prevention & Control] (41151)
 47 42 or 43 or 44 or 45 or 46 (185606)
 48 41 and 47 (259)
 49 limit 48 to english language (238)
 50 limit 49 to (case reports or editorial) (13)
 51 49 not 50 (225)
 52 exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy] (1190)
 53 (assistive device\$ or adaptive device\$).mp. (930)
 54 equipment training.mp. (70)
 55 device training.mp. (28)
 56 exp Occupational Therapy/ (9232)
 57 exp Leisure Activities/ (127534)
 58 exp Accidents, Occupational/pc [Prevention & Control] (4437)
 59 exp Occupational Diseases/pc [Prevention & Control] (17677)
 60 53 or 54 or 55 or 56 or 57 or 58 or 59 (158167)
 61 52 and 60 (122)
 62 limit 61 to english language (107)
 63 limit 62 to (case reports or editorial) (5)
 64 62 not 63 (102)
 65 exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy] (1190)
 66 manual therap\$.mp. (840)
 67 (mobilization or manipulation).mp. (84467)
 68 exp Traction/ (5480)
 69 exp Musculoskeletal Manipulations/ (10857)
 70 exp Manipulation, Orthopedic/ (3318)
 71 exp "Range of Motion, Articular"/ (28011)
 72 passive range of motion.mp. (503)
 73 66 or 67 or 68 or 69 or 70 or 71 or 72 (121941)
 74 65 and 73 (153)
 75 limit 74 to english language (143)
 76 limit 75 to (case reports or editorial) (7)
 77 75 not 76 (136)
 78 exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy] (1190)
 79 exp Self-Help Devices/ (7394)
 80 exp Orthopedic Equipment/ (69264)
 81 exp Bandages/ (17621)
 82 (adaptive device\$ or assistive device\$).mp. (930)
 83 orthotic device\$.mp. (4608)
 84 protective device\$.mp. (10616)
 85 supportive device\$.mp. (42)
 86 79 or 80 or 81 or 82 or 83 or 84 or 85 (103946)
 87 78 and 86 (147)
 88 limit 87 to english language (133)
 89 limit 88 to (case reports or editorial) (9)
 90 88 not 89 (124)
 91 exp osteoarthritis, knee/ (7907)
 92 exp Iontophoresis/ (6503)
 93 exp Electric Stimulation/ (112571)
 94 exp Electric Stimulation Therapy/ (51546)
 95 92 or 93 or 94 (168235)
 96 91 and 95 (85)
 97 (ems or fes or hvpc or nmes or tens).mp. (15513)
 98 91 and 97 (25)
 99 96 or 98 (88)
 100 limit 99 to english language (75)
 101 limit 100 to (case reports or editorial) (3)
 102 100 not 101 (72)

103 exp osteoarthritis, knee/ (7907)
 104 exp Treatment Outcome/ (526614)
 105 treatment duration.mp. (3967)
 106 treatment intensity.mp. (576)
 107 exp Patient Care Team/ (49041)
 108 exp Patient Care Planning/ or exp "Continuity of Patient Care"/ or exp Case Management/ (58505)
 109 coordinated care.mp. (428)
 110 exp Combined Modality Therapy/ (179059)
 111 exp Interdisciplinary Communication/ (7280)
 112 interdisciplinary.mp. (22266)
 113 104 or 105 or 106 or 107 or 108 or 109 or 110 or 111 or 112 (780767)
 114 103 and 113 (2192)
 115 limit 114 to english language (1973)
 116 limit 115 to (case reports or editorial) (90)
 117 115 not 116 (1883)
 118 exp osteoarthritis, knee/ (7907)
 119 lower extremity functional scale.mp. (54)
 120 lefs.mp. (57)
 121 arthritis impact measurement scale.mp. (110)
 122 patient specific functional scale.mp. (47)
 123 psfs.mp. (153)
 124 outpatient physical therapy improvement in movement assessment log.mp. (2)
 125 (optimal and log).mp. (1385)
 126 gait speed.mp. (949)
 127 single leg stance.mp. (221)
 128 tandem stance.mp. (80)
 129 manual muscle test.mp. (136)
 130 manual therapy.mp. or exp musculoskeletal manipulations/ (11170)
 131 exp synovitis/us (292)
 132 muscle relaxation.mp. or exp muscle relaxation/ (27846)
 133 quadriceps strengthening.mp. (76)
 134 exp quadriceps muscle/ (1463)
 135 strengthening.mp. (10798)
 136 134 and 135 (41)
 137 133 or 136 (98)
 138 patellar taping.mp. (52)
 139 exp patella/ (7634)
 140 taping.mp. (723)
 141 139 and 140 (54)
 142 138 or 141 (71)
 143 functional training.mp. (167)
 144 medical device\$.mp. (5685)
 145 exp "equipment and supplies"/ (1010757)
 146 device\$.mp. (199081)
 147 145 and 146 (104249)
 148 144 or 147 (106884)
 149 patient education.mp. or exp patient education/ (70439)
 150 exp hydrotherapy/ or aquatic therapy.mp. (16374)
 151 119 or 120 or 121 or 122 or 123 or 124 or 125 or 126 or 127 or 128 or 129 or 130 or 131 or 132 or 137 or 142
 or
 143 or 148 or 149 or 150 (234130)
 152 118 and 151 (443)
 153 limit 152 to english language (401)
 154 Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy] (1190)
 155 exp Osteoarthritis, Knee/ (7907)
 156 exp Health Education/ (123620)
 157 exp Patient Education as Topic/ (63339)
 158 exp Health Knowledge, Attitudes, Practice/ (58629)
 159 exp Counseling/ (29342)
 160 156 or 157 or 158 or 159 (193764)
 161 155 and 160 (114)
 162 limit 161 to english language (104)

163 limit 162 to (case reports or editorial) (6)
 164 162 not 163 (98)
 165 exp Osteoarthritis, Knee/ (7907)
 166 exp Exercise Therapy/ (24372)
 167 exp Exercise/ (91673)
 168 exp Exercise Movement Techniques/ (4330)
 169 exp Physical Endurance/ (20945)
 170 (aerobic capacity or aerobic endurance).mp. (2938)
 171 (conditioning or reconditioning).mp. (79440)
 172 propulsion.mp. (2288)
 173 aquatic.mp. (17727)
 174 (gait training or locomotor training).mp. (578)
 175 increased workload.mp. (365)
 176 exp "Range of Motion, Articular"/ (28011)
 177 muscle lengthening.mp. (146)
 178 stretching.mp. (12308)
 179 locomotion training.mp. (9)
 180 exp Physical Therapy Modalities/ (108793)
 181 (implement training or device training or perceptual training).mp. (153)
 182 exp Muscle Strength/ (12626)
 183 (strength training or power training or endurance training).mp. (4846)
 184 exp Postural Balance/ (11704)
 185 body mechanics.mp. (156)
 186 (balance training or coordination training or agility training).mp. (439)
 187 exp Relaxation Therapy/ (6427)
 188 166 or 167 or 168 or 169 or 170 or 171 or 172 or 173 or 174 or 175 or 176 or 177 or 178 or 179 or 180 or 181
 or
 182 or 183 or 184 or 185 or 186 or 187 (358887)
 189 165 and 188 (1902)
 190 limit 189 to english language (1749)
 191 limit 190 to humans (1733)
 192 limit 191 to (case reports or editorial) (73)
 193 191 not 192 (1660)
 194 exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy] (1190)
 195 exp Self Care/ (34322)
 196 exp "Activities of Daily Living"/ (44317)
 197 exp Orthopedic Equipment/ (69264)
 198 functional training.mp. (167)
 199 exp "Wounds and Injuries"/pc [Prevention & Control] (41151)
 200 195 or 196 or 197 or 198 or 199 (185606)
 201 194 and 200 (259)
 202 limit 201 to english language (238)
 203 limit 202 to (case reports or editorial) (13)
 204 202 not 203 (225)
 205 exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy] (1190)
 206 (assistive device\$ or adaptive device\$).mp. (930)
 207 equipment training.mp. (70)
 208 device training.mp. (28)
 209 exp Occupational Therapy/ (9232)
 210 exp Leisure Activities/ (127534)
 211 exp Accidents, Occupational/pc [Prevention & Control] (4437)
 212 exp Occupational Diseases/pc [Prevention & Control] (17677)
 213 206 or 207 or 208 or 209 or 210 or 211 or 212 (158167)
 214 205 and 213 (122)
 215 limit 214 to english language (107)
 216 limit 215 to (case reports or editorial) (5)
 217 215 not 216 (102)
 218 exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy] (1190)
 219 manual therap\$.mp. (840)
 220 (mobilization or manipulation).mp. (84467)
 221 exp Traction/ (5480)
 222 exp Musculoskeletal Manipulations/ (10857)

223 exp Manipulation, Orthopedic/ (3318)
 224 exp "Range of Motion, Articular"/ (28011)
 225 passive range of motion.mp. (503)
 226 219 or 220 or 221 or 222 or 223 or 224 or 225 (121941)
 227 218 and 226 (153)
 228 limit 227 to english language (143)
 229 limit 228 to (case reports or editorial) (7)
 230 228 not 229 (136)
 231 exp Osteoarthritis, Knee/rh, th [Rehabilitation, Therapy] (1190)
 232 exp Self-Help Devices/ (7394)
 233 exp Orthopedic Equipment/ (69264)
 234 exp Bandages/ (17621)
 235 (adaptive device\$ or assistive device\$).mp. (930)
 236 orthotic device\$.mp. (4608)
 237 protective device\$.mp. (10616)
 238 supportive device\$.mp. (42)
 239 232 or 233 or 234 or 235 or 236 or 237 or 238 (103946)
 240 231 and 239 (147)
 241 limit 240 to english language (133)
 242 limit 241 to (case reports or editorial) (9)
 243 241 not 242 (124)
 244 exp osteoarthritis, knee/ (7907)
 245 exp Iontophoresis/ (6503)
 246 exp Electric Stimulation/ (112571)
 247 exp Electric Stimulation Therapy/ (51546)
 248 245 or 246 or 247 (168235)
 249 244 and 248 (85)
 250 (ems or fes or hvpc or nmes or tens).mp. (15513)
 251 244 and 250 (25)
 252 249 or 251 (88)
 253 limit 252 to english language (75)
 254 limit 253 to (case reports or editorial) (3)
 255 253 not 254 (72)
 256 exp osteoarthritis, knee/ (7907)
 257 exp Treatment Outcome/ (526614)
 258 treatment duration.mp. (3967)
 259 treatment intensity.mp. (576)
 260 exp Patient Care Team/ (49041)
 261 exp Patient Care Planning/ or exp "Continuity of Patient Care"/ or exp Case Management/ (58505)
 262 coordinated care.mp. (428)
 263 exp Combined Modality Therapy/ (179059)
 264 exp Interdisciplinary Communication/ (7280)
 265 interdisciplinary.mp. (22266)
 266 257 or 258 or 259 or 260 or 261 or 262 or 263 or 264 or 265 (780767)
 267 256 and 266 (2192)
 268 limit 267 to english language (1973)
 269 limit 268 to (case reports or editorial) (90)
 270 268 not 269 (1883)
 271 exp osteoarthritis, knee/ (7907)
 272 lower extremity functional scale.mp. (54)
 273 lefs.mp. (57)
 274 arthritis impact measurement scale.mp. (110)
 275 patient specific functional scale.mp. (47)
 276 psfs.mp. (153)
 277 outpatient physical therapy improvement in movement assessment log.mp. (2)
 278 (optimal and log).mp. (1385)
 279 gait speed.mp. (949)
 280 single leg stance.mp. (221)
 281 tandem stance.mp. (80)
 282 manual muscle test.mp. (136)
 283 manual therapy.mp. or exp musculoskeletal manipulations/ (11170)
 284 exp synovitis/us (292)

285 muscle relaxation.mp. or exp muscle relaxation/ (27846)
 286 quadriceps strengthening.mp. (76)
 287 exp quadriceps muscle/ (1463)
 288 strengthening.mp. (10798)
 289 287 and 288 (41)
 290 286 or 289 (98)
 291 patellar taping.mp. (52)
 292 exp patella/ (7634)
 293 taping.mp. (723)
 294 292 and 293 (54)
 295 291 or 294 (71)
 296 functional training.mp. (167)
 297 medical device\$.mp. (5685)
 298 exp "equipment and supplies"/ (1010757)
 299 device\$.mp. (199081)
 300 298 and 299 (104249)
 301 297 or 300 (106884)
 302 patient education.mp. or exp patient education/ (70439)
 303 exp hydrotherapy/ or aquatic therapy.mp. (16374)
 304 272 or 273 or 274 or 275 or 276 or 277 or 278 or 279 or 280 or 281 or 282 or 283 or 284 or 285 or 290 or 295
 or
 296 or 301 or 302 or 303 (234130)
 305 271 and 304 (443)
 306 limit 305 to english language (401)

Appendix B. Excluded Studies

Not Eligible Outcomes

1. Trombini-Souza F, Kimura A, Ribeiro AP, et al. Inexpensive footwear decreases joint loading in elderly women with knee osteoarthritis. *Gait Posture*. 2011 May;34(1):126-30. PMID: 21536443.
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Appendix C. Ongoing Studies of Physical Therapy Interventions

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
NCT00613678 Design: RCT Recruitment: Active, not recruiting	Behavioral: Activity Strategy Training, Behavioral: Education	Self-reported pain	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind (Investigator), Primary Purpose: Supportive Care
NCT00522106 Design: RCT Recruitment: Active, not recruiting	Behavioral: Behavioral graded activity, Other: Exercise therapy	Pain, Physical function, Patient global assessment, Tiredness, Stiffness, Joint mobility, Muscle strength, Patient-specific physical function, Walking test, Pain coping, Locus of control, Quality of life, Exercise adherence, Social support, Level of performed activities	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind (Outcomes Assessor), Primary Purpose: Treatment
NCT00324857 Design: RCT Recruitment: Active, not recruiting	Behavioral: Decision Aid Video, Behavioral: Motivational Interviewing	Effectiveness of the proposed intervention among AA patients to improve willingness to consider knee replacement, to improve understanding of its risks, benefits and expected outcomes, and to increase primary care referrals for surgical evaluation. To examine and compare the effectiveness of the proposed intervention strategies to increase AA patient likelihood of receiving knee replacement within 12 months of the intervention.	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Factorial Assignment, Masking: Single Blind (Outcomes Assessor), Primary Purpose: Health Services Research
NCT00381290 Design: RCT Recruitment: Active, not recruiting	Behavioral: Diet, Behavioral: Exercise	Inflammatory biomarkers, Knee joint loads, Bone marrow lesions, Articular cartilage, Function, Pain, Mobility, Change in quadriceps' strength and disease progression as a function of knee alignment	Allocation: Randomized, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind (Outcomes Assessor), Primary Purpose: Treatment
NCT00655941 Design: RCT Recruitment: Active, not recruiting	Behavioral: Dietary instruction, Other: Exercise	Pain, OMERACT-OARSI response criterion, Weight change, Gait analysis, MRI, Ultrasound, Collagen markers, Metabolic syndrome, KOOS	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind (Outcomes Assessor), Primary Purpose: Treatment
NCT00197977 Design: RCT Recruitment: Active, not recruiting	Behavioral: Educational program to address patients' expectations	The primary outcome is the within- patient change between pre and post program scores measured by the Hospital for Special Surgery Total Knee Replacement Expectations Survey. The secondary outcome is to compare	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind, Primary Purpose: Educational/Counseling/Training

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
		patient-reported symptoms with radiographic ratings of disease activity.	
NCT00305890 Design: RCT Recruitment: Active, not recruiting	Behavioral: Lifestyle Behavioral Weight Management Program, Behavioral: Pain-Coping Skills Training, Other: Standard Care	Psychological impairment, Physical disability, Joint stiffness, Activity level, Physical activities, Physiological measures of disease activity, Gait measures	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00248105 Design: RCT Recruitment: Active, not recruiting	Behavioral: Lifestyle Physical Activity Management	Function, Quality of Life	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00465660 Design: RCT Recruitment: Active, not recruiting	Behavioral: Progressive resistance training	Articular cartilage morphology following 6 months high intensity progressive resistance training, Muscle and fat cross-sectional area (CSA) (pre and post), Muscle strength, power, endurance, and contraction velocity (pre, 3 months, & post), Medications (pre, 3 months, & post), Body composition (pre, 3 months, & post), Balance; Physical function (pre, 3 months, & post), Questionnaires (pre, 3 months, & post): Habitual exercise (PASE), WOMAC index (pain, stiffness and functional ability), Depressive symptoms (Depression Scale), Quality of life (SF36), Confidence performing physical activity (Ewart) Demographics	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind, Primary Purpose: Treatment
NCT01003925 Design: RCT Recruitment: Active, not recruiting	Behavioral: Standard of care for osteoarthritis treatment, Behavioral: Conjoint Analysis for Osteoarthritis	Change in osteoarthritis treatment (for instance, change from an NSAID to capsaicin cream) as measured by follow-up telephone interview, Ease of use, understandability, and suggestions for improvement of the computer decision aid	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind (Subject), Primary Purpose: Treatment
NCT00123994 Design: RCT Recruitment: Active, not recruiting	Behavioral: Tai Chi classes, Behavioral: Hydrotherapy classes	Self-reported pain and function (WOMAC), General health status (SF-36), Psychological well being (DASS), Patient global assessment (100mm visual analogue scale [VAS]), Physical performance: 50 feet walk time, stair time	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind, Primary Purpose: Treatment
NCT00763386 Design: RCT	Device: NexGen LPS-Flex Fixed	Postoperative range of motion, Return to function	Allocation: Randomized, Endpoint Classification: Safety,

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
Recruitment: Active, not recruiting	Bearing Knee, Device: NexGen Legacy Posterior Stabilized Knee		Efficacy Study, Intervention Model: Parallel Assignment Masking: Single Blind (Subject), Primary Purpose: Treatment
NCT00381563 Design: RCT Recruitment: Active, not recruiting	Device: Patellofemoral realigning knee brace, Device: Non-aligning knee brace	Change in pain on the visual analog scale (VAS), Western Ontario and McMaster Osteoarthritis Index (WOMAC), Knee Injury and Osteoarthritis Outcome Score (KOOS), Physical function, Pain with activity, Patient assessment, Short Form (36) Health Survey (SF-36), Analgesic use, Blinded knee, Physician assessment, Functional performance, X-ray, Physical activity, Physical Activity Scale for the Elderly (PASE), Knee strength	Allocation: Randomized, Control: Placebo Control, Endpoint Classification: Efficacy Study, Intervention Model: Crossover Assignment, Masking: Double Blind (Subject, Caregiver, Investigator, Outcomes Assessor), Primary Purpose: Treatment
NCT00199914 Design: RCT Recruitment: Active, not recruiting	Device: Shortwave diathermy	The change in Western Ontario and McMaster Universities Osteoarthritis (WOMAC) Index The changes in the following parameters: gait speed (calculated from the time spending for 100-meter walk), global improvement patient's satisfaction to the treatment	Allocation: Randomized, Control: Placebo Control, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Parallel Assignment, Masking: Double-Blind, Primary Purpose: Treatment
NCT01099371 Design: RCT Recruitment: Active, not recruiting	Other: exercise	Pain assessed on a 10-point numeric pain scale, Disability assessed on WOMAC, Quality of life assessed on the SF-36, Six-minute walk test	Allocation: Randomized, Control: Placebo Control, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind (Outcomes Assessor), Primary Purpose: Treatment
NCT00844558 Design: RCT Recruitment: Active, not recruiting	Other: Gait Training, Other: Power Training, Other: Control	Advanced Lower Limb Function: Late Life Function and Disability Instrument, Impairment: knee pain, stair climb power, Functional limitation: timed stair climb, summary performance score, long distance corridor walk, Knee-Related Quality of Life	Allocation: Randomized, Control: Placebo Control, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Parallel Assignment, Masking: Double Blind (Subject, Caregiver, Investigator, Outcomes Assessor), Primary Purpose: Treatment
NCT00586300 Design: RCT Recruitment: Active, not recruiting	Other: Physical training program, Behavioral: Self-management training program, Other: Physical training and self-management training programs	Knee function, as measured by the ERGOS machine, Pain, as measured by the visual analogue scale (VAS) and the Pain Subscale of the Western Ontario and MacMasters Universities (WOMAC), Coping efficacy, self-efficacy, and health-related quality of life, as measured by the Client Satisfaction Questionnaire (CSQ), Arthritis self-efficacy scale, Positive and Negative Affect Schedule (PANAS,, SF-36	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Treatment

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
		Health Survey, EuroQol, Medical Outcomes Social Support Survey	
NCT00970008 Design: RCT Recruitment: Active, not recruiting	Other: Swedish Massage 30 min 2x/wk x4 wks then 1x/wk x4 wks, Other: Swedish massage 60 min 2x/wk for 4 wks then 1x/wk for 4 wks, Other: Swedish Massage 30 min sessions 1x/wk for 8 wks, Other: Swedish Massage 60 min session 1x/wk for 8 wks	Improvement in WOMAC (Western Ontario Multipurpose Arthritis Centers) Knee and Hip Osteoarthritis Index Safety, Improvement in range of motion as measured by a goniometer. Improvement in physical function as measured by time in seconds to walk fifty (50) feet on a level straight surface. Reduction in pain as measured by the Visual Analog Scale (VAS) for pain.	Allocation: Randomized, Control: Dose Comparison, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind (Outcomes Assessor), Primary Purpose: Treatment
NCT00061490 Design: RCT Recruitment: Completed	Behavioral: Behavioral weight control and lifestyle exercise	Pain	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Factorial Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00979043 Design: RCT Recruitment: Completed	Behavioral: Dietary Weight-loss, Behavioral: Exercise	Self-reported physical function (WOMAC scale), 6-minute walking distance, timed stair climbing, weight-loss, self-reported pain, progression of knee osteoarthritis, measured radiographically, chronic inflammation, measured according to CRP, IL-6, IL-6 soluble receptor, TNF-alpha, TNF alpha receptors 1 and 2, total mortality	Allocation: Randomized, Control: Active Control, Intervention Model: Parallel Assignment, Masking: Single Blind (Outcomes Assessor). Primary Purpose: Treatment
NCT00462319 Design: RCT Recruitment: Completed	Behavioral: Education, weight reduction and physical exercise	Weight, Physical Exercise in Leisure	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Educational/Counseling/Training
NCT00951990 Design: RCT Recruitment: Completed	Behavioral: Ergometer Cycling, Behavioral: No ergometer cycling	WOMAC Physical Function, WOMAC Pain and Stiffness, SF-36, Patient satisfaction, Lequesne Hip or Knee Score	Allocation: Randomized, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00000434 Design: RCT Recruitment: Completed	Behavioral: Fit and Strong!	Adherence to exercise, Pain and stiffness	Allocation: Randomized, Control: Active Control, Endpoint Classification: Safety, Efficacy Study, Intervention Model: Single Group Assignment, Masking: Open

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
			Label, Primary Purpose: Prevention
NCT00708734 Design: Control: Uncontrolled, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Single Group Assignment, Masking: Open Label, Primary Purpose: Treatment Recruitment: Completed	Behavioral: functional exercise training	Gait and balance measures	Control: Uncontrolled, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Single Group Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00288912 Design: RCT Recruitment: Completed	Behavioral: Health Education, Behavioral: Osteoarthritis Self- Management	Pain, Physical function, Affect (mood), Arthritis Self-Efficacy	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Single Group Assignment, Masking: Single Blind (Outcomes Assessor), Primary Purpose: Health Services Research
NCT00427843 Design: Allocation: Non- Randomized, Control: Uncontrolled, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Treatment Recruitment: Completed	Behavioral: home exercise program for the hip abductor muscles	Walking variables: hip and knee abductor and adductor moments, Muscle strength measures: isometric and isokinetic peak torque measures for the hip abductor and adductor muscles, Radiographs: lower limb frontal plane alignment measures - limb alignment in degrees; grading of knee osteoarthritis severity (total score out of 13),Speed of performance on the Five-Times- Sit-to-Stand Test, Total score on the WOMAC pain subscale and the WOMAC physical function subscale, Total score obtained for the physical activity scale (PASE)	Allocation: Non-Randomized, Control: Uncontrolled, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00265447 Design: RCT Recruitment: Completed	Behavioral: self- directed exercise, Behavioral: 3 months of aerobic conditioning	WOMAC Pain scale, WOMAC physical function scale, muscle performance flexibility, aerobic capacity, self-reported health status,AIMS2	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00687726 Design: RCT Recruitment: Completed	Behavioral: Standing balance exercise, Behavioral: Isometric knee extension exercise	Knee osteoarthritis outcome scores (KOOS),Knee muscle peak torque, Aggregate functional performance time	Allocation: Randomized, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind (Subject), Primary Purpose: Treatment
NCT00222300 Design: RCT Recruitment: Completed	Behavioral: Strength training program	Lower limb strength using a step test, Pain, stiffness and function using the WOMAC questionnaire. Function using the Timed Up-	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model:

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
		and-Go Test. Quality of life using the AQL, Spatiotemporal measures of walking using an instrumented mat. Hip joint torques using 3-D motion analysis.	Parallel Assignment, Masking: Single Blind, Primary Purpose: Treatment
NCT00049816 Design: RCT Recruitment: Completed	Behavioral: Walking exercise, Behavioral: Cycling Exercise	VAS, SF-36, WOMAC, and Activity Index questionnaires, Weight-bearing anterior-posterior (AP) and lateral x-rays of the knee, MRI imaging of the knee, Measurements of gait during level walking and stair climbing, Change in consumption of analgesics, reflecting the level of joint pain	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00124462 Design: RCT Recruitment: Completed	Device: Brace and Shoe Insert, Device: Knee brace and shoe insert	Western Ontario and McMaster Osteoarthritis Index (WOMAC) Pain and Function Subscales (Most symptomatic treated knee), WOMAC Stiffness Subscale, Knee Injury and Osteoarthritis Outcome Score, Patient Global Assessment, Overall Knee Pain Visual Analogue Scale (V.A.S.) (Knee specific), SF36, Analgesic use (Medication log), Blinded knee exam by physician, Physician Global Assessment, Functional performance measures, Proprioception	Allocation: Randomized, Control: Placebo Control, Endpoint Classification: Efficacy Study, Intervention Model: Crossover Assignment, Masking: Double Blind (Subject, Caregiver, Investigator, Outcomes Assessor), Primary Purpose: Treatment
NCT00698412 Design: RCT Recruitment: Completed	Device: Cane	Pain - visual analogue scale, Function - Lequesne index, Function - WOMAC questionnaire, Quality of life - SF-36, Energy consumption (VO2)-gas analysis with and without cane during the 6MWT	Allocation: Randomized, Control: Active Control, Intervention Model: Parallel Assignment, Masking: Single Blind (Outcomes Assessor), Primary Purpose: Treatment
NCT00076453 Design: RCT Recruitment: Completed	Device: Lateral wedge orthotic shoe inserts, Device: Standard orthotic shoe inserts	Pain reduction, Reduction in loading of the medial knee	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Double Blind (Subject, Caregiver, Investigator, Outcomes Assessor), Primary Purpose: Treatment
NCT00331110 Design: RCT Recruitment: Completed	Device: Laterally-Wedged Insole with Ankle Strapping, Device: Laterally-Wedged Insole	Hip-Knee-Ankle Alignment, Talar Tilt Angle, External Knee Adduction Moment, Pain Assessment, Gait Velocity, Center of Pressure, Foot Progression Angle	Allocation: Randomized, Control: Active Control, Intervention Model: Crossover Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00931749 Design: RCT	Device: Low intensity pulsed	Medial compartment knee cartilage thickness and volume,	Allocation: Randomized, Control: Placebo Control,

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
Recruitment: Completed	ultrasound therapy, Device: Sham Low intensity pulsed ultrasound therapy	Western Ontario and McMaster Osteoarthritis Index Score (WOMAC, Lower Extremity Functional Scale (LEFS), 6 minutes walk test, Patient's global assessment of disease severity (Likert scale 0- 5), Semi quantitative scoring of the knee joint, Pain at the end of the 6 minute walk test	Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Double Blind (Subject, Caregiver, Investigator, Outcomes Assessor), Primary Purpose: Treatment
NCT00375544 Design: Allocation: Non-Randomized, Control: Uncontrolled, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Single Group Assignment, Masking: Open Label, Primary Purpose: Treatment Recruitment: Completed	Device: Low level light therapy	Decreased pain scores on the visual analog scale (VAS), Improved Western Ontario and McMaster Universities Osteoarthritis index (WOMAC) scores, Reduced use of over the counter (OTC) analgesics post therapy, Improved functionality as determined by measurable increases in knee range of motion (ROM), Increased exercise ability, No, or decreased knee effusion, Subject satisfaction, Durability of the Clinical Response	Allocation: Non-Randomized, Control: Uncontrolled, Endpoint Classification: Safety, Efficacy Study, Intervention Model: Single Group Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00653432 Design: RCT Recruitment: Completed	Device: MONOVISC	WOMAC Pain, Global Assessment	Allocation: Randomized, Endpoint Classification: Safety, Efficacy Study, Intervention Model: Parallel Assignment, Masking: Double Blind (Subject, Outcomes Assessor), Primary Purpose: Treatment
NCT00500448 Design: RCT Recruitment: Completed	Device: Neuromuscular Electrical Stimulation (Vectra Genisys 4 Channel Electrotherapy System)	Quadriceps Central Activation Ratio, Score on the WOMAC, Gait Measures (% time in double support, walking velocity, stride length, knee kinematics and kinetics)	Allocation: Randomized, Control: Placebo Control, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00417313 Design: RCT Recruitment: Completed	Device: periosteal electro-acupuncture (osteopuncture).	Changes in pain and disability, measured with the Western Ontario and McMaster Universities Osteoarthritis Index, changes in physical performance, psychosocial function (mood, self-efficacy, coping, fear, self-rated health), sleep and appetite	Allocation: Randomized, Control: Placebo Control, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind, Primary Purpose: Treatment
NCT00823888 Design: Non-Randomized Recruitment: Completed	Device: pneumatic brace	To undertake a clinical trial in patients with medial knee OA to determine whether provision of a pneumatic knee brace leads to a reduced adduction moment during the time of this treatment than during the use of a control treatment. To undertake a clinical trial in patients with medial knee OA to determine whether provision of a pneumatic knee	Endpoint Classification: Safety/Efficacy Study, Intervention Model: Crossover Assignment, Masking: Open Label, Primary Purpose: Treatment

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
		brace leads to a lower pain score and improved function during the time of this treatment than during the use of a control treatment.	
NCT00105365 Design: Non-Randomized Recruitment: Completed	Device: Shoe insert	WOMAC pain scale	Allocation: Non-Randomized, Control: Uncontrolled, Endpoint Classification: Efficacy Study, Intervention Model: Single Group Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00032240 Design: RCT Recruitment: Completed	Device: Shoe Insert		Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Crossover Assignment, Masking: Double-Blind, Primary Purpose: Treatment
NCT00154765 Design: RCT Recruitment: Completed	Device: sling suspension exercises	Significant difference on joint reposition test ($p < .05$). No difference on functional ambulating test and WOMAC index ($p > .05$) between the 2 groups. In the training group, all measurements got significant improvement ($p < .05$) except one of the functional ambulating tests.	Allocation: Randomized, Control: Active Control, Endpoint Classification: Safety Study, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Educational/Counseling/Training
NCT01137266 Design: RCT Recruitment: Completed	Device: TENS	Determine the effect of TENS on pain and mobility for each treatment group separately. Also determine the differences of the effect of TENS by comparing different stimulation sites; relationship between skin resistance values before stimulation with the sensations during TENS. Explore whether there is a relation between physiological or psychological characteristics of patients and outcome of TENS and user satisfaction questionnaire	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Factorial Assignment, Masking: Double Blind (Subject, Investigator), Primary Purpose: Treatment
NCT00976079 Design: RCT Recruitment: Completed	Device: Transcutaneous electrical nerve stimulation (TENS) Device: Placebo TENS	Quadriceps central activation ratio, Quadriceps torque production, WOMAC score, Visual analog pain score, Knee joint kinetics and kinematics	Allocation: Randomized, Control: Placebo Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind (Outcomes Assessor), Primary Purpose: Treatment
NCT00223795 Design: RCT Recruitment: Completed	Device: Walking with a cane or without a cane (Guardian offset handled cane)	Pain	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Crossover Assignment, Masking: Open Label, Primary Purpose: Treatment

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
NCT00420147 Design: RCT Recruitment: Completed	Device: wedged in shoe orthosis	knee abduction moment at baseline and one year, WOMAC at baseline and one year, 6 minute walk and stair climb pain and functional at baseline and one year	Allocation: Randomized, Control: Placebo Control, Endpoint Classification: Efficacy Study, Intervention Model: Single Group Assignment, Masking: Single Blind, Primary Purpose: Treatment
NCT00904319 Design: Non-Randomized Recruitment: Completed	Other: Aquatic Power Training	400 meter walk time, Lower limb function (LLFDI), Quality of life (KOOS), Knee osteoarthritis pain (KOOS pain scores, Vastus lateralis muscle bulk	Allocation: Non-Randomized, Control: Uncontrolled, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Single Group Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00726492 Design: RCT Recruitment: Completed	Other: Continuous short wave diathermy (CSWD), Other: Hydrotherapy	Six-minute walk test, Visual analogue pain scale (10 cm line), Knee range of motion, Arthritis Impact Measurement Scale 2 (AIMS 2), Patient interview	Allocation: Randomized, Control: Dose Comparison, Endpoint Classification: Efficacy Study, Intervention Model: Factorial Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00917618 Design: Non-Randomized Recruitment: Completed	Other: Exercise, Other: Control	Preferred gait speed, WOMAC, KOS	Control: Placebo Control, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT01090375 Design: Non-Randomized Recruitment: Completed	Other: Exercise Other: Non Exercise		Intervention Model: Parallel Assignment, Primary Purpose: Basic Science
NCT00581841 Design: Observational Recruitment: Completed	Other: Gait analysis, knee x-ray, and knee MRI	Day-to-day and inter/intra examiner repeatability of the techniques to be used in NIH grant R01 AR48768	Observational Model: Cohort, Time Perspective: Prospective
NCT00583245 Design: Non-Randomized Recruitment: Completed	Other: Gait Training	Changes in functional limitation assessed by the A) Summary Performance Score which includes balance tests, timed 4-meter walk, and timed chair stand test B) Timed stair climb C) Late Life Function and Disability Instrument (LLFDI) Questionnaire, Changes in the disability measure, a timed 400 meter walk, Changes in impairments assessed using the Knee and Osteoarthritis Outcome Score (KOOS) questionnaire	Allocation: Non-Randomized, Control: Uncontrolled, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Single Group Assignment, Masking: Open Label, Primary Purpose: Treatment
NCT00642772 Design: Uncontrolled, Health Services Research Recruitment: Completed	Other: Group Physical Therapy	Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), which assesses pain, stiffness, and function	Control: Uncontrolled, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Single Group Assignment, Masking: Open Label, Primary Purpose: Health Services Research

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
NCT00519922 Design: RCT Recruitment: Completed	Other: Kinesthesia, Balance, and Agility (KBA) Exercise, Other: Standard LE Strength Training	WOMAC Osteoarthritis Scale; Function subscale change pre to post intervention - KBA vs. standard strength training, WOMAC subscale change in Pain and in Stiffness pre to post intervention, Walking speed change in a timed Get Up & Go Test pre to post intervention, Stair climbing and descending speed change pre to post intervention, Gait quality measures with the GAITRite walking mat and EMG, pre to post intervention, Spontaneous engagement in physical activity - change pre to post intervention as measured by the Human Activity Profile, Efficacy for exercise change pre to post intervention as measured by the Self-Efficacy for Exercise scale.	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Supportive Care
NCT00979914 Design: RCT Recruitment: Completed	Other: Patient education programme	EQ5D, Arthritis self-efficacy scale, One-leg rising from sitting to standing, Grip Ability Test, Bipedal rising from sitting to standing, One-legged jump, Standing on one leg with eyes open and standing on one leg with eyes closed	Allocation: Randomized, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind (Outcomes Assessor), Primary Purpose: Treatment
NCT00759512 Design: RCT Recruitment: Completed	Other: Therapeutic Touch	SF36, WOMAC	Allocation: Randomized, Intervention Model: Parallel Assignment, Masking: Single Blind (Caregiver), Primary Purpose: Supportive Care
NCT00450606 Design: RCT Recruitment: Completed	Procedure: Balneotherapy and hydrotherapy	Quality of life evaluation at one, three and six months, Functional state of the patient at one, three and six months, Osteoarthritis severity at one, three and six months	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind, Primary Purpose: Treatment
NCT00322244 Design: RCT Recruitment: Completed	Procedure: Massage Therapy	Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain and functional scores, Visual Analog Scale (VAS), Range of motion, Time to walk 50 feet	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Single Group Assignment, Masking: Double-Blind, Primary Purpose: Treatment
NCT00000406 Design: RCT Recruitment: Completed	Procedure: Progressive resistance exercise		Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Single Group Assignment, Masking: Single Blind, Primary Purpose: Treatment

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
NCT00414557 Design: RCT Recruitment: Completed	Procedure: Quadriceps strengthening	Adduction moment, Time points: 0 and 13 weeks, Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) questionnaire, Numerical rating scales for pain, Quadriceps and hamstrings strength, Self- selected walking speed, Dynamic balance using step test, Physical function using stair climb test, Time points: 0 and 13 weeks	Allocation: Randomized, Control: Placebo Control, Endpoint Classification: Efficacy Study, Intervention Model: Factorial Assignment, Masking: Single Blind, Primary Purpose: Treatment
NCT01274546 Design: Observational Recruitment: Enrolling by invitation	Device: cruciate- retaining Foundation Knee system	Survivorship of the Device, Knee Society Score Evaluation, Short Form - 36, Oxford Knee Score Assessment, WOMAC Osteoarthritis Index, Range of Motion, Radiographic failure	Observational Model: Case- Only, Time Perspective: Prospective
NCT01017445 Design: RCT Recruitment: Enrolling by invitation	Other: Boonme stick exercise	VAS score, WOMAC, number of analgesic used	Allocation: Randomized, Control: Active Control, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind (Outcomes Assessor), Primary Purpose: Treatment
NCT01050465 Design: RCT Recruitment: Enrolling by invitation	Other: health information prescription	Seeking information using Medline Plus	Allocation: Randomized, Control: Active Control, Intervention Model: Parallel Assignment, Masking: Open Label
NCT01096524 Design: RCT Recruitment: Enrolling by invitation	Other: Standard Physiotherapy, Device: Kneehab	Efficacy of Kneehab in promoting early recovery of quadriceps performance following knee arthroplasty .Determine the effect of Kneehab in promoting quality of life measures and health economic outcomes, compared to controls.	Allocation: Randomized, Control: Active Control, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Parallel Assignment, Masking: Single Blind (Outcomes Assessor), Primary Purpose: Treatment
NCT00988468 Design: RCT Recruitment: Terminated	Procedure: Manual Therapy, Behavioral: Therapeutic Exercise Behavioral: Video Observation	Suprapatellar effusion measured via diagnostic ultrasound, Pain Visual Analog Scale, Goniometric knee arc range of motion, Western Ontario and McMaster Universities Index of osteoarthritis of the knee	Allocation: Randomized, Control: Placebo Control, Intervention Model: Parallel Assignment, Masking: Double Blind (Investigator, Outcomes Assessor), Primary Purpose: Treatment
NCT00467337 Design: RCT Recruitment: Terminated	Procedure: Medial-Wedge Insole intervention	To assess symptoms, Visual Analog Scale (VAS) will be used for night pain, pain at rest and on movement. Lequesne index score and the WOMAC questionnaire will be applied at baseline and after 8 weeks by a blinded examiner. Antero-posterior conventional X-ray of knees and ankles were both performed under monopodal load with and without insoles in order to	Allocation: Randomized, Control: Placebo Control, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Parallel Assignment, Masking: Double- Blind, Primary Purpose: Treatment

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
		measure femorotibial, talocalcaneal, and talus tilt angles.	
NCT00378339 Design: RCT Recruitment: Withdrawn	Device: gold berlocks	VAS WOMAC	Allocation: Randomized, Control: Placebo Control, Endpoint Classification: Efficacy Study, Intervention Model: Single Group Assignment, Masking: Double-Blind, Primary Purpose: Treatment
NCT00300326 Design: RCT Recruitment: Withdrawn	Device: LPS Flex knee system	Gait kinetic and kinematic parameters at the knee (knee forces, moments and angles), knee pain, stiffness and function	Allocation: Randomized, Control: Historical Control, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Treatment
ACTRN12606000224527 Design: RCT Recruitment: Completed	Water exercise, joint mobilization	Arthritis-specific quality of life, measured using the Arthritis Impact Measurement Scales version 2 (AIMS2). Primary timepoint week 9 of 10 week intervention. Pain: measured using short-form McGill Pain Questionnaire, returns scores for sensory pain, affective pain, total pain, present pain index, and visual analogue pain scale. Primary timepoint week 9 of 10 week intervention.	The effects of joint mobilization and water exercise on health-related quality of life in people with osteoarthritis
ACTRN12606000226505 Design: RCT Recruitment: Completed	Massage adjunct to usual care, joint mobilization adjunct to usual care	Arthritis-specific quality of life, measured using the Arthritis Impact Measurement Scales version 2 (AIMS2). Primary timepoint week 9 of 10 week intervention. Pain: measured using short-form McGill Pain Questionnaire, returns scores for sensory pain, affective pain, total pain, present pain index, and visual analogue pain scale. Primary timepoint week 9 of 10 week intervention.	Massage and joint mobilization for improving quality of life in people with osteoarthritis
ACTRN12606000524594 Design: RCT Recruitment: Completed	Quadriceps strengthening exercises by a project physiotherapist to be performed five days a week for twelve weeks at home	Adduction moment; Dynamic balance using step test; Numerical rating scales for pain; Physical function using stair climb test; Quadriceps and hamstrings strength; Self-selected walking speed; Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) questionnaire	The effects of knee malalignment and quadriceps strengthening on increasing the adduction moment in individuals with medial knee osteoarthritis
ACTRN12607000492459 Design: RCT Recruitment: Completed	Pulsed electrical stimulation	Pain (100 mm visual analogue scale); Function (Western Ontario and McMaster Universities Osteoarthritis Index); Patient global assessment (100 mm visual analogue scale)	A randomized placebo-controlled trial to determine the effectiveness of pulsed electrical stimulation (E-PES) in the management of osteoarthritis of the knee as measured by

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
			changes in pain, function and patient global assessment
ACTRN12609000395235 Design: RCT Recruitment: Not yet recruiting	Quadrapolar Neuromagnetic device, Magnetic Flux Generator (MFG), (Qmagnets tm)	Knee pain Visual Analogue scale; knee function WOMAC knee assessment	Effect and effect mechanisms of neuromagnetic treatment for pain of knee osteoarthritis QMOAK Trial
IRCT201008114549N1 Design: RCT Recruitment: Completed	Ultrasound in medial and lateral joint line that gradually was increased; trans-cutaneous electrical nerve stimulation; strengthening exercises for quadriceps Swedish massage: tapping, petrissage, traction, Eflurage.	Pain with VAS scale Quality of life with WOMAC scale	The effect of Swedish massage on knee osteoarthritis
ISRCTN12912789 Design: RCT Recruitment: Completed	TENS intervention	Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) function subscale; Total Western Ontario and McMaster Universities Osteoarthritis Index score and pain and stiffness subscale scores	Effects of Transcutaneous Electrical Nerve Stimulation (TENS) and exercise on knee Osteoarthritis
ISRCTN18518978 Design: RCT Recruitment: Completed	MagnaMax® static magnetic device	Not provided at time of registration	Application of static magnetic fields versus copper for the relief of pain in osteoarthritis: a randomized double-blind placebo controlled trial MACROPOD (Magnetic And Copper therapy for the Relief Of Pain in Osteoarthritis: a randomized Double-blind placebo-controlled trial)
ISRCTN85231954 Design: RCT Recruitment: Completed	Home-based exercise program, with particular emphasis on strengthening the quadriceps femoris muscle. Home-based quadriceps femoris neuromuscular electrical stimulation.	36-item Short Form Health Survey (SF-36) and Western Ontario McMaster University Arthritis index (WOMAC) scores; Isometric quadriceps strength ; Isokinetic strength at 60 degrees per second in knee extension and flexion measured bilaterally ; functional testing including a timed 25-metre walking test, a timed stair climbing test and a timed up/down seated test; Quadriceps femoris cross-sectional area on MRI imaging	The effects of resistance training and neuromuscular electrical stimulation (NMES) in advanced knee osteoarthritis - a comparison of the outcomes of a 6-week program of resistance training versus a 6-week program of NMES versus controls: a prospective, single blinded, randomized, interventional/treatment, efficacy study

NCT ID Design Recruitment	Interventions	Outcome measures	Study description
ISRCTN93462890 Design: RCT Recruitment: Completed	A valgus knee brace which is classed as a direct orthotic ; a lateral wedged insole which is classed as an indirect orthotic	Knee adduction moment and knee kinematics and kinetics	Biomechanical assessment of medial compartment knee osteoarthritis before and after surgery

Appendix D. Review Questions According to Population, Intervention, Comparator, Outcomes, Timing, and Settings (PICOTS) Framework

Question 1

What are the effectiveness and comparative effectiveness of available physical therapy interventions (without drug treatment) for adult patients with chronic knee pain due to OA on intermediate and patient-centered outcomes when compared to no active treatment or another active physical therapy modality?

- a. Which patient characteristics are associated with the benefits of examined interventions of physical therapy on intermediate and patient-centered outcomes?
- b. Do changes in intermediate and patient-centered outcomes differ by the dose, duration, intensity, and frequency of examined interventions of physical therapy?
- c. Do changes in intermediate and patient-centered outcomes differ by duration of examined interventions of physical therapy and the time of followup?

Population

- Adults with knee pain secondary to knee osteoarthritis in outpatient settings, including home-based therapy.
- Chronic OA is defined as meeting diagnostic criteria and having symptoms of OA for >2 months.

Excluded:

- Adults with knee OA who had knee arthroplasty on the “study limb” within 6 months before the study
- Adults with osteonecrosis
- Adults with acute knee injuries
- Adults with inflammatory arthritis
- Adults with arthritis secondary to systemic disease
- Adults with physical therapy treatment combined with drug treatment

Relevant population characteristics that may modify treatment effects:

- Age
- Gender
- Race
- Baseline activities of daily living (ADL)/instrumental activities of daily living (IADL)
- Disability
- Comorbidity
- Obesity
- Concomitant/prior treatments including history of prior knee surgery or injury
- Presence of significant skeletal abnormality
- Activity level
- Occupation

- **Intervention**

Physical therapy (monotherapy with one physical therapy intervention or combined physical therapy interventions). Studies examining the marginal effects of drugs combined with physical therapy will be excluded.

Physical therapy interventions eligible for review

General Modality	Specific Intervention	Definition
Patient/client-related instruction		
Instruction, education, and training of patients/clients and caregivers	Current condition Enhancement of performance Health, wellness, and fitness Plan of care Risk factors for pathology/ pathophysiology, impairments, functional limitations, or disabilities	
Therapeutic exercise	Aerobic capacity/endurance conditioning or reconditioning	Increased workload over time Walking programs Aquatic therapy
	Flexibility exercises	Muscle lengthening Range of motion Stretching
	Gait and locomotion training	Gait training Implement and device training
	Strength, power, and endurance training for limb muscles	Active assistive, active, and resistive exercises Quadriceps strengthening Aquatic programs Standardized, programmatic, complementary exercise approaches Task-specific performance training Body mechanics and postural stabilization Body mechanics training
	Balance, coordination, and agility training	Neuromuscular education or re-education Posture awareness training
	Muscle relaxation technique for pain management	
Functional training in self-care, home management, work, community, and leisure integration or reintegration (including ADL, IADL, work hardening, and work conditioning)	ADL training	
	Devices and equipment use and training	Assistive and adaptive device or equipment training during ADL and IADL Orthotic, protective, or supportive device or equipment training during ADL and IADL
	Functional training programs	Simulated environments and tasks Task adaptation
	IADL training	
	Injury prevention or reduction	Injury prevention education during self- care, home management, work, community, and leisure integration or reintegration Injury prevention or reduction with use of devices and equipment Safety awareness training during self- care, home management, work, community, and leisure integration and reintegration

General Modality	Specific Intervention	Definition
Manual therapy techniques (Including mobilization/ manipulation)	Detailed examination to reveal impaired movements	
	Manual techniques with reinforcing exercise to improve movement	
	Manual traction	
	Massage	Connective tissue massage Therapeutic massage
	Mobilization/manipulation	Soft tissue Knee joint, other joints
	Passive range of motion	
Prescription, application of devices and equipment	Adaptive devices	Raised toilet seats
	Assistive devices	Canes
		Crutches
		Walkers
		Long-handled reachers
		Power devices
		Static and dynamic splints
		Grab bars and tub chairs
	Orthotic devices	Braces Shoe inserts Splints
Electrotherapeutic interventions	Protective devices	Braces Protective patellar taping
	Supportive devices	Supportive taping
	Electrotherapeutic delivery of medications	Iontophoresis
	Electrical stimulation	Electrical muscle stimulation
		Functional electrical stimulation
		High-voltage pulsed current
		Neuromuscular electrical stimulation
Physical agents and mechanical interventions	Nonthermal agents	Transcutaneous electrical nerve stimulation
	Aquatic therapy	Pulsed electromagnetic fields
		Pools
Sound agents	Thermotherapy	Ultrasound
		Dry heat
		Hot packs
		Diathermy
	Cryotherapy	Cold modalities
		Cold packs Ice massage

Abbreviations: ADL = activities of daily living; IADL = instrumental activities of daily living.

Comparator

Analysis of efficacy:

- No active treatment (sham stimulation)

Analysis of comparative effectiveness:

- Active control as above
- Monotherapy with one physical therapy intervention compared to combined therapy of more than physical therapy interventions

• Outcomes

Patient-centered outcomes:

- Pain

- Independence in ADL and IADL, with or without devices and equipment
- Ability to assume or resume required self-care, home management, work, community, and leisure roles
- Walking, general physical activity
- Patient satisfaction global assessment
- Time to return to work/activities
- Quality of life
- Intermediate outcomes:**
 - Joint swelling, inflammation, or restriction
 - Impaired physical performance
 - Tolerance of positions and activities

Question 2

What is the association between changes in intermediate outcomes with changes in patient-centered outcomes after physical therapy interventions?

- d. What is the validity of the tests and measures used to determine intermediate outcomes of physical therapy on OA in association with patient-centered outcomes?
- e. Which intermediate outcomes meet the criteria of surrogates for patient-centered outcomes?
- f. What are minimal clinically important differences of the tests and measures used to determine intermediate outcomes?

- **Population**
Same as KQ1

- **Interventions**

Tests and measurements (intermediate outcomes of physical therapy):

- Muscle performance or strength tests:
 - Manual muscle test
 - Hand-held dynamometer
 - Isokinetic dynamometer
 - Knee goniometry
 - Lower extremity activity profile
 - Measure of balance including single-leg stance test or tandem stance
 - Aerobic capacity
- Markers of inflammation:
 - Girth measurements for swelling/edema
- Self-reported patient scales and questionnaires:
 - Knee Pain Screening Tool (KNEST)
 - Extra Short Musculoskeletal Function Assessment questionnaire (XSMFA-D)
 - 12-item Oxford Knee Score
- **Comparator**
 - Normal ranges of the tests and measurements described above
- **Outcomes**
Patient-centered outcomes:

- Independence in activities of daily living (Activities of Daily Living Scale of the Knee Outcome Survey)
 - 6 Minute Walk Test
 - Gait Speed (potential surrogate for clinical outcomes)
 - Functional Status Index
 - Timed Get Up and Go Test
 - Fifty-foot Timed Walk Measure
 - Aggregate Functional Performance Time Measure
 - Lequesne Index for Knee Osteoarthritis
 - Algofunctional Index for Knee Osteoarthritis
 - Lower Extremity Functional Scale (LEFS)
- Time to return to work/activities
- Quality of life measured with:
 - Short Form 36 (SF-36)
 - Mapping the Osteoarthritis Knee and Hip Quality of Life (OAKHQOL)
- Pain measured with:
 - Anterior Knee Pain Questionnaire
 - Knee pain osteoarthritis Visual Analogue Scale (VAS)
 - Knee Pain Scale (KPS)
 - Western Ontario McMaster Osteoarthritis Index (WOMAC) Pain subscale
 - Patient Global Assessment
 - Arthritis Impact Measurement Scales
 - Outcome Measures in Rheumatology
 - OMERACT outcome measures including:
 - Pain
 - Physical function
 - Patient global assessment
 - Joint imaging (for studies of 1 year or longer)
 - Health-related quality of life measure
 - Physician global assessment
- Patient Specific Functional Scale (PSFS)
- Knee Injury and Osteoarthritis Outcome Score (KOOS)
- Outpatient Physical Therapy Improvement in Movement Assessment Log (OPTIMAL)

Question 3

What are the harms from physical therapy interventions available for adult patients with chronic knee pain due to osteoarthritis when compared to no active treatment or active controls?

- c. Which patient characteristics are associated with the harms of examined physical therapy interventions?
- d. Do harms differ by the duration of the treatment and time of followup?

- **Population**
Same as KQ 1
- **Interventions**
Same as KQ 1
- **Comparators**

Same as KQ 1

- **Outcomes**
All reported adverse events

Questions 1–3:

- **Timing**
 - At the end of the treatment
 - Short-term outcomes (0–6 weeks up to 3 months)
 - Long-term outcomes (3-6 months or >6 months)
- **Settings**
Outpatient and home-based care settings

Appendix E. Data Abstraction Forms

Abstraction Form for Questions 1-3

What are the effectiveness and comparative effectiveness of physical therapy interventions available for adult patients with chronic knee pain due to osteoarthritis on intermediate and patient-centered outcomes when compared to no active treatment or another active physical therapy modality?

What are the harms from physical therapy interventions available for adult patients with chronic knee pain due to osteoarthritis when compared to no active treatment or active controls?

(Complete for each study)

Number of the study in the database (PubMed ID, Cochrane accession number, ISBN)_____

First author_____

Year of the publication_____

Purpose/aim of study_____

Sponsorship_____

Conflict of interest_____

Variable label	Format
Year the event occurred	1960-2010
Journal of the publication	PubMed abbreviation
Database to identify study	Database to identify study
Multicenter study	Check if multicenter
Country of the study	As reported
How project was funded	Industry, government, industry+government, other, or not reported
Ethical approval of study	Ethical approval of study by the local or federal IRB
Consent of participants	Consent of participants
How long was the treatment	Weeks
Time to measure the outcome from randomization in weeks to reflect off treatments measures	Weeks
Type to measure length of followup	Median or mean, preferably median
Total length of followup	Months (median or mean)
Total length of followup	Range
Eligibility criteria of age	Eligibility criteria for age
Inclusion criteria	As reported all inclusion criteria
Exclusion criteria	Exclusion criteria as reported
Masking of the treatment status	Double-blind, single blind, triple blind, open label, not reported
Intention to treat analysis preplanned	Preplanned ITT Executed ITT (all patients were analyzed)
Allocation concealment	Not reported, unclear, adequate if
Adequacy of allocation concealment	Adequate - Centralized or pharmacy-controlled randomization; Serially-numbered identical containers; on-site computer based system with a randomization sequence that is not readable until allocation Unclear - Uncertainty about whether the allocation was adequately concealed allocation was adequately concealed Not adequate - The allocation was definitely not adequately concealed (open random number lists or quasi-randomization such as alternate days, odd/even date of birth, or hospital number, serially numbered envelopes)
Randomization scheme	Central computerized randomization, simple table with random numbers, stratified
Details on randomization scheme	Permuted blocks, stratified ratios, other
Reporting of baseline data of the subjects	Reporting of baseline data of the subjects

Variable label	Format
Adequacy of randomization	Patients did not differ at baseline by primary set of confounding
Details on crossover cases	As reported or not available
Baseline status of subjects	Age (mean or median)
Baseline range of age in the study	Range of age groups in the study
Baseline status of subjects	% of disabled; baseline ADL/IADL disability
Baseline status of subjects	Other joint diseases, other diseases, as reported
Baseline status of subjects	Prior surgery, prior drug treatments, prior physiotherapy
Baseline status of subjects	Baseline restrictions in activity
Baseline status of subjects	As reported
Health care setting	Primary care; physiotherapy clinic, pain clinic, as reported
% of loss of follow p totally	Empty if not reported
% of loss of followup in active group	Empty if not reported
% of loss of followup in control group	Empty if not reported
Sample size of the study	
Size of subgroup	
Racial groups	White-% Black-% Asian-%
Ethnic groups	Proportion of African Americans Arabs Asian Americans Hispanic Americans Mexican Americans Jews
Type of treatment in active group	Ultrasound, etc
Type of treatment in control group	Shame or no specific intervention
Characteristics of treatment in active group	
Treatment group	Exercise, ultrasound, etc
Monotherapy or combined treatment in active group	Monotherapy or combined
Monotherapy or combined treatment in control group	Monotherapy or combined
Description of treatment in active group	Physio+drug+education....
Description of treatment in control group	Physio+drug+education....
Intensity of treatment in active group	How many times per week
Intensity of treatment in control group	How many times per week
Dose of treatment in active group	How long per treatment
Dose of treatment in control group	How long per treatment
Type of comparison	After treatment, after vs. baseline
Type of analysis: total sample, subgroup	Total, post hoc subgroup, planned subgroup
Education	As reported
Walking programs, Aquatic therapy, Gait and locomotor training, Increased workload over time	WALK, AQUATIC
Stretching, Range of motion, Muscle lengthening	STRETCH, ROM, LENGTHEN
Gait training, Implement and device training	GAIT
Aquatic programs, Quadriceps strengthening, Active assistive, active, and resistive exercises, Standardized, programmatic, complementary exercise approaches, Task-specific performance training, Body mechanics and postural stabilization, Body mechanics training	QUATIC, STRENGTHEN, ACTIVE, RESISTIVE
Posture awareness training, Neuromuscular education or re-education	BALANCE, POSTURE
Muscle relaxation technique	RELAXATION
Biofeedback	BIOFEEDBACK
Any of 7 above	Y or N
Functional Training in Self-Care, Home Management, Work, Community, and Leisure Integration	Functional Training in Self-Care, Home Management
Massage, Manual traction, Mobilization/manipulation	Massage, Manual traction, Mobilization/manipulation
Canes, Crutches, Walkers, Shoe inserts, Splints, Braces,	Canes, Crutches, Walkers, Shoe inserts, Splints, Braces,

Variable label	Format
Taping	Taping
Electrical muscle stimulation (EMS), Functional electrical stimulation (FES), High voltage pulsed current (HVPC), Neuromuscular electrical stimulation (NMES), Transcutaneous electrical nerve stimulation (TENS)	TENS, EMS, NMES
Pulsed electromagnetic fields, Aquatic therapy, Ultrasound, Thermotherapy, Diathermy, Ice massage	PEMF, Aquatic therapy, Ultrasound, Thermotherapy, Diathermy, Ice massage
	PEMF, US, Diathermy, NA, other
Grouping variable that could modify the effect of the treatment	As reported
Type of grouping variable: patient characteristics or severity	Patient characteristics or severity
Number of subjects in active group	Number of subjects in active group
Number of subjects in control group	Number of subjects in control group
Type of outcome	Pain, function, adverse event
Definition of outcomes	As reported
Type of categorical outcomes (events)	As reported with all details including type of the outcomes, measure of the outcomes
Number of events in active group	Number of events in active group
Number of events in control group	Number of events in control group
Number of subjects in active group with no events	Number of subjects in active group with no events
Number of subjects in control group with no events	Number of subjects in control group with no events
Type of relative risk estimation	Type of relative risk estimation that is reported: OR, RR, HR, mean difference
Mean of the outcome in active group	As reported
Mean of the outcome in control group	As reported
Standard deviation in active group	As reported
Standard deviation in control group	As reported
Relative risk of outcome	Relative risk of outcome as reported
Relative risk of outcome	Relative risk of outcome by calculation
SE of regression coefficient	SE of regression coefficient
Low 95% CI of relative risk	Low 95% CI of relative risk
Upper 95% CI of relative risk	Upper 95% CI of relative risk
Number needed to treat to achieve one outcome	Number needed to treat to achieve one outcome
Low 95% CI NNT to achieve one outcome	Low 95% CI NNT to achieve one outcome
Upper 95% CI NNT to achieve one outcome	Upper 95% CI NNT to achieve one outcome
Number of attributable events/1000 treated	Number of attributable events/1000 treated
Low 95% CI of number of attributable events/1000 treated	Low 95% CI of number of attributable events/1000 treated
Upper 95% CI of number of attributable events/1000 treated	Upper 95% CI of number of attributable events/1000 treated

Abstraction Form for question 2

What is the association between changes in intermediate outcomes with changes in patient-centered outcomes after physical therapy interventions?

- What is the validity of the tests and measures used to determine intermediate outcomes of PT on OA in association with patient-centered outcomes?
- Which intermediate outcomes meet the criteria of surrogates for patient-centered outcomes?
- What are minimal clinically important differences of the tests and measures used to determine intermediate outcomes?

(Complete for each study)

Number of the study in the database (PubMed ID, Cochrane accession number, ISBN) _____
 First author _____
 Year of the publication _____
 Purpose/aim of study _____
 Sponsorship _____
 Conflict of interest _____

Variable label	Format
Year of the event occurred	1960-2010
Journal of the publication	PubMed abbreviation
Database to identify study	database to identify study
Multicenter study	Check if multicenter
Country of the study	as reported
How project was funded	Industry, government, industry +government, other, or not reported
Ethical approval of study	Ethical approval of study by the local or federal IRB
Consent of participants	Consent of participants
How long was the treatment	Weeks
Time to measure the outcome from randomization in weeks to reflect off treatments measures	Weeks
Type to measure length of followup	Median or mean, preferably median
Total length of followup	months(median or mean)
Total length of followup	range
Eligibility criteria of Age	Eligibility criteria for age
Inclusion criteria	As reported all inclusion criteria
Exclusion criteria	Exclusion criteria as reported
Masking of the treatment status	Double-blind, single blind, triple blind, open label, not reported
Intention to Treat analysis preplanned	Preplanned ITT Executed ITT (all patients were analyzed)
Allocation concealment	Not reported, unclear, adequate if
Adequacy of Allocation concealment	Adequate -Centralized or pharmacy-controlled randomization; Serially-numbered identical containers; on-site computer based system with a randomization sequence that is not readable until allocation Unclear - uncertainty about whether the allocation was adequately concealed allocation was adequately concealed Not adequate- the allocation was definitely not adequately

Variable label	Format
	concealed (open random number lists or quasi-randomization such as alternate days, odd/even date of birth, or hospital number, serially numbered envelopes)
Randomization scheme	Central computerized randomization, simple table with random numbers, stratified
Details on Randomization scheme	Permuted blocks, stratified ratios, other
Reporting of baseline data of the subjects	Reporting of baseline data of the subjects
Adequacy of randomization	Patients did not differ at baseline by primary set of confounding
Details on crossover cases	as reported or not available
Baseline status of subjects	age(mean or median)
Baseline range of age in the study	Range of age groups in the study
Baseline status of subjects	% of disabled; Baseline ADL /IADL disability
Baseline status of subjects	other joint diseases, other diseases, as reported
Baseline status of subjects	Prior surgery, prior drug treatments, prior physiotherapy
Baseline status of subjects	baseline restrictions in activity
Baseline status of subjects	as reported
health care setting	primary care; physiotherapy clinic, pain clinic, as reported
% of loss of follow up totally	empty if not reported
% of loss of follow up in active group	empty if not reported
% of loss of follow up in control group	empty if not reported
Sample size of the study	
Size of subgroup	
Racial groups	White-%
	Black-%
	Asian-%
Ethnic groups	Proportion of African Americans
	Arabs
	Asian Americans
	Hispanic Americans
	Mexican Americans
	Jews
Index diagnostic Methods	As reported
Label for index test	
Reference standard	As reported
Label for reference standard	
Condition to test	Score from worse to best for each scale
Sample size for each hypothesis	
True positive	
False positive	
False negative	
True negative	
Sensitivity	
Specificity	
positive predictive value	
Lower 95%CI positive predictive value	
Upper 95%CI positive predictive value	
negative predictive value	
accuracy	
Prevalence of tested condition	
Reported sensitivity	
Reported specificity	
ROC curve	
Testing of Reliability or validity	

Variable label	Format
test-retest reliability	
correlation	
P value	
intermediate outcome	
clinical outcomes	
Type of regression	
Regression coefficient and Standard error in log scale	
Conditions	
Domain	
Clinical outcome	
Methods to consider minimal clinically important differences	
Definition of minimal clinically important difference	

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Appendix Table F1. FDA review of medical devices for physical therapy interventions in adults with knee OA

Review ID	Medical device	Year	Link
K983228	Bionicare Stimulator System, Model BIO-1000 510(K) Summary	1998	http://www.accessdata.fda.gov/cdrh_docs/pdf/K983228.pdf
K971437	510(K) Summary - Bionicare Stimulator System, Model BIO-1000	1997	http://www.accessdata.fda.gov/cdrh_docs/pdf/K971437.pdf
K062325	510(K) Summary RS-4i Sequential Stimulator	2007	http://www.accessdata.fda.gov/cdrh_docs/pdf6/K062325.pdf
K052625	BioniCare®, Stimulator Model BIG-IOOO TM	2005	http://www.accessdata.fda.gov/cdrh_docs/pdf5/K052625.pdf
K042912	510(k) Summary- InterX5000	2008	http://www.accessdata.fda.gov/cdrh_docs/pdf4/K042912.pdf
K032652	510(K) Summary RS-4i Muscle Stimulator	2003	http://www.accessdata.fda.gov/cdrh_docs/pdf3/K032652.pdf
K030332	510(K) Summary BioniCare Stimulator, Model BIO- 1000	2003	http://www.accessdata.fda.gov/cdrh_docs/pdf3/K030332.pdf

Appendix Table F2. Registered in clinicaltrials.gov closed studies of physical therapy interventions in adults with knee OA

NCT ID, study design, recruitment	Interventions	Outcome measures	Publications
NCT00613678 Design: RCT Recruitment: Active, not recruiting	Behavioral: Activity Strategy Training Behavioral: Education	Self-reported pain	Murphy, 2008 ¹
NCT00522106 Design: RCT Recruitment: Active, not recruiting	Behavioral: Behavioral graded activity, Other: Exercise therapy	Pain, Physical function, Patient global assessment, Tiredness, Stiffness, Joint mobility, Muscle strength, Patient-specific physical function, Walking test, Pain coping, Locus of control, Quality of life, Exercise adherence, Social support, Level of performed activities	Pisters, 2010 ² , Pisters, 2010 ³
NCT00324857 Design: RCT Recruitment: Active, not recruiting	Behavioral: Decision Aid Video, Behavioral: Motivational interviewing	Effectiveness of the proposed intervention among AA patients to improve willingness to consider knee replacement, to improve understanding of its risks, benefits and expected outcomes, and to increase primary care referrals for surgical evaluation. To examine and compare the effectiveness of the proposed intervention strategies to increase AA patient likelihood of receiving knee replacement within 12 months of the intervention.	
NCT00381290 Design: RCT Recruitment: Active, not recruiting	Behavioral: Diet Behavioral: Exercise	Inflammatory biomarkers, Knee joint loads, Bone marrow lesions, Articular cartilage, Function, Pain, Mobility, Change in quadriceps' strength and disease progression as a function of knee alignment	Messier, 2009 ⁴
NCT00655941 Design: RCT Recruitment: Active, not recruiting	Behavioral: Dietary instruction, Other: Exercise	Pain OMERACT-OARSI response criterion, Weight change, Gait analysis, MRI, Ultrasound, Collagen markers, Metabolic syndrome, KOOS	Riecke, 2010 ⁵
NCT00197977 Design: RCT Recruitment: Active, not recruiting	Behavioral: Educational program to address patients' expectations	The primary outcome is the within-patient change between pre and post program scores measured by the Hospital for Special Surgery Total Knee Replacement Expectations Survey. The secondary outcome is to compare patient-reported symptoms with radiographic ratings of disease activity.	
NCT00305890 Design: RCT Recruitment: Active, not recruiting	Behavioral: Lifestyle Behavioral Weight Management Program, Behavioral: Pain-Coping Skills Training, Other: Standard Care	Psychological impairment, Physical disability, Joint stiffness, Activity level, Physical activities, Physiological measures of disease activity, Gait measures	
NCT00248105 Design: RCT Recruitment: Active, not recruiting	Behavioral: Lifestyle Physical Activity Management	Function, Quality of Life	
NCT00465660 Design: RCT Recruitment: Active, not recruiting	Behavioral: Progressive resistance training	Articular cartilage morphology following 6 months high intensity progressive resistance training, Muscle and fat cross-sectional area (CSA) (pre and post), Muscle strength, power, endurance, and contraction velocity (pre, 3 months, & post), Medications (pre, 3 months, & post),	

Appendix Table F2. Registered in clinicaltrials.gov closed studies of physical therapy interventions in adults with knee OA (continued)

NCT ID, study design, recruitment	Interventions	Outcome measures	Publications
		Body composition (pre, 3 months, & post), Balance; Physical function (pre, 3 months, & post), Questionnaires (pre, 3 months, & post): Habitual exercise (PASE), WOMAC index (pain, stiffness and functional ability), Depressive symptoms (Depression Scale), Quality of life (SF36), Confidence performing physical activity (Ewart) Demographics	
NCT01003925 Design: RCT Recruitment: Active, not recruiting	Behavioral: Standard of care for osteoarthritis treatment, Behavioral: Conjoint Analysis for Osteoarthritis	Change in osteoarthritis treatment (for instance, change from an NSAID to capsaicin cream) as measured by follow-up telephone interview, Ease of use, understandability, and suggestions for improvement of the computer decision aid	
NCT00123994 Design: RCT Recruitment: Active, not recruiting	Behavioral: Tai Chi classes, Behavioral: Hydrotherapy classes	Self-reported pain and function (WOMAC), General health status (SF-36), Psychological well being (DASS), Patient global assessment (100mm visual analogue scale [VAS]), Physical performance: 50 feet walk time, stair time	Fransen, 2007 ⁶
NCT00763386 Design: RCT Recruitment: Active, not recruiting	Device: NexGen LPS-Flex Fixed Bearing Knee, Device: NexGen Legacy Posterior Stabilized Knee	Postoperative range of motion, Return to function	
NCT00381563 Design: RCT Recruitment: Active, not recruiting	Device: Patellofemoral realigning knee brace, Device: Non-aligning knee brace	Change in pain on the visual analog scale (VAS), Western Ontario and McMaster Osteoarthritis Index (WOMAC), Knee Injury and Osteoarthritis Outcome Score (KOOS), Physical function, Pain with activity, Patient assessment, Short Form (36) Health Survey (SF-36), Analgesic use, Blinded knee, Physician assessment, Functional performance, X-ray, Physical activity, Physical Activity Scale for the Elderly (PASE), Knee strength	Hunter, 2011 ⁷
NCT00199914 Design: RCT Recruitment: Active, not recruiting	Device: Shortwave diathermy	The change in Western Ontario and McMaster Universities Osteoarthritis (WOMAC) Index. The changes in the following parameters: gait speed (calculated from the time spending for 100-meter walk), global improvement, patient's satisfaction to the treatment	Rattanachaiyanont, 2008 ⁸
NCT01099371 Design: RCT Recruitment: Active, not recruiting	Other: exercise	Pain assessed on a 10-point numeric pain scale, Disability assessed on WOMAC, Quality of life assessed on the SF-36, Six-minute walk test	
NCT00844558 Design: RCT Recruitment: Active, not recruiting	Other: Gait Training, Other: Power Training, Other: Control	Advanced Lower Limb Function: Late Life Function and Disability Instrument, Impairment: knee pain, stair climb power, Functional limitation: timed stair climb, summary performance score, long distance corridor walk, Knee-Related Quality of Life	
NCT00586300 Design: RCT Recruitment: Active, not recruiting	Other: Physical training program, Behavioral: Self-management training program,	Knee function, as measured by the ERGOS machine, Pain, as measured by the visual analogue scale (VAS) and the Pain Subscale of the Western Ontario and	McKnight, 2010 ⁹ , Farr, 2010 ¹⁰ , Farr, 2008 ¹¹

Appendix Table F2. Registered in clinicaltrials.gov closed studies of physical therapy interventions in adults with knee OA (continued)

NCT ID, study design, recruitment	Interventions	Outcome measures	Publications
	Other: Physical training and self-management training programs	McMaster Universities (WOMAC), Coping efficacy, self-efficacy, and health-related quality of life, as measured by the Client Satisfaction Questionnaire (CSQ), Arthritis self-efficacy scale, Positive and Negative Affect Schedule (PANAS, SF-36 Health Survey, EuroQuol, Medical Outcomes Social Support Survey	
NCT00970008 Design: RCT Recruitment: Active, not recruiting	Other: Swedish Massage 30 min 2x/wk x4 wks then 1x/wk x4 wks, Other: Swedish massage 60 min 2x/wk for 4 wks then 1x/wk for 4 wks, Other: Swedish Massage 30 min sessions 1x/wk for 8 wks, Other: Swedish Massage 60 min session 1x/wk for 8 wks	Improvement in WOMAC (Western Ontario Multipurpose Arthritis Centers) Knee and Hip Osteoarthritis Index Safety. Improvement in range of motion as measured by a goniometer. Improvement in physical function as measured by time in seconds to walk fifty (50) feet on a level straight surface. Reduction in pain as measured by the Visual Analog Scale (VAS) for pain.	
NCT00061490 Design: RCT Recruitment: Completed	Behavioral: Behavioral weight control and lifestyle exercise	Pain	
NCT00979043 Design: RCT Recruitment: Completed	Behavioral: Dietary Weight-loss, Behavioral: Exercise	Self-reported physical function (WOMAC scale), 6-minute walking distance/timed stair climbing, weight-loss, self-reported pain, progression of knee osteoarthritis, measured radiographically, chronic inflammation, measured according to CRP, IL-6, IL-6 soluble receptor, TNF-alpha, TNF alpha receptors 1 and 2, total mortality	
NCT00462319 Design: RCT Recruitment: Completed	Behavioral: Education, weight reduction and physical exercise	Weight/Physical Exercise in Leisure	Ravaud, 2009 ¹²
NCT00951990 Design: RCT Recruitment: Completed	Behavioral: Ergometer Cycling/Behavioral: No ergometer cycling	WOMAC Physical Function, WOMAC Pain and Stiffness, SF-36, Patient satisfaction, Lequesne Hip or Knee Score	
NCT00000434 Design: RCT Recruitment: Completed	Behavioral: Fit and Strong!	Adherence to exercise, Pain and stiffness	
NCT00708734 Design: Control: Uncontrolled, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Single Group Assignment, Masking: Open Label, Primary Purpose: Treatment Recruitment: Completed	Behavioral: functional exercise training	Gait and balance measures	
NCT00288912 Design: RCT Recruitment: Completed	Behavioral: Health Education, Behavioral: Osteoarthritis Self-Management	Pain, Physical function, Affect (mood), Arthritis Self-Efficacy	Allen, 2010 ¹³
NCT00427843 Design: Allocation: Non-Randomized, Control:	Behavioral: home exercise program for the hip abductor	Walking variables: hip and knee abductor and adductor moments, Muscle strength measures: isometric and isokinetic peak	Sled, 2010 ¹⁴

Appendix Table F2. Registered in clinicaltrials.gov closed studies of physical therapy interventions in adults with knee OA (continued)

NCT ID, study design, recruitment	Interventions	Outcome measures	Publications
Uncontrolled, Endpoint Classification: Efficacy Study, Intervention Model: Parallel Assignment, Masking: Open Label, Primary Purpose: Treatment Recruitment: Completed	muscles	torque measures for the hip abductor and adductor muscles, Radiographs: lower limb frontal plane alignment measures - limb alignment in degrees; grading of knee osteoarthritis severity (total score out of 13), Speed of performance on the Five-Times-Sit-to-Stand Test, Total score on the WOMAC pain subscale and the WOMAC physical function subscale, Total score obtained for the physical activity scale (PASE)	
NCT00265447 Design: RCT Recruitment: Completed	Behavioral: self-directed exercise, Behavioral: 3 months of aerobic conditioning	WOMAC Pain scale, WOMAC physical function scale, muscle performance, flexibility, aerobic capacity, self-reported health status, AIMS2	
NCT00687726 Design: RCT Recruitment: Completed	Behavioral: Standing balance exercise, Behavioral: Isometric knee extension exercise	Knee osteoarthritis outcome scores (KOOS), Knee muscle peak torque, Aggregate functional performance time	
NCT00222300 Design: RCT Recruitment: Completed	Behavioral: Strength training program	Lower limb strength using a step test, Pain, stiffness and function using the WOMAC questionnaire. Function using the Timed Up-and-Go Test. Quality of life using the AQoL, Spatiotemporal measures of walking using an instrumented mat. Hip joint torques using 3-D motion analysis.	
NCT00049816 Design: RCT Recruitment: Completed	Behavioral: Walking exercise, Behavioral: Cycling Exercise	VAS, SF-36, WOMAC, and Activity Index questionnaires, Weight-bearing anterior-posterior (AP) and lateral x-rays of the knee, MRI imaging of the knee, Measurements of gait during level walking and stair climbing, Change in consumption of analgesics, reflecting the level of joint pain	
NCT00124462 Design: RCT Recruitment: Completed	Device: Brace and Shoe Insert, Device: Knee brace and shoe insert	Western Ontario and McMaster Osteoarthritis Index (WOMAC) Pain and Function Subscales (Most symptomatic treated knee), WOMAC Stiffness Subscale, Knee Injury and Osteoarthritis Outcome Score, Patient Global Assessment, Overall Knee Pain Visual Analogue Scale (VAS) (Knee specific), SF36, Analgesic use (Medication log), Blinded knee exam by physician, Physician Global Assessment, Functional performance measures, Proprioception	
NCT00698412 Design: RCT Recruitment: Completed	Device: Cane	Pain - visual analogue scale, Function - Lequesne index, Function - WOMAC questionnaire, Quality of life - SF-36, Energy consumption (VO2)- gas analysis with and without cane during the 6MWT	
NCT00076453 Design: RCT Recruitment: Completed	Device: Lateral wedge orthotic shoe inserts, Device: Standard orthotic shoe inserts	Pain reduction, Reduction in loading of the medial knee	
NCT00331110 Design: RCT Recruitment: Completed	Device: Laterally-Wedged Insole with Ankle Strapping,	Hip-Knee-Ankle Alignment, Talar Tilt Angle, External Knee Adduction Moment, Pain Assessment, Gait Velocity, Center of	

Appendix Table F2. Registered in clinicaltrials.gov closed studies of physical therapy interventions in adults with knee OA (continued)

NCT ID, study design, recruitment	Interventions	Outcome measures	Publications
	Device: Laterally-Wedged Insole	Pressure, Foot Progression Angle	
NCT00931749 Design: RCT Recruitment: Completed	Device: Low intensity pulsed ultrasound therapy, Device: Sham Low intensity pulsed ultrasound therapy	Medial compartment knee cartilage thickness and volume, Western Ontario and McMaster Universities Osteoarthritis Index score (WOMAC, Lower Extremity Functional Scale (LEFS), 6 minutes walk test, Patient's global assessment of disease severity (Likert scale 0- 5), Semi quantitative scoring of the knee joint, Pain at the end of the 6 minute walk test	
NCT00375544 Design: Allocation: Non-Randomized, Control: Uncontrolled, Endpoint Classification: Safety/Efficacy Study, Intervention Model: Single Group Assignment, Masking: Open Label, Primary Purpose: Treatment Recruitment: Completed	Device: Low level light therapy	Decreased pain scores on the visual analog scale (VAS), Improved Western Ontario and McMaster Universities Osteoarthritis index (WOMAC) scores, Reduced use of over the counter (OTC) analgesics post therapy, Improved functionality as determined by measurable increases in knee range of motion (ROM), Increased exercise ability, No, or decreased knee effusion, Subject satisfaction, Durability of the Clinical Response	
NCT00653432 Design: RCT Recruitment: Completed	Device: MONOVISC	WOMAC Pain, Global Assessment	
NCT00500448 Design: RCT Recruitment: Completed	Device: Neuromuscular Electrical Stimulation (Vectra Genisys 4 Channel Electrotherapy System)	Quadriceps Central Activation Ratio, Score on the WOMAC, Gait Measures (% time in double support, walking velocity, stride length, knee kinematics and kinetics)	Palmieri-Smith, 2010 ¹⁵
NCT00417313 Design: RCT Recruitment: Completed	Device: periosteal electro-acupuncture (osteopuncture).	Changes in pain and disability, measured with the Western Ontario and McMaster Universities Osteoarthritis Index, changes in physical performance, psychosocial function (mood, self-efficacy, coping, fear, self-rated health), sleep and appetite	
NCT00823888 Design: Non-Randomized Recruitment: Completed	Device: pneumatic brace	To undertake a clinical trial in patients with medial knee OA to determine whether provision of a pneumatic knee brace leads to a reduced adduction moment during the time of this treatment than during the use of a control treatment. To undertake a clinical trial in patients with medial knee OA to determine whether provision of a pneumatic knee brace leads to a lower pain score and improved function during the time of this treatment than during the use of a control treatment.	
NCT00105365 Design: Non-Randomized Recruitment: Completed	Device: Shoe insert	WOMAC pain scale	
NCT00032240 Design: RCT Recruitment: Completed	Device: Shoe Insert		Baker, 2007 ¹⁶
NCT00154765 Design: RCT Recruitment: Completed	Device: sling suspension exercises	Significant difference on joint reposition test ($p < .05$). No difference on functional ambulating test and WOMAC index ($p > .05$) between the 2 groups. In the	

Appendix Table F2. Registered in clinicaltrials.gov closed studies of physical therapy interventions in adults with knee OA (continued)

NCT ID, study design, recruitment	Interventions	Outcome measures	Publications
		training group, all measurements got significant improvement ($p < .05$) except one of the functional ambulating tests.	
NCT01137266 Design: RCT Recruitment: Completed	Device: TENS	Determine the effect of TENS on pain and mobility for each treatment group separately. Also determine the differences of the effect of TENS by comparing different stimulation sites; relationship between skin resistance values before stimulation with the sensations during TENS. Explore whether there is a relation between physiological or psychological characteristics of patients and outcome of TENS and user satisfaction questionnaire	
NCT00976079 Design: RCT Recruitment: Completed	Device: Transcutaneous electrical nerve stimulation (TENS), Device: Placebo TENS	Quadriceps central activation ratio, Quadriceps torque production, WOMAC score, Visual analog pain score, Knee joint kinetics and kinematics	
NCT00223795 Design: RCT Recruitment: Completed	Device: Walking with a cane or without a cane (Guardian offset handled cane)	Pain	
NCT00420147 Design: RCT Recruitment: Completed	Device: wedged in-shoe orthotic	Knee abduction moment at baseline and one year, WOMAC at baseline and one year, 6 minute walk and stair climb pain and functional at baseline and one year	
NCT00904319 Design: Non-Randomized Recruitment: Completed	Other: Aquatic Power Training	400 meter walk time, Lower limb function (LLFDI), Quality of life (KOOS), Knee osteoarthritis pain (KOOS pain scores, Vastus lateralis muscle bulk	
NCT00726492 Design: RCT Recruitment: Completed	Other: Continuous short wave diathermy (CSWD), Other: Hydrotherapy	Six-minute walk test, Visual analogue pain scale (10 cm line), Knee range of motion, Arthritis Impact Measurement Scale 2 (AIMS 2), Patient interview	
NCT00917618 Design: Non-Randomized Recruitment: Completed	Other: Exercise, Other: Control	Preferred gait speed, WOMAC, KOS	
NCT01090375 Design: Non-Randomized Recruitment: Completed	Other: Exercise, Other: Non Exercise		Helmark, 2010 ¹⁷
NCT00581841 Design: Observational Recruitment: Completed	Other: Gait analysis, knee x-ray, and knee MRI	Day-to-day and inter/intra examiner repeatability of the techniques to be used in NIH grant R01 AR48768	
NCT00583245 Design: Non-Randomized Recruitment: Completed	Other: Gait training	Changes in functional limitation assessed by the A) Summary Performance Score which includes balance tests, timed 4-meter walk, and timed chair stand test B) Timed stair climb C) Late Life Function and Disability Instrument (LLFDI) Questionnaire, Changes in the disability measure, a timed 400 meter walk, Changes in impairments assessed using the Knee and Osteoarthritis Outcome Score (KOOS) questionnaire	
NCT00642772 Design: Uncontrolled Health Services Research Recruitment: Completed	Other: Group physical therapy	Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), which assesses pain, stiffness, and function	

Appendix Table F2. Registered in clinicaltrials.gov closed studies of physical therapy interventions in adults with knee OA (continued)

NCT ID, study design, recruitment	Interventions	Outcome measures	Publications
NCT00519922 Design: RCT Recruitment: Completed	Other: Kinesthesia, balance, and agility (KBA) exercise, Other: standard LE strength training	WOMAC Osteoarthritis Scale; Function subscale change pre to post intervention - KBA vs. standard strength training, WOMAC subscale change in Pain and in Stiffness pre to post intervention, Walking speed change in a timed Get Up & Go Test pre to post intervention, Stair climbing and descending speed change pre to post intervention, Gait quality measures with the GAITRite walking mat and EMG, pre to post intervention, Spontaneous engagement in physical activity - change pre to post intervention as measured by the Human Activity Profile, Efficacy for exercise change pre to post intervention as measured by the Self-Efficacy for Exercise scale.	
NCT00979914 Design: RCT Recruitment: Completed	Other: patient education program	EQ5D, Arthritis self-efficacy scale, One-leg rising from sitting to standing, Grip Ability Test, Bipedal rising from sitting to standing, One-legged jump, Standing on one leg with eyes open and standing on one leg with eyes closed	Hansson, 2010 ¹⁸
NCT00759512 Design: RCT Recruitment: Completed	Other: therapeutic touch	SF36, WOMAC	
NCT00450606 Design: RCT Recruitment: Completed	Procedure: balneotherapy and hydrotherapy	Quality of life evaluation at one, three and six months, Functional state of the patient at one, three and six months, Osteoarthritis severity at one, three and six months	
NCT00322244 Design: RCT Recruitment: Completed	Procedure: massage therapy	Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain and functional scores, Visual Analog Scale (VAS), Range of motion, Time to walk 50 feet	Perlman, 2006 ¹⁹
NCT00000406 Design: RCT Recruitment: Completed	Procedure: progressive resistance exercise		
NCT00414557 Design: RCT Recruitment: Completed	Procedure: quadriceps strengthening	Adduction moment, Time points: 0 and 13 weeks, Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) questionnaire, Numerical rating scales for pain, Quadriceps and hamstrings strength, Self-selected walking speed, Dynamic balance using step test, Physical function using stair climb test, Time points: 0 and 13 weeks	Lim, 2008 ²⁰
NCT01274546 Design: Observational Recruitment: Enrolling by invitation	Device: curiae-retaining foundation knee system	Survivorship of the Device, Knee Society Score Evaluation, Short Form - 36, Oxford Knee Score Assessment, WOMAC Osteoarthritis Index, Range of Motion, Radiographic failure	
NCT01017445 Design: RCT Recruitment: Enrolling by invitation	Other: Boonme stick exercise	VAS score, WOMAC, number of analgesic used	

Appendix Table F2. Registered in clinicaltrials.gov closed studies of physical therapy interventions in adults with knee OA (continued)

NCT ID, study design, recruitment	Interventions	Outcome measures	Publications
NCT01050465 Design: RCT Recruitment: Enrolling by invitation	Other: health information prescription	Seeking information using Medline Plus	
NCT01096524 Design: RCT Recruitment: Enrolling by invitation	Other: Standard Physiotherapy, Device: Kneehab	Efficacy of Kneehab in promoting early recovery of quadriceps performance following knee arthroplasty. Determine the effect of Kneehab in promoting quality of life measures and health economic outcomes, compared to controls.	
NCT00988468 Design: RCT Recruitment: Terminated	Procedure: manual therapy, behavioral: therapeutic exercise, behavioral: video observation	Suprapatellar effusion measured via diagnostic ultrasound, Pain Visual Analog Scale, Goniometric knee arc range of motion, Western Ontario and McMaster Universities Index of osteoarthritis of the knee	
NCT00467337 Design: RCT Recruitment: Terminated	Procedure: Medial-wedge in-sole intervention	To assess symptoms, Visual Analog Scale (VAS) will be used for night pain, pain at rest and on movement. Lequesne index score and the WOMAC questionnaire will be applied at baseline and after 8 weeks by a blinded examiner. Antero-posterior conventional X-ray of knees and ankles were both performed under monopodal load with and without insoles in order to measure femorotibial, talocalcaneal, and talus tilt angles.	Rodrigues, 2008 ²¹
NCT00378339 Design: RCT Recruitment: Withdrawn	Device: gold berlocks	VAS WOMAC	
NCT00300326 Design: RCT Recruitment: Withdrawn	Device: LPS flex knee system	Gait kinetic and kinematic parameters at the knee (knee forces, moments and angles), knee pain, stiffness and function	

Appendix Table F3. Scientific Information Package requests

Company	SIP Letter Sent	Response
3M Innovative Properties Company	3/3/2011	None
AlignMed, LLC	3/3/2011	None
AMREX	3/3/2011	None
Anatomical Concepts, Inc.	3/3/2011	None
Biometrics Ltd.	3/3/2011	None
Bledsoe Brace Systems	3/3/2011	None
BSN medical, Inc.	3/3/2011	None
CASTEC CORPORATION	3/3/2011	None
Chattanooga Group	3/3/2011	None
CIR Systems, Inc.	3/3/2011	None
Cybex International, Inc.	3/3/2011	None
EBI, L.P.	3/3/2011	None
EMPI	3/3/2011	None
Engineering Fitness International, Inc.	3/3/2011	None
EPAMERICA, LLC	3/3/2011	None
Hewlett-Packard USA	3/3/2011	None
HRL Laboratories, LLC	3/3/2011	None
Innovation Sports	3/3/2011	None
Kneebourne Therapeutic	3/3/2011	None
Lenjoy Medical Engineering, Inc.	3/3/2011	None
LGMedSupply	3/3/2011	None
Neuro Resource Group, Inc.	3/3/2011	None
Omnitek Partners LLC	3/3/2011	None
OrthoCor Medical, Inc.	3/3/2011	None
Össur Americas	3/3/2011	None
RAM Plus, LLC	3/3/2011	None
Relieve Pain Today	3/3/2011	None
Robert Bosch LLC	3/3/2011	None
Robert Bosch LLC	3/3/2011	None
RS Medical	3/3/2011	None
Science & Technology Corporation @ UNM	3/3/2011	None
Sigmedics, Inc.	3/3/2011	None
Taketora USA Inc.	3/3/2011	None
Thera-Band	3/3/2011	None
Tibion Corporation	3/3/2011	None
EMAIL ONLY/International		None
Absolute Aromas		None
Axiom Worldwide		None
Biometer A/S		None
BioniCare Medical Technologies, Inc.		None
Bosch Rexroth		None
Byonic Medical Systems		None
Eisai Co, Ltd		None
EMHI		None
Enraf-Nonius B.V.		None
Enraf-Nonius B.V.		None
ITO Co. Ltd		None
iWALKFree Inc.		None
KneeWalkerCentral.com		None
KOBAYASHI Healthcare, LLC		None
Össur Prosthetics		None
Snowden Healthcare Ltd		None
Society' Française d'Orthopedie		None
Generic/No Contact/Not Found/No address, etc.		None
Biofields Aps, Copenhagen, Denmark		None
Bio-Magnetic therapy systems, Inc. (Danbury, CT)		None
Brown & Company of Pensacola, Inc.		None

Appendix Table F3. Scientific Information Package requests (continued)

Company	SIP Letter Sent	Response
Dynamic Medical Instruments Ltd (Wigan, UK)		None
Egro-Crutch, LLC (Minneapolis, MN)		None
Hammer Corporation (Cincinnati, OH)		None
Kinetecs, Inc. (Lincoln, NE)		None
Kineticure, Inc. (Helfet, DL)		None
Medi Bayreuth Weihermuller & Voightman GmbH & Co. KG (Bayreuth, DE)		None
Neuromuscular Gain Inc.		None
OrthoRehab, Inc. Lowell, MA		None
Otto Bock Healthcare GmbH Duderstadt, DE		None
Petson® .250 ultrasound equipment Petas, Turkey		None
ProMDX Technology, Inc. New York, NY)		None
Sanshinkousan Co. Ltd.		None
Sigmedics, Inc. of Delaware (Northfield, IL		None
Staodyn Inc. (Longmont, CO)		None
Taketora Co. Ltd., Tokyo, Japan		None
Taketoraa Co. Ltd.		None
Technology Research Association of Medical and Welfare Apparatus, Tokyo, Japan		None
TerapiMaster, Nordisk Terapi AS, Norway		None
The Han Acupoint Nerve Stimulation, model LH204H (Beijing, China)		None
Thermal mineral water of Nagybaracska, Hungary		None
Thuasne Levallois Perret, France		None
Unknown stimulator, Endomed-CV 405 electrodes and Enraf Myomed-432 superficial electrodes		None

Appendix Table F4. Poorly reported RCTs, and nonrandomized studies

Intervention	Author, year	Country	Sample	Design
Aquatic exercise	Lin, 2004 ²²	England	106	Clinical Trial
Aquatic exercise	Foley, 2003 ²³	Australia	105	RCT
Aquatic exercise	Wang, 2007 ²⁴	Taiwan	38	RCT
Balneotherapy	Forestier, 2000 ²⁵	France	51	Case-series
Balneotherapy	Guillemin, 2001 ²⁶	France	102	Clinical Trial
Balneotherapy	Gaal, 2008 ²⁷	Hungary	81	Clinical Trial
Balneotherapy	Evcik, 2007 ²⁸	Turkey	80	Clinical Trial
Balneotherapy	Yilmaz, 2004 ²⁹	Turkey	50	Comparative Study
Diathermy	Jan, 2006 ³⁰	Taiwan	30	Clinical Trial
Diathermy	Quirk, 1985 ³¹			
Education	Dalury, 2003 ³²	USA	20	Case series
Education	Emery, 2006 ³³	USA	62	Case-series
Epidemiology, risk factors	Blagojevic, 2008 ³⁴	England	1577	Prospective cohort
Epidemiology, risk factors	Ettinger, 1994 ³⁵		4059	Prospective cohort
Epidemiology, risk factors	Dunlop, 2010 ³⁶	USA	2274	Prospective cohort
Exercise	Fitzgerald, 2002 ³⁷	USA		Case reports
Exercise	Roddy, 2005 ³⁸	England		Case reports
Exercise	Scopaz, 2009 ³⁹	USA	111	Case series
Exercise	Aglamis, 2009 ⁴⁰	Turkey	30	Case series
Exercise	Schank, 1986 ⁴¹	USA	70	Case series
Exercise	Diracoglu, 2008 ⁴²		60	Case-series
Exercise	Focht, 2002 ⁴³	USA	964	Case-series
Exercise	Toda, 2001 ⁴⁴	Japan	128	Clinical Trial
Exercise	Damush, 2005 ⁴⁵	USA	191	Clinical Trial
Exercise	Konishi, 2009 ⁴⁶	Japan	42	Clinical Trial
Exercise	Coupe, 2007 ⁴⁷	Netherlands.	200	Cost effectiveness
Exercise	Foy, 2005 ⁴⁸	USA	584	Prospective evaluation of subjects from RCT
Exercise	French, 2010 ⁴⁹	Ireland	27	RCT
Exercise	Dias, 2003 ⁵⁰	Brazil.	50	RCT
Exercise	Bulthuis, 2007 ⁵¹	The Netherlands	98	RCT
Exercise	Iwamoto, 2007 ⁵²	Japan	26	
Exercise	Cooper, 1999 ⁵³			
Exercise	Fisher, 1991 ⁵⁴			
Exercise + device	Goldman, 2003 ⁵⁵	USA	113	Evaluation Studies; Phase I
Heat	Seto, 2008 ⁵⁶	Japan	41	RCT
Joint mobilization	Courtney, 2010 ⁵⁷		10	Case series
Joint mobilization	Cliborne, 2004 ⁵⁸	USA	22	Comparative Study
Magnet	Chen, 2008 ⁵⁹	Taiwan	50	RCT
Manual therapy	Chen, 2000 ⁶⁰	China		Case Reports
Orthotics	Hewitt, 2002 ⁶¹	Australia	20	Case control
Orthotics	Draper, 2000 ⁶²	England	30	Case control
Orthotics	Dennis, 2006 ⁶³	USA	40	Case reports
Orthotics	Giori, 2004 ⁶⁴	USA	46	Case reports
Orthotics	Keating, 1993 ⁶⁵	USA	85	Case series
Orthotics	Lindenfeld, 1997 ⁶⁶	USA	11	Case series
Orthotics	Powers, 2004 ⁶⁷	USA	15	Case series
Orthotics	Hewett, 1998 ⁶⁸	USA	18	Case series
Orthotics	Butler, 2009 ⁶⁹	England	30	Case series
Orthotics	Finger, 2002 ⁷⁰	USA	28	Case-series
Orthotics	Pollo, 2002 ⁷¹	USA	11	Case-series
Orthotics	Birmingham, 2001 ⁷²	Canada	14	Case-series
Orthotics	Chan, 2005 ⁷³	China	14	Case-series
Orthotics	Gaasbeek, 2007 ⁷⁴		15	Case-series

Appendix Table F4. Poorly reported RCTs, and nonrandomized studies (continued)

Intervention	Author, year	Country	Sample	Design
Orthotics	Fang, 2006 ⁷⁵		28	Case-series
Orthotics	Rubin, 2005 ⁷⁶		30	Case-series
Orthotics	Draganich, 2006 ⁷⁷	USA	10	Clinical trial
Orthotics	Butler, 2007 ⁷⁸	USA	20	Clinical Trial
Orthotics	Matsuno, 1997 ⁷⁹	USA	20	Clinical Trial
Orthotics	Katsuragawa, 1999 ⁸⁰	Japan	14	Clinical Trial
Orthotics	Pascual, 2003 ⁸¹	Spain		Comment, Case reports
Orthotics	Kemp, 2008 ⁸²	USA	40	Comparative Study
Orthotics	Hinman, 2008 ⁸³	Australia	13	Comparative Study
Orthotics	Barnes, 2002 ⁸⁴	USA	30	Evaluation Studies
Orthotics	Barrios, 2009 ⁸⁵	USA	66	RCT
Orthotics	Kirkley, 1999 ⁸⁶	Canada	119	RCT analyzed as one arm study
Orthotics	Felson, 2009 ⁸⁷	USA	2,243	the Multicenter Osteoarthritis Study
Orthotics	Bal, 2007 ⁸⁸			
Orthotics	Foxworth, 2006 ⁸⁹			
Orthotics	Kuo, 2006 ⁹⁰			
Orthotics	Richards, 2006 ⁹¹			
Physical Therapy, not specified	Lankhorst, 1982 ⁹²	Sweden	24	Case series
PT	Jamtvedt, 2010 ⁹³	Norway	297	Case-series
PT	Clarke, 1974 ⁹⁴	England	45	Comparative Study
PT	Axford, 2008 ⁹⁵	England	170	RCT
Pulsed electrical stimulation	Fary, 2009 ⁹⁶	Australia		Case Reports
Pulsed electrical stimulation	Pfeiffer, 2001 ⁹⁷	Germany		Case Reports
Pulsed electrical stimulation	Picaza, 1975 ⁹⁸	USA	100	Case series
Pulsed electrical stimulation	Mont, 2006 ⁹⁹	USA	23	Clinical Trial
Pulsed electrical stimulation	Farr, 2006 ¹⁰⁰	USA	288	Clinical Trial
Pulsed electrical stimulation	Smith, 1983 ¹⁰¹	England	32	Clinical Trial
Pulsed electrical stimulation	Lewis, 1994 ¹⁰²	Australia	36	Clinical Trial
Pulsed electrical stimulation	Fransen, 1997 ¹⁰³	England	40	Clinical Trial
Pulsed electrical stimulation	Mont, 2006 ⁹⁹	USA	266	Clinical Trial
Pulsed electrical stimulation	Lewis, 1984 ¹⁰⁴	England	30	RCT
Pulsed electrical stimulation	Danao-Camara, 2001 ¹⁰⁵	USA		
Pulsed electrical stimulation	Paul, 2006 ¹⁰⁶			
Self management	Allen, 2010 ¹³	USA	515	RCT
Tai Chi	Adler, 2007 ¹⁰⁷			
Ultrasound	Lindahl, 1952 ¹⁰⁸			Case series
Yoga	Bukowski, 2006 ¹⁰⁹	USA	15	Case series
Bracing	Ramsey, 2007 ¹¹⁰	USA	16	Case-series

Appendix Table F5. Therapeutic studies of physical therapy interventions that did not contribute to synthesis of evidence due to poor quality or inclusion of patients with hip OA

Author, Year Design Risk of bias	Physical therapy intervention	Subject characteristics	Intention to treat	Adequate allocation concealment	Reporting of baseline characteristics	Baseline similarity of subjects in treatment groups
Ravaud, 2004 ¹¹¹ RCT Risk of bias low	Exercise	Age: 66.7 % women: 70.1 BMI: 27.75 Comorbidity: Not available Prior treatment: NSAID: 64.7%; SYSADOA: 41.3%; IA treatment: 29.3%	Yes	Not reported	Yes	Not reported
Hinman, 2007 ¹¹² RCT Risk of bias low	Exercise	Age: 62.4 % women: 67.6 BMI: 33.4 Comorbidity: Not available Prior treatment: analgesics: 50.7%; NSAIDs: 45.1%; nutraceuticals: 39.4%	Yes	Yes	Yes	Yes
Harlow, 2004 ¹¹³ RCT Risk of bias low	Pulsed electromagnetic fields	Age: 66.6 % women: 38.3 BMI: Not available Comorbidity: Not available Prior treatment: Not available	Yes	Not reported	Yes	Yes
Cochrane, 2005 ¹¹⁴ RCT Risk of bias low	Exercise	Age: 69.74 % women: 62.82 BMI: 29.76 Comorbidity: Obesity 47%, Cardiovascular 16%, Gastrointestinal 11%, Other musculoskeletal 8%, Cancer 7% Prior treatment: Not available	Yes	Yes	Yes	Yes
Fransen, 2007 ⁶ RCT Risk of bias low	Hydrotherapy	Age: 70.2 % women: 73.7 BMI: 30 Comorbidity: Comorbidity score (0-16): 4.7 Prior treatment: Not available	Yes	Not reported	Yes	Yes
Pisters, 2010 ¹¹⁵ RCT Risk of bias low	Education	Age: 64.8 % women: 77 BMI: 28.509 Comorbidity: 0.64 Prior treatment: Not available	Yes	Yes	Yes	Yes

Appendix Table F5. Therapeutic studies of physical therapy interventions that did not contribute to synthesis of evidence due to poor quality or inclusion of patients with hip OA (continued)

Author, Year Design Risk of bias	Physical therapy intervention	Subject characteristics	Intention to treat	Adequate allocation concealment	Reporting of baseline characteristics	Baseline similarity of subjects in treatment groups
Hurley, 2007 ¹¹⁶ RCT Risk of bias low	Exercise	Age: 66.9 % women: 70.3 BMI: 30.2 Comorbidity: Not available Prior treatment: Not available	Yes	Not reported	Yes	Yes
Heuts, 2005 ¹¹⁷ RCT Risk of bias low	Education	Age: 51.6 % women: 59.7 BMI: 28.2 Comorbidity: Not available Prior treatment: Not available	Yes	Not reported	Yes	Yes
Foley, 2003 ²³ RCT Risk of bias low	Exercise aquatic	Age: 70.9 % women: 49.5 BMI: Not available Comorbidity: Heart conditions: 34% Respiratory condition: 39%; Other: 95% Prior treatment: Not available	Yes	Yes	Yes	Yes
Hansson, 2010 ¹⁸ RCT Risk of bias low	Education	Age: 62.5 % women: 85.1 BMI: 28.1 Comorbidity: Not available Prior treatment: Not available	Yes	Not reported	Yes	Yes
Allen, 2010 ¹³ RCT Risk of bias low	Self-management support (telephone- based)	Age: 60.1 % women: 7 BMI: 31.8 Comorbidity: Not available Prior treatment: Not available	Yes	Not reported	Yes	Yes
Veenhof, 2006 ¹¹⁸ RCT Risk of bias low	Behavioral graded activity program	Age: 65 % women: 77 BMI: 29 Comorbidity: 0.64 Prior treatment: Not available	Yes	Yes	Yes	Yes
van Baar, 2001 ¹¹⁹ RCT Risk of bias medium	Exercise	Age: 67.9 % women: 78.5 BMI: Not available Comorbidity: 63% for TG 62% for CG Prior treatment: 59% for TG 64% for CG	Yes	Yes	Yes	No
Halbert, 2001 ¹²⁰ RCT	Education	Age: 68.9 % women: 59.4	No	Not reported	Yes	Yes

Appendix Table F5. Therapeutic studies of physical therapy interventions that did not contribute to synthesis of evidence due to poor quality or inclusion of patients with hip OA (continued)

Author, Year Design Risk of bias	Physical therapy intervention	Subject characteristics	Intention to treat	Adequate allocation concealment	Reporting of baseline characteristics	Baseline similarity of subjects in treatment groups
Risk of bias medium		BMI: 27.81 Comorbidity: Not available Prior treatment: Not available				
Hughes, 2004 ¹²¹ RCT Risk of bias medium	Exercise	Age: 73.59 % women: 84 BMI: Not available Comorbidity: % treated for Cardiovascular disease 58.5, Asthma: 5.1, Emphysema: 5.1, Diabetes: 11.4, Cancer: 6.4 Prior treatment: Not available	No	Not reported	Yes	Yes
Wang, 2007 ²⁴ RCT Risk of bias medium	Exercise	Age: 66.2 % women: 84.2 BMI: Not available Comorbidity: Not available Prior treatment: Not available	ITT planned, but not executed	Not reported	Yes	Yes
Minor, 1989 ¹²² RCT Risk of bias medium	Exercise	Age: 60.6 % women: 81.7 BMI: Not available Comorbidity: Not available Prior treatment: Not available	No	Not reported	Yes	Yes
Moffett, 1996 ¹²³ RCT Risk of bias medium	Short wave	Age: 63 % women: 63.04 BMI: Not available Comorbidity: Not available Prior treatment: Not available	No	Yes	Yes	Yes
Hopman-Rock, 2000 ¹²⁴ RCT Risk of bias medium	Education	Age: 65 % women: 83 BMI: 27.5 Comorbidity: arthritis in hand or other joints (65%), Back problems or hernia nuclei pulposi for >3 months (32%), high blood pressure (27%) Prior treatment: Not available	No	Not reported	Yes	Yes
Wetzels, 2008 ¹²⁵ RCT Risk of bias medium	Education	Age: 74.53 % women: 75.96 BMI: Not available Comorbidity: Not available Prior treatment: Not available	No	Not reported	Yes	Yes

Appendix Table F5. Therapeutic studies of physical therapy interventions that did not contribute to synthesis of evidence due to poor quality or inclusion of patients with hip OA (continued)

Author, Year Design Risk of bias	Physical therapy intervention	Subject characteristics	Intention to treat	Adequate allocation concealment	Reporting of baseline characteristics	Baseline similarity of subjects in treatment groups
Trock, 1993 ¹²⁶ RCT Risk of bias medium	Pulsed electromagnetic fields	Age: Not available % women: Not available BMI: Not available Comorbidity: Not available Prior treatment: Not available	Unclear	Yes	Yes	Yes
Belza, 2002 ¹²⁷ RCT Risk of bias medium	Exercise aquatic	Age: 65.7 % women: 86.3 BMI: Not available Comorbidity: Number of comorbid conditions = 4 Prior treatment: Not available	No	Not reported	Yes	Yes
Song, 2007 ¹²⁸ RCT Risk of bias medium	Tai Chi	Age: 63 % women: 100 BMI: Not available Comorbidity: Not available Prior treatment: Not available	No	Not reported	Yes	Yes
Hughes, 2006 ¹²⁹ RCT Risk of bias medium	Exercise	Age: 73.35 % women: 83.15 BMI: Not available Comorbidity: Hypertension:55%, Cardiovascular disease: 45%, Asthma: 7%, Emphysema:4% , Diabetes:14% , Cancer: 4% Prior treatment: Not available	No	Not reported	Yes	Yes
van Baar, 1998 ¹³⁰ RCT Risk of bias medium	Exercise	Age: 68 % women: 78.5 BMI: Not available Comorbidity: 62.5 Prior treatment: 61.5% medical treatment	Yes	Yes	Yes	No
Cadmus, 2010 ¹³¹ RCT Risk of bias medium	Aquatic exercise	Age: 65.9 % women: 86 BMI: 31.6 Comorbidity: 4 chronic conditions Prior treatment: Not available	No	Not reported	Yes	Yes
Gill, 2009 ¹³² RCT Risk of bias high	Exercise aquatic vs. aerobic	Age: 70.4 % women: 62.2 BMI: 31.1 Comorbidity: Not available	No	No	Yes	Yes

Appendix Table F5. Therapeutic studies of physical therapy interventions that did not contribute to synthesis of evidence due to poor quality or inclusion of patients with hip OA (continued)

Author, Year Design Risk of bias	Physical therapy intervention	Subject characteristics	Intention to treat	Adequate allocation concealment	Reporting of baseline characteristics	Baseline similarity of subjects in treatment groups
		Prior treatment: 17% previous joint replacement				
Evciik, 2002 ¹³³ Non RCT Risk of bias high	Exercise	Age: 56.35 % women: 65.43 BMI: Not available Comorbidity: Not available Prior treatment: Not available	Not available	Not available	Yes	Not available
Sen, 2004 ¹³⁴ Non RCT Risk of bias high	Exercise	Age: 56.61 % women: 82.29 BMI: 27.73 Comorbidity: Not available Prior treatment: Not available	Not available	Not available	Yes	Not available
Jan, 1991 ¹³⁵ Non RCT Risk of bias high	Ultrasound	Age: 62.4 % women: 100 BMI: 23.6 Comorbidity: Not available Prior treatment: Not available	Not available	Not available	Yes	Not available
Svarcova, 1987 ¹³⁶ Non RCT Risk of bias high	Ultrasound	Age: 63.37 % women: Not available BMI: Not available Comorbidity: Not available Prior treatment: Not available	Not available	Not available	Yes	Not available
Hill, 1999 ¹³⁷ Non RCT Risk of bias high	Balneotherapy	Age: 71 % women: 80 BMI: Not available Comorbidity: Not available Prior treatment: Not available	Not available	Not available	Yes	Not available
Hurley, 1998 ¹³⁸ Non RCT Risk of bias high	Exercise	Age: 61.387 % women: 70.1 BMI: Not available Comorbidity: Not available Prior treatment: Not available	Not available	Not available	Yes	Not available
Tohyama, 1991 ¹³⁹ Non RCT Risk of bias high	Insole	Age: 57 % women: 85.45 BMI: Not available Comorbidity: Not available Prior treatment: Not available	Not available	Not available	No	Not available
Sasaki, 1987 ¹⁴⁰ Non RCT Risk of bias high	Insole	Age: 59.2 % women: 82.55 BMI: Not available Comorbidity: Not available	Not available	Not available	No	Not available

Appendix Table F5. Therapeutic studies of physical therapy interventions that did not contribute to synthesis of evidence due to poor quality or inclusion of patients with hip OA (continued)

Author, Year Design Risk of bias	Physical therapy intervention	Subject characteristics	Intention to treat	Adequate allocation concealment	Reporting of baseline characteristics	Baseline similarity of subjects in treatment groups
Norton, 1999 ¹⁴¹ Non RCT Risk of bias high	Exercise	Prior treatment: Not available Age: 66.58 % women: 100 BMI: Not available Comorbidity: Not available Prior treatment: Not available	Not available	Not available	Yes	Not available
Konishi, 2009 ⁴⁶ Non RCT Risk of bias high	Home-based exercise	Age: 69.37 % women: 100 BMI: 24.62 Comorbidity: Not available Prior treatment: Not available	Not available	Not available	Yes	Not available
de Jong, 2004 ¹⁴² Non RCT Risk of bias high	Exercise	Age: 69 % women: 71 BMI: Not available Comorbidity: Number of chronic conditions=2.2 Prior treatment: Not available	Not available	Not available	No	Not available
Fransen, 1997 ¹⁰³ Non RCT Risk of bias high	Exercise	Age: 66.24 % women: 80 BMI: 28.98 Comorbidity: Not available Prior treatment: Not available	Not available	Not available	No	Not available
Domaille, 2006 ¹⁴³ Non RCT Risk of bias high	Exercise	Age: 66.9 % women: 62 BMI: Not available Comorbidity: Not available Prior treatment: Not available	Not available	Not available	No	Not available
Coleman, 2008 ¹⁴⁴ Non RCT Risk of bias high	Education	Age: 66 % women: 75.95 BMI: Not available Comorbidity: cardiovascular 45%; mental health 11%; gastrointestinal 30%; endocrine 18%; musculoskeletal 20%; osteoporosis 18%; multiple comorbidities 64.5%; other 61%; No comorbidities 15% Prior treatment: Not available	Not available	Not available	No	Not available
Fisher, 1993 ¹⁴⁵ Non RCT Risk of bias high	Quantitative progressive exercise muscle rehabilitation	Age: 63.9 % women: 50 BMI: Not available	Not available	Not available	No	Not available

Appendix Table F5. Therapeutic studies of physical therapy interventions that did not contribute to synthesis of evidence due to poor quality or inclusion of patients with hip OA (continued)

Author, Year Design Risk of bias	Physical therapy intervention	Subject characteristics	Intention to treat	Adequate allocation concealment	Reporting of baseline characteristics	Baseline similarity of subjects in treatment groups
	program added to physical therapy program	Comorbidity: Not available Prior treatment: Not available				
Elbaz, 2010 ¹⁴⁶ Non RCT Risk of bias high	Exercise	Age: 62.5 % women: Not available BMI: 32.1 Comorbidity: Not available Prior treatment: Not available	Not available	Not available	Yes	Not available
Erhart, 2008 ¹⁴⁷ Non RCT Risk of bias high	Shoe	Age: 60.2 % women: 46.8 BMI: Not available Comorbidity: Not available Prior treatment: Not available	Not available	Not available	No	Not available
Kilicoglu, 2010 ¹⁴⁸ Non RCT Risk of bias high	Balneotherapy	Age: 69 % women: 50 BMI: 29.3 Comorbidity: Not available Prior treatment: Not available	Not available	Not available	Yes	Not available
King, 2008 ¹⁴⁹ Non RCT Risk of bias high	Exercise	Age: 48.4 % women: 14.3 BMI: 29.3 Comorbidity: Not available Prior treatment: Not available	Not available	Not available	Yes	Not available
Shimada, 2006 ¹⁵⁰ Non RCT Risk of bias high	Insole	Age: 67 % women: 73.9 BMI: Not available Comorbidity: Not available Prior treatment: Not available	Not available	Not available	Yes	Not available
Sled, 2010 ¹⁴ Non RCT Risk of bias high	Exercise	Age: 62.98 % women: 57.5 BMI: 27.38 Comorbidity: Not available Prior treatment: Not available	Not available	Not available	Yes	Not available
Huang, 2000 ¹⁵¹ Non RCT Risk of bias high	Transcutaneous Electrical Nerve Stimulation	Age: 53.8 % women: 88.9 BMI: Not available Comorbidity: Not available Prior treatment: Not available	Not available	Not available	No	Not available

NR - not reported

Appendix Table F6. Consent of the subjects, sponsorship, and risk of bias in the studies of physical therapy interventions

Study characteristics	Category	Included in quantitative pooling analyses	Included in qualitative analyses	Included in quantitative analyses	Total
Ethical approval	Not reported	53	4	9	66
Ethical approval	Yes	159	23	13	195
Consent of the subjects	Not reported	24	3	13	40
Consent of the subjects	Yes	188	24	9	221
Funding	Grant	50	8	3	61
Funding	Grant + industry	1	0	0	1
Funding	Grant + industry+ others	2	0	0	2
Funding	Grant + others	16	3	1	20
Funding	Industry	15	2	0	17
Funding	Industry+ others	1	0	0	1
Funding	Not reported	88	4	16	108
Funding	other	39	10	2	51
Design	Non-RCT	0	0	22	22
Adequacy of allocation concealment	No	22	1	0	23
Adequacy of allocation concealment	Unclear	137	17	22	176
Adequacy of allocation concealment	Yes	53	9	0	62
Intention to treat	ITT not planned, but executed	30	0	0	30
Intention to treat	ITT planned, but not executed	12	1	0	13
Intention to treat	No	112	11	0	123
Intention to treat	Unclear	4	1	22	27
Intention to treat	Yes	54	14	0	68
Masking of treatment status	Double blind	37	2	0	39
Masking of treatment status	Open label	70	8	22	100
Masking of treatment status	Single Blind	105	17	0	122
Adequacy of randomization	No	27	2	0	29
Adequacy of randomization	Not reported	32	1	22	55
Adequacy of randomization	Yes	153	24	0	177
Risk o bias	Unclear	2	0	0	2
Risk o bias	High	29	1	22	52
Risk o bias	Low	66	12	0	78
Risk o bias	Medium	115	14	0	129
Total	Total	212	27	22	261

Appendix Table F7. Sample size, proportion of women, and an average BMI in adults with knee OA participating in the studies of physical therapy interventions

Study	Category	Mean	Std Dev	Min	Max
Included in quantitative pooling analyses	BMI	29.2	2.7	24.0	34.8
Included in quantitative pooling analyses	% women	73.4	17.7	0.0	100.0
Included in quantitative pooling analyses	Mean age, years	64.4	5.4	47.5	85.0
Included in quantitative pooling analyses	Sample size	103.4	109.5	9.0	786.0
Included in quantitative pooling analyses	Treatment duration, weeks	15.4	23.3	0.3	104.0
Included in quantitative pooling analyses	Loss of followup, %	10.3	10.6	0.0	75.7
Included in qualitative analyses	BMI	29.6	1.8	27.5	34.8
Included in qualitative analyses	% women	70.9	18.5	7.0	100.0
Included in qualitative analyses	Mean age, years	66.3	4.9	51.6	74.5
Included in qualitative analyses	Sample size	274.6	548.3	27.0	2957.0
Included in qualitative analyses	Treatment duration, weeks	13.8	12.3	3.0	52.0
Included in qualitative analyses	Loss of followup, %	16.4	13.7	1.6	50.0
Included in quantitative analyses	BMI	27.9	2.7	23.6	32.1
Included in quantitative analyses	% women	71.8	21.1	14.3	100.0
Included in quantitative analyses	Mean age, years	62.7	5.7	48.4	71.0
Included in quantitative analyses	Sample size	75.9	57.2	14.0	252.0
Included in quantitative analyses	Treatment duration, weeks	11.2	8.6	2.0	36.0
Included in quantitative analyses	Loss of followup, %	16.2	11.2	0.0	32.6

Appendix Table F8. Risk of bias in therapeutic studies of physical therapy for adults with pain secondary to knee OA

Reference	Masking of the treatment status	Intention to treat	Adequacy of collocation concealment	Adequacy of randomization	Risk of bias
Adedoyin, 200 ¹⁵²	Single blind	No	No	Yes	High
Adedoyin, 2005 ¹⁵³	Single blind	No	Not reported	No	High
Aglamis, 2008 ¹⁵⁴	Single blind	No	Not reported	No	High
Aglamış, 2009 ⁴⁰	Open	No	Not reported	No	High
Akyol, 2010 ¹⁵⁵	Single blind	No ITT planned, all patients analyzed	Not reported	Yes	Low
Alcidi, 2007 ¹⁵⁶	Open	No	Not reported	Not reported	Medium
An, 2008 ¹⁵⁷	Open	No	Not reported	Yes	Medium
Aoki, 2009 ¹⁵⁸	Single blind	No ITT planned, all patients analyzed	Not reported	Yes	Low
Ay, 2009 ¹⁵⁹	Single blind	No ITT planned, all patients analyzed	Not reported	Yes	Low
Baker, 2001 ¹⁶⁰	Single blind	No	Yes	Yes	Medium
Baker, 2007 ¹⁶	Double blind	No	Yes	Yes	Medium
Balint, 2007 ¹⁶¹	Double blind	No	Not reported	Not reported	Medium
Bansil, 1975 ¹⁶²	Open	No	Not reported	Not reported	Medium
Barrios, 2009 ⁸⁵	Single blind	Yes	Not reported	Yes	Low
Bar-Ziv, 2010 ¹⁶³	Single blind	No	Not reported	Not reported	Medium
Battisti, 2004 ¹⁶⁴	Open	No ITT planned, all patients analyzed	Not reported	Yes	Low
Bautch, 1997 ¹⁶⁵	Open	No	Not reported	No	High
Bennell, 2011 ¹⁶⁶	Double blind	Yes	Yes	Yes	Low
Bennell, 2010 ¹⁶⁷	Single blind	Yes	Yes	Yes	Low
Bennell, 2005 ¹⁶⁸	Double blind	Yes	Yes	Yes	Low
Bezalel, 2011 ¹⁶⁹	Single blind	Yes	Not reported	No	Medium
Borjesson, 1996 ¹⁷⁰	Open	No	Not reported	Yes	Medium
Brismee, 2007 ¹⁷¹	Single blind	No	Not reported	Yes	Medium
Brouwer, 2006 ¹⁷²	Open	Yes	No	No	High
Bryk, 2011 ¹⁷³	Randomized order design	No	Not reported	Not reported	Medium
Burch, 2008 ¹⁷⁴	Single blind	No	Not reported	No	High
Callaghan, 2005 ¹⁷⁵	Double blind	No	Not reported	Yes	Medium
Callaghan, 1995 ¹⁷⁶	Single blind	No	Not reported	Not reported	Medium
Cantarini, 2007 ¹⁷⁷	Single blind	No ITT planned, all patients analyzed	Not reported	Yes	Low
Cetin, 2008 ¹⁷⁸	Single blind	No	Not reported	Yes	Medium
Chaipinyo, 2009 ¹⁷⁹	Single blind	No	Not reported	Yes	Medium
Chamberlain, 1982 ¹⁸⁰	Single blind	No	Not reported	No	High
Cheing, 2002 ¹⁸¹	Open	No	Not reported	Yes	Medium
Cheing, 2004 ¹⁸²	Open	No	Not reported	No	High

Appendix Table F8. Risk of bias in therapeutic studies of physical therapy for adults with pain secondary to knee OA (continued)

Reference	Masking of the treatment status	Intention to treat	Adequacy of collocation concealment	Adequacy of randomization	Risk of bias
Cheing, 2003 ¹⁸³	Open	No	Not reported	Yes	Medium
Chen, 2011 ¹⁸⁴	Double blind	ITT planned, but not executed	Yes	No	High
Chuang, 2007 ¹⁸⁵	Open	No ITT planned, all patients analyzed	Not reported	Yes	Low
Cushnaghan, 1994 ¹⁸⁶	Single blind	No ITT planned, all patients analyzed	Not reported	Not reported	Low
Defrin, 2005 ¹⁸⁷	Single blind	No ITT planned, all patients analyzed	Not reported	No	Medium
Denegar, 2010 ¹⁸⁸	Randomized order design	No	Not reported	Yes	Medium
Deyle, 2000 ¹⁸⁹	Single blind	No	Yes	Yes	Medium
Deyle, 2005 ¹⁹⁰	Single blind	No	Yes	Yes	Medium
Diracoglu, 2005 ¹⁹¹	Single blind	No	Not reported	Yes	Medium
Doi, 2008 ¹⁹²	Open	No	Not reported	Yes	Medium
Durmuş, 2007 ¹⁹³	Open	No ITT planned, all patients analyzed	Not reported	Yes	Low
Erhart, 2010 ¹⁹⁴	Single blind	No	Not reported	Yes	Medium
Ettinger, 1997 ¹⁹⁵	Single blind	Yes	Yes	Yes	Low
Eyigor, 2004 ¹⁹⁶	Single blind	No	Not reported	Yes	Medium
Falconer, 1992 ¹⁹⁷	Single blind	No	Not reported	Yes	Medium
Fargas-Babjak, 1989 ¹⁹⁸	Double blind	No	Not reported	Not reported	Medium
Farr, 2010 ¹⁹⁹	Open	No	No	Yes	High
Fary, 2011 ¹⁹⁹	Double blind	Yes	Not reported	No	Medium
Fioravanti, 2010 ²⁰⁰	Single blind	Yes	Not reported	Yes	Low
Fitzgerald, 2011 ²⁰¹	Single blind	Yes	Yes	No	Medium
Forestier, 2009 ²⁰²	Open	ITT planned, but not executed	Yes	Yes	Medium
Foroughi, 2011 ²⁰³	Single blind	No	Not reported	Yes	Medium
Fransen, 2001 ²⁰⁴	Single blind	Yes	Yes	Yes	Low
French, 2010 ⁴⁹	Single blind	No	Not reported	Not reported	Medium
Fukuda, 2011 ²⁰⁵	Single blind	No	Yes	Yes	Medium
Gaines, 2004 ²⁰⁶	Open	No	Not reported	No	High
Garland, 2007 ²⁰⁷	Double blind	Yes	Not reported	Yes	Low
Giombini, 2011 ²⁰⁸	Double blind	Yes	Yes	Yes	Low
Gordon, 1998 ²⁰⁹	Single blind	No	Not reported	Yes	Medium
Gremion, 2009 ²¹⁰	Double blind	No	Not reported	Yes	Medium
Grimmer, 1992 ²¹¹	Double blind	No	Not reported	Not reported	Medium
Gür, 2002 ²¹²	Open	No ITT planned, all patients analyzed	Not reported	Yes	Low
Hassan, 2001 ²¹³	Open	No	Not reported	Not reported	Medium
Hay, 2006 ²¹⁴	Single blind	ITT planned, but not executed	Yes	Yes	Medium
Hinman, 2003 ²¹⁵	Single blind	Yes	Yes	Yes	Low
Hinman, 2008 ²¹⁶	Randomized order design	No	Not reported	Not reported	Medium
Hinman, 200 ²¹⁷	Double blind	No	Not reported	Yes	Medium

Appendix Table F8. Risk of bias in therapeutic studies of physical therapy for adults with pain secondary to knee OA (continued)

Reference	Masking of the treatment status	Intention to treat	Adequacy of collocation concealment	Adequacy of randomization	Risk of bias
Hinman, 2009 ²¹⁸	Randomized order design	No	No	Not reported	High
Hinman, 2003 ²¹⁹	Randomized order design	No	Not reported	Not reported	Medium
Horlick, 1993 ²²⁰	Open	No	Not reported	Not reported	Medium
Huang, 2003 ²²¹	Open	No	Yes	Not reported	Medium
Huang, 2005 ²²²	Single blind	No	Yes	Not reported	Medium
Huang, 2005 ²²³	Single blind	No	Yes	Not reported	Medium
Itoh, 2008 ²²⁴	Open	No	Not reported	Yes	Medium
Jacobson, 2001 ²²⁵	Double blind	No	Not reported	Not reported	Medium
Jan, 2009 ²²⁶	Single blind	Yes	Not reported	Yes	Low
Jan, 2008 ²²⁷	Single blind	ITT planned, but not executed	Not reported	Yes	Medium
Jan, 2008 ²²⁸	Single blind	No	Not reported	Yes	Medium
Jensen, 1991 ²²⁹	Open	No ITT planned, all patients analyzed	Not reported	Yes	Low
Jessep, 2009 ²³⁰	Single blind	Yes	Yes	Yes	Low
Kang, 2007 ²³¹	Single blind	No	Not reported	Yes	Medium
Karagülle, 2007 ²³²	Single blind	Yes	Not reported	Yes	Low
Keefe, 2004 ²³³	Open	No	Not reported	Yes	Medium
Kerrigan, 2002 ²³⁴	Randomized order design	Unclear	Not reported	Not reported	Not applicable
Kirkley, 1999 ⁸⁶	Open	No	Not reported	Yes	Medium
Kitay, 2009 ²³⁵	Single blind	No	Yes	Yes	Medium
Ko, 2009 ²³⁶	Open	No ITT planned, all patients analyzed	Not reported	Yes	Low
Kovacs, 2002 ²³⁷	Double blind	No	Yes	Not reported	Medium
Kovar, 1992 ²³⁸	Open	No	Not reported	Yes	Medium
Kreindler, 1989 ²³⁹	Open	No ITT planned, all patients analyzed	No	Yes	Medium
Kuptniratsaikul, 2002 ²⁴⁰	Open	No	Not reported	Yes	Medium
Kuroyanagi, 2007 ²⁴¹	Randomized order design	Unclear	Not reported	Not reported	Not applicable
Laufer, 2005 ²⁴²	Double blind	No	No	Yes	High
Law, 2004 ²⁴³	Double blind	No	No	Yes	High
Law, 2004 ²⁴⁴	Double blind	No	No	Yes	High
Lee, 2009 ²⁴⁵	Single blind	Yes	Not reported	Yes	Low
Lim, 2008 ²⁰	Single blind	Yes	Not reported	Yes	Low
Lim, 2002 ²⁴⁶	Open	No	Not reported	Yes	Medium
Lin, 2009 ²⁴⁷	Single blind	Yes	No	Yes	Medium
Lin, 2007 ²⁴⁸	Single blind	No	Not reported	Yes	Medium
Loyola-Sánchez, 2012 ²⁴⁹	Double blind	ITT planned, but not executed (for secondary outcomes)	Yes	Not reported	Medium
Lund, 2008 ²⁵⁰	Single blind	Yes	Yes	No	Medium

Appendix Table F8. Risk of bias in therapeutic studies of physical therapy for adults with pain secondary to knee OA (continued)

Reference	Masking of the treatment status	Intention to treat	Adequacy of collocation concealment	Adequacy of randomization	Risk of bias
Lund, 2009 ²⁵¹	Single blind	No ITT planned, all patients analyzed	Not reported	Yes	Low
Maillefert, 2001 ²⁵²	Open	Yes	Not reported	Yes	Low
Maly, 2002 ²⁵³	Randomized order design	No ITT planned, all patients analyzed	Not reported	Not reported	Low
Mangani, 2006 ²⁵⁴	Single blind	No	Yes	Yes	Medium
Mangione, 1999 ²⁵⁵	Open	No	Not reported	Yes	Medium
Maurer, 1999 ²⁵⁶	Single blind	No	Not reported	Yes	Medium
Mazzuca, 2004 ²⁵⁷	Double blind	No	Not reported	Yes	Medium
McCarthy, 2004 ²⁵⁸	Single blind	Yes	Yes	Yes	Low
McKnight, 2010 ⁹	Open	Yes	Not reported	Yes	Low
Mikesky, 2006 ²⁵⁹	Single blind	No	Not reported	Yes	Medium
Moss, 2007 ²⁶⁰	Double blind	No	Not reported	Yes	Medium
Ng, 2003 ²⁶¹	Single blind	No ITT planned, all patients analyzed	Not reported	Yes	Low
Nguyen, 1997 ²⁶²	Single blind	No	Not reported	Yes	Medium
Ni, 2010 ²⁶³	Single blind	No	Yes	Yes	Medium
Nicolakis, 2002 ²⁶⁴	Double blind	No	Yes	Yes	Medium
Nigg, 2006 ²⁶⁵	Single blind	No	Not reported	Yes	Medium
Odabasi, 2008 ²⁶⁶	Single blind	Yes	Not reported	Yes	Low
Oldham, 1995 ²⁶⁷	Double blind	No	Not reported	Not reported	Medium
O'Reilly, 1999 ²⁶⁸	Open	No	No	Yes	High
Ozdincler, 2005 ²⁶⁹	Open	No	Not reported	Not reported	Medium
Özgönenel, 2009 ²⁷⁰	Double blind	No ITT planned, all patients analyzed	Not reported	Yes	Low
Ozgüçlü, 2010 ²⁷¹	Double blind	No ITT planned, all patients analyzed	Not reported	Yes	Low
Pajareya, 2003 ²⁷²	Single blind	ITT planned, but not executed	Yes	Yes	Medium
Palmieri-Smith, 2010 ¹⁵	Open	Yes	Yes	Yes	Low
Patrick, 2001 ²⁷³	Open	No	Not reported	Yes	Medium
Péloquin 1999 ²⁷⁴	Single blind	No	Yes	No	High
Perlman, 2006 ¹⁹	Open	Yes	Not reported	No	Medium
Petrella, 2000 ²⁷⁵	Double blind	Yes	Not reported	Yes	Low
Pietrosimone, 2009 ²⁷⁶	Single blind	No	No	Yes	High
Pietrosimone, 2010 ²⁷⁷	Single blind	Unclear	Not reported	Yes	Low
Pipitone, 2001 ²⁷⁸	Double blind	Yes	Yes	No	Medium
Pisters, 2010 ³	Single blind	ITT planned, but not executed	Not reported	Yes	Medium
Pollard, 2008 ²⁷⁹	Open	No ITT planned, all patients analyzed	Not reported	Yes	Low
Rattanachaiyanont, 2008 ⁸	Double blind	Yes	Yes	No	Medium
Ravaud, 2009 ¹²	Open	Yes	Not reported	No	Medium

Appendix Table F8. Risk of bias in therapeutic studies of physical therapy for adults with pain secondary to knee OA (continued)

Reference	Masking of the treatment status	Intention to treat	Adequacy of collocation concealment	Adequacy of randomization	Risk of bias
Rejeski, 2002 ²⁸⁰	Single blind	ITT planned, but not executed	Yes	Yes	Low
Richards, 2005 ²⁸¹	Open	No	Not reported	Not reported	Medium
Rodrigues, 2008 ²¹	Single blind	No ITT planned, all patients analyzed	Not reported	Yes	Low
Røgind, 1998 ²⁸²	Single blind	No	Not reported	Yes	Medium
Rooks, 2006 ²⁸³	Single blind	ITT planned, but not executed	Not reported	Yes	Medium
Sayers, 2012 ²⁸⁴	Single blind	ITT planned, but not executed	Not reported	Yes	Medium
Schilke, 1996 ²⁸⁵	Open	No	Not reported	Yes	Medium
Segal, 2009 ²⁸⁶	Single blind	No	Not reported	Yes	Medium
Selfe, 2008 ²⁸⁷	Single blind	unclear	Yes	Yes	Low
Shakoor, 2007 ²⁸⁸	Open	No ITT planned, all patients analyzed	Not reported	Yes	Low
Sherman, 2009 ²⁸⁹	Single blind	No	Not reported	Yes	Medium
Silva, 2008 ²⁹⁰	Single blind	Yes	Not reported	Yes	Low
Smith, 1983 ¹⁰¹	Single blind	No	No	Not reported	High
Song, 2003 ²⁹¹	Single blind	No	Yes	Yes	Medium
Song, 2010 ²⁹²	Single blind	No	Not reported	Yes	Medium
Swank, 2011 ²⁹³	Open	No	No	Yes	High
Talbot, 2003 ²⁹⁴	Open	No	Yes	No	High
Talbot, 2003 ²⁹⁵	Open	No	Not reported	Yes	Medium
Tascioglu, 2010 ²⁹⁶	Double blind	No	Not reported	Yes	Medium
Taylor 1981 ²⁹⁷	Double blind	No	Not reported	Not reported	Medium
Thamsborg, 2005 ²⁹⁸	Double blind	Yes	Not reported	Yes	Low
Thomas, 2002 ²⁹⁹	Single blind	Yes	Not reported	Yes	Low
Thorstensson, 2005 ³⁰⁰	Open	No	No	Yes	High
Tishler, 2004 ³⁰¹	Single blind	No	Not reported	Yes	Medium
Toda, 2004 ³⁰²	Open	No ITT planned, all patients analyzed	No	Yes	Medium
Toda, 2005 ³⁰³	Open	No ITT planned, all patients analyzed	No	Yes	High
Toda, 2001 ³⁰⁴	Open	No ITT planned, all patients analyzed	No	Yes	Medium
Toda, 2008 ³⁰⁵	Single blind	Yes	No	Yes	Medium
Toda, 2002 ³⁰⁶	Open	No ITT planned, all patients analyzed	No	Yes	Medium
Toda, 2004 ³⁰⁷	Open	No	No	Yes	High
Toda, 2006 ³⁰⁸	Open	No	No	Yes	High
Tok, 2009 ³⁰⁹	Open	No ITT planned, all patients analyzed	Not reported	Yes	Low
Topp, 2002 ³¹⁰	Open	No ITT planned, all patients analyzed	Not reported	Yes	Low
Trans, 2009 ³¹¹	Single blind	Yes	Not reported	Yes	Low
Trock, 1994 ³¹²	Double blind	No	Yes	Yes	Medium
Tsauo, 2008 ³¹³	Single blind	No	Not reported	No	High
Tüzün, 2004 ³¹⁴	Open	No ITT planned, all patients analyzed	Not reported	Yes	Low
van Raaij, 2010 ³¹⁵	Open	Yes	Not reported	Yes	Low

Appendix Table F8. Risk of bias in therapeutic studies of physical therapy for adults with pain secondary to knee OA (continued)

Reference	Masking of the treatment status	Intention to treat	Adequacy of collocation concealment	Adequacy of randomization	Risk of bias
Victor, 2005 ³¹⁶	Single blind	No	Not reported	Not reported	Medium
Wang, 2009 ³¹⁷	Single blind	Yes	Yes	Not reported	Low
Weiner, 2007 ³¹⁸	Single blind	Yes	Not reported	Yes	Low
Weng, 2009 ³¹⁹	Single blind	ITT planned, but not executed	Yes	Yes	Medium
Williamson, 2007 ³²⁰	Single blind	Yes	Yes	Yes	Low
Wolsko, 2004 ³²¹	Double blind	No ITT planned, all patients analyzed	Yes	No	Medium
Wyatt, 2001 ³²²	Single blind	No	Not reported	Not reported	Medium
Yilmaz, 2000 ³²³	Open	No	Not reported	Yes	Medium
Yip, 2007 ³²⁴	Open	Yes	Not reported	Yes	Low
Yip, 2008 ³²⁵	Double blind	No	No	Yes	High
Yip, 2008 ³²⁶	Open	ITT planned, but not executed	Not reported	Yes	Medium
Yurtkuran, 1999 ³²⁷	Single blind	No ITT planned, all patients analyzed	Not reported	Yes	Low
Yurtkuran, 2006 ³²⁸	Double blind	No	Not reported	Yes	Medium
Zizic, 1995 ³²⁹	Double blind	No	Not reported	Yes	Medium

Appendix Table F9. Characteristics of included subjects in the studies of physical therapy interventions

Study characteristics	Category	Included in quantitative pooling analyses	Included in qualitative analyses	Included in quantitative analyses	Total
Country	USA	67	8	3	78
Country	UK	18	4	3	25
Country	Turkey	20	0	3	23
Country	Taiwan	10	0	2	12
Country	Japan	11	0	4	15
Country	Canada	8	0	2	10
Country	Australia	15	5	2	22
Country	Other	63	10	3	76
Recruitment	Clinic	174	17	14	205
Recruitment	Clinic plus community	1	0	0	1
Recruitment	Community	27	8	5	40
Recruitment	Not reported	10	2	3	15
OA severity definition	ACR class	0	1	0	1
OA severity definition	AIMS	0	1	0	1
OA severity definition	Aeckle index	1	0	0	1
OA severity definition	Ahlback	2	0	0	2
OA severity definition	Altman Grade II	4	0	1	5
OA severity definition	American Rheumatism Association class	0	1	0	1
OA severity definition	Global assessment joint	0	1	0	1
OA severity definition	Grade of OA	3	0	0	3
OA severity definition	Kellgren and Lawrence	76	4	8	88
OA severity definition	Lequesne's functional index	1	0	0	1
OA severity definition	Not reported	117	17	10	144
OA severity definition	Number of tender joints	0	1	0	1
OA severity definition	OARSI–Medial JSN Grade	1	0	0	1
OA severity definition	Radiographs	3	0	2	5
OA severity definition	Severe score defined by the authors	1	0	0	1
OA severity definition	Steinbrocker	1	0	0	1
OA severity definition	VAS	1	0	0	1
OA severity definition	WOMAC	1	1	1	3
Activity level	% with sedentary lifestyle	5	1	0	6
Activity level	% disability	6	0	0	6
Activity level	Not reported	201	26	22	249
Baseline disability	Not reported	211	27	22	260
% with baseline disability	Total	212	27	22	261
Comorbidity	Chronic condition	11	12	2	25
Comorbidity	Chronic condition+other OA	10	0	0	10
Comorbidity	Not reported	190	15	20	225
Comorbidity	Other OA	1	0	0	1
Occupation	% by type	8	1	0	9
Occupation	Not reported	204	26	22	252

Appendix Table F9. Characteristics of included subjects in the studies of physical therapy interventions (continued)

Study characteristics	Category	Included in quantitative pooling analyses	Included in qualitative analyses	Included in quantitative analyses	Total
Concomitant drugs	Not reported	94	15	19	128
Concomitant drugs	NO	18	0	0	18
Concomitant drugs	YES	100	12	3	115
Prior surgery	Not reported	185	25	22	232
Prior surgery	NO	20	1	0	21
Prior surgery	YES	7	1	0	8
Prior surgery	Total	212	27	22	261
Prior OA treatments	Not reported	204	22	22	248
Prior OA treatments	No surgery or PT	4	0	0	4
Prior OA treatments	No surgery or injection	3	0	0	3
Prior OA treatments	OA conservative treatment	1	4	0	5
Prior OA treatments	Joint replacement	0	1	0	1
PT involvement	NO	50	9	8	67
PT involvement	Unclear	87	2	2	91
PT involvement	YES	75	16	12	103
PT involvement	Total	212	27	22	261

Appendix Table F10. Sample size and intensity of examined physical therapy interventions

Physical therapy interventions	N studies	Size-Mean	Size-Standard deviation	Size-Sum	N studies with reported intensity	Intensity/Week mean
ED	9	316.0	467.0	2844	7	1.9
Exercise ED	10	221.7	215.6	2217	5	0.9
Exercise NS	3	288.0	87.0	864	3	3.3
Exercise aerobic	26	147.0	152.3	3821	22	2.6
Exercise aerobic +ED	2	96.0	82.0	192	2	3.0
Exercise aquatic	10	120.0	107.2	1200	10	2.4
Exercise balance	2	57.0	12.7	114	2	4.0
Exercise proprioception	5	74.6	33.1	373	5	3.0
Exercise strength	32	138.0	267.1	4417	28	3.1
Exercise strength + ED	1	1440.0	0.0	1440	1	4.0
Exercise stretching	1	36.0	0.0	36	1	7.0
Exercise vibration	1	35.0	0.0	35	1	2.0
Tai Chi	6	68.0	21.8	408	6	2.5
Massage	4	45.0	15.4	180	3	2.3
Manual contact	1	76.0	0.0	76		0.0
Joint mobilization	2	59.5	23.3	119	1	3.0
Joint mobilization + exercise	1	134.0	0.0	134	1	2.0
Brace	8	81.3	42.2	650	2	7.0
Orthotics	13	72.0	40.2	936	6	7.0
Lateral wedge vs. neutral wedge	4	119.3	74.5	477	2	7.0
Taping	3	40.7	15.5	122	1	4.0
Taping + massage + exercise	1	140.0	0.0	140	1	1.0
Estim	30	38.8	16.5	1086	26	4.0
Estim bone	1	88.0	0.0	88	1	1.0
Estim + exercise	2	35.0	0.0	70	2	5.0
PEMF	9	71.0	44.9	639	9	4.9
Magnet therapy	4	62.0	45.8	248	3	7.0
US	7	75.7	44.9	454	6	3.7
US + HEAT	1	40.0	0.0	40	1	3.0
Diathermy	10	56.3	24.0	563	10	3.2
Pack	1	60.0	0.0	60	1	5.0
Cold	2	45.5	31.8	91	1	5.0
Heat	3	53.3	14.0	160	3	5.0
Heat+cold	1	68.0	0.0	68	1	5.0
Heat + vibration	1	71.0	0.0	71	1	7.0
Ice massage	1	50.0	0.0	50	1	5.0
Balneotherapy	12	97.3	119.3	1168	12	4.3
Therapeutic touch	1	31.0	0.0	31	1	1.0
Education vs. education	1	344.0	0.0	344	1	0.3

Appendix Table F10. Sample size and intensity of examined physical therapy interventions (continued)

Physical therapy interventions	N studies	Size-Mean	Size-Standard deviation	Size-Sum	N studies with reported intensity	Intensity/Week mean
Exercise aerobic vs. ED	1	162.0	0.0	162	1	3.0
Exercise aerobic vs. aerobic	4	103.8	62.5	415	3	2.7
Exercise aerobic vs. education	2	113.5	112.4	227	2	3.0
Exercise aerobic vs. strength	3	213.3	132.8	640	3	4.3
Exercise aquatic or aerobic vs. ROM	1	68.0	0.0	68	1	3.0
Exercise aquatic vs. aerobic	4	65.5	15.0	262	4	2.8
Exercise aquatic vs. strength	1	54.0	0.0	54	1	2.0
Exercise aquatic vs. tai chi	1	111.0	0.0	111	1	2.0
Exercise proprioception vs. proprioception	1	59.0	0.0	59	1	3.0
Exercise proprioception vs. strength	1	72.0	0.0	72	1	3.0
Exercise strength vs. education	2	847.5	946.8	1695		0.0
Exercise strength vs. strength	21	86.9	62.5	1825	17	3.2
Tai chi vs. stretching	2	37.5	3.5	75	2	2.0
Brace vs. brace	3	47.7	28.3	143	1	7.0
Orthotics vs. brace	1	91.0	0.0	91	1	7.0
Orthotics vs. orthotics	16	70.3	45.9	1124	8	7.0
Estim vs. US	2	50.0	14.1	100	2	3.0
estim vs. diathermy	2	50.0	14.1	100	2	3.0
Estim vs. education	1	68.0	0.0	68	1	3.0
Estim vs. Estim	3	60.0	42.7	180	2	4.5
Estim vs. exercise	3	37.3	11.0	112	3	5.0
Estim vs. massage	1	50.0	0.0	50	1	5.0
Estim vs. EMF	1	40.0	0.0	40	1	5.0
Estim vs. Cryotherapy	1	22.0	0.0	22		0.0
Pulsed Signal Therapy vs. massage	1	95.0	0.0	95	1	5.0
Magnet therapy vs. magnet therapy	1	129.0	0.0	129	1	7.0
US vs. US	2	90.0	42.4	180	2	4.0
Diathermy + exercise vs. US	1	46.0	0.0	46	1	4.0
Diathermy vs. US	4	62.3	26.5	249	3	3.3
Diathermy vs. US + exercise	1	48.0	0.0	48	1	4.0
Diathermy vs. balneotherapy	1	54.0	0.0	54	1	5.0
Diathermy vs. diathermy	3	49.3	25.4	148	3	3.0
Diathermy vs. exercise	1	50.0	0.0	50	1	1.0

Table F11. Actual measurement and frequency of outcomes-disability, pain, quality of life, and composite function in the pooled analyses

Disability	%	Pain	%	QOL	%	Function composite	%
WOMAC Total	30	VAS	40.8	QWB	25	WOMAC physical function	49.3
KOOS: Daily activities subscale	12	WOMAC pain	28	SF-36	25	Lequesne's index	37.3
AIMS	16	Borg Scale	0.8	KOOS	50	KOOS: Symptoms subscale	9.0
ASE, self-efficacy	4	Pain rating index	4.8			Lift and carry task, s (timed lifting, picking-up, and carrying a 10-pound weight)	3.0
SF-36 Physical function	16	OASI pain	0.8			Functional performance (s)	1.5
HAQ disability	12	Pain intensity score	1.6				
AIMS2 Family/friend	2	AIMS Arthritis pain	7.2				
Self-report of physical disability	4	AIMS2-Pain Subscale	1.6				
Functional incapacity score, (modified Bandi's criteria)	2	Numeric Pain Rating Scale	1.6				
Fear of falling	2	HAQ pain (Health Assessment Questionnaire)	0.8				
		Ambulation intensity (1=no pain to 6=excruciating pain)	4.8				
		Pain VAS, Lattinen test score, and ROM, unspecified	0.8				
		Subjective pain	6.4				

WOMAC: Western Ontario and McMaster University Osteoarthritis Index

KOOS: Knee Injury and Osteoarthritis Score

AIMS: Arthritis Impact Measure Scale

ASE: Arthritis Self-Efficacy Scale

HAQ: Health Assessment Questionnaire

VAS: Visual analogue scale

OASI: Osteoarthritis Screening Index

QWB: Quality of Well-Being Scale.

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Diathermy	Disability	Low	Akyol, 2010 ¹⁵⁵ 4 weeks 20/20	-52.75 \pm 25.10- 46.00 \pm 21.92	-0.29 (-0.91; 0.34)	13.0	-0.28 (-0.90; 0.34)	12.9
Diathermy	Disability	Medium	Callaghan, 2005 ¹⁷⁵ 10/10	5.10 \pm 2.30 5.10 \pm 1.70	0.00 (-0.88; 0.88)	7.0	0.00 (-0.88; 0.88)	6.9
Diathermy	Disability	Medium	Callaghan, 2005 ¹⁷⁵ 2 weeks 10/10	5.50 \pm 3.00 5.10 \pm 1.70	0.16 (-0.71; 1.04)	7.0	0.16 (-0.72; 1.04)	6.8
Diathermy	Disability	Medium	Fukuda, 2011 ²⁰⁵ 3 weeks 31/23	-63.20 \pm 16.50 -51.50 \pm 17.50	-0.69 (-1.25; -0.14)	15.8	-0.68 (-1.24; -0.13)	15.8
Diathermy	Disability	Medium	Fukuda, 2011 ²⁰⁵ 3 weeks 32/23	-61.50 \pm 20.30 -51.50 \pm 17.50	-0.52 (-1.07; 0.02)	16.4	-0.51 (-1.06; 0.03)	16.4
Diathermy	Disability	High	Laufer, 2005 ²⁴² 3 weeks 32/33	4.40 \pm 3.44 4.63 \pm 3.54	-0.07 (-0.55; 0.42)	19.7	-0.07 (-0.55; 0.42)	19.9
Diathermy	Disability	High	Laufer, 2005 ²⁴² 3 weeks 38/33	4.93 \pm 3.63 4.63 \pm 3.54	0.08 (-0.38; 0.55)	21.1	0.08 (-0.38; 0.55)	21.3
		Studies: 4; Subjects: 259			-0.22 (-0.46, 0.03)	I-squared=0.14, p-value=0.32	-0.21 (-0.45, 0.02)	I-squared=0.11, p-value=0.35
Diathermy	Disability	Low	Akyol, 2010 ¹⁵⁵ 6 weeks 20/20	-51.75 \pm 29.74 -44.00 \pm 23.26	-0.29 (-0.91; 0.33)	22.6	-0.28 (-0.91; 0.34)	22.6
Diathermy	Disability	High	Laufer, 2005 ²⁴² 6 weeks 32/33	4.56 \pm 3.31 4.60 \pm 3.58	-0.01 (-0.50; 0.47)	37.1	-0.01 (-0.50; 0.47)	37.1
Diathermy	Disability	High	Laufer, 2005 ²⁴² 6 weeks 38/33	4.82 \pm 3.71 4.60 \pm 3.58	0.06 (-0.41; 0.53)	40.3	0.06 (-0.41; 0.53)	40.3

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
		Studies: 2; Subjects: 143			-0.05 (-0.34, 0.25)	I-squared=0, p=0.67	-0.04 (-0.34, 0.25)	I-squared=0, p=0.68
Diathermy	Pain	Low	Akyol, 2010 ¹⁵⁵ 4 weeks 20/20	3.30 \pm 2.00 4.25 \pm 1.77	-0.50 (-1.13; 0.13)	14.5	-0.49 (-1.12; 0.14)	14.5
Diathermy	Pain	Medium	Callaghan, 2005 ¹⁷⁵ 2 weeks 10/10	5.50 \pm 2.70 6.30 \pm 1.90	-0.34 (-1.23; 0.54)	11.2	-0.33 (-1.21; 0.56)	11.1
Diathermy	Pain	Medium	Callaghan, 2005 ¹⁷⁵ 2 weeks 10/10	5.00 \pm 3.20 6.30 \pm 1.90	-0.49 (-1.39; 0.40)	11.1	-0.47 (-1.36; 0.42)	11.0
Diathermy	Pain	Medium	Fukuda, 2011 ²⁰⁵ 3 weeks 31/23	4.60 \pm 2.50 6.90 \pm 2.00	-1.00 (-1.57; -0.43)	15.3	-0.98 (-1.56; -0.41)	15.3
Diathermy	Pain	Medium	Fukuda, 2011 ²⁰⁵ 3 weeks 32/23	3.80 \pm 2.20 6.90 \pm 2.00	-1.46 (-2.07; -0.86)	14.8	-1.44 (-2.05; -0.84)	14.8
Diathermy	Pain	High	Laufer, 2005 ²⁴² 3 weeks 32/33	4.03 \pm 3.30 4.44 \pm 3.51	-0.12 (-0.61; 0.37)	16.4	-0.12 (-0.61; 0.37)	16.5
Diathermy	Pain	High	Laufer, 2005 ²⁴² 3 weeks 38/33	4.73 \pm 3.48 4.44 \pm 3.51	0.08 (-0.38; 0.55)	16.7	0.08 (-0.38; 0.55)	16.8
		Studies: 4; Subjects: 259			-0.54 (-0.98, -0.10)	I-squared=0.72, p-value=0.002	-0.53 (-0.96, -0.10)	I-squared=0.71, p-value=0.002
Diathermy	Pain	Low	Akyol, 2010 ¹⁵⁵ 6 weeks 20/20	4.65 \pm 3.67 4.35 \pm 2.54	0.10 (-0.53; 0.72)	18.5	0.09 (-0.53; 0.71)	18.5
Diathermy	Pain	Medium	Cetin, 2008 ¹⁷⁸ 8 weeks 20/20	3.36 \pm 1.33 3.49 \pm 1.28	-0.10 (-0.72; 0.52)	18.5	-0.10 (-0.72; 0.52)	18.5
Diathermy	Pain	High	Laufer, 2005 ²⁴² 6 weeks 32/33	4.09 \pm 3.49 4.33 \pm 3.69	-0.07 (-0.55; 0.42)	30.1	-0.07 (-0.55; 0.42)	30.1

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Diathermy	Pain	High	Laufer, 2005 ²⁴² 6 weeks 38/33	4.48 \pm 3.58 4.33 \pm 3.69	0.04 (-0.43; 0.51)	32.8	0.04 (-0.43; 0.51)	32.8
		Studies: 3; Subjects: 183			-0.01 (-0.27, 0.26)	I-squared=0, p-value=0.96	-0.01 (-0.27, 0.26)	I-squared=0, p-value=0.96
Diathermy	Function composite	Low	Akyol, 2010 ¹⁵⁵ 4 weeks 20/20	21.60 \pm 6.55 24.55 \pm 11.24	-0.25 (-0.87; 0.37)	18.6	-0.24 (-0.87; 0.38)	18.6
Diathermy	Function composite	Medium	Fukuda, 2011 ²⁰⁵ 3 weeks 31/23	-62.70 \pm -18.60 -44.80 \pm -16.30	-1.01 (-1.59; -0.44)	19.5	-1.00 (-1.57; -0.42)	19.5
Diathermy	Function composite	Medium	Fukuda, 2011 ²⁰⁵ 3 weeks 32/23	-66.50 \pm -20.30 -44.80 \pm -16.30	-1.16 (-1.74; -0.58)	19.4	-1.14 (-1.72; -0.56)	19.4
Diathermy	Function composite	High	Laufer, 2005 ²⁴² 3 weeks 32/33	4.61 \pm 3.43 4.89 \pm 3.44	-0.08 (-0.57; 0.40)	21.1	-0.08 (-0.57; 0.41)	21.1
Diathermy	Function composite	High	Laufer, 2005 ²⁴² 3 weeks 38/33	5.06 \pm 3.54 4.89 \pm 3.44	0.05 (-0.42; 0.52)	21.4	0.05 (-0.42; 0.51)	21.5
		Studies: 3; Subjects: 229			-0.48 (-0.96, 0.01)	I-squared=0.76, p-value=0.003	-0.47 (-0.95, 0.02)	I-squared=0.75, p-value=0.003
Diathermy	Function composite	Low	Akyol, 2010 ¹⁵⁵ 6 weeks 20/20	24.10 \pm 17.61 24.30 \pm 14.39	-0.01 (-0.63; 0.61)	18.6	-0.01 (-0.63; 0.61)	18.6
Diathermy	Function composite	Medium	Cetin, 2008 ¹⁷⁸ 8 weeks 20/20	6.81 \pm 2.69 6.87 \pm 2.58	-0.02 (-0.64; 0.60)	18.6	-0.02 (-0.64; 0.60)	18.6
Diathermy	Function composite	High	Laufer, 2005 ²⁴² 6 weeks 32/33	4.80 \pm 3.25 4.82 \pm 3.42	-0.01 (-0.49; 0.48)	30.1	-0.01 (-0.49; 0.48)	30.1
Diathermy	Function composite	High	Laufer, 2005 ²⁴² 6 weeks 38/33	4.98 \pm 3.61 4.82 \pm 3.42	0.05 (-0.42; 0.51)	32.8	0.04 (-0.42; 0.51)	32.8
		Studies: 3; Subjects: 183			0.01 (-0.26, 0.27)	I-squared=0, p-value=1	0.01 (-0.26, 0.27)	I-squared=0, p-value=1

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Diathermy	Function joint	Low	Akyol, 2010 ¹⁵⁵ 4 weeks 20/20	1.80 \pm 1.73 2.05 \pm 1.27	-0.16 (-0.79; 0.46)	23.2	-0.16 (-0.78; 0.46)	22.9
Diathermy	Function joint	High	Laufer, 2005 ²⁴² 3 weeks 32/33	3.69 \pm 3.79 2.98 \pm 3.26	0.20 (-0.29; 0.69)	37.2	0.20 (-0.29; 0.69)	37.2
Diathermy	Function joint	High	Laufer, 2005 ²⁴² 3 weeks 38/33	4.39 \pm 3.66 2.98 \pm 3.26	0.41 (-0.07; 0.88)	39.7	0.40 (-0.07; 0.87)	39.8
		Studies: 2; Subjects: 143			0.20 (-0.10, 0.50)	I-squared=0.03, p=0.36	0.20 (-0.10, 0.49)	I-squared=0, p=0.37
Diathermy	Function joint	Low	Akyol, 2010 ¹⁵⁵ 6 weeks 20/20	2.15 \pm 1.75 1.80 \pm 1.19	0.23 (-0.39; 0.86)	22.7	0.23 (-0.39; 0.85)	22.7
Diathermy	Function joint	High	Laufer, 2005 ²⁴² 6 weeks 32/33	3.81 \pm 3.28 3.60 \pm 3.78	0.06 (-0.43; 0.55)	37.1	0.06 (-0.43; 0.54)	37.1
Diathermy	Function joint	High	Laufer, 2005 ²⁴² 6 weeks 38/33	4.43 \pm 3.85 3.60 \pm 3.78	0.22 (-0.25; 0.69)	40.2	0.22 (-0.25; 0.68)	40.2
		Studies: 2; Subjects: 143			0.16 (-0.13, 0.46)	I-squared=0, p=0.87	0.16 (-0.14, 0.46)	I-squared=0, p=0.88
Diathermy	Gait function	Low	Akyol, 2010 ¹⁵⁵ 4 weeks 20/20	-469.7 \pm 115.8 -460.7 \pm 81.0	-0.09 (-0.71; 0.53)	18.6	-0.09 (-0.71; 0.53)	18.6
Diathermy	Gait function	Medium	Callaghan, 2005 ¹⁷⁵ 2 weeks 10/10	13.30 \pm 2.80 13.90 \pm 3.60	-0.19 (-1.06; 0.69)	9.3	-0.18 (-1.06; 0.70)	9.3
Diathermy	Gait function	Medium	Callaghan, 2005 ¹⁷⁵ 2 weeks 10/10	14.70 \pm 6.80 13.90 \pm 3.60	0.15 (-0.73; 1.02)	9.3	0.14 (-0.74; 1.02)	9.3
Diathermy	Gait function	High	Laufer, 2005 ²⁴² 3 weeks 32/33	-146.41 \pm 36.30 -137.21 \pm 43.44	-0.23 (-0.72; 0.26)	30.0	-0.23 (-0.71; 0.26)	30.0

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Diathermy	Gait function	High	Laufer, 2005 ²⁴² 3 weeks 38/33	-138.08 \pm 37.54 -137.21 \pm 43.44	-0.02 (-0.49; 0.44)	32.9	-0.02 (-0.49; 0.45)	32.9
		Studies: 3; Subjects: 173			-0.10 (-0.36, 0.17)	I-squared=0, p-value=0.95	-0.10 (-0.36, 0.17)	I-squared=0, p-value=0.95
Diathermy	Gait function	Low	Akyol, 2010 ¹⁵⁵ 6 weeks 20/20	-460.60 \pm 103.92 -447.45 \pm 101.58	-0.13 (-0.75; 0.49)	18.6	-0.13 (-0.75; 0.50)	18.6
Diathermy	Gait function	Medium	Cetin, 2008 ¹⁷⁸ 8 weeks 20/20	39.90 \pm 6.47 40.60 \pm 6.04	-0.11 (-0.73; 0.51)	18.6	-0.11 (-0.73; 0.51)	18.6
Diathermy	Gait function	High	Laufer, 2005 ²⁴² 6 weeks 32/33	-144.53 \pm 30.06 -133.62 \pm 49.32	-0.27 (-0.75; 0.22)	30.0	-0.26 (-0.75; 0.23)	30.0
Diathermy	Gait function	High	Laufer, 2005 ²⁴² 6 weeks 38/33	-135.42 \pm 34.40 -133.62 \pm 49.32	-0.04 (-0.51; 0.42)	32.9	-0.04 (-0.51; 0.42)	32.9
		Studies: 3; Subjects: 183			-0.14 (-0.41, 0.13)	I-squared=0, p-value=0.93	-0.14 (-0.40, 0.13)	I-squared=0, p-value=0.94
Estim vs. exercise	Pain	High	Cheing, 2002 ¹⁸¹ 4 weeks 16/15	42.20 \pm 27.00 63.20 \pm 64.00	-0.43 (-1.15; 0.28)	49.9	-0.42 (-1.13; 0.29)	49.9
Estim vs. exercise	Pain	Low	Durmus, 2007 ¹⁹³ 4 weeks 25/25	0.60 \pm 0.10 1.04 \pm 0.27	-2.16 (-2.86; -1.46)	50.1	-2.13 (-2.83; -1.42)	50.1
		Studies: 2; Subjects: 81			-1.30 (-2.99, 0.40)	I-squared=0.91, p=0.001	-1.28 (-2.95, 0.40)	I-squared=0.91, p=0.001
Estim vs. exercise	Gait function	Medium	Cheing, 2004 ¹⁸² 4 weeks 16/15	-0.97 \pm 0.19 -0.89 \pm 0.10	-0.52 (-1.24; 0.20)	48.8	-0.51 (-1.23; 0.21)	48.8
Estim vs. exercise	Gait function	Low	Durmus, 2007 ¹⁹³ 4 weeks 25/25	49.92 \pm 2.69 48.10 \pm 1.10	0.89 (0.30; 1.47)	51.2	0.87 (0.29; 1.45)	51.2
		Studies: 2; Subjects: 81			0.20 (-1.18, 1.58)	I-squared=0.89, p=0.003	0.20 (-1.15, 1.55)	I-squared=0.88, p=0.003

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Ed	Pain	High	Farr, 2010 ¹⁰ 6 weeks 100/95	67.10 \pm 68.80 47.60 \pm 50.90	0.32 (0.04; 0.60)	29.4	0.32 (0.04; 0.60)	29.4
Ed	Pain	Medium	Keefe, 2004 ²³³ 6 weeks 18/18	4.00 \pm 1.56 4.03 \pm 2.08	-0.02 (-0.67; 0.64)	21.2	-0.02 (-0.67; 0.64)	21.1
Ed	Pain	Medium	Keefe, 2004 ²³³ 6 weeks 20/16	4.26 \pm 1.45 3.19 \pm 1.85	0.65 (-0.02; 1.33)	20.7	0.64 (-0.04; 1.31)	20.6
Ed	Pain	Low	Shakoor, 2007 ²⁸⁸ 6 weeks 83/79	7.70 \pm 4.07 9.77 \pm 4.73	-0.47 (-0.78; -0.16)	28.8	-0.47 (-0.78; -0.16)	28.8
		Studies: 3; Subjects: 429			0.09 (-0.42, 0.60)	I-squared=0.83, p-value=0.001	0.09 (-0.42, 0.60)	I-squared=0.82, p-value=0.001
Ed	Pain	High	Farr, 2010 ¹⁰ 36 weeks 100/95	56.20 \pm 75.30 48.60 \pm 61.30	0.11 (-0.17; 0.39)	36.1	0.11 (-0.17; 0.39)	36.2
Ed	Pain	Low	Messier, 2004 ³³⁰ 72 weeks 82/78	5.51 \pm 4.07 6.02 \pm 3.97	-0.13 (-0.44; 0.18)	32.3	-0.13 (-0.44; 0.18)	32.2
Ed	Pain	Low	Messier, 2004 ³³⁰ 72 weeks 76/80	5.07 \pm 4.10 6.24 \pm 4.20	-0.28 (-0.60; 0.03)	31.6	-0.28 (-0.60; 0.04)	31.6
		Studies: 2; Subjects: 511			-0.09 (-0.32, 0.14)	I-squared=0.42, p-value=0.18	-0.09 (-0.32, 0.14)	I-squared=0.41, p-value=0.19
Exercise proprioception	Pain	Medium	Lin, 2009 ²⁴⁷ 8 weeks 36/36	4.30 \pm 2.30 7.30 \pm 3.40	-1.03 (-1.53; -0.54)	32.3	-1.02 (-1.52; -0.53)	32.3
Exercise proprioception	Pain	High	Tsauo, 2008 ³¹³ 8 weeks 30/30	64.00 \pm 37.00 66.00 \pm 38.00	-0.05 (-0.56; 0.45)	31.9	-0.05 (-0.56; 0.45)	31.9
Exercise proprioception	Pain	Medium	Weng, 2009 ³¹⁹ 8 weeks 66/66 (knee)	2.70 \pm 1.90 4.40 \pm 1.40	-1.02 (-1.38; -0.66)	35.8	-1.01 (-1.38; -0.65)	35.9
		Studies: 3; Subjects: 198			-0.72 (-1.32, -0.12)	I-squared=0.81, p-value=0.005	-0.71 (-1.31, -0.11)	I-squared=0.81, p-value=0.005

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise proprioception	Function composite	Medium	Lin, 2009 ²⁴⁷ 8 weeks 36/36	14.60 \pm 9.60 24.90 \pm 11.80	-0.96 (-1.45; -0.47)	33.7	-0.95 (-1.44; -0.46)	33.7
Exercise proprioception	Function composite	High	Tsauo, 2008 ³¹³ 8 weeks 30/30	322.00 \pm 216.00 273.00 \pm 186.00	0.24 (-0.26; 0.75)	33.6	0.24 (-0.27; 0.75)	33.6
Exercise proprioception	Function composite	Medium	Weng, 2009 ³¹⁹ 8 weeks 33/33	4.20 \pm 0.50 6.90 \pm 1.30	-2.74 (-3.42; -2.06)	32.7	-2.71 (-3.39; -2.03)	32.7
		Studies: 3; Subjects: 198			-1.14 (-2.69, 0.42)	I-squared=0.96, p-value=0	-1.12 (-2.66, 0.41)	I-squared=0.96, p-value=0
Exercise proprioception	Gait function	Medium	Jan, 2008 ²²⁸ 6 weeks 24/25	26.50 \pm 2.30 33.10 \pm 3.40	-2.26 (-2.99; -1.54)	31.5	-2.23 (-2.95; -1.50)	31.5
Exercise proprioception	Gait function	Medium	Lin, 2009 ²⁴⁷ 8 weeks 36/36	34.80 \pm 7.20 38.00 \pm 3.80	-0.56 (-1.03; -0.08)	34.4	-0.55 (-1.02; -0.08)	34.5
Exercise proprioception	Gait function	High	Tsauo, 2008 ³¹³ 8 weeks 30/30	40.40 \pm 6.70 41.70 \pm 6.50	-0.20 (-0.70; 0.31)	34.0	-0.19 (-0.70; 0.31)	34.1
		Studies: 3; Subjects: 181			-0.97 (-2.04, 0.09)	I-squared=0.91, p-value=0	-0.96 (-2.00, 0.09)	I-squared=0.91, p-value=0
Orthotics	Gait function	High	Hinman, 2009 ²¹⁸ 4 weeks 20/20	-1.27 \pm 0.24 -1.27 \pm 0.22	0.00 (-0.62; 0.62)	11.6	0.00 (-0.62; 0.62)	11.6
Orthotics	Gait function	NA	Kerrigan, 2002 ²³⁴ immediate after treatment 15/15	-1.17 \pm 0.18 -1.17 \pm 0.19	0.00 (-0.72; 0.72)	8.7	0.00 (-0.72; 0.72)	8.7
Orthotics	Gait function	NA	Kerrigan, 2002 ²³⁴ immediate after treatment 15/15	-1.15 \pm 0.20 -1.17 \pm 0.19	0.10 (-0.61; 0.82)	8.7	0.10 (-0.62; 0.82)	8.7
Orthotics	Gait function	NA	Kerrigan, 2002 ²³⁴ immediate after weeks 15/15	-1.16 \pm 0.18 -1.17 \pm 0.19	0.05 (-0.66; 0.77)	8.7	0.05 (-0.66; 0.77)	8.7

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Orthotics	Gait function	NA	Kerrigan, 2002 ²³⁴ immediate after treatment 15/15	-1.15 \pm 0.18 -1.17 \pm 0.19	0.11 (-0.61; 0.82)	8.7	0.11 (-0.61; 0.82)	8.7
Orthotics	Gait function	NA	Kuroyanagi, 2007 ²⁴¹ immediate after treatment 37/37	-0.76 \pm 0.26 -0.73 \pm 0.23	-0.6 (-0.58; 0.33)	21.5	-0.6 (-0.58; 0.34)	21.5
Orthotics	Gait function	NA	Kuroyanagi, 2007 ²⁴¹ immediate after treatment 37/37	-0.74 \pm 0.26 -0.73 \pm 0.23	-0.04 (-0.50; 0.41)	21.5	-0.04 (-0.50; 0.42)	21.5
Orthotics	Gait function	Low	Maly, 2002 ²⁵³ immediate after treatment 9/9	-0.92 \pm 0.16 -0.93 \pm 0.16	0.06 (-0.86; 0.99)	5.2	0.06 (-0.86; 0.98)	5.2
Orthotics	Gait function	Low	Maly, 2002 ²⁵³ immediate after treatment 9/9	-0.93 \pm 0.16 -0.93 \pm 0.16	0.00 (-0.92; 0.92)	5.2	0.00 (-0.92; 0.92)	5.2
		Studies: 4; Subjects: 101			-0.01 (-0.22, 0.20)	I-squared=0, p=1	-0.01 (-0.22, 0.20)	I-squared=0, p=1
Orthotics	Function composite	Medium	Bar-Ziv, 2010 ¹⁶³ 4 weeks 31/26	3.1 \pm 1.9 5.5 \pm 2.2	-1.18 (-1.74, -0.61)	25.9	-1.16 (-1.73, -0.59)	25.9
Orthotics	Function composite	Medium	Toda, 2005 ³⁰³ 2 weeks 21/22	6 \pm 4.8 7.5 \pm 5.1	-0.30 (-0.90, 0.30)	25.1	-0.30 (-0.90, 0.30)	25.2
Orthotics	Function composite	Medium	Toda, 2005 ³⁰³ 2 weeks 20/22	3 \pm 3.8 7.5 \pm 5.1	-0.99 (-1.64, -0.35)	24.3	-0.97 (-1.62, -0.33)	24.3
Orthotics	Function composite	Medium	Toda, 2005 ³⁰³ 2 weeks 18/22	8.3 \pm 5.2 7.5 \pm 5.1	0.16 (-0.47, 0.78)	24.7	0.15 (-0.47, 0.78)	24.7

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
		Studies: 2; Subjects: 138			-0.58 (-1.19, 0.02)	I-squared = 0.75; p-value = 0.007	-0.57 (-1.17, 0.02)	I-squared = 0.74; p-value = 0.009
Elastic subtalar strapping	Function composite	Medium	Toda, 2001 ³⁰⁴ 8 weeks 46/44	8.2 \pm 5.4 8.8 \pm 5.3	-0.11 (-0.53; 0.30)	37.0	-0.11 (-0.52; 0.30)	37.0
Elastic subtalar strapping	Function composite	High	Toda, 2004 ³⁰⁷ 12 weeks 32/34	7.6 \pm 5.7 9.2 \pm 5.8	-0.28 (-0.76; 0.21)	26.9	-0.27 (-0.76; 0.21)	26.9
Elastic subtalar strapping	Function composite	Medium	Toda, 2008 ³⁰⁵ 12 weeks 45/45	6.8 \pm 5.1 9.1 \pm 5.3	-0.44 (-0.86; -0.02)	36.1	-0.44 (-0.86; -0.02)	36.1
		Studies: 3; Subjects: 246			-0.28 (-0.53, -0.03)	I-squared=0, p-value=0.55	-0.27 (-0.53, -0.02)	I-squared=0, p-value=0.55
Massage	Function composite	Low	Ko, 2009 ²³⁶ 8 weeks 17/18	41.73 \pm 7.58 44.09 \pm 6.19	-0.34 (-1.01; 0.33)	32.3	-0.33 (-1.00; 0.33)	32.3
Massage	Function composite	High	Yip, 2008 ³²⁵ 7 weeks 21/18	10.54 \pm 7.89 14.64 \pm 4.88	-0.61 (-1.26; 0.03)	34.6	-0.60 (-1.25; 0.04)	34.6
Massage	Function composite	High	Yip, 2008 ³²⁵ 7 weeks 20/18	10.61 \pm 5.97 14.64 \pm 4.88	-0.74 (-1.39; -0.08)	33.1	-0.72 (-1.38; -0.06)	33.1
		Studies: 2; Subjects: 94			-0.57 (-0.95, -0.19)	I-squared=0, p=0.70	-0.55 (-0.93, -0.18)	I-squared=0, p=0.76
Estim	Disability	Low	Garland, 2007 ²⁰⁷ 6 weeks 39/19	39.60 \pm 24.25 45.90 \pm 16.81	-0.28 (-0.84; 0.27)	56.1	-0.28 (-0.83; 0.27)	56.1
Estim	Disability	Low	Selfe, 2008 ²⁸⁷ 6 weeks 20/20	70.39 \pm 48.82 82.07 \pm 39.70	-0.26 (-0.89; 0.36)	43.9	-0.26 (-0.88; 0.37)	43.9
		Studies: 2; Subjects: 98			-0.28 (-0.69, 0.14)	I-squared=0, p-value=0.96	-0.27 (-0.68, 0.14)	I-squared=0, p-value=0.96
Estim	Pain	Medium	Cheing, 2002 ¹⁸¹ 4 weeks 16/18	42.20 \pm 27.00 50.40 \pm 42.40	-0.23 (-0.90; 0.45)	10.4	-0.22 (-0.90; 0.45)	10.6

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Estim	Pain	Medium	Cheing, 2002 ¹⁸¹ 4 weeks 17/15	55.60 \pm 50.60 63.20 \pm 64.00	-0.13 (-0.83; 0.56)	10.1	-0.13 (-0.82; 0.57)	10.2
Estim	Pain	Medium	Grimmer, 1992 ²¹¹ immediate after treatment 20/20	2.20 \pm 2.80 3.50 \pm 2.90	-0.46 (-1.08; 0.17)	11.3	-0.45 (-1.08; 0.18)	11.6
Estim	Pain	Medium	Grimmer, 1992 ²¹¹ immediate after treatment 20/20	1.50 \pm 1.80 3.50 \pm 2.90	-0.83 (-1.48; -0.18)	10.9	-0.81 (-1.46; -0.16)	11.2
Estim	Pain	Medium	Itoh, 2008 ²²⁴ 5 weeks 8/8	38.80 \pm 13.30 54.50 \pm 8.70	-1.40 (-2.51; -0.29)	5.2	-1.32 (-2.43; -0.21)	5.0
Estim	Pain	Medium	Itoh, 2008 ²²⁴ 5 weeks 8/8	33.30 \pm 11.70 41.70 \pm 10.60	-0.75 (-1.77; 0.27)	6.0	-0.71 (-1.73; 0.31)	5.8
Estim	Pain	High	Law, 2004 ²⁴³ 2 weeks 13/10	1.40 \pm 1.50 4.10 \pm 2.60	-1.32 (-2.24; -0.40)	7.0	-1.27 (-2.19; -0.35)	6.8
Estim	Pain	High	Law, 2004 ²⁴³ 2 weeks 12/10	0.70 \pm 0.70 4.10 \pm 2.60	-1.87 (-2.89; -0.85)	5.9	-1.80 (-2.82; -0.77)	5.7
Estim	Pain	High	Law, 2004 ²⁴³ 2 weeks 13/10	1.10 \pm 1.70 4.10 \pm 2.60	-1.41 (-2.33; -0.48)	6.8	-1.36 (-2.29; -0.43)	6.7
Estim	Pain	High	Pietrosimone, 2009 ²⁷⁶ 1 week 11/12	11.65 \pm 16.71 20.96 \pm 18.44	-0.53 (-1.36; 0.31)	8.0	-0.51 (-1.34; 0.33)	7.9
Estim	Pain	Low	Selfe, 2008 ²⁸⁷ 4 weeks 20/20	15.33 \pm 10.99 19.63 \pm 9.09	-0.43 (-1.05; 0.20)	11.3	-0.42 (-1.05; 0.21)	11.7
Estim	Pain	Medium	Taylor, 1981 ²⁹⁷ 2 weeks 10/10	-0.90 \pm 0.57 -0.30 \pm 0.95	-0.77 (-1.68; 0.15)	7.0	-0.73 (-1.65; 0.18)	6.9
		Studies: 7; Subjects: 301			-0.74 (-1.03, -0.46)	I-squared=0.34, p-value=0.12	-0.71 (-0.98, -0.43)	I-squared=0.28, p-value=0.17

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Estim	Pain	Medium	Cetin, 2008 ¹⁷⁸ 8 weeks 20/20	3.52 \pm 1.18 3.49 \pm 1.28	0.02 (-0.60; 0.64)	13.3	0.02 (-0.60; 0.64)	13.3
Estim	Pain	Medium	Cheing, 2002 ¹⁸¹ 8 weeks 16/18	43.70 \pm 30.30 48.60 \pm 42.20	-0.13 (-0.81; 0.54)	11.2	-0.13 (-0.80; 0.55)	11.2
Estim	Pain	Medium	Cheing, 2002 ¹⁸¹ 8 weeks 17/15	61.10 \pm 57.90 95.20 \pm 118.00	-0.37 (-1.08; 0.33)	10.4	-0.37 (-1.07; 0.34)	10.4
Estim	Pain	High	Gaines, 2004 ²⁰⁶ 6 weeks 20/18	5.18 \pm 2.11 5.99 \pm 2.40	-0.36 (-1.00; 0.28)	12.3	-0.35 (-0.99; 0.29)	12.3
Estim	Pain	Low	Garland, 2007 ²⁰⁷ 6 weeks 39/19	37.40 \pm 23.60 41.80 \pm 16.59	-0.20 (-0.75; 0.35)	16.9	-0.20 (-0.75; 0.35)	16.9
Estim	Pain	Medium	Itoh, 2008 ²²⁴ 10 weeks 8/8	53.50 \pm 9.70 49.30 \pm 20.20	0.27 (-0.72; 1.25)	5.3	0.25 (-0.73; 1.24)	5.2
Estim	Pain	Medium	Itoh, 2008 ²²⁴ 10 weeks 8/8	41.30 \pm 20.20 43.00 \pm 21.20	-0.08 (-1.06; 0.90)	5.3	-0.08 (-1.06; 0.90)	5.3
Estim	Pain	Low	Selfe, 2008 ²⁸⁷ 6 weeks 20/20	14.17 \pm 10.68 15.89 \pm 8.92	-0.17 (-0.80; 0.45)	13.2	-0.17 (-0.79; 0.45)	13.2
Estim	Pain	Medium	Talbot, 2003 ²⁹⁵ 6 weeks 20/18	16.33 \pm 13.35 11.60 \pm 8.00	0.47 (-0.18; 1.11)	12.2	0.46 (-0.19; 1.10)	12.2
		Studies: 7; Subjects: 304			-0.09 (-0.31, 0.14)	I-squared=0, p-value=0.75	-0.09 (-0.31, 0.14)	I-squared=0, p-value=0.78
Estim	Pain	High	Gaines, 2004 ²⁰⁶ 16 weeks 20/18	19.38 \pm 13.66 10.44 \pm 5.25	0.85 (0.18; 1.51)	48.4	0.83 (0.16; 1.50)	48.3
Estim	Pain	Medium	Talbot, 2003 ²⁹⁵ 24 weeks 20/18	16.14 \pm 6.03 6.42 \pm 9.66	0.34 (-0.30; 0.98)	51.6	0.33 (-0.31; 0.97)	51.7
		Studies: 2; Subjects: 76			0.59 (0.09, 1.08)	I-squared=0.14, p-value=0.28	0.57 (0.09, 1.06)	I-squared=0.10, p-value=0.29

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Estim	Global assessment	Low	Garland, 2007 ²⁰⁷ 6 weeks 39/19	38.30 \pm 25.81 45.10 \pm 21.41	-0.28 (-0.83; 0.27)	57.3	-0.27 (-0.82; 0.28)	57.3
Estim	Global assessment	Low	Selfe, 2008 ²⁸⁷ 8 weeks 20/20	3.11 \pm 1.78 4.32 \pm 1.83	-0.67 (-1.31; -0.03)	42.7	-0.66 (-1.30; -0.02)	42.7
		Studies: 2; Subjects: 98			-0.45 (-0.86, -0.03)	I-squared=0, p-value=0.36	-0.44 (-0.85, -0.02)	I-squared=0, p-value=0.37
Estim	Function composite	Medium	Cetin, 2008 ¹⁷⁸ 8 weeks 20/20	7.22 \pm 2.06 6.87 \pm 2.58	0.15 (-0.47; 0.77)	30.6	0.15 (-0.47; 0.77)	30.6
Estim	Function composite	Low	Garland, 2007 ²⁰⁷ 6 weeks 39/19	43.10 \pm 28.59 50.10 \pm 18.09	-0.27 (-0.82; 0.28)	38.8	-0.27 (-0.82; 0.28)	38.8
Estim	Function composite	Low	Selfe, 2008 ²⁸⁷ 6 weeks 20/20	8.06 \pm 4.15 8.37 \pm 4.18	-0.07 (-0.69; 0.55)	30.6	-0.07 (-0.69; 0.55)	30.6
		Studies: 3; Subjects: 138			-0.08 (-0.43, 0.26)	I-squared=0, p-value=0.61	-0.08 (-0.43, 0.26)	I-squared=0, p-value=0.62
Estim	Function joint	Medium	Grimmer, 1992 ²¹¹ immediate after treatment 20/20	1.60 \pm 2.60 2.40 \pm 3.10	-0.28 (-0.90; 0.34)	33.3	-0.27 (-0.90; 0.35)	33.3
Estim	Function joint	Medium	Grimmer, 1992 ²¹¹ immediate after treatment 20/20	2.10 \pm 2.80 2.40 \pm 3.10	-0.10 (-0.72; 0.52)	33.6	-0.10 (-0.72; 0.52)	33.6
Estim	Function joint	Low	Selfe, 2008 ²⁸⁷ 4 weeks 20/20	53.33 \pm 34.58 66.00 \pm 30.15	-0.39 (-1.02; 0.24)	33.0	-0.38 (-1.01; 0.24)	33.0
		Studies: 2; Subjects: 100			-0.26 (-0.62, 0.10)	I-squared=0, p-value=0.81	-0.25 (-0.61, 0.11)	I-squared=0, p-value=0.82
Estim	Function joint	Low	Garland, 2007 ²⁰⁷ 6 weeks 39/19	39.90 \pm 24.59 46.60 \pm 18.31	-0.29 (-0.85; 0.26)	56.1	-0.29 (-0.84; 0.26)	56.1

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Estim	Function joint	Low	Selfe, 2008 ²⁸⁷ 6 weeks 20/20	48.17 \pm 35.63 57.81 \pm 29.65	-0.29 (-0.92; 0.33)	43.9	-0.29 (-0.91; 0.34)	43.9
		Studies: 2; Subjects: 98			-0.29 (-0.71, 0.12)	I-squared=0, p-value=1	-0.29 (-0.70, 0.12)	I-squared=0, p-value=1
Estim	Gait function	High	Cheing, 2004 ¹⁸² 4 weeks 16/18	-0.97 \pm 0.19 -0.92 \pm 0.17	-0.28 (-0.96; 0.40)	17.2	-0.27 (-0.95; 0.41)	17.2
Estim	Gait function	High	Cheing, 2004 ¹⁸² 4 weeks 17/15	-0.93 \pm 0.18 -0.89 \pm 0.10	-0.27 (-0.97; 0.43)	16.9	-0.26 (-0.96; 0.43)	16.9
Estim	Gait function	High	Law, 2004 ²⁴⁴ 4 weeks 22/17	15.50 \pm 6.40 20.00 \pm 11.60	-0.50 (-1.14; 0.14)	17.7	-0.49 (-1.13; 0.15)	17.8
Estim	Gait function	Low	Pietrosimone, 2010 ²⁷⁷ 4 weeks 12/12	-1.32 \pm 0.16 -1.30 \pm 0.24	-0.10 (-0.90; 0.70)	15.3	-0.09 (-0.90; 0.71)	15.2
Estim	Gait function	Low	Pietrosimone, 2010 ²⁷⁷ 4 weeks 12/12	-1.32 \pm 0.16 -1.50 \pm 0.14	1.20 (0.32; 2.07)	14.3	1.16 (0.28; 2.03)	14.1
Estim	Gait function	Low	Yurtkuran, 1999 ³²⁷ 2 weeks 25/25	19.10 \pm 15.70 13.40 \pm 4.20	-0.88 (-1.46; -0.30)	18.7	-0.86 (-1.44; -0.28)	18.8
		Studies: 4; Subjects: 191			-0.19 (-0.70, 0.32)	I-squared=0.68, p-value=0.008	-0.19 (-0.69, 0.30)	I-squared=0.66, p-value=0.01
Estim	Gait function	Medium	Cetin, 2008 ¹⁷⁸ 8 weeks 20/20	42.40 \pm 8.40 40.60 \pm 6.04	0.25 (-0.38; 0.87)	21.7	0.24 -0.38; 0.86)	21.7
Estim	Gait function	Medium	Cetin, 2008 ¹⁷⁸ 8 weeks 20/20	42.40 \pm 8.40 39.95 \pm 8.89	0.28 (-0.34; 0.91)	21.7	0.28 (-0.35; 0.90)	21.7
Estim	Gait function	High	Cheing, 2004 ¹⁸² 8 weeks 16/18	-0.98 \pm 0.21 -0.93 \pm 0.21	-0.24 (-0.91; 0.44)	18.4	-0.23 (-0.91; 0.44)	18.4

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Estim	Gait function	High	Cheing, 2004 ¹⁸² 8 weeks 17/15	-0.90 \pm 0.19 -0.92 \pm 0.13	0.12 (-0.57; 0.82)	17.4	0.12 (-0.58; 0.81)	17.4
Estim	Gait function	Medium	Talbot, 2003 ²⁹⁵ 6 weeks 20/18	29.60 \pm 4.78 30.23 \pm 4.83	-0.13 (-0.77; 0.51)	20.7	-0.13 (-0.77; 0.51)	20.7
		Studies: 3; Subjects: 164			0.07 (-0.23, 0.36)	I-squared=0, p-value=0.74	0.06 (-0.23, 0.35)	I-squared=0, p-value=0.76
Estim	Strength, measured as 120 degree extension	Medium	Cetin, 200 ¹⁷⁸ 8 weeks 20/20	-49.85 \pm 15.72 -41.95 \pm 6.72	-0.55 (-1.18; 0.08)	33.7	-0.54 (-1.17; 0.09)	33.7
Estim	Strength, measured as 120 degree extension	Medium	Cetin, 2008 ¹⁷⁸ 8 weeks 20/20	-44.85 \pm 11.40 -36.50 \pm 6.20	-0.71 (-1.35; -0.07)	33.1	-0.69 (-1.33; -0.05)	33.0
Estim	Strength, measured as 120 degree extension	Medium	Talbot, 2003 ²⁹⁵ 6 weeks 20/18	-315.39 \pm 76.42 -316.38 \pm 98.73	0.01 (-0.63; 0.65)	33.3	0.01 (-0.63; 0.65)	33.3
		Studies: 2; Subjects: 118			-0.42 (-0.84, 0.011)	I-squared=0.26, p-value=0.26	-0.41 (-0.83, 0.01)	I-squared=0.23, p-value=0.27
Estim	Strength, measured as 60 degree extension	Medium	Cetin, 2008 ¹⁷⁸ 8 weeks 20/20	-57.80 \pm 17.21 -47.60 \pm 13.80	-0.65 (-1.29; -0.02)	27.3	-0.64 (-1.28; 0.00)	27.3
Estim	Strength, measured as 60 degree extension	Medium	Cetin, 2008 ¹⁷⁸ 8 weeks 20/20	-54.05 \pm 14.36 -44.20 \pm 13.97	-0.70 (-1.33; -0.06)	27.1	-0.68 (-1.32; -0.04)	27.1

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Estim	Strength, measured as 60 degree extension	High	Cheing, 2004 ¹⁸² 8 weeks 16/18	-82.60 \pm 19.90 -80.80 \pm 27.30	-0.07 (-0.75; 0.60)	24.4	-0.07 (-0.75; 0.60)	24.5
Estim	Strength, measured as 60 degree extension	High	Cheing, 2004 ¹⁸² 8 weeks 17/15	-93.00 \pm 21.70 -69.60 \pm 34.20	-0.83 (-1.55; -0.10)	21.1	-0.81 (-1.53; -0.08)	21.1
		Studies: 2; Subjects: 146			-0.56 (-0.89, -0.23)	I-squared=0, p-value=0.43	-0.55 (-0.88, -0.22)	I-squared=0, p-value=0.45
Exercise aerobic	Disability	High	Aglamis, 2008 ¹⁵⁴ 6 weeks 17/17	-82.20 \pm 10.60 -49.40 \pm 14.20	-2.62 (-3.55; -1.69)	46.9	-2.56 (-3.49; -1.62)	46.7
Exercise aerobic	Disability	Medium	Deyle, 2000 ¹⁸⁹ 4 weeks 42/41	505.20 \pm 196.96 921.20 \pm 584.39	-0.96 (-1.41; -0.50)	53.1	-0.95 (-1.40; -0.49)	53.3
		Studies: 2; Subjects: 117			-1.74 (-3.36, -0.11)	I-squared=0.90, p-value=0.002	-1.70 (-3.27, -0.13)	I-squared=0.89, p-value=0.002
Exercise aerobic	Disability	High	Aglamis, 2008 ¹⁵⁴ 12 weeks 17/17	-87.20 \pm 9.70 -36.40 \pm 7.90	-5.74 (-7.30; -4.18)	5.8	-5.61 (-7.18; -4.04)	5.7
Exercise aerobic	Disability	High	Bautch, 1997 ¹⁶⁵ 6 weeks 17/17	23.37 \pm 9.60 17.88 \pm 7.17	0.65 (-0.04; 1.34)	10.6	0.63 (-0.06; 1.32)	10.6
Exercise aerobic	Disability	Medium	Deyle, 2000 ¹⁸⁹ 8 weeks 42/41	462.40 \pm 438.17 934.30 \pm 653.57	-0.85 (-1.30; -0.40)	12.0	-0.84 (-1.29; -0.39)	12.1
Exercise aerobic	Disability	Medium	Keefe, 2004 ²³³ 6 weeks 16/18	220.46 \pm 44.66 224.17 \pm 54.26	-0.07 (-0.75; 0.60)	10.7	-0.07 (-0.75; 0.60)	10.7
Exercise aerobic	Disability	Medium	Keefe, 2004 ²³³ 6 weeks 20/18	238.71 \pm 31.61 234.13 \pm 37.43	0.13 (-0.50; 0.77)	11.0	0.13 (-0.51; 0.77)	10.9

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise aerobic	Disability	Medium	Kovar, 1992 ²³⁸ 8 weeks 52/50	3.74 \pm 2.69 5.96 \pm 2.32	-0.88 (-1.29; -0.48)	12.2	-0.88 (-1.28; -0.47)	12.3
Exercise aerobic	Disability	High	Peloquin, 1999 ²⁷⁴ 6 weeks 69/68	1.85 \pm 2.26 1.93 \pm 1.88	-0.04 (-0.37; 0.30)	12.6	-0.04 (-0.37; 0.30)	12.6
Exercise aerobic	Disability	Low	Yip, 2007 ³²⁴ 7 weeks 88/94	4.63 \pm 3.80 4.46 \pm 3.63	0.05 (-0.25; 0.34)	12.7	0.05 (-0.25; 0.34)	12.8
Exercise aerobic	Disability	Medium	Yip, 2008 ³²⁶ 7 weeks 40/37	4.54 \pm 3.66 4.22 \pm 4.34	0.08 (-0.32; 0.48)	12.3	0.08 (-0.32; 0.48)	12.3
		Studies: 8; Subjects: 739			-0.46 (-0.96, 0.04)	I-squared=0.90, p-value=0	-0.44 (-0.94, 0.05)	I-squared=0.90, p-value=0
Exercise aerobic	Disability	Low	Yip, 2007 ³²⁴ 23 weeks 88/94	4.70 \pm 3.69 4.44 \pm 3.30	0.07 (-0.22; 0.37)	65.9	0.07 (-0.22; 0.36)	65.9
Exercise aerobic	Disability	Medium	Yip, 2008 ³²⁶ 23 weeks 45/50	4.28 \pm 3.68 3.57 \pm 2.80	0.22 (-0.19; 0.62)	34.1	0.22 (-0.19; 0.62)	34.1
		Studies: 2; Subjects: 277			0.12 (-0.11, 0.36)	I-squared=0, p-value=0.57	0.12 (-0.11, 0.36)	I-squared=0, p-value=0.57
Exercise aerobic	Disability	Low	Ettinger, 1997 ¹⁹⁵ 26-78 weeks 144/149	1.72 \pm 0.48 1.90 \pm 0.49	-0.37 (-0.60; -0.14)	30.8	-0.37 (-0.60; -0.14)	30.9
Exercise aerobic	Disability	Medium	Rejeski, 2002 ²⁸⁰ 26-78 weeks 80/78	-37.14 \pm 10.38 -34.41 \pm 8.99	-0.28 (-0.59; 0.03)	20.4	-0.28 (-0.59; 0.03)	20.4
Exercise aerobic	Disability	Medium	Rejeski, 2002 ²⁸⁰ 26-78 weeks 76/82	-40.57 \pm 10.97 -38.20 \pm 9.65	-0.23 (-0.54; 0.08)	20.4	-0.23 (-0.54; 0.08)	20.4
Exercise aerobic	Disability	High	Sullivan, 1998 ³³¹ 52 weeks 52/50	6.07 \pm 2.95 6.18 \pm 2.75	-0.04 (-0.43; 0.35)	14.6	-0.04 (-0.43; 0.35)	14.6
Exercise aerobic	Disability	Medium	Yip, 2008 ³²⁶ 52 weeks 45/50	3.95 \pm 3.68 3.54 \pm 3.13	0.12 (-0.28; 0.52)	13.7	0.12 (-0.28; 0.52)	13.7

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
		Studies: 4; Subjects: 806			-0.21 (-0.37, -0.04)	I-squared=0.26, p-value=0.25	-0.21 (-0.37, -0.04)	I-squared=0.25, p-value=0.26
Exercise aerobic	Psychological disability	High	Aglamis, 2008 ¹⁵⁴ 12 weeks 17/17	-79.30 \pm 8.00 -46.40 \pm 13.80	-2.92 (-3.90; -1.94)	17.3	-2.85 (-3.83; -1.86)	17.1
Exercise aerobic	Psychological disability	Medium	An, 2008 ¹⁵⁷ 8 weeks 14/14	-76.40 \pm 15.30 -67.00 \pm 8.20	-0.77 (-1.54; 0.00)	19.3	-0.74 (-1.51; 0.03)	19.3
Exercise aerobic	Psychological disability	Medium	Keefe, 2004 ²³³ 6 weeks 16/18	1.88 \pm 0.87 1.80 \pm 1.04	0.08 (-0.59; 0.76)	20.2	0.08 (-0.59; 0.75)	20.2
Exercise aerobic	Psychological disability	Medium	Keefe, 2004 ²³³ 6 weeks 20/18	2.21 \pm 1.21 2.38 \pm 1.38	-0.13 (-0.77; 0.51)	20.5	-0.13 (-0.77; 0.51)	20.5
Exercise aerobic	Psychological disability	High	Peloquin, 1999 ²⁷⁴ 6 weeks 69/68	1.54 \pm 1.46 1.70 \pm 1.57	-0.11 (-0.44; 0.23)	22.7	-0.10 (-0.44; 0.23)	22.9
		Studies: 4; Subjects: 271			-0.69 (-1.47, 0.1)	I-squared=0.87, p-value=0	-0.67 (-1.43, 0.1)	I-squared=0.87, p-value=0
Exercise aerobic	Pain	High	Aglamis, 2008 ¹⁵⁴ 6 weeks 17/17	0.80 \pm 1.00 7.00 \pm 2.90	-2.86 (-3.83; -1.89)	30.1	-2.79 (-3.77; -1.82)	29.9
Exercise aerobic	Pain	Medium	Messier, 1997 ³³² 3 weeks 33/36	1.94 \pm 0.92 2.30 \pm 0.90	-0.40 (-0.87; 0.08)	34.9	-0.39 (-0.87; 0.09)	35.0
Exercise aerobic	Pain	Medium	Messier, 1997 ³³² 3 weeks 34/36	2.29 \pm 0.87 2.30 \pm 0.90	-0.01 (-0.48; 0.46)	35.0	-0.01 (-0.48; 0.46)	35.1
		Studies: 2; Subjects: 137			-1.00 (-2.25, 0.25)	I-squared=0.93, p=0	-0.98 (-2.19, 0.24)	I-squared=0.92, p=0
Exercise aerobic	Pain	High	Aglamis, 2008 ¹⁵⁴ 12 weeks 17/17	0.80 \pm 1.00 7.00 \pm 2.90	-3.95 (-5.12; -2.77)	3.0	-3.85 (-5.04; -2.67)	2.9
Exercise aerobic	Pain	Medium	An, 2008 ¹⁵⁷ 8 weeks 14/14	71.10 \pm 110.10 138.20 \pm 16.60	-0.60 (-1.36; 0.16)	5.2	-0.59 (-1.34; 0.17)	5.1

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise aerobic	Pain	High	Bautch, 1997 ¹⁶⁵ 6 weeks 17/17	2.19 \pm 1.67 2.08 \pm 2.09	0.06 (-0.61; 0.73)	5.8	0.06 (-0.62; 0.73)	5.7
Exercise aerobic	Pain	High	Farr, 2010 ¹⁰ 6 weeks 100/98	67.10 \pm 68.80 72.00 \pm 66.30	-0.07 (-0.35; 0.21)	9.3	-0.07 (-0.35; 0.21)	9.4
Exercise aerobic	Pain	Medium	Hay, 2006 ²¹⁴ 6 weeks 109/108	7.36 \pm 4.30 8.99 \pm 3.70	-0.41 (-0.68; -0.14)	9.4	-0.40 (-0.67; -0.14)	9.5
Exercise aerobic	Pain	Medium	Keefe, 2004 ²³³ 6 weeks 16/18	3.19 \pm 1.85 4.03 \pm 2.08	-0.43 (-1.11; 0.26)	5.7	-0.42 (-1.10; 0.27)	5.7
Exercise aerobic	Pain	Medium	Keefe, 2004 ²³³ 6 weeks 20/18	4.26 \pm 1.45 4.00 \pm 1.56	0.17 (-0.47; 0.81)	6.1	0.17 (-0.47; 0.81)	6.0
Exercise aerobic	Pain	Medium	Kovar, 1992 ²³⁸ 8 weeks 52/50	3.77 \pm 1.73 4.77 \pm 2.60	-0.52 (-0.91; -0.12)	8.2	-0.51 (-0.91; -0.12)	8.3
Exercise aerobic	Pain	Medium	Messier, 1997 ³³² 9 weeks 33/36	2.26 \pm 0.98 2.46 \pm 0.96	-0.21 (-0.68; 0.27)	7.5	-0.20 (-0.68; 0.27)	7.5
Exercise aerobic	Pain	Medium	Messier, 1997 ³³² 9 weeks 34/36	2.24 \pm 1.00 2.46 \pm 0.96	-0.23 (-0.70; 0.24)	7.5	-0.22 (-0.69; 0.25)	7.5
Exercise aerobic	Pain	High	Peloquin, 1999 ²⁷⁴ 6 weeks 69/68	3.09 \pm 1.54 3.94 \pm 2.22	-0.45 (-0.78; -0.11)	8.8	-0.44 (-0.78; -0.10)	8.8
Exercise aerobic	Pain	High	Talbot, 2003 ²⁹⁴ 6 weeks 19/21	6.41 \pm 9.77 10.60 \pm 4.64	0.30 (-0.32; 0.93)	6.2	0.30 (-0.33; 0.92)	6.1
Exercise aerobic	Pain	Low	Yip, 2007 ³²⁴ 7 weeks 88/94	37.33 \pm 21.06 44.41 \pm 23.23	-0.32 (-0.61; -0.03)	9.2	-0.32 (-0.61; -0.02)	9.2
Exercise aerobic	Pain	Medium	Yip, 2008 ³²⁶ 7 weeks 45/50	39.00 \pm 19.94 38.11 \pm 21.96	0.04 (-0.36; 0.45)	8.2	0.04 (-0.36; 0.44)	8.2

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
		Studies: 12; Subjects: 1242			-0.33 (-0.57, -0.09)	I-squared=0.75, p-value=0	-0.32 (-0.55, -0.08)	I-squared=0.74, p-value=0
Exercise aerobic	Pain	Medium	Hay, 2006 ²¹⁴ 26 weeks 109/108	7.51 \pm 4.80 8.36 \pm 3.90	-0.19 (-0.46; 0.07)	21.9	-0.19 (-0.46; 0.07)	21.9
Exercise aerobic	Pain	Low	Messier, 2004 ³³⁰ 24 weeks 76/82	5.47 \pm 4.10 5.10 \pm 3.89	0.09 (-0.22; 0.40)	16.0	0.09 (-0.22; 0.40)	16.0
Exercise aerobic	Pain	Low	Messier, 2004 ³³⁰ 24 weeks 80/78	6.22 \pm 4.02 6.19 \pm 4.06	0.01 (-0.30; 0.32)	16.0	0.01 (-0.30; 0.32)	16.0
Exercise aerobic	Pain	Medium	Messier, 1997 ³³² 18 weeks 33/36	2.15 \pm 0.98 2.28 \pm 0.90	-0.14 (-0.61; 0.33)	7.0	-0.14 (-0.61; 0.34)	7.0
Exercise aerobic	Pain	Medium	Messier, 1997 ³³² 18 weeks 34/36	2.21 \pm 0.93 2.28 \pm 0.90	-0.08 (-0.55; 0.39)	7.1	-0.08 (-0.54; 0.39)	7.1
Exercise aerobic	Pain	High	Talbot, 2003 ²⁹⁴ 24 weeks 17/17	6.95 \pm 11.41 10.90 \pm 9.69	0.19 (-0.43; 0.82)	4.0	0.19 (-0.43; 0.81)	4.0
Exercise aerobic	Pain	Low	Yip, 2007 ³²⁴ 23 weeks 88/94	38.58 \pm 22.01 42.50 \pm 23.67	-0.17 (-0.46; 0.12)	18.4	-0.17 (-0.46; 0.12)	18.4
Exercise aerobic	Pain	Medium	Yip, 2008 ³²⁶ 23 weeks 39/35	35.23 \pm 21.93 34.59 \pm 23.55	0.03 (-0.37; 0.43)	9.6	0.03 (-0.37; 0.43)	9.6
		Studies: 6; Subjects: 953			-0.06 (-0.19, 0.06)	I-squared=0, p-value=0.83	-0.06 (-0.19, 0.06)	I-squared=0, p-value=0.83
Exercise aerobic	Pain	Low	Ettinger, 1997 ¹⁹⁵ 13, 39, 78 weeks 144/149	2.14 \pm 0.60 2.40 \pm 0.61	-0.43 (-0.66; -0.20)	20.4	-0.43 (-0.66; -0.20)	20.5
Exercise aerobic	Pain	High	Farr, 2010 ¹⁰ 36 weeks 100/98	56.20 \pm 75.30 62.90 \pm 81.00	-0.09 (-0.36; 0.19)	16.1	-0.09 (-0.36; 0.19)	16.1

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise aerobic	Pain	Medium	Hay, 2006 ²¹⁴ 52 weeks 109/108	7.41 \pm 4.40 8.49 \pm 4.50	-0.24 (-0.51; 0.02)	17.1	-0.24 (-0.51; 0.03)	17.1
Exercise aerobic	Pain	Low	Messier, 2004 ³³⁰ 72 weeks 76/82	5.07 \pm 4.10 5.51 \pm 4.07	-0.11 (-0.42; 0.20)	13.7	-0.11 (-0.42; 0.21)	13.7
Exercise aerobic	Pain	Low	Messier, 2004 ³³⁰ 72 weeks 80/78	6.24 \pm 4.20 6.02 \pm 3.97	0.05 (-0.26; 0.37)	13.8	0.05 (-0.26; 0.37)	13.7
Exercise aerobic	Pain	High	Sullivan, 1998 ³³¹ 52 weeks 52/50	4.59 \pm 2.40 5.50 \pm 2.07	-0.41 (-0.80; -0.01)	9.7	-0.40 (-0.79; -0.01)	9.6
Exercise aerobic	Pain	Medium	Yip, 2008 ³²⁶ 52 weeks 45/50	21.75 \pm 21.97 26.95 \pm 23.25	-0.23 (-0.63; 0.17)	9.2	-0.23 (-0.63; 0.18)	9.2
		Studies: 6; Subjects: 1221			-0.21 (-0.35; -0.08)	I-squared=0.28, p-value=0.21	-0.21 (-0.35; -0.08)	I-squared=0.28, p-value=0.22
Exercise aerobic	Function composite	Medium	An, 2008 ¹⁵⁷ 8 weeks 11/10	347.50 \pm 382.80 511.80 \pm 381.60	-0.43 (-1.18; 0.32)	19.5	-0.42 (-1.17; 0.33)	19.4
Exercise aerobic	Function composite	Medium	Hay, 2006 ²¹⁴ 6 weeks 109/108	24.27 \pm 15.20 30.18 \pm 6.80	-0.42 (-0.69; -0.15)	30.5	-0.42 (-0.69; -0.15)	30.6
Exercise aerobic	Function composite	Low	Jan, 2009 ²²⁶ 8 weeks 36/35	12.30 \pm 9.80 25.00 \pm 11.80	-1.17 (-1.68; -0.67)	25.2	-1.16 (-1.66; -0.65)	25.2
Exercise aerobic	Function composite	Low	Jan, 2009 ²²⁶ 8 weeks 35/35	10.10 \pm 10.30 25.00 \pm 11.80	-1.35 (-1.87; -0.83)	24.8	-1.33 (-1.85; -0.81)	24.8
		Studies: 3; Subjects: 351			-0.84 (-1.36; -0.33)	I-squared=0.79, p-value=0.003	-0.83 (-1.34; -0.32)	I-squared=0.78, p-value=0.004
Exercise aerobic	Function composite	Low	Ettinger, 1997 ¹⁹⁵ 13, 39, 78 weeks 144/149	9.10 \pm 2.40 10.00 \pm 1.22	-0.48 (-0.71; -0.24)	27.5	-0.47 (-0.71; -0.24)	27.5
Exercise aerobic	Function composite	Medium	Hay, 2006 ²¹⁴ 52 weeks 108/109	24.83 \pm 15.30 28.95 \pm 14.40	-0.28 (-0.54; -0.01)	25.7	-0.28 (-0.54; -0.01)	25.7

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise aerobic	Function composite	Low	Messier, 2004 ³³⁰ 72 weeks 76/82	5.73 \pm 13.79 4.23 \pm 13.68	0.11 (-0.20; 0.42)	23.4	0.11 (-0.20; 0.42)	23.4
Exercise aerobic	Function composite	Low	Messier, 2004 ³³⁰ 72 weeks 80/78	3.07 \pm 13.96 3.40 \pm 13.16	-0.02 (-0.34; 0.29)	23.4	-0.02 (-0.34; 0.29)	23.4
		Studies: 3; Subjects: 826			-0.18 (-0.44, 0.08)	I-squared=0.72, p-value=0.01	-0.18 (-0.44, 0.08)	I-squared=0.72, p-value=0.02
Exercise aerobic	Gait function	High	Aglamis, 2008 ¹⁵⁴ 6 weeks 17/17	-532.80 \pm 61.50 -488.30 \pm 208.70	-0.29 (-0.97; 0.39)	13.4	-0.28 (-0.96; 0.39)	13.4
Exercise aerobic	Gait function	Medium	Deyle, 2000 ¹⁸⁹ 4 weeks 42/41	-484.00 \pm 61.05 -402.00 \pm 69.49	-0.65 (-1.10; -0.21)	31.5	-0.65 (-1.09; -0.21)	31.5
Exercise aerobic	Gait function	Medium	Messier, 1997 ³³² 3 weeks 33/36	-114.56 \pm 15.40 -110.87 \pm 15.06	-0.24 (-0.72; 0.23)	27.3	-0.24 (-0.71; 0.23)	27.3
Exercise aerobic	Gait function	Medium	Messier, 1997 ³³² 3 weeks 34/36	-114.64 \pm 14.64 -110.87 \pm 15.06	-0.25 (-0.72; 0.22)	27.7	-0.25 (-0.72; 0.22)	27.7
		Studies: 3; Subjects: 220			-0.38 (-0.63, -0.13)	I-squared=0, p-value=0.54	-0.38 (-0.63, -0.13)	I-squared=0, p-value=0.55
Exercise aerobic	Gait function	High	Aglamis, 2008 ¹⁵⁴ 12 weeks 17/17	-549.70 \pm 71.80 -468.30 \pm 175.80	-0.61 (-1.29; 0.08)	5.9	-0.59 (-1.28; 0.10)	5.8
Exercise aerobic	Gait function	Medium	An, 2008 ¹⁵⁷ 8 weeks 14/14	-605.80 \pm 68.20 -539.00 \pm 64.30	-0.53 (-1.28; 0.23)	5.0	-0.51 (-1.27; 0.24)	5.0
Exercise aerobic	Gait function	Medium	Deyle, 2000 ¹⁸⁹ 8 weeks 42/41	-487.40 \pm 116.65 -409.70 \pm 133.78	-0.62 (-1.06; -0.18)	11.7	-0.61 (-1.05; -0.17)	11.7
Exercise aerobic	Gait function	Low	Jan, 2009 ²²⁶ 8 weeks 36/35	6.30 \pm 2.40 8.60 \pm 2.30	-0.98 (-1.47; -0.49)	10.0	-0.97 (-1.46; -0.47)	10.0
Exercise aerobic	Gait function	Low	Jan, 2009 ²²⁶ 8 weeks 35/35	7.40 \pm 2.60 8.60 \pm 2.30	-0.49 (-0.96; -0.01)	10.5	-0.48 (-0.96; -0.01)	10.5

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise aerobic	Gait function	Medium	Messier, 1997 ³³² 9 weeks 33/36	-62.22 \pm 15.68 -111.93 \pm 15.06	-0.67 (-1.16; -0.18)	10.2	-0.66 (-1.15; -0.18)	10.2
Exercise aerobic	Gait function	Medium	Messier, 1997 ³³² 9 weeks 34/36	-116.30 \pm 16.44 -111.93 \pm 15.06	-0.28 (-0.75; 0.19)	10.7	-0.27 (-0.75; 0.20)	10.7
Exercise aerobic	Gait function	High	Peloquin, 1999 ²⁷⁴ 6 weeks 69/68	-467.77 \pm 74.27 -425.58 \pm 84.79	-0.53 (-0.87; -0.19)	16.2	-0.53 (-0.87; -0.19)	16.4
Exercise aerobic	Gait function	Medium	Peterson, 1993 ³³³ 8 weeks 52/49	-449.00 \pm 118.00 -338.00 \pm 65.00	-0.91 (-1.32; -0.50)	12.9	-0.91 (-1.32; -0.50)	12.9
Exercise aerobic	Gait function	High	Talbot, 2003 ²⁹⁴ 6 weeks 19/21	30.95 \pm 8.42 29.91 \pm 5.17	0.15 (-0.47; 0.77)	7.0	0.15 (-0.47; 0.77)	6.9
		Studies: 8; Subjects: 632			-0.58 (-0.76, -0.39)	I-squared=0.27, p-value=0.19	-0.57 (-0.75, -0.39)	I-squared=0.26, p-value=0.21
Exercise aerobic	Gait function	Low	Messier, 2004 ³³⁰ 24 weeks 76/82	-482.37 \pm 110.28 -433.68 \pm 108.67	-0.45 (-0.76; -0.13)	32.0	-0.44 (-0.76; -0.13)	32.0
Exercise aerobic	Gait function	Low	Messier, 2004 ³³⁰ 24 weeks 80/78	-465.04 \pm 108.49 -428.56 \pm 113.75	-0.33 (-0.64; -0.01)	32.4	-0.33 (-0.64; -0.01)	32.4
Exercise aerobic	Gait function	Medium	Messier, 1997 ³³² 18 weeks 33/36	-117.70 \pm 15.45 -107.41 \pm 14.70	-0.68 (-1.17; -0.20)	13.5	-0.68 (-1.16; -0.19)	13.5
Exercise aerobic	Gait function	Medium	Messier, 1997 ³³² 18 weeks 34/36	-115.20 \pm 15.16 -107.41 \pm 14.70	-0.52 (-1.00; -0.05)	14.0	-0.52 (-0.99; -0.04)	14.0
Exercise aerobic	Gait function	High	Talbot, 2003 ²⁹⁴ 24 weeks 19/21	27.85 \pm 5.16 30.00 \pm 6.01	-0.38 (-1.01; 0.24)	8.1	-0.37 (-1.00; 0.25)	8.1
		Studies: 3; Subjects: 459			-0.45 (-0.62, -0.27)	I-squared=0, p-value=0.81	-0.44 (-0.62, -0.26)	I-squared=0, p-value=0.82
Exercise aerobic	Gait function	Low	Ettinger, 1997 ¹⁹⁵ 13, 39, 78 weeks 144/149	-1507.00 \pm 192.00 -1349.00 \pm 195.30	-0.82 (-1.05; -0.58)	36.9	-0.81 (-1.05; -0.58)	36.9

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise aerobic	Gait function	Medium	Focht, 2005 ³³⁴ 72 weeks 76/82	-1524.00 \pm 316.00 -1433.00 \pm 260.00	-0.32 (-0.63; 0.00)	31.6	-0.31 (-0.63; 0.00)	31.6
Exercise aerobic	Gait function	Medium	Focht, 2005 ³³⁴ 72 weeks 80/78	-1551.00 \pm 297.00 -1411.00 \pm 261.00	-0.50 (-0.82; -0.18)	31.5	-0.50 (-0.81; -0.18)	31.4
		Studies: 2; Subjects: 609			-0.558 (-0.862, -0.254)	I-squared=0.7, p=0.036	-0.556 (-0.86, -0.252)	I-squared=0.7, p=0.036
Exercise aerobic	Health perception	High	Aglamis, 2008 ⁴⁰ 12 weeks 17/17	-77.50 \pm 10.20 -40.00 \pm 20.50	-2.32 (-3.20; -1.44)	49.2	-2.26 (-3.14; -1.38)	49.1
Exercise aerobic	Health perception	Medium	An, 2008 ¹⁵⁷ 8 weeks 14/14	-61.20 \pm 17.90 -49.10 \pm 25.90	-0.54 (-1.30; 0.21)	50.8	-0.53 (-1.28; 0.23)	50.9
		Studies: 2; Subjects: 62			-1.42 (-3.15, 0.32)	I-squared=0.89, p-value=0.003	-1.38 (-3.08, 0.32)	I-squared=0.88, p-value=0.003
Exercise aerobic	Health perception	Medium	Rejeski, 2002 ²⁸⁰ 26-78 weeks 80/78	-62.86 \pm 19.19 -61.15 \pm 17.81	-0.09 (-0.40; 0.22)	30.9	-0.09 (-0.40; 0.22)	30.9
Exercise aerobic	Health perception	Medium	Rejeski, 2002 ²⁸⁰ 26-78 weeks 76/82	-67.53 \pm 21.60 -67.5 \pm 18.11	0.00 (-0.31; 0.31)	30.9	0.00 (-0.31; 0.31)	30.9
Exercise aerobic	Health perception	High	Sullivan, 1998 ³³¹ 52 weeks 52/50	3.71 \pm 2.8 3.26 \pm 1.87	0.19 (-0.20; 0.58)	19.9	0.19 (-0.20; 0.58)	19.9
Exercise aerobic	Health perception	Medium	Yip, 2008 ³²⁶ 52 weeks 45/50	-3.22 \pm 0.8 -3 \pm 0.93	-0.25 (-0.66; 0.15)	18.4	-0.25 (-0.65; 0.15)	18.4
		Studies: 3; Subjects: 513			-0.04 (-0.21, 0.14)	I-squared=0, p-value=0.47	-0.04 (-0.21, 0.14)	I-squared=0, p-value=0.47
Exercise aquatic	Disability	Medium	Lund, 2008 ²⁵⁰ 8 weeks 27/27	-62.70 \pm 11.95 -61.10 \pm 11.43	-0.14 (-0.67; 0.40)	54.1	-0.13 (-0.67; 0.40)	54.2
Exercise aquatic	Disability	Medium	Rooks, 2006 ²⁸³ 6 weeks 22/23	-34.00 \pm 21.50 -40.20 \pm 19.40	0.30 (-0.28; 0.89)	45.9	0.30 (-0.29; 0.89)	45.8

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
		Studies: 2; Subjects: 99			0.07 (-0.36, 0.50)	I-squared=0.15, p-value=0.28	0.06 (-0.36, 0.49)	I-squared=0.12, p-value=0.29
Exercise aquatic	Disability	Medium	Lund, 2008 ²⁵⁰ 20 weeks 27/27	-63.00 \pm 13.51 -61.40 \pm 13.51	-0.12 (-0.65; 0.42)	18.0	-0.12 (-0.65; 0.42)	18.0
Exercise aquatic	Disability	Medium	Patrick, 2001 ²⁷³ 20 weeks 125/124	0.93 \pm 0.55 1.13 \pm 0.67	-0.32 (-0.57; -0.07)	82.0	-0.32 (-0.57; -0.07)	82.0
		Studies: 2; Subjects: 303			-0.28 (-0.51, -0.05)	I-squared=0, p-value=0.51	-0.28 (-0.51, -0.05)	I-squared=0, p-value=0.51
Exercise aquatic	Pain	Medium	Lund, 2008 ²⁵⁰ 8 weeks 27/27	20.30 \pm 16.63 27.20 \pm 16.63	-0.41 (-0.95; 0.6)	54.0	-0.41 (-0.95; 0.13)	54.0
Exercise aquatic	Pain	Medium	Rooks, 2006 ²⁸³ 6 weeks 22/23	7.30 \pm 0.70 7.50 \pm 5.00	-0.06 (-0.64; 0.53)	46.0	-0.05 (-0.64; 0.53)	46.0
		Studies: 2; Subjects: 99			-0.25 (-0.65, 0.15)	I-squared=0, p=0.38	-0.25 (-0.64, 0.15)	I-squared=0, p=0.38
Exercise aquatic	Pain	Medium	Lund, 2008 ²⁵⁰ 20 weeks 27/27	18.10 \pm 14.03 23.80 \pm 14.03	-0.41 (-0.95; 0.13)	17.5	-0.40 (-0.94; 0.14)	17.5
Exercise aquatic	Pain	Medium	Patrick, 2001 ²⁷³ 20 weeks 125/124	1.38 \pm 0.74 1.46 \pm 0.62	-0.12 (-0.37; 0.13)	82.5	-0.12 (-0.37; 0.13)	82.5
		Studies: 2; Subjects: 303			-0.17 (-0.39, 0.06)	I-squared=0, p-value=0.34	-0.17 (-0.39, 0.06)	I-squared=0, p-value=0.35
Exercise aquatic	QL	Medium	Lund, 2008 ²⁵⁰ 20 weeks 27/27	-42.80 \pm 6.47 -41.40 \pm 6.47	-0.11 (-0.65; 0.42)	17.8	-0.11 (-0.64; 0.42)	17.8
Exercise aquatic	QL	Medium	Patrick, 2001 ²⁷³ 20 weeks 125/124	-0.61 \pm 0.07 -0.60 \pm 0.08	-0.09 (-0.34; 0.15)	82.2	-0.09 (-0.34; 0.15)	82.2
		Studies: 2; Subjects: 303			-0.10 (-0.32, 0.13)	I-squared=0, p-value=0.95	-0.10 (-0.32, 0.13)	I-squared=0, p-value=0.96

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise aquatic	Function composite	Medium	Lund, 2008 ²⁵⁰ 8 weeks 27/27	-64.60 \pm 6.00 -61.40 \pm 11.95	-0.27 (-0.80; 0.27)	53.0	-0.26 (-0.80; 0.27)	53.1
Exercise aquatic	Function composite	Medium	Rooks, 2006 ²⁸³ 6 weeks 22/23	27.70 \pm 11.60 25.00 \pm 11.90	0.23 (-0.36; 0.82)	47.0	0.23 (-0.36; 0.81)	46.9
		Studies: 2; Subjects: 99			-0.03 (-0.52, 0.45)	I-squared=0.33, p-value=0.22	-0.03 (-0.51, 0.44)	I-squared=0.31, p-value=0.23
Exercise strength	Disability	Medium	Doi, 2008 ¹⁹² 8 weeks 72/70	13.69 \pm 13.47 18.59 \pm 16.38	-0.33 (-0.66; 0.00)	29.6	-0.33 (-0.66; 0.01)	29.6
Exercise strength	Disability	Medium	Kuptniratsaikul, 2002 ²⁴⁰ 8 weeks 199/193	6.66 \pm 1.86 6.09 \pm 1.68	0.32 (0.12; 0.52)	33.3	0.32 (0.12; 0.52)	33.4
Exercise strength	Disability	Medium	Lund, 2008 ²⁵⁰ 8 weeks 25/27	-64.10 \pm 11.50 -61.10 \pm 11.43	-0.26 (-0.81; 0.28)	22.7	-0.26 (-0.80; 0.29)	22.7
Exercise strength	Disability	Medium	Schilke, 1996 ²⁸⁵ 8 weeks 10/10	2.30 \pm 0.84 2.50 \pm 0.85	-0.24 (-1.12; 0.64)	14.3	-0.23 (-1.11; 0.65)	14.3
		Studies: 4; Subjects: 606			-0.08 (-0.51, 0.35)	I-squared=0.78, p-value=0.004	-0.08 (-0.51, 0.35)	I-squared=0.77, p-value=0.004
Exercise strength	Disability	Medium	Baker, 2001 ¹⁶⁰ 16 weeks 23/23	-63.40 \pm 28.69 -60.80 \pm 29.36	-0.09 (-0.67; 0.49)	9.4	-0.09 (-0.67; 0.49)	9.4
Exercise strength	Disability	Medium	Kuptniratsaikul, 2002 ²⁴⁰ 24 weeks 199/193	5.39 \pm 3.61 6.09 \pm 3.44	-0.20 (-0.40; 0.00)	80.0	-0.20 (-0.40; 0.00)	80.0
Exercise strength	Disability	Medium	Lund, 2008 ²⁵⁰ 20 weeks 25/27	-66.90 \pm 13.50 -61.40 \pm 13.52	-0.19 (-0.73; 0.36)	10.6	-0.18 (-0.73; 0.36)	10.6
		Studies: 3; Subjects: 490			-0.19 (-0.36, -0.01)	I-squared=0, p-value=0.94	-0.19 (-0.36, -0.01)	I-squared=0, p-value=0.94

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise strength	Disability	Low	Ettinger, 1997 ¹⁹⁵ 13, 39, 78 weeks 146/149	1.74 \pm 0.49 1.90 \pm 0.49	-0.33 (-0.56; -0.10)	48.3	-0.33 (-0.56; -0.10)	48.3
Exercise strength	Disability	Medium	Kuptniratsaikul, 2002 ²⁴⁰ 48 weeks 199/193	6.86 \pm 1.79 6.86 \pm 1.97	0.00 (-0.20; 0.20)	51.7	0.00 (-0.20; 0.20)	51.7
		Studies: 2; Subjects: 687			-0.16 (-0.48, 0.16)	I-squared=0.78, p-value=0.04	-0.16 (-0.48, 0.16)	I-squared=0.77, p-value=0.04
Exercise strength	Pain	Low	Bennell ¹⁶⁷ 13 weeks 45/44	4.90 \pm 3.30 6.50 \pm 3.30	-0.48 (-0.91; -0.06)	6.5	-0.48 (-0.90; -0.06)	6.5
Exercise strength	Pain	Medium	Borjesson, 1996 ¹⁷⁰ 6 weeks 34/34	3.00 \pm 1.50 3.30 \pm 1.50	-0.20 (-0.68; 0.28)	6.2	-0.20 (-0.67; 0.28)	6.2
Exercise strength	Pain	Medium	Cheing, 2002 ¹⁸¹ 8 weeks 17/16	61.10 \pm 57.90 43.70 \pm 30.30	0.37 (-0.32; 1.06)	4.9	0.36 (-0.33; 1.05)	4.9
Exercise strength	Pain	Medium	Cheing, 2002 ¹⁸¹ 8 weeks 15/18	95.20 \pm 118.00 48.60 \pm 42.20	0.55 (-0.15; 1.25)	4.9	0.53 (-0.17; 1.23)	4.8
Exercise strength	Pain	Medium	Doi, 2008 ¹⁹² 8 weeks 72/70	22.55 \pm 20.68 29.59 \pm 23.94	-0.32 (-0.65; 0.02)	7.0	-0.31 (-0.64; 0.02)	7.1
Exercise strength	Pain	Low	Gur, 2002 ²¹² 8 weeks 9/6	10.30 \pm 4.50 28.00 \pm 5.20	-3.70 (-5.46; -1.94)	1.6	-3.48 (-5.27; -1.70)	1.5
Exercise strength	Pain	Low	Gur, 2002 ²¹² 8 weeks 8/6	16.60 \pm 7.30 28.00 \pm 5.20	-1.75 (-3.02; -0.48)	2.6	-1.64 (-2.92; -0.36)	2.5
Exercise strength	Pain	Medium	Jan, 2008 ²²⁷ 8 weeks 34/34	4.80 \pm 3.50 7.10 \pm 3.40	-0.67 (-1.16; -0.18)	6.1	-0.66 (-1.15; -0.17)	6.1
Exercise strength	Pain	Medium	Jan, 2008 ²²⁷ 8 weeks 34/34	4.80 \pm 2.70 7.10 \pm 3.40	-0.75 (-1.24; -0.26)	6.1	-0.74 (-1.23; -0.25)	6.1

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise strength	Pain	Medium	Kuptniratsaikul, 2002 ²⁴⁰ 8 weeks 199/193	4.14 \pm 2.28 5.15 \pm 2.26	-0.44 (-0.65; -0.24)	7.6	-0.44 (-0.64; -0.24)	7.7
Exercise strength	Pain	Low	Lim, 2008 ²⁰ 13 weeks 26/26	28.50 \pm 16.90 36.20 \pm 16.20	-0.47 (-1.02; 0.09)	5.7	-0.46 (-1.01; 0.09)	5.7
Exercise strength	Pain	Low	Lim, 2008 ²⁰ 13 weeks 27/28	22.80 \pm 16.90 33.60 \pm 15.40	-0.67 (-1.21; -0.12)	5.8	-0.66 (-1.20; -0.12)	5.8
Exercise strength	Pain	Medium	Lin, 2009 ²⁴⁷ 8 weeks 36/36	4.20 \pm 3.00 7.30 \pm 3.40	-0.97 (-1.46; -0.48)	6.1	-0.96 (-1.45; -0.47)	6.1
Exercise strength	Pain	Medium	Lund, 2008 ²⁵⁰ 8 weeks 25/27	18.80 \pm 16.50 27.20 \pm 16.63	-0.51 (-1.06; 0.05)	5.7	-0.50 (-1.05; 0.05)	5.7
Exercise strength	Pain	Medium	Schilke, 1996 ²⁸⁵ 8 weeks 10/10	9.70 \pm 4.72 10.10 \pm 6.44	-0.07 (-0.95; 0.81)	4.0	-0.07 (-0.94; 0.81)	3.9
Exercise strength	Pain	high	Swank, 2011 ²⁹³ 6 weeks 37/36	4.30 \pm -0.38 5.10 \pm -0.42	-2.00 (-2.56; -1.43)	5.6	-1.98 (-2.54; -1.41)	5.6
Exercise strength	Pain	Medium	Weng, 2009 ³¹⁹ 8 weeks 66/66	3.60 \pm 0.70 4.40 \pm 1.40	-0.72 (-1.08; -0.37)	6.9	-0.72 (-1.07; -0.37)	7.0
Exercise strength	Pain	Medium	Weng, 2009 ³¹⁹ 8 weeks 66/66	3.10 \pm 0.80 4.40 \pm 1.40	-1.14 (-1.51; -0.77)	6.8	-1.13 (-1.50; -0.77)	6.9
		Studies: 13; Subjects: 1404			-0.64 (-0.89; -0.39)	I-squared=0.78, p-value=0	-0.63 (-0.87; -0.39)	I-squared=0.77, p-value=0
Exercise strength	Pain	Medium	Baker, 2001 ¹⁶⁰ 16 weeks 22/22	128.00 \pm 98.12 189.00 \pm 117.26	-0.56 (-1.15; 0.03)	8.0	-0.55 (-1.14; 0.04)	7.7
Exercise strength	Pain	Medium	Kuptniratsaikul, 2002 ²⁴⁰ 24 weeks 199/193	4.06 \pm 2.53 5.07 \pm 2.53	-0.40 (-0.60; -0.20)	58.5	-0.40 (-0.60; -0.20)	60.1

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise strength	Pain	Medium	Lund, 2008 ²⁵⁰ 20 weeks 25/27	15.60 \pm 14.00 23.80 \pm 14.03	-0.59 (-1.14; -0.03)	9.0	-0.58 (-1.13; -0.02)	8.6
Exercise strength	Pain	Low	Topp, 2002 ³¹⁰ 16 weeks 35/35	10.71 \pm 3.14 10.77 \pm 3.19	-0.02 (-0.49; 0.45)	12.5	-0.02 (-0.49; 0.45)	12.1
Exercise strength	Pain	Low	Topp, 2002 ³¹⁰ 16 weeks 32/35	10.38 \pm 3.31 10.77 \pm 3.05	-0.12 (-0.60; 0.36)	12.0	-0.12 (-0.60; 0.36)	11.5
		Studies: 4; Subjects: 592			-0.35 (-0.52, -0.18)	I-squared=0.05, p-value=0.38	-0.35 (-0.51, -0.18)	I-squared=0.03, p-value=0.39
Exercise strength	Pain	Low	Ettinger, 1997 ¹⁹⁵ 13, 39, 78 weeks 146/149	2.21 \pm 0.72 2.40 \pm 0.61	-0.28 (-0.51; -0.06)	25.8	-0.28 (-0.51; -0.05)	25.8
Exercise strength	Pain	Medium	Kuptniratsaikul, 2002 ²⁴⁰ 48 weeks 199/193	4.25 \pm 2.70 4.57 \pm 2.69	-0.12 (-0.32; 0.08)	26.1	-0.12 (-0.32; 0.08)	26.1
Exercise strength	Pain	Medium	Weng, 2009 ³¹⁹ 52 weeks 66/66 (knee)	3.60 \pm 1.60 5.00 \pm 1.40	-0.93 (-1.29; -0.57)	24.2	-0.93 (-1.29; -0.57)	24.2
Exercise strength	Pain	Medium	Weng, 2009 ³¹⁹ 52 weeks 66/66 (knee)	2.90 \pm 1.40 5.00 \pm 1.40	-1.50 (-1.89; -1.11)	23.8	-1.49 (-1.88; -1.10)	23.8
		Studies: 3; Subjects: 786			-0.69 (-1.24, -0.14)	I-squared=0.94, p-value=0	-0.68 (-1.23, -0.14)	I-squared=0.94, p-value=0
Exercise strength	QL	Medium	Doi, 2008 ¹⁹² 8 weeks 72/70	-71.19 \pm 16.33 -63.40 \pm 16.36	-0.48 (-0.81; -0.14)	63.7	-0.47 (-0.81; -0.14)	63.8
Exercise strength	QL	Medium	Lund, 2008 ²⁵⁰ 8 weeks 25/27	-43.80 \pm 6.50 -43.10 \pm 11.95	-0.06 (-0.60; 0.49)	36.3	-0.06 (-0.60; 0.49)	36.2
		Studies: 2; Subjects: 194			-0.32 (-0.72, 0.07)	I-squared=0.40, p-value=0.20	-0.32 (-0.72, 0.07)	I-squared=0.39, p-value=0.20

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise strength	Function composite	Low	Bennell, 2010 ¹⁶⁷ 13 weeks 45/44	16.20 \pm 11.70 21.90 \pm 11.00	-0.50 (-0.92; -0.08)	12.6	-0.50 (-0.92; -0.08)	12.6
Exercise strength	Function composite	Low	Jan, 2008 ²²⁷ 8 weeks 34/34	14.70 \pm 8.50 22.50 \pm 10.90	-0.80 (-1.29; -0.30)	11.4	-0.79 (-1.28; -0.29)	11.5
Exercise strength	Function composite	Medium	Jan, 2008 ²²⁷ 8 weeks 34/34	14.80 \pm 9.20 22.50 \pm 10.90	-0.76 (-1.26; -0.27)	11.5	-0.75 (-1.25; -0.26)	11.5
Exercise strength	Function composite	Medium	Lim, 2008 ²⁰ 13 weeks 26/26	29.30 \pm 15.60 36.50 \pm 18.20	-0.42 (-0.97; 0.13)	10.6	-0.42 (-0.97; 0.13)	10.6
Exercise strength	Function composite	Low	Lim, 2008 ²⁰ 13 weeks 27/28	24.00 \pm 18.10 32.40 \pm 15.50	-0.50 (-1.04; 0.04)	10.8	-0.49 (-1.03; 0.05)	10.8
Exercise strength	Function composite	Low	Lin, 2009 ²⁴⁷ 8 weeks 36/36	10.10 \pm 8.30 24.90 \pm 11.80	-1.45 (-1.97; -0.93)	11.0	-1.44 (-1.96; -0.91)	11.0
Exercise strength	Function composite	Medium	Lund, 2008 ²⁵⁰ 8 weeks 25/27	-66.90 \pm 11.50 -61.40 \pm 11.95	-0.47 (-1.02; 0.08)	10.6	-0.46 (-1.01; 0.09)	10.6
Exercise strength	Function composite	Medium	Weng, 2009 ³¹⁹ 8 weeks 33/33	5.60 \pm 0.90 6.90 \pm 1.30	-1.16 (-1.69; -0.64)	11.0	-1.15 (-1.67; -0.63)	11.0
Exercise strength	Function composite	Medium	Weng, 2009 ³¹⁹ 8 weeks 33/33	5.00 \pm 1.00 6.90 \pm 1.30	-1.64 (-2.20; -1.08)	10.5	-1.62 (-2.18; -1.06)	10.4
		Studies: 6; Subjects: 521			-0.85 (-1.14; -0.56)	I-squared=0.65, p-value=0.004	-0.84 (-1.13; -0.56)	I-squared=0.64, p-value=0.005
Exercise strength	Function composite	Medium	Baker, 2001 ¹⁶⁰ 16 weeks 23/23	462.00 \pm 385.28 664.00 \pm 437.93	-0.49 (-1.08; 0.10)	19.3	-0.48 (-1.07; 0.11)	19.3
Exercise strength	Function composite	Medium	Lund, 2008 ²⁵⁰ 20 weeks 25/27	-66.10 \pm 13.00 -63.70 \pm 12.99	-0.18 (-0.73; 0.36)	22.4	-0.18 (-0.73; 0.36)	22.4
Exercise strength	Function composite	Low	Topp, 2002 ³¹⁰ 16 weeks 35/35	35.30 \pm 10.83 39.70 \pm 10.83	-0.41 (-0.88; 0.07)	29.7	-0.40 (-0.88; 0.07)	29.7

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise strength	Function composite	Low	Topp, 2002 ³¹⁰ 16 weeks 32/35	35.97 \pm 11.30 39.70 \pm 10.35	-0.34 (-0.83; 0.14)	28.5	-0.34 (-0.82; 0.14)	28.5
		Studies: 3; Subjects: 200			-0.36 (-0.61, -0.10)	I-squared=0, p-value=0.89	-0.35 (-0.61, -0.09)	I-squared=0, p-value=0.90
Exercise strength	Function composite	Low	Ettinger, 1997 ¹⁹⁵ 13, 39, 78 weeks 146/149	9.30 \pm 2.42 10.00 \pm 1.22	-0.37 (-0.60; -0.14)	35.4	-0.37 (-0.60; -0.14)	35.5
Exercise strength	Function composite	Medium	Weng, 2009 ³¹⁹ 52 weeks 33/33	6.30 \pm 1.70 7.30 \pm 1.70	-0.59 (-1.08; -0.10)	33.0	-0.58 (-1.07; -0.09)	33.0
Exercise strength	Function composite	Medium	Weng, 2009 ³¹⁹ 52 weeks 33/33	4.00 \pm 1.30 7.30 \pm 1.70	-2.18 (-2.79; -1.57)	31.5	-2.16 (-2.77; -1.54)	31.5
		Studies: 2; Subjects: 394			-1.01 (-1.97, -0.05)	I-squared=0.93, p-value=0	-1.00 (-1.95, -0.05)	I-squared=0.93, p-value=0
Exercise strength	Gait function	Low	Bennell, 2010 ¹⁶⁷ 13 weeks 45/44	7.00 \pm 2.20 7.90 \pm 1.80	-0.45 (-0.87; -0.03)	9.8	-0.44 (-0.86; -0.02)	9.8
Exercise strength	Gait function	Medium	Borjesson, 1996 ¹⁷⁰ 6 weeks 34/34	-1.09 \pm 0.17 -1.11 \pm 0.18	0.11 (-0.36; 0.59)	9.3	0.11 (-0.36; 0.59)	9.4
Exercise strength	Gait function	high	Cheing, 2004 ¹⁸² 8 weeks 17/16	-0.90 \pm 0.19 -0.98 \pm 0.21	0.40 (-0.29; 1.09)	7.6	0.39 (-0.30; 1.08)	7.6
Exercise strength	Gait function	high	Cheing, 2004 ¹⁸² 8 weeks 17/16	-0.92 \pm 0.13 -0.93 \pm 0.21	0.06 (-0.63; 0.74)	7.6	0.06 (-0.63; 0.74)	7.6
Exercise strength	Gait function	Low	Gur, 2002 ²¹² 8 weeks 9/6	9.17 \pm 1.65 10.56 \pm 1.48	-0.88 (-1.96; 0.21)	5.0	-0.82 (-1.91; 0.26)	4.9
Exercise strength	Gait function	Low	Gur, 2002 ²¹² 8 weeks 8/6	8.94 \pm 0.81 10.56 \pm 1.48	-1.42 (-2.63; -0.22)	4.4	-1.33 (-2.54; -0.12)	4.3

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise strength	Gait function	Medium	Jan, 2008 ²²⁷ 8 weeks 34/34	35.50 \pm 5.30 38.00 \pm 6.80	-0.41 (-0.89; 0.07)	9.3	-0.41 (-0.89; 0.08)	9.3
Exercise strength	Gait function	Medium	Kuptniratsaikul, 2002 ²⁴⁰ 8 weeks 199/193	-417.06 \pm 84.39 -354.73 \pm 80.94	-0.75 (-0.96; -0.55)	11.3	-0.75 (-0.96; -0.55)	11.3
Exercise strength	Gait function	Low	Lim, 2008 ²⁰ 13 weeks 26/26	11.80 \pm 4.20 11.70 \pm 3.80	-0.22 (-0.77; 0.32)	8.8	-0.22 (-0.77; 0.32)	8.8
Exercise strength	Gait function	Low	Lim, 2008 ²⁰ 13 weeks 27/28	11.00 \pm 4.80 11.80 \pm 4.80	-0.17 (-0.70; 0.36)	8.9	-0.16 (-0.69; 0.37)	8.9
Exercise strength	Gait function	Medium	Lin, 2009 ²⁴⁷ 8 weeks 36/36	35.50 \pm 5.30 38.00 \pm 3.80	-0.54 (-1.01; -0.07)	9.4	-0.54 (-1.01; -0.07)	9.4
Exercise strength	Gait function	Medium	Swank, 2011 ²⁹³ 6 weeks 37/36	4.30 \pm -0.38 5.10 \pm -0.42	-1.92 (-2.47; -1.36)	8.7	-1.90 (-2.45; -1.34)	8.7
		Studies: 9; Subjects: 958			-0.48 (-0.80, -0.16)	I-squared=0.78, p-value=0	-0.47 (-0.78, -0.16)	I-squared=0.78, p-value=0
Exercise strength	Gait function	Medium	Kuptniratsaikul, 2002 ²⁴⁰ 24 weeks 199/193	-402.94 \pm 92.57 -341.49 \pm 73.83	-0.73 (-0.94; -0.53)	44.0	-0.73 (-0.94; -0.53)	44.0
Exercise strength	Gait function	Low	Topp, 2002 ³¹⁰ 16 weeks 35/35	16.33 \pm 7.04 17.53 \pm 7.04	-0.17 (-0.64; 0.30)	28.3	-0.17 (-0.64; 0.30)	28.4
Exercise strength	Gait function	Low	Topp, 2002 ³¹⁰ 16 weeks 32/35	15.15 \pm 7.34 17.53 \pm 6.73	-0.34 (-0.82; 0.14)	27.6	-0.33 (-0.82; 0.15)	27.7
		Studies: 2; Subjects: 494			-0.46 (-0.84, -0.09)	I-squared=0.66, p-value=0.05	-0.46 (-0.84, -0.08)	I-squared=0.67, p-value=0.05
Exercise strength	Gait function	Low	Ettinger, 1997 ¹⁹⁵ 13, 39, 78 weeks 146/149	-1406.00 \pm 205.41 -1349.00 \pm 195.30	-0.28 (-0.51; -0.06)	46.0	-0.28 (-0.51; -0.05)	46.0

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Exercise strength	Gait function	Medium	Kuptniratsaikul, 2002 ²⁴⁰ 48 weeks 199/193	-382.91 \pm 96.40 -341.51 \pm 72.95	-0.48 (-0.68; -0.28)	54.0	-0.48 (-0.68; -0.28)	54.0
		Studies: 2; Subjects: 687			-0.39 (-0.59, -0.20)	I-squared=0.39, p-value=0.20	-0.39 (-0.59, -0.20)	I-squared=0.39, p-value=0.20
PEMF	Pain	Low	Ay, 2009 ¹⁵⁹ 3 weeks 30/25	2.58 \pm 1.37 2.24 \pm 1.14	0.27 (-0.27; 0.80)	42.5	0.26 (-0.27; 0.80)	42.3
PEMF	Pain	Low	Thamsborg, 2005 ²⁹⁸ 6 weeks 45/45	11.68 \pm 3.22 12.36 \pm 4.43	-0.18 (-0.59; 0.24)	57.5	-0.17 (-0.59; 0.24)	57.7
		Studies: 2; Subjects: 145			0.01 (-0.42, 0.44)	I-squared=0.40, p=0.20	0.01 (-0.41, 0.44)	I-squared=0.38, p=0.20
PEMF	Function composite	Low	Ay, 2009 ¹⁵⁹ 3 weeks 30/25	7.76 \pm 4.68 7.10 \pm 4.10	0.15 (-0.38; 0.68)	44.2	0.15 (-0.38; 0.68)	44.0
PEMF	Function composite	Low	Thamsborg, 2005 ²⁹⁸ 6 weeks 45/45	37.63 \pm 11.61 42.44 \pm 15.97	-0.34 (-0.76; 0.07)	55.8	-0.34 (-0.76; 0.07)	56.0
		Studies: 2; Subjects: 145			-0.13 (-0.61, 0.35)	I-squared=0.51, p=0.15	-0.13 (-0.60, 0.35)	I-squared=0.50, p=0.16
Tai Chi	Disability	Medium	Brismee, 2007 ¹⁷¹ 6 weeks 22/19	55.18 \pm 24.20 57.10 \pm 16.95	-0.09 (-0.70; 0.52)	51.2	-0.09 (-0.70; 0.53)	51.2
Tai Chi	Disability	Low	Lee, 2009 ²⁴⁵ 8 weeks 29/15	20.80 \pm 18.70 28.50 \pm 19.60	-0.41 (-1.03; 0.22)	48.8	-0.40 (-1.03; 0.23)	48.8
		Studies: 2; Subjects: 85			-0.24 (-0.68, 0.20)	I-squared=0, p-value=0.48	-0.24 (-0.68, 0.2)	I-squared=0, p-value=0.49
Tai Chi	Disability	Medium	Brismee, 2007 ¹⁷¹ 18 weeks 22/19	60.28 \pm 23.80 57.73 \pm 19.58	0.12 (-0.50; 0.73)	45.2	0.11 (-0.50; 0.73)	45.1

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Tai Chi	Disability	Medium	Song, 2010 ²⁹² 24 weeks 41/41	20.66 \pm 6.16 24.11 \pm 5.60	-0.59 (-1.03; -0.14)	54.8	-0.58 (-1.02; -0.14)	54.9
		Studies: 2; Subjects: 123			-0.27 (-0.95, 0.42)	I-squared=0.70, p-value=0.07	-0.27 (-0.95, 0.41)	I-squared=0.69, p-value=0.07
Tai Chi	Pain	Medium	Brismee, 2007 ¹⁷¹ 6 weeks 22/19	2.41 \pm 2.05 3.37 \pm 1.78	-0.50 (-1.12; 0.13)	50.3	-0.49 (-1.11; 0.14)	50.3
Tai Chi	Pain	Low	Lee, 2009 ²⁴⁵ 8 weeks 29/15	4.60 \pm 4.00 5.90 \pm 3.70	-0.33 (-0.96; 0.29)	49.7	-0.33 (-0.95; 0.30)	49.7
		Studies: 2; Subjects: 85			-0.42 (-0.86, 0.03)	I-squared=0, p-value=0.72	-0.41 (-0.85, 0.03)	I-squared=0, p-value=0.72
Tai Chi	Function composite	Medium	Brismee, 2007 ¹⁷¹ 6 weeks 22/19	31.82 \pm 14.00 37.77 \pm 11.22	-0.47 (-1.09; 0.16)	50.6	-0.46 (-1.08; 0.17)	50.6
Tai Chi	Function composite	Low	Lee, 2009 ²⁴⁵ 8 weeks 29/15	14.70 \pm 13.80 20.80 \pm 15.00	-0.43 (-1.06; 0.20)	49.4	-0.42 (-1.05; 0.21)	49.4
		Studies: 2; Subjects: 85			-0.45 (-0.89, -0.01)	I-squared=0, p-value=0.94	-0.44 (-0.88, 0.00)	I-squared=0, p-value=0.94
Tai Chi	Function joint	Medium	Brismee, 2007 ¹⁷¹ 6 weeks 22/19	4.70 \pm 1.66 4.67 \pm 1.40	0.02 (-0.59; 0.63)	50.9	0.02 (-0.59; 0.63)	50.9
Tai Chi	Function joint	Low	Lee, 2009 ²⁴⁵ 8 weeks 29/15	1.50 \pm 1.70 1.80 \pm 1.70	-0.18 (-0.80; 0.45)	49.1	-0.17 (-0.80; 0.45)	49.1
		Studies: 2; Subjects: 85			-0.08 (-0.52, 0.36)	I-squared=0, p-value=0.66	-0.08 (-0.51, 0.36)	I-squared=0, p-value=0.67
Ultrasound	Disability	Low	Ozgonenel, 2009 ²⁷⁰ 2.3 weeks 34/33	33.30 \pm 15.50 38.50 \pm 15.20	-0.34 (-0.82; 0.14)	34.8	-0.33 (-0.82; 0.15)	34.9

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Ultrasound	Disability	Medium	Tascioglu, 2010 ²⁹⁶ 2 weeks 30/30	43.44 \pm 16.48 44.33 \pm 6.78	-0.06 (-0.57; 0.45)	33.2	-0.06 (-0.57; 0.45)	33.2
Ultrasound	Disability	Medium	Tascioglu, 2010 ²⁹⁶ 2 weeks 30/30	35.61 \pm 8.73 44.33 \pm 6.78	-0.80 (-1.32; -0.27)	31.9	-0.79 (-1.31; -0.26)	31.9
		Studies: 2; Subjects: 157			-0.39 (-0.80, 0.02)	I-squared=0.50, p-value=0.14	-0.39 (-0.79, 0.02)	I-squared=0.48, p-value=0.15
Ultrasound	Pain	Low	Ozgonenel, 2009 ²⁷⁰ 2.3 weeks 34/33	3.90 \pm 2.00 4.00 \pm 2.60	-0.04 (-0.52; 0.44)	34.7	-0.04 (-0.52; 0.44)	34.8
Ultrasound	Pain	Medium	Tascioglu, 2010 ²⁹⁶ 2 weeks 30/30	5.22 \pm 1.70 6.67 \pm 1.78	-0.83 (-1.36; -0.30)	32.6	-0.82 (-1.35; -0.29)	32.6
Ultrasound	Pain	Medium	Tascioglu, 2010 ²⁹⁶ 2 weeks 30/30	5.25 \pm 1.90 6.67 \pm 1.78	-0.77 (-1.30; -0.25)	32.7	-0.76 (-1.29; -0.24)	32.7
		Studies: 2; Subjects: 157			-0.54 (-1.05, -0.03)	I-squared=0.67, p-value=0.05	-0.53 (-1.04, -0.03)	I-squared=0.66, p-value=0.05
Ultrasound	Pain	Medium	Cetin, 2008 ¹⁷⁸ 8 weeks 20/20	3.55 \pm 1.41 3.49 \pm 1.28	0.04 (-0.58; 0.66)	15.36	0.04 (-0.58; 0.66)	15.3
Ultrasound	Pain	Medium	Huang, 2005 ²²³ 8 weeks 70/70 (knee)	3.00 \pm 1.80 4.10 \pm 0.60	-0.82 (-1.17; -0.47)	24.8	-0.82 (-1.16; -0.47)	24.9
Ultrasound	Pain	Medium	Huang, 2005 ²²² 8 weeks 60/60 (knee)	3.30 \pm 0.80 3.70 \pm 0.70	-0.53 (-0.90; -0.17)	24.04	-0.53 (-0.89; -0.16)	24.1
Ultrasound	Pain	Medium	Huang, 2005 ²²² 8 weeks 60/60 (knee)	2.60 \pm 1.70 3.70 \pm 0.70	-0.85 (-1.22; -0.47)	23.67	-0.84 (-1.21; -0.47)	23.7

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Ultrasound	Pain	Medium	Loyola-Sanchez, 2012 ²⁴⁹ 8 weeks 14/13	1.58 \pm 2.02 1.46 \pm 2.02	0.059 (-0.7; 0.8)	12.13	-0.52 (-0.84; -0.19)	12.1
		Studies: 4; Subjects: 227			-0.52 (-0.85; -0.2)	I-squared=0.617, p-value=0.03	-0.52 (-0.84, -0.19)	I-squared=0.61, p-value=0.04
Ultrasound	Pain	Medium	Huang, 2005 ²²³ 52 weeks 70/70 (knee)	2.60 \pm 1.50 3.90 \pm 1.40	-0.90 (-1.24; -0.55)	35.9	-0.89 (-1.24; -0.54)	35.9
Ultrasound	Pain	Medium	Huang, 2005 ²²² 52 weeks 60/60 (knee)	1.60 \pm 1.40 3.50 \pm 1.70	-0.58 (-0.94; -0.21)	32.5	-0.57 (-0.94; -0.21)	32.5
Ultrasound	Pain	Medium	Huang, 2005 ²²² 52 weeks 60/60 (knee)	2.20 \pm 1.80 3.50 \pm 1.70	-0.74 (-1.11; -0.37)	31.6	-0.74 (-1.11; -0.37)	31.6
		Studies: 2; Subjects: 160			-0.74 (-0.95, -0.54)	I-squared=0, p-value=0.47	-0.74 (-0.95, -0.53)	I-squared=0, p-value=0.47
Ultrasound	Function composite	Medium	Cetin, 2008 ¹⁷⁸ 8 weeks 20/20	7.67 \pm 2.30 6.87 \pm 2.58	0.33 (-0.30; 0.95)	19.86	0.32 (-0.30; 0.95)	19.9
Ultrasound	Function composite	Medium	Huang, 2005 ²²³ 8 weeks 35/35	4.40 \pm 1.10 6.10 \pm 0.90	-1.69 (-2.24; -1.14)	20.42	-1.67 (-2.22; -1.12)	20.4
Ultrasound	Function composite	Medium	Huang, 2005 ²²² 8 weeks 30/30	4.80 \pm 1.00 5.20 \pm 0.90	-0.42 (-0.93; 0.09)	20.67	-0.42 (-0.93; 0.10)	20.7
Ultrasound	Function composite	Medium	Huang, 2005 ²²² 8 weeks 30/30	4.10 \pm 0.60 5.20 \pm 0.90	-1.44 (-2.01; -0.87)	20.26	-1.42 (-1.99; -0.85)	20.3
Ultrasound	Function composite	Medium	Loyola-Sanchez, 2012 ²⁴⁹ 8 weeks 14/13	23.92 \pm 11.30 20.38 \pm 13.00	0.29 (-0.47; 1.1)	18.79	0.28 (-0.48; 1.04)	18.8
		Studies: 4; Subjects: 227			-0.61 (-1.4; 0.2)	I-squared=0.89, p-value=0	-0.60 (-1.40, 0.20)	I-squared=0.89, p-value=0

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Ultrasound	Function composite	Medium	Huang, 2005 ²²² 52 weeks 35/35	3.9 \pm 1.5 5.1 \pm 1.8	-1.51 (-2.04; -0.98)	33.5	-1.49 (-2.03; -0.96)	33.5
Ultrasound	Function composite	Medium	Huang, 2005 ²²² 52 weeks 30/30	3.1 \pm 1.4 5.1 \pm 1.8	-0.72 (-1.25; -0.20)	34.1	-0.71 (-1.24; -0.19)	34.1
Ultrasound	Function composite	Medium	Huang, 2005 ²²³ 52 weeks 30/30	3.3 \pm 1.5 5.8 \pm 1.8	-1.24 (-1.79; -0.69)	32.3	-1.22 (-1.78; -0.67)	32.3
		Studies: 2; Subjects: 160			-1.15 (-1.61, -0.70)	I-squared=0.55, p-value=0.11	-1.14 (-1.60, -0.69)	I-squared=0.54, p-value=0.12
Ultrasound	Gait function	Low	Ozgonenel, 2009 ²⁷⁰ 2.3 weeks 34/33	35.50 \pm 6.70 36.40 \pm 7.60	-0.13 (-0.61; 0.35)	34.0	-0.12 (-0.60; 0.36)	34.0
Ultrasound	Gait function	Medium	Tascioglu, 2010 ²⁹⁶ 2 weeks 30/30	22.85 \pm 2.99 23.19 \pm 2.54	-0.12 (-0.63; 0.38)	33.5	-0.12 (-0.63; 0.39)	33.6
Ultrasound	Gait function	Medium	Tascioglu, 2010 ²⁹⁶ 2 weeks 30/30	20.00 \pm 1.94 23.19 \pm 2.54	-1.41 (-1.98; -0.84)	32.4	-1.39 (-1.96; -0.83)	32.4
		Studies: 2; Subjects: 157			-0.54 (-1.34, 0.26)	I-squared=0.86, p-value=0.001	-0.53 (-1.32, 0.25)	I-squared=0.86, p-value=0.001
Ultrasound	Gait function	Medium	Cetin, 2008 ¹⁷⁸ 8 weeks 20/20	42.60 \pm 11.50 40.60 \pm 6.04	0.22 (-0.40; 0.84)	20.1	0.21 (-0.41; 0.84)	20.1
Ultrasound	Gait function	Medium	Huang, 2005 ²²³ 8 weeks 35/35	-90.20 \pm 3.10 -82.90 \pm 5.30	-1.68 (-2.23; -1.13)	20.48	-1.66 (-2.21; -1.12)	20.5
Ultrasound	Gait function	Medium	Huang, 2005 ²²² 8 weeks 30/30	-90.90 \pm 4.10 -81.90 \pm 5.50	-1.86 (-2.46; -1.25)	20.17	-1.83 (-2.44; -1.22)	20.2
Ultrasound	Gait function	Medium	Huang, 2005 ²²² 8 weeks 30/30	-92.40 \pm 3.40 -81.90 \pm 5.50	-2.30 (-2.95; -1.64)	19.91	-2.27 (-2.92; -1.61)	19.9

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Ultrasound	Gait function	Medium	Loyola-Sanchez, 2012 ²⁴⁹ 8 weeks 14/13	-414.55 \pm 68.53 -411.85 \pm 89.80	-0.03 (-0.79; 0.72)	19.34	-0.03 (-0.79; 0.72)	19.3
		Studies: 4; Subjects: 227			-1.14 (-2.11; -0.17)	I-squared=0.92, p-value=0	-1.13 (-2.08; -0.17)	I-squared=0.91, p-value=0
Ultrasound	Gait function	Medium	Huang, 2005 ²²² 52 weeks 35/35	-90.4 \pm 7.8 -82.5 \pm 7.1	-1.35 (-1.87; -0.83)	34.9	-1.34 (-1.86; -0.82)	35.0
Ultrasound	Gait function	Medium	Huang, 2005 ²²² 52 weeks 30/30	-99.7 \pm 8.7 -82.5 \pm 7.1	-1.06 (-1.60; -0.52)	34.2	-1.05 (-1.59; -0.50)	34.3
Ultrasound	Gait function	Medium	Huang, 2005 ²²³ 52 weeks 30/30	-94.3 \pm 6.8 -85.3 \pm 6.5	-2.17 (-2.81; -1.52)	30.8	-2.14 (-2.78; -1.50)	30.8
		Studies: 2; Subjects: 160			-1.50 (-2.11; -0.90)	I-squared=0.71, p-value=0.03	-1.48 (-2.08; -0.89)	I-squared=0.70, p-value=0.04
Exercise aquatic vs. aerobic	Pain	Low	Silva, 2008 ²⁹⁰ 9 weeks 32/32	37.0 \pm 18.1 38.4 \pm 27.5	-0.06 (-0.55; 0.43)	52.5	-0.06 (-0.55; 0.43)	52.6
Exercise aquatic vs. aerobic	Pain	Medium	Wyatt, 2001 ³²² 6 weeks 23/23	2.40 \pm 1.60 3.80 \pm 1.60	-0.87 (-1.48; -0.27)	47.5	-0.86 (-1.47; -0.25)	47.4
		Studies: 2; Subjects: 110			-0.45 (-1.25; 0.35)	I-squared=0.76, p-value=0.04	-0.44 (-1.22; 0.35)	I-squared=0.75, p-value=0.04
Laterally vs. neutrally wedged insole	Function composite	Low	Maillefert, 2001 ²⁵² 12 weeks 82/74	52.4 \pm 20 47.2 \pm 18	0.27 (-0.04; 0.59)	24.1	0.27 (-0.04; 0.59)	24.2
Laterally vs. neutrally wedged insole	Function composite	Medium	Toda, 2008 ³⁰⁵ 12 weeks 45/45	8.4 \pm 5.8 8.1 \pm 5	0.19 (-0.22; 0.61)	18.9	0.19 (-0.22; 0.61)	18.9
Laterally vs. neutrally wedged insole	Function composite	Medium	Toda, 2008 ³⁰⁵ 12 weeks 46/45	6.8 \pm 5.1 8.1 \pm 5	0.06 (-0.36; 0.47)	19.1	0.05 (-0.36; 0.47)	19.1

Appendix Table F12. Efficacy and comparative effectiveness of physical therapy interventions, pooled with random effects results from randomized controlled clinical trials (continued)

Physical therapy interventions	Outcome	Risk of bias	Author, year Weeks to assess outcomes Randomized to active/control	Mean \pm STD in active Mean \pm STD in control	Cohen standard Mean difference (95% CI)	Weights from Cohen random effects model	Hedges standard; Mean difference (95% CI)	Weights from Hedges random effects model
Laterally vs. neutrally wedged insole	Function composite	Medium	Toda, 2008 ³⁰⁵ 12 weeks 45/45	9.1 \pm 5.3 8.1 \pm 5	-0.26 (-0.67; 0.16)	18.9	-0.26 (-0.67; 0.16)	18.9
Laterally vs. neutrally wedged insole	Function composite	Medium	Toda, 2008 ³⁰⁵ 12 weeks 46/45	6.2 \pm 5.3 8.1 \pm 5	-0.37 (-0.78; 0.05)	18.9	-0.37 (-0.78; 0.05)	18.9
		Studies: 2; Subjects: 383			-0.01 (-0.26, 0.25)	I-squared=0.52, p-value=0.08	-0.01 (-0.25, 0.25)	I-squared=0.51, p-value=0.09

Appendix Table F13. Strength of evidence of differences in outcomes with physical therapy interventions for adults with knee OA

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Directness	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Diathermy	Disability <6 weeks	Callaghan, 2005 ¹⁷⁵ Fukuda, 2011 ²⁰⁵ Laufer, 2005 ²⁴² Akyol, 2010 ¹⁵⁵	Studies: 4; Subjects: 259	High	Direct	Consistent	No	Imprecise	NA	Low
Diathermy	Disability 6-13 weeks	Laufer, 2005 ²⁴² Akyol, 2010 ¹⁵⁵	Studies: 2; Subjects: 143	High	Direct	Consistent	No	Imprecise	NA	Low
Diathermy	Pain <6 weeks	Callaghan, 2005 ¹⁷⁵ Fukuda, 2011 ²⁰⁵ Laufer, 2005 ²⁴² Akyol, 2010 ¹⁵⁵	Studies: 4; Subjects: 259	High	Direct	Inconsistent	Yes	Imprecise	Moderate	Low
Diathermy	Pain 6-13 weeks	Cetin, 2008 ¹⁷⁸ Laufer, 2005 ²⁴² Akyol, 2010 ¹⁵⁵	Studies: 3; Subjects: 183	High	Direct	Consistent	No	Imprecise	NA	Low
Diathermy	Function composite < 6 weeks	Fukuda, 2011 ²⁰⁵ Laufer, 2005 ²⁴² Akyol, 2010 ¹⁵⁵	Studies: 3; Subjects: 229	High	Direct	Inconsistent	Yes	Imprecise	NA	Low
Diathermy	Function composite 6-13 weeks	Cetin, 2008 ¹⁷⁸ Laufer, 2005 ²⁴² Akyol, 2010 ¹⁵⁵	Studies: 3; Subjects: 183	High	Direct	Consistent	No	Imprecise	NA	Low
Diathermy	Function joint < 6 weeks	Laufer, 2005 ²⁴² Akyol, 2010 ¹⁵⁵	Studies: 2; Subjects: 143	High	Direct	Consistent	No	Imprecise	NA	Low
Diathermy	Function joint 6-13 weeks	Laufer, 2005 ²⁴² Akyol, 2010 ¹⁵⁵	Studies: 2; Subjects: 143	High	Direct	Consistent	No	Imprecise	NA	Low
Diathermy	Gait function < 6 weeks	Callaghan, 2005 ¹⁷⁵ Laufer, 2005 ²⁴² Akyol, 2010 ¹⁵⁵	Studies: 3; Subjects: 173	High	Direct	Consistent	No	Imprecise	NA	Low
Diathermy	Gait function 6-13 weeks	Cetin, 2008 ¹⁷⁸ Laufer, 2005 ²⁴² Akyol, 2010 ¹⁵⁵	Studies: 3; Subjects: 183	High	Direct	Consistent	No	Imprecise	NA	Low

Appendix Table F13. Strength of evidence of differences in outcomes with physical therapy interventions for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Directness	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Estim vs. exercise	Pain < 6 weeks	Cheing, 2002 ¹⁸¹ Durmus, 2007 ¹⁹²	Studies: 2; Subjects: 81	High	Direct	Inconsistent	Yes	Imprecise	NA	Low
Estim vs. exercise	Gait function < 6 weeks	Cheing, 2004 ¹⁸² Durmus, 2007 ¹⁹²	Studies: 2; Subjects: 81	Medium	Direct	Inconsistent	Yes	Imprecise	NA	Low
Ed	Pain 6-13 weeks	Shakoor, 2007 ²⁸ Keefe, 2004 ²³³ Farr, 2010 ¹⁰	Studies: 3; Subjects: 429	High	Direct	Inconsistent	Yes	Imprecise	NA	Low
Ed	Pain >26 weeks	Farr, 2010 ¹⁰ Messier, 2004 ³³⁰	Studies: 2; Subjects: 511	High	Direct	Consistent	No	Precise	NA	Low
Exercise proprioception	Pain 6-13 weeks	Weng, 2009 ³¹⁹ Lin, 2009 ²⁴⁷ Tsauo, 2008 ³¹³	Studies: 3; Subjects: 198	High	Direct	Inconsistent	Yes	Imprecise	Moderate	Low
Exercise proprioception	Function composite 6-13 weeks	Weng, 2009 ³¹⁹ Lin, 2009 ²⁴⁷ Tsauo, 2008 ³¹³	Studies: 3; Subjects: 198	High	Direct	Inconsistent	Yes	Imprecise	NA	Low
Exercise proprioception	Gait function 6-13 weeks	Jan, 2008 ²²⁸ Lin, 2009 ²⁴⁷ Tsauo, 2008 ³¹³	Studies: 3; Subjects: 181	High	Direct	Inconsistent	Yes	Imprecise	NA	Low
Orthotics	Gait function < 6 weeks	Hinman, 2009 ²¹⁸ Maly, 2002 ²⁵³ Kerrigan, 2002 ²³⁴ Kuroyanagi, 2007 ²⁴¹	Studies: 4; Subjects: 101	High	Direct	Consistent	No	Imprecise	NA	Low
Orthotics	Function composite < 6 weeks	Toda, 2005 ³⁰³ Bar-Ziv, 2010 ¹⁶³	Studies: 2; Subjects: 138	Medium	Direct	Inconsistent	Yes	Imprecise	NA	Low
Elastic subtalar strapping	Function composite 6-13 weeks	Toda, 2001 ³⁰⁴ Toda, 2004 ³⁰⁷ Toda, 2008 ³⁰⁵	Studies: 3; Subjects: 246	High	Direct	Consistent	No	Imprecise	Small	Low
Massage	Function composite 6-13 weeks	Yip, 2008 ³²⁵ Ko, 2009 ²³⁶	Studies: 2; Subjects: 94	High	Direct	Consistent	No	Imprecise	Moderate	Low
Estim	Disability 6-13 weeks	Garland, 2007 ²⁰⁷ Selfe, 2008 ²⁸⁷	Studies: 2; Subjects: 98	Low	Direct	Consistent	No	Imprecise	NA	Moderate

Appendix Table F13. Strength of evidence of differences in outcomes with physical therapy interventions for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Directness	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Estim	Pain < 6 weeks	Taylor, 1981 ²⁹⁷ Law, 2004 ²⁴³ Cheing, 2002 ¹⁸¹ Selfe, 2008 ²⁸⁷ Itoh, 2008 ²²⁴ Pietrosimone, 2009 ²⁷⁶ Grimmer, 1992 ²¹¹	Studies: 7; Subjects: 301	High	Direct	Consistent	No	Imprecise	Moderate	Low
Estim	Pain 6-13 weeks	Cetin, 2008 ¹⁷⁸ Itoh, 2008 ²²⁴ Gaines, 2004 ²⁰⁶ Garland, 2007 ²⁰⁷ Selfe, 2008 ²⁸⁷ Talbot, 2003 ²⁹⁵	Studies: 7; Subjects: 304	High	Direct	Consistent	No	Imprecise	NA	Low
Estim	Pain 13-26 weeks	Gaines, 2004 ²⁰⁶ Talbot, 2003 ²⁹⁵	Studies: 2; Subjects: 76	High	Direct	Consistent	No	Imprecise	Moderate	Low
Estim	Global assessment 6-13 weeks	Selfe, 2008 ²⁸⁷ Garland, 2007 ²⁰⁷	Studies: 2; Subjects: 98	Low	Direct	Consistent	No	Imprecise	Small	Low
Estim	Function composite 6-13 weeks	Cetin, 2008 ¹⁷⁸ Garland, 2007 ²⁰⁷ Selfe, 2008 ²⁸⁷	Studies: 3; Subjects: 138	Medium	Direct	Consistent	No	Imprecise	NA	Low
Estim	Function joint < 6 weeks	Selfe, 2008 ²⁸⁷ Grimmer, 1992 ²¹¹	Studies: 2; Subjects: 100	Medium	Direct	Consistent	No	Imprecise	NA	Low
Estim	Function joint 6-13 weeks	Garland, 2007 ²⁰⁷ Selfe, 2008 ²⁸⁷	Studies: 2; Subjects: 98	Low	Direct	Consistent	No	Imprecise	NA	Moderate

Appendix Table F13. Strength of evidence of differences in outcomes with physical therapy interventions for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Directness	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Estim	Gait function < 6 weeks	Yurtkuran, 1999 ³²⁷ Cheing, 2004 ¹⁸² Law, 2004 ²⁴⁴ Pietrosimone, 2010 ²⁷⁷	Studies: 4; Subjects: 191	High	Direct	Inconsistent	Yes	Imprecise	NA	Low
Estim	Gait function 6-13 weeks	Cetin, 2008 ¹⁷⁸ Cheing, 2004 ¹⁸² Talbot, 2003 ²⁹⁵	Studies: 3; Subjects: 164	High	Direct	Consistent	No	Imprecise	NA	Low
Estim	Strength 120 degree extension 6-13 weeks	Cetin, 2008 ¹⁷⁸ Talbot, 2003 ²⁹⁵	Studies: 2; Subjects: 118	Medium	Direct	Inconsistent	No	Imprecise	NA	Low
Estim	Strength 60 degree extension 6-13 weeks	Cetin, 2008 ¹⁷⁸ Cheing, 2004 ¹⁸²	Studies: 2; Subjects: 146	High	Direct	Consistent	No	Imprecise	Moderate	Low
Exercise aerobic	Disability < 6 weeks	Deyle, 2000 ¹⁸⁹ Aglamis, 2008 ¹⁵⁴	Studies: 2; Subjects: 117	High	Direct	Inconsistent	Yes	Imprecise	Large	Low
Exercise aerobic	Disability 6-13 weeks	Yip, 2007 ³²⁴ Yip, 2008 ³²⁶ Kovar, 1992 ²³⁸ Deyle, 2000 ¹⁸⁹ Bautch, 1997 ¹⁶⁵ Peloquin, 1999 ²⁷⁴ Keefe, 2004 ²³³ Aglamis, 2008 ¹⁵⁴	Studies: 8; Subjects: 739	High	Direct	Inconsistent	Yes	Imprecise	NA	Low
Exercise aerobic	Disability 13-26 weeks	Yip, 2007 ³²⁴ Yip, 2008 ³²⁶	Studies: 32 Subjects: 277	Medium	Direct	Consistent	No	Imprecise	NA	Low
exercise aerobic	Disability >26 weeks	Yip, 2008 ³²⁶ Sullivan, 1998 ³³¹ Rejeski, 2002 ²⁸⁰ Ettinger, 1997 ¹⁹⁵	Studies: 4; Subjects: 806	High	Direct	Consistent	No	Precise	Small	Low

Appendix Table F13. Strength of evidence of differences in outcomes with physical therapy interventions for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Directness	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Exercise aerobic	Psychological disability 6-13 weeks	An, 2008 ¹⁵⁷ Peloquin, 1999 ²⁷⁴ Keefe, 2004 ²³³ Aglamis, 2008 ¹⁵⁴	Studies: 4; Subjects: 271	High	Direct	Inconsistent	Yes	Imprecise	NA	Low
Exercise aerobic	Pain <6 weeks	Messier, 2004 ³³⁰ Aglamis, 2008 ¹⁵⁴	Studies: 2; Subjects: 137	High	Direct	Inconsistent	Yes	Imprecise	NA	Low
Exercise aerobic	Pain 6-13 weeks	Yip, 2007 ³²⁴ Yip, 2008 ³²⁶ Kovar, 1992 ²³⁸ An, 2008 ¹⁵⁷ Messier, 1997 ³³² Talbot, 2003 ²⁹⁴ Bautch, 1997 ¹⁶⁵ Peloquin, 1999 ²⁷⁴ Keefe, 2004 ²³³ Farr, 2010 ¹⁰ Hay, 2006 ²¹⁴ Aglamis, 2008 ¹⁵⁴	Studies: 12; Subjects: 1242	High	Direct	Inconsistent	Yes	Precise	Small	Low
Exercise aerobic	Pain 13-26 weeks	Yip, 2007 ³²⁴ Yip, 2008 ³²⁶ Talbot, 2003 ²⁹⁴ Messier, 2004 ³³⁰ Messier, 1997 ³³² Hay, 2006 ²¹⁴	Studies: 6; Subjects: 953	High	Direct	Consistent	No	Precise	NA	Low

Appendix Table F13. Strength of evidence of differences in outcomes with physical therapy interventions for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Directness	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Exercise aerobic	Pain >26 weeks	Ettinger, 1997 ¹⁹⁵ Farr, 2010 ¹⁰ Yip, 2008 ³²⁶ Hay, 2006 ²¹⁴ Sullivan, 1998 ³³¹ Messier, 2004 ³³⁰	Studies: 6; Subjects: 1221	High	Direct	Consistent	No	Precise	Small	Low
Exercise aerobic	Function composite 6-13 weeks	Jan, 2009 ²²⁶ An, 2008 ¹⁵⁷ Hay, 2006 ²¹⁴	Studies: 3; Subjects: 351	Medium	Direct	Inconsistent	Yes	Imprecise	Large	Low
Exercise aerobic	Function composite >26 weeks	Hay, 2006 ²¹⁴ Messier, 2004 ³³⁰ Ettinger, 1997 ¹⁹⁵	Studies: 3; Subjects: 826	Medium	Direct	Inconsistent	Yes	Precise	NA	Low
Exercise aerobic	Gait function < 6 weeks	Messier, 1997 ³³² Deyle, 2000 ¹⁸⁹ Aglamis, 2008 ¹⁵⁴	Studies: 3; Subjects: 220	High	Direct	Consistent	No	Imprecise	Small	Low
Exercise aerobic	Gait function 6-13 weeks	Peterson, 1993 ³³³ Jan, 2009 ²²⁶ An, 2008 ¹⁵⁷ Deyle, 2000 ¹⁸⁹ Messier, 1997 ³³² Talbot, 2003 ²⁹⁴ Peloquin, 1999 ²⁷⁴ Aglamis, 2008 ¹⁵⁴	Studies: 8; Subjects: 632	High	Direct	Consistent	No	Precise	Moderate	Low
Exercise aerobic	Gait function 13-26 weeks	Messier, 1997 ³³² Talbot, 2003 ²⁹⁴ Messier, 2004 ³³⁰	Studies: 3; Subjects: 459	High	Direct	Consistent	No	Precise	Small	Low
Exercise aerobic	Gait function >26 weeks	Focht, 2005 ³³⁴ Ettinger, 1997 ¹⁹⁵	Studies: 2; Subjects: 609	Medium	Direct	Consistent	No	Precise	Moderate	Low

Appendix Table F13. Strength of evidence of differences in outcomes with physical therapy interventions for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Directness	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Exercise aerobic	Health perception 6-13 weeks	An, 2008 ¹⁵⁷ Aglamis, 2008 ¹⁵⁴	Studies: 2; Subjects: 62	High	Direct	Inconsistent	Yes	Imprecise	NA	Low
Exercise aerobic	Health perception >26 weeks	Sullivan, 1998 ³³¹ Yip, 2008 ³²⁶ Rejeski, 2002 ²⁸⁰	Studies: 3; Subjects: 513	High	Direct	Consistent	No	Precise	NA	Low
Exercise aquatic	Disability 6-13 weeks	Rooks, 2006 ²⁸³ Lund, 2008 ²⁵⁰	Studies: 2; Subjects: 99	Medium	Direct	Consistent	No	Imprecise	NA	Low
Exercise aquatic	Disability 13-26 weeks	Patrick, 2001 ²⁷³ Lund, 2008 ²⁵⁰	Studies: 2; Subjects: 303	Medium	Direct	Consistent	No	Imprecise	Small	Low
Exercise aquatic	Pain 6-13 weeks	Rooks, 2006 ²⁸³ Lund, 2008 ²⁵⁰	Studies: 2; Subjects: 99	Medium	Direct	Consistent	No	Imprecise	NA	Low
Exercise aquatic	Pain 13-26 weeks	Patrick, 2001 ²⁷³ Lund, 2008 ²⁵⁰	Studies: 2; Subjects: 303	Medium	Direct	Consistent	No	Imprecise	NA	Low
Exercise aquatic	QL 13-26 weeks	Patrick, 2001 ²⁷³ Lund, 2008 ²⁵⁰	Studies: 2; Subjects: 303	Medium	Direct	Consistent	No	Imprecise	NA	Low
Exercise aquatic	Function composite 6-13 weeks	Rooks, 2006 ²⁸³ Lund, 2008 ²⁵⁰	Studies: 2; Subjects: 99	Medium	Direct	Consistent	No	Imprecise	NA	Low
Exercise strength	Disability 6-13 weeks	Schilke, 1996 ²⁸⁵ Kuptniratsaikul, 2002 ²⁴⁰ Doi, 2008 ¹⁹² Lund, 2008 ²⁵⁰	Studies: 4; Subjects: 606	Medium	Direct	Inconsistent	Yes	Imprecise	NA	Low
Exercise strength	Disability 13-26 weeks	Baker, 2001 ¹⁶⁰ Lund, 2008 ²⁵⁰ Kuptniratsaikul, 2002 ²⁴⁰	Studies: 3; Subjects: 490	Medium	Direct	Consistent	No	Precise	Small	Low
Exercise strength	Disability >26 weeks	Kuptniratsaikul, 2002 ²⁴⁰ Ettinger, 1997 ¹⁹⁵	Studies: 2; Subjects: 687	Medium	Direct	Inconsistent	Yes	Precise	NA	Low

Appendix Table F13. Strength of evidence of differences in outcomes with physical therapy interventions for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Directness	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Exercise strength	Pain 6-13 weeks	Swank, 2011 ²⁹³ Schilke, 1996 ²⁸⁵ Kuptniratsaikul, 2002 ²⁴⁰ Gur, 2002 ²¹² Jan, 2008 ²²⁷ Cheing, 2002 ¹⁸¹ Weng, 2009 ³¹⁹ Doi, 2008 ¹⁹² Lin, 2009 ²⁴⁷ Lund, 2008 ²⁵⁰ Borjesson, 1996 ¹⁷⁰ Lim, 2008 ²⁰ Bennell, 167	Studies: 13; Subjects: 1404	High	Direct	Inconsistent	Yes	Precise	Moderate	Low
Exercise strength	Pain 13-26 weeks	Baker, 2001 ¹⁶⁰ Topp, 2002 ³¹⁰ Lund, 2008 ²⁵⁰ Kuptniratsaikul, 2002 ²⁴⁰	Studies: 4; Subjects: 592	Medium	Direct	Consistent	No	Precise	Small	Low
Exercise strength	Pain >26 weeks	Ettinger, 1997 ¹⁹⁵ Kuptniratsaikul, 2002 ²⁴⁰ Weng, 2009 ³¹⁹	Studies: 3; Subjects: 786	Medium	Direct	Inconsistent	Yes	Precise	Moderate	Low
Exercise strength	QL 6-13 weeks	Doi, 2008 ¹⁹² Lund, 2008 ²⁵⁰	Studies: 2; Subjects: 194	Medium	Direct	Consistent	No	Imprecise	NA	Low
Exercise strength	Function composite 6-13 weeks	Jan, 2008 ²²⁷ Weng, 2009 ³¹⁹ Lin, 2009 ²⁴⁷ Lim, 2008 ²⁰ Lund, 2008 ²⁵⁰ Bennell, 2010 ¹⁶⁷	Studies: 6; Subjects: 521	Medium	Direct	Inconsistent	Yes	Precise	Large	Low
Exercise strength	Function composite 13-26 weeks	Baker, 2001 ¹⁶⁰ Lund, 2008 ²⁵⁰ Topp, 2002 ³¹⁰	Studies: 3; Subjects: 200	Medium	Direct	Consistent	No	Imprecise	Small	Low
Exercise strength	Function composite >26 weeks	Weng, 2009 ³¹⁹ Ettinger, 1997 ¹⁹⁵	Studies: 2; Subjects: 394	Medium	Direct	Inconsistent	Yes	Imprecise	Large	Low

Appendix Table F13. Strength of evidence of differences in outcomes with physical therapy interventions for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Directness	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Exercise strength	Gait function 6-13 weeks	Kuptniratsaikul, 2002 ²⁴⁰ Gur, 2002 ²¹² Jan, 2008 ²²⁷ Cheing, 2004 ¹⁸² Lin, 2009 ²⁴⁷ Borjesson, 1996 ¹⁷⁰ Lim, 2008 ²⁰ Bennell, 1997 ¹⁶⁷ Swank, 2011 ²⁹³	Studies: 9; Subjects: 958	High	Direct	Inconsistent	Yes	Precise	Small	Low
Exercise strength	Gait function 13-26 weeks	Topp, 2002 ³¹⁰ Kuptniratsaikul, 2002 ²⁴⁰	Studies: 2; Subjects: 494	Medium	Direct	Consistent	No	Precise	Small	Low
Exercise strength	Gait function >26 weeks	Kuptniratsaikul, 2002 ²⁴⁰ Ettinger, 1997 ¹⁹⁵	Studies: 2; Subjects: 687	Medium	Direct	Consistent	No	Precise	Small	Low
PEMF	Pain < 6 weeks	Ay, 2009 ¹⁵⁹ Thamsborg, 2005 ²⁹⁸	Studies: 2; Subjects: 145	Low	Direct	Consistent	No	Imprecise	NA	Moderate
PEMF	Function composite < 6 weeks	Ay, 2009 ¹⁵⁹ Thamsborg, 2005 ²⁹⁸	Studies: 2; Subjects: 145	Low	Direct	Consistent	No	Imprecise	NA	Moderate
Tai Chi	Disability 6-13 weeks	Lee, 2009 ²⁴⁵ Brismee, 2007 ¹⁷¹	Studies: 2; Subjects: 85	Medium	Direct	Consistent	No	Imprecise	NA	Low
Tai Chi	Disability 13-26 weeks	Brismee, 2007 ¹⁷¹ Song, 2010 ²⁹²	Studies: 2; Subjects: 123	Medium	Direct	Consistent	No	Imprecise	NA	Low
Tai Chi	Pain 6-13 weeks	Lee, 2009 ²⁴⁵ Brismee, 2007 ¹⁷¹	Studies: 2; Subjects: 85	Medium	Direct	Consistent	No	Imprecise	NA	Low
Tai Chi	Function composite 6-13 weeks	Lee, 2009 ²⁴⁵ Brismee, 2007 ¹⁷¹	Studies: 2; Subjects: 85	Medium	Direct	Consistent	No	Imprecise	Small	Low
Tai Chi	Function joint 6-13 weeks	Lee, 2009 ²⁴⁵ Brismee, 2007 ¹⁷¹	Studies: 2; Subjects: 85	Medium	Direct	Consistent	No	Imprecise	NA	Low

Appendix Table F13. Strength of evidence of differences in outcomes with physical therapy interventions for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Directness	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Ultrasound	Disability < 6 weeks	Tascioglu, 2010 ²⁹⁶ Ozgonenel, 2009 ²⁷⁰	Studies: 2; Subjects: 157	Medium	Direct	Consistent	No	Imprecise	NA	Low
Ultrasound	Pain < 6 weeks	Tascioglu, 2010 ²⁹⁶ Ozgonenel, 2009 ²⁷⁰	Studies: 2; Subjects: 157	Medium	Direct	Inconsistent	Yes	Imprecise	Moderate	Low
Ultrasound	Pain 6-13 weeks	Huang, 2005 ²²³ Huang, 2005 ²²² Cetin, 2008 ¹⁷⁸	Studies: 3; Subjects: 200	Medium	Direct	Consistent	No	Imprecise	Moderate	Low
Ultrasound	Pain >26 weeks	Huang, 2005 ²²³ Huang, 2005 ²²²	Studies: 2; Subjects: 160	Medium	Direct	Consistent	No	Imprecise	Moderate	Low
Ultrasound	Function composite 6-13 weeks	Huang, 2005 ²²³ Huang, 2005 ²²² Cetin, 2008 ¹⁷⁸	Studies: 3; Subjects: 200	Medium	Direct	Inconsistent	Yes	Imprecise	NA	Low
Ultrasound	Function composite >26 weeks	Huang, 2005 ²²² Huang, 2005 ²²³	Studies: 2; Subjects: 160	Medium	Direct	Consistent	No	Imprecise	Large	Low
Ultrasound	Gait function < 6 weeks	Tascioglu, 2010 ²⁹⁶ Ozgonenel, 2009 ²⁷⁰	Studies: 2; Subjects: 157	Medium	Direct	Inconsistent	Yes	Imprecise	NA	Low
Ultrasound	Gait function 6-13 weeks	Huang, 2005 ²²³ Huang, 2005 ²²² Cetin, 2008 ¹⁷⁸	Studies: 3; Subjects: 200	Medium	Direct	Inconsistent	Yes	Imprecise	Large	Low
Ultrasound	Gait function >26 weeks	Huang, 2005 ²²² Huang, 2005 ²²³	Studies: 2; Subjects: 160	Medium	Direct	Inconsistent	Yes	Imprecise	Large	Low
Exercise aquatic vs. aerobic	Pain 6-13 weeks	Lund, 2008 ²⁵⁰ Wyatt, 2001 ³²²	Studies: 2; Subjects: 110	Medium	Direct	Inconsistent	Yes	Imprecise	NA	Low
Laterally vs. neutrally wedged insole	Function composite 6-13 weeks	Maillefert, 2001 ²⁵² Toda, 2008 ³⁰⁵	Studies: 2; Subjects: 383	Medium	Direct	Consistent	No	Imprecise	NA	Low

Appendix Table F14. Effectiveness of physical therapy intervention; results from individual RCTs

Author, year	Comparison	Outcome/week of followup	Subjects in active/control arms	Type of risk/measures	Risk of bias	Mean (95% CI)
Education						
Rejeski, 2002 ²⁸⁰	Dietary education (with exercise in both arms)	Disability / Repeated measure (average of 6 and 18- month data) weeks	76/80	Mean	Medium	-3.43 (-6.79; -0.07)
Rejeski, 2002 ²⁸⁰	Dietary education (with exercise in both arms)	Psychological disability / Repeated measure (average of 6 and 18- month data) weeks	76/80	Mean	Medium	-0.46 (-3.40; 2.48)
Rejeski, 2002 ²⁸⁰	Dietary education (with exercise in both arms)	Health / Repeated measure (average of 6 and 18- month data) weeks	76/80	Mean	Medium	-4.67 (-11.09; 1.75)
Messier, 2004 ³³⁰	Dietary education (with exercise in both arms)	Function composite / 72 weeks	76/80	Mean	low	2.66 (-1.70; 7.02)
Messier, 2004 ³³⁰	Dietary education (with exercise in both arms)	Gait function / 24 weeks	76/80	Mean	low	-17.33 (-51.68; 17.02)
Rejeski, 2002 ²⁸⁰	Dietary education (without exercise in both arms)	Disability / Repeated measure (average of 6 and 18- month data) weeks	82/78	Mean	Medium	-3.79 (-6.68; -0.90)
Rejeski, 2002 ²⁸⁰	Dietary education (without exercise in both arms)	Psychological disability / Repeated measure (average of 6 and 18- month data) weeks	82/78	Mean	Medium	-0.38 (-3.22; 2.46)
Rejeski, 2002 ²⁸⁰	Dietary education (without exercise in both arms)	Health / Repeated measure (average of 6 and 18- month data) weeks	82/78	Mean	Medium	-6.35 (-11.92; -0.78)
Messier, 2004 ³³⁰	Dietary education (without exercise in both arms)	Function composite / 72 weeks	82/78	Mean	low	0.83 (-3.33; 4.99)
Messier, 2004 ³³⁰	Dietary education (without exercise in both arms)	Gait function / 24 weeks	82/78	Mean	low	-5.12 (-39.54; 29.30)
Keefe, 2004 ²³³	Spouse-assisted pain coping skill training (with exercise in both arms)	Disability / 12 weeks	20/16	Mean	Medium	18.25 (-7.65; 44.15)
Keefe, 2004 ²³³	Spouse-assisted pain coping skill training (with exercise in both arms)	Psychological disability / 12 weeks	20/16	Mean	Medium	0.33 (-0.35; 1.01)
Keefe, 2004 ²³³	Spouse-assisted pain coping skill training (without exercise in both arms)	Disability / 12 weeks	18/18	Mean	Medium	9.96 (-20.49; 40.41)

Appendix Table F14. Effectiveness of physical therapy intervention; results from individual RCTs (continued)

Author, year	Comparison	Outcome/week of followup	Subjects in active/control arms	Type of risk/measures	Risk of bias	Mean (95% CI)
Keefe, 2004 ²³³	Spouse-assisted pain coping skill training (without exercise in both arms)	Psychological disability / 12 weeks	18/18	Mean	Medium	0.58 (-0.22; 1.38)
Hay, 2006 ²¹⁴	Aerobic exercise	Global assessment / 52 weeks	109/108	OR	Medium	1.41 (0.61; 3.22)
Thorstensson, 2005 ³⁰⁰	Aerobic exercise	QL / 26 weeks	30/31	change	high	7.40 (-1.51; 16.31)
Hay, 2006 ²¹⁴	Aerobic exercise	Satisfaction / 52 weeks	109/108	OR	Medium	2.36 (1.24; 4.51)
An, 2008 ¹⁵⁷	Aerobic exercise	Joint function / 8 weeks	14/14	Mean	Medium	-31.50 (-66.04; 3.04)
Thomas, 2002 ²⁹⁹	Aerobic exercise	Function joint / 104 weeks	470/316	Mean difference	low	-0.29 (-0.5; -0.1)
Ettinger, 1997 ¹⁹⁵	Aerobic exercise	Transfer / 13, 39, 78 weeks	144/149	Mean	low	-1.90 (-2.73; -1.07)
	Education plus aerobic exercise					
Keefe, 2004 ²³³	Spouse-assisted pain coping skill training plus aerobic exercise	Disability / 12 weeks	20/18	Mean	Medium	14.54 (-14.10; 43.18)
Keefe, 2004 ²³³	Spouse-assisted pain coping skill training plus aerobic exercise	Psychological disability / 12 weeks	20/18	Mean	Medium	0.41 (-0.31; 1.13)
Messier, 2004 ³³⁰	Dietary education plus aerobic exercise	Pain / 72 weeks	76/78	Mean	low	-0.95 (-2.23; 0.33)
Messier, 2004 ³³⁰	Dietary education plus aerobic exercise	Function composite / 72 weeks	76/78	Mean	low	2.33 (-2.02; 6.68)
Messier, 2004 ³³⁰	Dietary education plus aerobic exercise	Gait function / 72 weeks	76/78	Mean	low	-0.92 (-3.10; 1.26)
	Aquatic exercise					
Patrick, 2001 ²⁷³	Aquatic exercise	Psychological disability / 20 weeks	125/124	Mean	Medium	-1.14 (-2.48; 0.21)
Rooks, 2006 ²⁸³	Aquatic exercise	Function composite / 6 weeks	22/23	Mean	Medium	2.70 (-4.17; 9.57)
Rooks, 2006 ²⁸³	Aquatic exercise	Gait function / 6 weeks	22/23	Mean	Medium	1.77 (0.45; 3.09)
	Strengthening exercise					
Borjesson, 1996 ¹⁷⁰	Strengthening exercise	Global assessment / 12 weeks	34/34	OR	Medium	47.14 (5.75; 386.29)
Baker, 2001 ¹⁶⁰	Strengthening exercise	Psychological disability / 16 weeks	23/23	Mean	Medium	-11.30 (-19.68; -2.92)
Baker, 2001 ¹⁶⁰	Strengthening exercise	Health / 16 weeks	23/23	Mean	Medium	-6.70 (-19.43; 6.03)

Appendix Table F14. Effectiveness of physical therapy intervention; results from individual RCTs (continued)

Author, year	Comparison	Outcome/week of followup	Subjects in active/control arms	Type of risk/measures	Risk of bias	Mean (95% CI)
Ettinger, 1997 ¹⁹⁵	Strengthening exercise	Function transfers / Repeated measure at 3, 9, 18 month weeks	146/149	Mean	low	-1.60 (-2.43; -0.77)
Topp, 2002 ³¹⁰	Strengthening exercise (dynamic resistance training)	Joint function / 16 weeks	35/35	mean	low	-0.46 (-1.20; 0.28)
Topp, 2002 ³¹⁰	Strengthening exercise (isometric resistance training)	Joint function / 16 weeks	32/35	mean	low	-0.47 (-1.22; 0.28)
Topp, 2002 ³¹⁰	Strengthening exercise (dynamic resistance training)	Transfers / 16 weeks	35/35	Mean	low	-2.45 (-5.32; 0.42)
Topp, 2002 ³¹⁰	Strengthening exercise (isometric resistance training)	Transfers / 16 weeks	32/35	Mean	low	-1.79 (-4.68; 1.10)
Balance exercise						
Chaipinyo, 2009 ¹⁷⁹	Balance exercise	Pain / 4 weeks	24/24	Mean	Medium	-5.00 (-13.00; 3.00)
Chaipinyo, 2009 ¹⁷⁹	Balance exercise	QL / 4 weeks	24/24	Mean	Medium	-8.00 (-18.77; 2.77)
Chaipinyo, 2009 ¹⁷⁹	Balance exercise	Disability / 4 weeks	24/24	Mean	Medium	-6.00 (-12.56; 0.56)
Chaipinyo, 2009 ¹⁷⁹	Balance exercise	Gait function / 4 weeks	24/24	Mean	Medium	-5.00 (-6.79; -3.21)
Vibration exercise						
Trans, 2009 ³¹¹	Conventional stable whole body vibration (WBV) exercise	Pain / 8 weeks	18/17	Mean difference	low	-1.4 (-14.6; 11.9)
Trans, 2009 ³¹¹	Conventional stable whole body vibration (WBV) exercise	Composite function QL / 8 weeks	18/17	Mean difference	low	-1.2 (-13.3; 10.9)
Trans, 2009 ³¹¹	Conventional stable whole body vibration (WBV) exercise	Joint function / 8 weeks	18/17	Mean difference	low	1.3 (-13.2; 15.9)
Trans, 2009 ³¹¹	A balance board with a build-in vibration device	Pain / 8 weeks	17/17	Mean difference	low	-6.8 (-20.1; 6.6)
Trans, 2009 ³¹¹	A balance board with a build-in vibration device	Composite function QL / 8 weeks	17/17	Mean difference	low	-2.7 (-14.8; 9.4)
Trans, 2009 ³¹¹	A balance board with a build-in vibration device	Joint function / 8 weeks	17/17	Mean difference	low	5.6 (-8.7; 19.8)
Tai Chi						
Lee, 2009 ²⁴⁵	Tai Chi	Psychological disability / 8 weeks	29/15	Mean	low	-14.70 (-25.82; -3.58)
Lee, 2009 ²⁴⁵	Tai Chi	QL / 8 weeks	29/15	Mean	low	-9.30 (-20.97; 2.37)
Lee, 2009 ²⁴⁵	Tai Chi	Gait function / 8 weeks	29/15	Mean	low	-0.80 (-1.78; 0.18)

Appendix Table F14. Effectiveness of physical therapy intervention; results from individual RCTs (continued)

Author, year	Comparison	Outcome/week of followup	Subjects in active/control arms	Type of risk/measures	Risk of bias	Mean (95% CI)
Stretching exercise						
Aoki, 2009 ¹⁵⁸	Stretching exercise	Gait function / 11 weeks	19/17	Mean	low	4.80 (-1.75; 11.35)
Exercises were specifically educated						
Ravaud, 2009 ¹²	Exercise ED	Disability / 52 weeks	129/147	Change	Medium	-2.26 (-4.14; -0.38)
Victor, 2005 ³¹⁶	Exercise ED	Psychological disability / 52 weeks	120/73	Mean	Medium	-2.00 (-6.65; 2.65)
Ravaud, 2009 ¹²	Exercise ED	Global assessment / 52 weeks	146/181	change	Medium	-0.89 (-1.45; -0.33)
Victor, 2005 ³¹⁶	Exercise ED	Health / 52 weeks	120/73	Mean	Medium	-2.00 (-7.82; 3.82)
Ravaud, 2009 ¹²	Exercise ED	Satisfaction / 12 weeks	108/115	OR	Medium	1.66 (0.94; 2.92)
Ravaud, 2009 ¹²	Exercise ED	Function composite / 52 weeks	144/176	change	Medium	-3.23 (-5.98; -0.48)
Victor, 2005 ³¹⁶	Exercise ED	Function joint / 52 weeks	120/73	Mean	Medium	-0.50 (-1.05; 0.05)
Exercise program, not-specified						
O'Reilly, 1999 ²⁶⁸	Exercise NS	Pain / 24 weeks	78/113	change	high	-7.07 (-13.22; -0.92)
O'Reilly, 1999 ²⁶⁸	Exercise NS	Disability / 24 weeks	78/113	change	high	4.31 (-0.29; 8.91)
O'Reilly, 1999 ²⁶⁸	Exercise NS	Psychological disability / 24 weeks	78/113	change	high	2.70 (-1.52; 6.92)
O'Reilly, 1999 ²⁶⁸	Exercise NS	Health / 24 weeks	78/113	change	high	2.63 (-0.98; 6.24)
O'Reilly, 1999 ²⁶⁸	Exercise NS	Function composite / 24 weeks	78/113	change	high	-3.54 (-6.06; -1.02)
Exercise aerobic vs. strength						
Ettinger, 1997 ¹⁹⁵	exercise aerobic vs. strength	Pain/ Repeated measure at 3, 9, 18 month	144/166	mean	low	-0.07 (-0.22; 0.08)
Ettinger, 1997 ¹⁹⁵	exercise aerobic vs. strength	Disability/ Repeated measure at 3, 9, 18 month	144/166	mean	low	-0.02 (-0.13; 0.09)
Ettinger, 1997¹⁹⁵	exercise aerobic vs. strength	Gait function/ Repeated measure at 3, 9, 18 month	144/166	mean	low	-101.00 (-146.76; -55.24)
Ettinger, 1997 ¹⁹⁵	exercise aerobic vs. strength	Function composite/ Repeated measure at 3, 9, 18 month	144/166	mean	low	-0.20 (-0.75; 0.35)
Ettinger, 1997 ¹⁹⁵	exercise aerobic vs. strength	Function transfers/ Repeated measure at 3, 9, 18 month	144/166	mean	low	-0.30 (-1.13; 0.53)
Exercise aquatic vs. aerobic						
Silva, 2008 ²⁹⁰	exercise aquatic vs. aerobic	Function composite/ 18 weeks	32/32	mean	low	-1.94 (-4.33; 0.45)

Appendix Table F14. Effectiveness of physical therapy intervention; results from individual RCTs (continued)

Author, year	Comparison	Outcome/week of followup	Subjects in active/control arms	Type of risk/measures	Risk of bias	Mean (95% CI)
Silva, 2008 ²⁹⁰	exercise aquatic vs. aerobic	disability/ 18 weeks	32/32	mean	low	-7.12 (-14.82; 0.58)
Silva, 2008 ²⁹⁰	exercise aquatic vs. aerobic	Gait function/ 18 weeks	32/32	mean	low	-0.39 (-6.51; 5.73)
Exercise proprioception vs. strength						
Lin, 2009 ²⁴⁷	exercise proprioception vs. strength	Pain/ 8 weeks	36/36	mean	medium	0.10 (-1.13; 1.33)
Lin, 2009²⁴⁷	exercise proprioception vs. strength	Function composite/ 8 weeks	36/36	mean	medium	4.50 (0.35; 8.65)
Lin, 2009 ²⁴⁷	exercise proprioception vs. strength	Gait function/ 8 weeks	36/36	mean	medium	-0.70 (-3.62; 2.22)
Tai Chi vs. stretching						
Wang, 2009³¹⁷	Tai Chi vs. stretching	disability/ 48 weeks	20/20	change	low	-0.96 (-1.64; -0.28)
Wang, 2009³¹⁷	Tai Chi vs. stretching	psychological disability/ 48 weeks	20/20	change	low	-8.90 (-13.82; -3.98)
Wang, 2009 ³¹⁷	Tai Chi vs. stretching	Pain/ 48 weeks	20/20	change	low	-46.15 (-111.00; 18.70)
Wang, 2009 ³¹⁷	Tai Chi vs. stretching	global assessment/ 48 weeks	20/20	change	low	0.05 (-1.61; 1.71)
Wang, 2009 ³¹⁷	Tai Chi vs. stretching	Function composite/ 48 weeks	20/20	change	low	-105.30 (-294.67; 84.07)
Wang, 2009 ³¹⁷	Tai Chi vs. stretching	Function joint/ 48 weeks	20/20	change	low	-3.65 (-33.79; 26.49)
Wang, 2009 ³¹⁷	Tai Chi vs. stretching	Gait function/ 48 weeks	20/20	change	low	-14.61 (-79.69; 50.47)
Wang, 2009³¹⁷	Tai Chi vs. stretching	Function transfers/ 48 weeks	20/20	change	low	-5.98 (-10.86; -1.10)
Joint mobilization						
Pollard, 2008 ²⁷⁹	Joint mobilization	Pain / 2 weeks	26/17	Mean	low	-1.20 (-2.42; 0.02)
Pollard, 2008 ²⁷⁹	Joint mobilization	Disability / 2 weeks	26/17	Mean difference	low	-2.7 (-4.8; -0.6)
Pollard, 2008 ²⁷⁹	Joint mobilization	Global assessment / 2 weeks	26/17	Mean difference	low	-3.1 (-5; -1.3)
Moss, 2007 ²⁶⁰	Joint mobilization	Gait function / immediate after	38/38	percent change	Medium	-0.40 (-4.84; 4.04)
Deyle, 2005 ¹⁹⁰	Joint mobilization + exercise	Disability / 8 weeks	66/68	Mean	Medium	-216.80 (-395.60; -38.00)
Deyle, 2005 ¹⁹⁰	Joint mobilization + exercise	Gait function / 8 weeks	66/68	Mean	Medium	-42.20 (-85.00; 0.60)
Massage						
Yip, 2008 ³²⁵	Aromatic essential oil massage	Pain / 7 weeks	21/18	Mean	high	-1.69 (-3.13; -0.25)
Yip, 2008 ³²⁵	Oil massage	Pain / 7 weeks	20/18	Mean	high	-2.76 (-4.11; -1.41)
Perlman, 2006 ¹⁹	Massage	Disability / 8 weeks	34/34	change	Medium	-16.59 (-25.83; -7.35)
Yip, 2008 ³²⁵	Aromatic essential oil massage	Psychological disability / 7 weeks	21/18	change	high	-2.37 (-12.90; 8.16)

Appendix Table F14. Effectiveness of physical therapy intervention; results from individual RCTs (continued)

Author, year	Comparison	Outcome/week of followup	Subjects in active/control arms	Type of risk/measures	Risk of bias	Mean (95% CI)
Yip, 2008 ³²⁵	Oil massage	Psychological disability / 7 weeks	20/18	change	high	-2.65 (-14.16; 8.86)
Yip, 2008 ³²⁵	Aromatic essential oil massage	Health / 7 weeks	21/18	change	high	-8.24 (-18.08; 1.60)
Yip, 2008 ³²⁵	Oil massage	Health / 7 weeks	20/18	change	high	-11.53 (-21.74; -1.32)
Perlman, 2006 ¹⁹	Massage	Gait function / 8 weeks	34/34	change	Medium	-2.01 (-3.87; -0.15)
Moss, 2007 ²⁶⁰	Manual contact	Gait function / NA weeks	38/38	percent change	Medium	-3.98 (-8.15; 0.19)
Brace						
Horlick, 1993 ²²⁰	10 degree valgus brace	Pain / 6 weeks	20/20	Mean	Medium	-0.68 (-1.97; 0.61)
Horlick, 1993 ²²⁰	Neutral brace	Pain / 6 weeks	20/20	Mean	Medium	-0.16 (-1.46; 1.14)
Pajareya, 2003 ²⁷²	Elastic sleeve	Disability / 8 weeks	64/64	Mean	Medium	-1.83 (-5.68; 2.02)
Pajareya, 2003 ²⁷²	Elastic sleeve	Satisfaction / 8 weeks	64/64	OR	Medium	1.22 (0.60; 2.51)
Kirkley, 1999 ⁸⁶	Neoprene-sleeve	Disability / 26 weeks	38/40	change	Medium	-97.6 vs. 27.9, p=0.066
Kirkley, 1999 ⁸⁶	Neoprene-sleeve	Function composite / 26 weeks	38/40	change	Medium	-68.9 vs. 6.5, p=0.112
Kirkley, 1999 ⁸⁶	Neoprene-sleeve	Function joint / 26 weeks	38/40	change	Medium	-15.5 vs. 8.1, p=0.91
Kirkley, 1999 ⁸⁶	Neoprene-sleeve	Global assessment / 26 weeks	38/40	OR	Medium	4.12 (1.40; 12.14)
Richards, 2005 ²⁸¹	Non-valgus bracing	Function composite / 24 weeks	12/12	Mean	Medium	-4.20 (-37.24; 28.84)
Richards, 2005 ²⁸¹	Valgus bracing	Function composite / 24 weeks	12/12	Mean	Medium	-16.40 (-45.61; 12.81)
Brouwer, 2006 ¹⁷²	OAsys brace	Function composite / 52 weeks	60/57	Mean difference	high	-3 (-7.05; 1.05)
Brouwer, 2006 ¹⁷²	OAsys brace	Gait function / 52 weeks	60/57	Mean difference	high	-1.34 (-2.63; -0.05)
Brouwer, 2006 ¹⁷²	OAsys brace	QL / 52 weeks	60/57	Mean difference	high	0.01 (-0.08; 0.1)
Kirkley, 1999 ⁸⁶	Unloader-Brace	Disability / 26 weeks	41/40	change	Medium	-229.1 vs. 27.9, p<0.001
Kirkley, 1999 ⁸⁶	Unloader-Brace	Function composite / 26 weeks	41/40	change	Medium	-157.2 vs. 6.5, p=0.001
Kirkley, 1999 ⁸⁶	Unloader-Brace	Function joint / 26 weeks	41/40	change	Medium	-28.6 vs. 8.1, p<0.001
Kirkley, 1999 ⁸⁶	Unloader-Brace	Global assessment / 26 weeks	41/40	OR	Medium	8.85 (3.03; 25.84)
Orthotics						
Nigg, 2006 ²⁶⁵	Orthotics	Pain / 12 weeks	58/67	change	Medium	4.20 (-27.61; 36.01)

Appendix Table F14. Effectiveness of physical therapy intervention; results from individual RCTs (continued)

Author, year	Comparison	Outcome/week of followup	Subjects in active/control arms	Type of risk/measures	Risk of bias	Mean (95% CI)
Nigg, 2006 ²⁶⁵	Orthotics	Disability / 12 weeks	58/67	change	Medium	26.50 (-125.43; 178.43)
Nigg, 2006 ²⁶⁵	Orthotics	Global assessment / 12 weeks	58/67	change	Medium	-0.11 (-2.55; 2.33)
Nigg, 2006 ²⁶⁵	Orthotics	Function joint / 12 weeks	58/67	change	Medium	14.30 (-1.75; 30.35)
Orthotics vs. brace						
van Raaij, 2010 ³¹⁵	orthotics vs. brace	Pain/ 26 weeks	45/46	change	low	0.10 (-0.85; 1.05)
van Raaij, 2010 ³¹⁵	orthotics vs. brace	Function composite/ 26 weeks	45/46	change	low	-0.20 (-7.56; 7.16)
Laterally vs. neutrally wedged insole						
Bennell, 2011(21593096)	Laterally vs. neutrally wedged insole	Pain / 52 weeks	103/97	Mean	low	0.00 (-0.61; 0.61)
Bennell, 2011(21593096)	Laterally vs. neutrally wedged insole	Disability / 52 weeks	103/97	Mean	low	0.00 (-23.74; 23.74)
Bennell, 2011(21593096)	Laterally vs. neutrally wedged insole	Global assessment / 52 weeks	82/85	OR	low	0.77 (0.42; 1.43)
Bennell, 2011(21593096)	Laterally vs. neutrally wedged insole	QL / 52 weeks	103/97	Mean	low	0.00 (-0.06; 0.06)
Bennell, 2011(21593096)	Laterally vs. neutrally wedged insole	Function joint / 52 weeks	103/97	Mean	low	0.00 (-0.55; 0.55)
Kerrigan, 2002 ²³⁴	Laterally (5 degree) vs. neutrally wedged insole	Gait function / immediate after	15/15	Mean	NA	-0.02 (-0.16;0.12)
Kerrigan, 2002 ²³⁴	Laterally (10 degree) vs. neutrally wedged insole	Gait function / immediate after	15/15	Mean	NA	-0.01 (-0.60;0.58)
Taping						
Hinman, 2003 ²¹⁵	Taping	Pain / 6 weeks	29/29	Mean	low	1.50 (-0.42; 3.42)
Hinman, 2003 ²¹⁵	Taping	Disability / 6 weeks	29/29	Mean	low	5.90 (-6.55; 18.35)
Hinman, 2003 ²¹⁵	Taping	Function composite / 6 weeks	29/29	Mean	low	4.20 (-2.31; 10.71)
Hinman, 2003 ²¹⁹	Taping	Gait function	18/18	Mean difference	Medium	-0.2 (-0.68; 0.28)
Taping+ massage+ exercise						
Bennell, 2005 ¹⁶⁸	Taping+ massage+ exercise	Disability / 24 weeks	73/67	Mean	low	-0.20 (-0.98; 0.58)
Bennell, 2005 ¹⁶⁸	Taping + massage + exercise	QL / 24 weeks	73/67	Mean	low	0.04 (-0.02; 0.10)
Bennell, 2005 ¹⁶⁸	Taping + massage + exercise	Function composite / 24 weeks	73/67	Mean	low	-1.70 (-5.45; 2.05)
E-stim						
Selfe, 2008 ²⁸⁷	Estim	Health / 12 weeks	20/20	Mean	low	-9.19 (-20.72; 2.34)
Kang, 2007 ²³¹	Estim	Satisfaction / 0.3 weeks	35/28	OR	Medium	5.96 (1.20; 29.68)

Appendix Table F14. Effectiveness of physical therapy intervention; results from individual RCTs (continued)

Author, year	Comparison	Outcome/week of followup	Subjects in active/control arms	Type of risk/measures	Risk of bias	Mean (95% CI)
Talbot, 2003 ²⁹⁵	Estim	Function transfers / 24 weeks	20/18	Mean	Medium	-0.30 (-1.83; 1.23)
Cetin, 2008 ¹⁷⁸	Estim + hot pack	Function composite / 8 weeks	20/20	Mean	Medium	-0.50 (-1.78; 0.78)
Estim vs. exercise						
Durmus, 2007 ¹⁹³	Estim vs. exercise	Function composite / 4 weeks	25/25	Mean	low	-1.68 (-2.53; -0.83)
Durmus, 2007 ¹⁹³	Estim vs. exercise	Function joint / 4 weeks	25/25	Mean	low	-0.28 (-0.40; -0.16)
E-stim vs. US						
Cetin, 2008 ¹⁷⁸	E-stim vs. US	Pain/ 8 weeks	20/20	mean	medium	-0.03 (-0.84; 0.78)
Cetin, 2008 ¹⁷⁸	E-stim vs. US	Gait function/ 8 weeks	20/20	mean	medium	-0.20 (-6.44; 6.04)
Cetin, 2008 ¹⁷⁸	E-stim vs. US	Function composite/ 8 weeks	20/20	mean	medium	-0.45 (-1.80; 0.90)
PEMF						
Trock, 1994 ³¹²	PEMF	Disability / 10 weeks	42/44	change	Medium	1.76 (-0.83; 4.35)
Nicolakis, 2002 ²⁶⁴	PEMF	global assessment / 6 weeks	18/18	OR	Medium	4.38 (1.03; 18.63)
Thamsborg, 2005 ²⁹⁸	PEMF	Function joint / 12 weeks	45/45	Mean	low	-0.34 (-1.20; 0.52)
Nicolakis, 2002 ²⁶⁴	PEMF	Gait function / 6 weeks	18/18	change	Medium	1.80 (-4.15; 7.75)
Magnet therapy						
Wolsko, 2004 ³²¹	Magnet therapy	Disability / 1 day	13/13	change	Medium	-50.00 (-106.84; 6.84)
Wolsko, 2004 ³²¹	Magnet therapy	Global assessment / 6 weeks	13/13	OR	Medium	1.48 (0.26; 8.50)
Wolsko, 2004 ³²¹	Magnet therapy	Function composite / 6 weeks	13/13	change	Medium	-6.00 (-255.47; 243.47)
Wolsko, 2004 ³²¹	Magnet therapy	Function joint / 6 weeks	13/13	change	Medium	-12.00 (-42.99; 18.99)
Wolsko, 2004 ³²¹	Magnet therapy	Gait function / 6 weeks	13/13	change	Medium	-1.40 (-3.21; 0.41)
Diathermy						
Akyol, 2010 ¹⁵⁵	Diathermy	Psychological disability / 12 weeks	20/20	Mean	low	-0.85 (-3.58; 1.88)
Rattanachaiyanont, 2008 ⁸	Diathermy	Global assessment / 3 weeks	53/60	OR	Medium	1.84 (0.87; 3.89)
Akyol, 2010 ¹⁵⁵	Diathermy	Health / 12 weeks	20/20	Mean	low	0.50 (-9.36; 10.36)
Rattanachaiyanont, 2008 ⁸	Diathermy	Satisfaction / 3 weeks	53/60	OR	Medium	1.56 (0.59; 4.11)
Cantarini, 2007 ¹⁷⁷	Diathermy	Satisfaction / 12 weeks	24/20	OR	low	1.33 (0.39; 4.52)
Fukuda, 2011 ²⁰⁵	Diathermy	Quality of life / 52 weeks	31/23	Mean	Medium	8.20 (-0.74; 17.14)
Fukuda, 2011 ²⁰⁵	Diathermy	Quality of life / 52 weeks	32/23	Mean	Medium	-1.20 (-7.61; 5.21)
Cetin, 2008 ¹⁷⁸	Diathermy	Function composite / 8 weeks	20/20	Mean	Medium	-0.91 (-2.39; 0.57)

Appendix Table F14. Effectiveness of physical therapy intervention; results from individual RCTs (continued)

Author, year	Comparison	Outcome/week of followup	Subjects in active/control arms	Type of risk/measures	Risk of bias	Mean (95% CI)
Cetin, 2008 ¹⁷⁸	Diathermy	Gait function / 8 weeks	20/20	Mean	Medium	-0.05 (-4.87; 4.77)
	Mud pack					
Odabasi, 2008 ²⁶⁶	Mud pack	Disability / 27 weeks	30/30	Mean	low	-35.00 (-40.69; -29.31)
Odabasi, 2008 ²⁶⁶	Mud pack	Global assessment / 27 weeks	30/30	Mean	low	-3.30 (-4.23; -2.37)
Heat						
Cetin, 2008 ¹⁷⁸	Heat	Pain / 8 weeks	20/20	Mean	Medium	-0.61 (-1.42; 0.20)
Denegar, 2010 ¹⁸⁸	Heat (superficial heat therapy)	Disability / 1 weeks	34/34	change	Medium	-6.20 (-13.25; 0.85)
Denegar, 2010 ¹⁸⁸	Heat (hot pad treatment)	Disability / 1 weeks	34/34	change	Medium	-4.80 (-11.87; 2.27)
Cetin, 2008 ¹⁷⁸	Heat	Function composite / 8 weeks	20/20	Mean	Medium	-0.85 (-2.30; 0.60)
Cetin, 2008 ¹⁷⁸	Heat	Gait function / 8 weeks	20/20	Mean	Medium	0.65 (-4.06; 5.36)
Denegar, 2010 ¹⁸⁸	Heat (superficial heat therapy)	QL / 1 weeks	34/34	change	Medium	-5.70 (-12.60; 1.20)
Denegar, 2010 ¹⁸⁸	Heat (hot pad treatment)	QL / 1 weeks	34/34	change	Medium	-5.70 (-12.03; 0.63)
Mazzuca, 2004 ²⁵⁷	Heat	Function composite / 4 weeks	26/26	change	Medium	-1.00 (-5.72; 3.72)
Mazzuca, 2004 ²⁵⁷	Heat	Function joint / 4 weeks	26/26	change	Medium	-0.40 (-1.30; 0.50)
Cryotherapy						
Pietrosimone, 2009 ²⁷⁶	Cryotherapy	Pain / immediate after	11/12	Mean	high	-6.51 (-20.65; 7.63)
Denegar, 2010 ¹⁸⁸	Cryotherapy	Disability / 1 weeks	34/34	change	Medium	-5.60 (-12.55; 1.35)
Denegar, 2010 ¹⁸⁸	Cryotherapy	QL / 1 weeks	34/34	change	Medium	-4.70 (-11.26; 1.86)
Denegar, 2010 ¹⁸⁸	Cryotherapy	Function composite / 1 weeks	34/34	change	Medium	-6.20 (-13.71; 1.31)
Pietrosimone, 2009 ²⁷⁶	Cryotherapy	Strength / immediate after	11/12	Mean	high	-0.41 (-1.24; 0.42)
Cryotherapy + heat						
Denegar, 2010 ¹⁸⁸	Cryotherapy + heat	Disability / 1 weeks	34/34	change	Medium	-7.00 (-14.12; 0.12)
Denegar, 2010 ¹⁸⁸	Cryotherapy + heat	Function composite / 1 weeks	34/34	change	Medium	-6.70 (-14.19; 0.79)
Denegar, 2010 ¹⁸⁸	Cryotherapy + heat	QL / 1 weeks	34/34	change	Medium	-5.80 (-12.23; 0.63)
US						
Ozgonenel, 2009 ²⁷⁰	US	Function joint / 2.3 weeks	34/33	Mean	low	-0.10 (-0.92; 0.72)
Cetin, 2008 ¹⁷⁸	US + Heat	Function composite / 8 weeks	20/20	Mean	Medium	-0.05 (-1.40; 1.30)
Therapeutic touch						
Gordon, 1998 ²⁰⁹	Therapeutic touch	Pain / 6 weeks	8/11	Mean	Medium	-1.13 (-1.30; -0.96)
Gordon, 1998 ²⁰⁹	Therapeutic touch	Disability / 6 weeks	8/11	Mean	Medium	-0.79 (-0.92; -0.66)

Appendix Table F14. Effectiveness of physical therapy intervention; results from individual RCTs (continued)

Author, year	Comparison	Outcome/week of followup	Subjects in active/control arms	Type of risk/measures	Risk of bias	Mean (95% CI)
Gordon, 1998 ²⁰⁹	Therapeutic touch	Psychological disability / 6 weeks	8/11	Mean	Medium	-1.35 (-1.57; -1.13)
Gordon, 1998 ²⁰⁹	Therapeutic touch	QL / 6 weeks	8/11	Mean	Medium	-0.60 (-0.77;-0.43)

Negative values for mean differences or changes, and OR larger than 1 reflect improvements in knee symptoms compared with control groups.

Appendix Table F15. Exploring heterogeneity in pain relief around 3 months after aerobic exercise, compared to placebo; results from meta-regression

Variable	Coefficient	Standard Error	T Statistic	P>t	Lower 95% CI	Upper 95% CI
Treatment duration (week)	0.01	0.03	0.34	0.74	-0.06	0.08
Constant	-0.53	0.49	-1.09	0.30	-1.59	0.53
Median age	0.06	0.05	1.34	0.21	-0.04	0.16
Constant	-4.38	3.00	-1.46	0.17	-10.91	2.16
Female proportion	-0.03	0.02	-1.73	0.11	-0.07	0.01
Constant	1.89	1.35	1.40	0.19	-1.08	4.86
Body Mass Index	-0.21	0.22	-0.97	0.38	-0.78	0.35
Constant	5.80	6.69	0.87	0.43	-11.39	22.98
Number of treatments/week	-0.19	0.23	-0.81	0.44	-0.70	0.32
Constant	0.05	0.65	0.07	0.95	-1.38	1.47
Duration per section	0.00	0.00	1.12	0.29	0.00	0.01
Constant	-0.42	0.16	-2.67	0.03	-0.78	-0.07

Appendix Table F16. Exploring heterogeneity by quality of study in pain relief around 3 months after aerobic exercise, compared to placebo; results from subgroup analyses

	Standardized ES	Lower 95% CI	Upper 95% CI	P-value	I-squared
Overall	-0.33	-0.57	-0.09	0.00	75.2%
With PT involvement	-0.44	-0.68	-0.20	0.67	0.0%
No PT involvement	-0.33	-0.64	-0.01	0.00	76.8%
Medium/low risk of bias	-0.30	-0.43	-0.16	0.47	0.0%
High risk of bias	-0.63	-1.36	0.11	0.00	91.0%

Bold: indicated significant results without significant heterogeneity in the specific subgroup

Appendix Table F17. Exploring heterogeneity by quality of study in composite function 3 months after aerobic exercise compared to placebo; results from subgroup analyses

	Standardized ES	Lower 95% CI	Upper 95% CI	P-value	I-squared
Overall	-0.841	-1.358	-0.325	0.003	78.50%
With PT involvement	-0.422	-0.675	-0.168	0.981	0.00%
No PT involvement	-1.256	-1.619	-0.894	0.64	0.00%

Studies with PT are also medium risk of bias and studies without PT involvement are low risk of bias; Bold: indicated significant results without significant heterogeneity in the specific subgroup

Appendix Table F18. Exploring heterogeneity in gait function around 3 months after strengthening exercise compared to placebo; results from meta-regression

Variable	Coefficient	Standard Error	T Statistic	P>t	Lower 95% CI	Upper 95% CI
Treatment duration (week)	-0.02	0.07	-0.27	0.79	-0.17	0.13
Constant	-0.34	0.58	-0.58	0.57	-1.62	0.95
Median age	0.07	0.06	1.16	0.27	-0.07	0.21
Constant	-5.11	3.99	-1.28	0.23	-14.00	3.77
Female proportion	0.00	0.02	0.21	0.84	-0.03	0.04
Constant	-0.63	1.08	-0.59	0.57	-3.11	1.85
Body Mass Index	-0.14	0.08	-1.67	0.16	-0.35	0.07
Constant	3.54	2.39	1.48	0.20	-2.61	9.69
Number of treatments/week	0.28	0.15	1.90	0.09	-0.05	0.61
Constant	-1.52	0.57	-2.66	0.02	-2.80	-0.25
Duration per section	0.01	0.02	0.53	0.64	-0.05	0.07
Constant	-0.79	0.94	-0.84	0.46	-3.80	2.21

Appendix Table F19. Exploring heterogeneity in function composite around 3 months after strengthening exercise compared to placebo; results from meta-regression

Variable	Coefficient	Standard Error	T Statistic	P>t	Lower 95% CI	Upper 95% CI
Treatment duration (week)	0.14	0.06	2.17	0.07	-0.01	0.29
Constant	-2.16	0.62	-3.49	0.01	-3.63	-0.70
Median age	0.13	0.09	1.41	0.20	-0.09	0.34
Constant	-8.97	5.78	-1.55	0.17	-22.65	4.70
Female proportion	-0.02	0.01	-1.64	0.15	-0.05	0.01
Constant	0.44	0.80	0.55	0.60	-1.45	2.33
Body Mass Index	0.14	0.06	2.15	0.12	-0.07	0.34
Constant	-4.41	1.75	-2.52	0.09	-9.97	1.16
Number of treatments/week	0.17	0.17	1.02	0.35	-0.24	0.57
Constant	-1.47	0.58	-2.53	0.05	-2.89	-0.05
Duration per section	0.02	0.03	0.54	0.64	-0.11	0.14
Constant	-1.52	1.22	-1.24	0.34	-6.76	3.73

Appendix Table F20. Exploring heterogeneity in pain relief around 3 months after strengthening exercise, compared to placebo; results from meta-regression

Variable	Coefficient	Standard Error	T Statistic	P>t	Lower 95% CI	Upper 95% CI
Treatment duration (week)	-0.07	0.08	-0.96	0.35	-0.24	0.09
Constant	-0.05	0.65	-0.08	0.94	-1.43	1.33
Median age	0.14	0.05	2.66	0.02	0.03	0.26
Constant	-9.90	3.48	-2.84	0.01	-17.27	-2.52
Female proportion	0.01	0.01	0.77	0.45	-0.02	0.03
Constant	-1.21	0.86	-1.41	0.18	-3.05	0.63
Body Mass Index	-0.11	0.07	-1.49	0.18	-0.29	0.07
Constant	2.58	2.09	1.23	0.26	-2.36	7.53
Number of treatments/week	0.22	0.16	1.34	0.20	-0.13	0.57
Constant	-1.32	0.57	-2.30	0.04	-2.55	-0.08
Duration per section	0.01	0.01	0.87	0.42	-0.02	0.05
Constant	-1.04	0.66	-1.57	0.17	-2.65	0.57

Bold: Significant result in meta-regression analysis

Appendix Table F21. Exploring heterogeneity by quality of study in pain relief 3 months after strengthening exercise, compared to placebo; results from subgroup analyses

	Standardized ES	Lower 95% CI	Upper 95% CI	P-value	I-squared
Overall	-0.64	-0.89	-0.39	0	78.2%
With PT involvement	-0.51	-0.70	-0.31	0.001	63.9%
No PT involvement	-1.75	-3.02	-0.48	0	84.3%
Low risk of bias	-0.99	-1.61	-0.36	0.004	74.2%
Medium risk of bias	-0.47	-0.71	-0.24	0	70.0%
High risk of bias	-2.00	-2.56	-1.43	NA	NA

NA: Not applicable (only one study in the subgroup); Bold: indicated significant results without significant heterogeneity in the specific subgroup

Appendix Table F22. Exploring heterogeneity by quality of study in gait function 3 months after strengthening exercise compared to placebo, results from subgroup analyses

	Standardized ES	Lower 95% CI	Upper 95% CI	P-value	I-squared
Overall	-0.479	-0.797	-0.161	0	78.40%
With PT involvement	-0.278	-0.542	-0.014	0.003	66.30%
No PT involvement	-1.556	-2.182	-0.93	0.228	32.40%
Low risk of bias	-0.41	-0.71	-0.109	0.318	15.10%
Medium risk of bias	-0.431	-0.813	-0.048	0.01	73.80%
High risk of bias	-0.498	-1.997	1.002	0	93.90%

Bold: indicated significant results without significant heterogeneity in the specific subgroup

Appendix Table F23. Exploring heterogeneity by quality of study in composite function 3 months after strengthening exercise compared to placebo; results from subgroup analyses

	Standardized ES	Lower 95% CI	Upper 95% CI	P-value	I-squared
Overall	-0.90	-1.21	-0.59	0.004	64.6%
Low risk of bias	-0.48	-0.77	-0.20	0.97	0.0%
Medium risk of bias	-1.04	-1.39	-0.70	0.02	62.2%

All 6 studies have PT involvement; Bold indicated significant results without significant heterogeneity in the specific subgroup

Appendix Table F24. Exploring heterogeneity by quality of study in long term pain relief after strengthening exercise compared to placebo; results from subgroup analyses

	Standardized ES	Lower 95% CI	Upper 95% CI	P-value	I-squared
Overall	-0.688	-1.239	-0.137	0	93.70%
With PT involvement	-0.838	-1.688	0.013	0	95.60%
No PT involvement	-0.285	-0.514	-0.056	NA	NA

NA: Not applicable (only one study in the subgroup); Bold: indicated significant results without significant heterogeneity in the specific subgroup

Appendix Table F25. Subgroup analyses on PT involvement with aerobic or strengthening exercises for adults with knee OA

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Standardized ES	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Exercise aerobic	Disability< 6 weeks	Deyle, 2000 ¹⁸⁹ Aglamis, 2008 ¹⁵⁴	Studies: 2; Subjects: 127	high	-1.737 (-3.359, -0.114)	inconsistent	yes	imprecise	Large	Low
	PT involvement	Deyle, 2000 ¹⁸⁹	Studies: 1; Subjects: 83	Medium	-0.96 (-1.41; -0.50)	NA	NA	imprecise	Large	Low
Exercise aerobic	Disability6-13 weeks	Yip, 2007 ³²⁴ Yip, 2008 ³²⁶ Kovar, 1992 ²³⁸ Deyle, 2000 ¹⁸⁹ Bautch, 1997 ¹⁶⁵ Peloquin, 1999 ²⁷⁴ Keefe, 2004 ²³³ Aglamis, 2008 ¹⁵⁴	Studies: 8; Subjects: 739	high	-0.46 (-0.963, 0.044)	inconsistent	yes	imprecise	NA	Low
	PT involvement	Kovar, 1992 ²³⁸ Deyle, 2000 ¹⁸⁹	Studies: 2; Subjects: 185	Medium	-0.87 (-1.17, -0.57)	consistent	no	imprecise	Large	Low
Exercise aerobic	Disability13-26 weeks	Yip, 2007 ³²⁴ Yip, 2008 ³²⁶	Studies: 2 Subjects: 277	Medium	direct	consistent	no	imprecise	NA	Low
	PT involvement		Studies: 0	NA	NA	NA	NA	NA	NA	NA
exercise aerobic	Disability>26 weeks	Yip, 2008 ³²⁶ Sullivan, 1998 ³³¹ Rejeski, 2002 ²⁸⁰ Ettinger, 1997 ¹⁹⁵	Studies: 4; Subjects: 806	high	-0.208 (-0.372, -0.043)	consistent	no	precise	Small	Low
	PT involvement	Sullivan, 1998 ³³¹	Studies: 1; Subjects: 102	high	-0.04 (-0.43; 0.35)	NA	NA	imprecise	NA	Low
Exercise aerobic	Psychological disability6-13 weeks	An, 2008 ¹⁵⁷ Peloquin, 1999 ²⁷⁴ Keefe, 2004 ²³³ Aglamis, 2008 ¹⁵⁴	Studies: 4; Subjects: 271	high	-0.687 (-1.473, 0.1)	inconsistent	yes	imprecise	NA	Low
	PT involvement		Studies: 0	NA	NA	NA	NA	NA	NA	NA
Exercise aerobic	Pain< 6 weeks	Messier, 2004 ³³⁰ Aglamis, 2008 ¹⁵⁴	Studies: 2; Subjects: 137	high	-1.00 (-2.25, 0.25)	inconsistent	yes	imprecise	NA	Low
	PT involvement		Studies: 0	NA	NA	NA	NA	NA	NA	NA

Appendix Table F25. Subgroup analyses on PT involvement with aerobic or strengthening exercises for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Standardized ES	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Exercise aerobic	Pain 6-13 weeks	Yip, 2007 ³²⁴ Yip, 2008 ³²⁶ Kovar, 1992 ²³⁸ An, 2008 ¹⁵⁷ Messier, 1997 ³³² Talbot, 2003 ²⁹⁴ Bautch, 1997 ¹⁶⁵ Peloquin, 1999 ²⁷⁴ Keefe, 2004 ²³³ Farr, 2010 ¹⁰ Hay, 2006 ²¹⁴ Aglamis, 2008 ¹⁵⁴	Studies: 12; Subjects: 1242	high	-0.326 (-0.567, -0.085)	inconsistent	yes	precise	Small	Low
	PT involvement	Kovar, 1992 ²³⁸ Hay, 2006 ²¹⁴	Studies: 2; Subjects: 319	Medium	-0.44 (-0.66, -0.22)	consistent	No	imprecise	Small	Low
Exercise aerobic	Pain 13-26 weeks	Yip, 2007 ³²⁴ Yip, 2008 ³²⁶ Talbot, 2003 ²⁹⁴ Messier, 2004 ³³⁰ Messier, 1997 ³³² Hay, 2006 ²¹⁴	Studies: 6; Subjects: 953	high	-0.063 (-0.187, 0.062)	consistent	no	precise	NA	Low
	PT involvement	Hay, 2006 ²¹⁴	Studies: 1; Subjects: 217	Medium	-0.19 (-0.46; 0.07)	NA	NA	imprecise	NA	Low
Exercise aerobic	Pain >26 weeks	Ettinger, 1997 ¹⁹⁵ Farr, 2010 ¹⁰ Yip, 2008 ³²⁶ Hay, 2006 ²¹⁴ Sullivan, 1998 ³³¹ Messier, 2004 ³³⁰	Studies: 6; Subjects: 1221	high	-0.211 (-0.346, -0.075)	consistent	no	precise	Small	Low
	PT involvement	Hay, 2006 ²¹⁴ Sullivan, 1998 ³³¹	Studies: 2; Subjects: 319	high	-0.29 (-0.52, -0.07)	consistent	no	imprecise	Small	Low
Exercise aerobic	Function composite 6-13 weeks	Jan, 2009 ²²⁶ An, 2008 ¹⁵⁷ Hay, 2006 ²¹⁴	Studies: 3; Subjects: 351	Medium	-0.841 (-1.358, -0.325)	inconsistent	yes	imprecise	Large	Low
	PT involvement	Jan, 2009 ²²⁶ Hay, 2006 ²¹⁴	Studies: 2; Subjects: 330	Medium	-0.95 (-1.58, -0.31)	inconsistent	yes	imprecise	Large	Low
Exercise aerobic	Function composite >26 weeks	Hay, 2006 ²¹⁴ Messier, 2004 ³³⁰ Ettinger, 1997 ¹⁹⁵	Studies: 3; Subjects: 826	Medium	-0.182 (-0.444, 0.08)	inconsistent	yes	precise	NA	Low
	PT involvement	Hay, 2006 ²¹⁴	Studies: 1; Subjects: 217	Medium	-0.28 (-0.54; -0.01)	NA	NA	imprecise	Small	Low

Appendix Table F25. Subgroup analyses on PT involvement with aerobic or strengthening exercises for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Standardized ES	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Exercise aerobic	Gait function < 6 weeks	Messier, 1997 ³³² Deyle, 2000 ¹⁸⁹ Aglamis, 2008 ¹⁵⁴	Studies: 3; Subjects: 220	high	-0.382 (-0.629, -0.134)	consistent	no	imprecise	Small	Low
	PT involvement	Deyle, 2000 ¹⁸⁹	Studies: 1; Subjects: 83	Medium	-0.65 (-1.10; -0.21)	NA	NA	imprecise	Moderate	Low
Exercise aerobic	Gait function 6-13 weeks	Peterson, 1993 ³³³ Jan, 2009 ²²⁶ An, 2008 ¹⁵⁷ Deyle, 2000 ¹⁸⁹ Messier, 1997 ³³² Talbot, 2003 ²⁹⁴ Peloquin, 1999 ²⁷⁴ Aglamis, 2008 ¹⁵⁴	Studies: 8; Subjects: 632	high	-0.575 (-0.756, -0.393)	consistent	no	precise	Moderate	Low
	PT involvement	Jan, 2009 ²²⁶ Deyle, 2000 ¹⁸⁹	Studies: 2; Subjects: 189	Medium	-0.68 (-0.96, -0.41)	consistent	no	imprecise	Moderate	Low
Exercise aerobic	Gait function 13-26 weeks	Messier, 1997 ³³² Talbot, 2003 ²⁹⁴ Messier, 2004 ³³⁰	Studies: 3; Subjects: 459	high	-0.445 (-0.624, -0.267)	consistent	no	precise	Small	Low
	PT involvement		Studies: 0	NA	NA	NA	NA	NA	NA	NA
Exercise aerobic	Gait function >26 weeks	Focht, 2005 ³³⁴ Ettinger, 1997 ¹⁹⁵	Studies: 2; Subjects: 609	Medium	-0.558 (-0.862, -0.254)	consistent	no	precise	Moderate	Low
	PT involvement		Studies: 0	NA	NA	NA	NA	NA	NA	NA
Exercise aerobic	Health perception 6-13 weeks	An, 2008 ¹⁵⁷ Aglamis, 2008 ¹⁵⁴	Studies: 2; Subjects: 62	high	-1.415 (-3.152, 0.322)	inconsistent	yes	imprecise	NA	Low
	PT involvement		Studies: 0	NA	NA	NA	NA	NA	NA	NA
Exercise aerobic	Health perception >26 weeks	Sullivan, 1998 ³³¹ Yip, 2008 ³²⁶ Rejeski, 2002 ²⁸⁰	Studies: 3; Subjects: 513	high	-0.038 (-0.211, 0.135)	consistent	no	precise	NA	Low
	PT involvement	Sullivan, 1998 ³³¹	Studies: 1; Subjects: 102	high	0.19 (-0.20; 0.58)	NA	NA	imprecise	NA	Low
Exercise strength	Disability 6-13 weeks	Schilke, 1996 ²⁸⁵ Kuptniratsaikul, 2002 ²⁴⁰ Doi, 2008 ¹⁹² Lund, 2008 ²⁵⁰	Studies: 4; Subjects: 606	Medium	-0.083 (-0.513, 0.347)	inconsistent	yes	imprecise	NA	Low
	PT involvement	Kuptniratsaikul, 2002 ²⁴⁰ Doi, 2008 ¹⁹² Lund, 2008 ²⁵⁰	Studies: 3; Subjects: 586	Medium	-0.06 (-0.55, 0.43)	inconsistent	yes	imprecise	NA	Low

Appendix Table F25. Subgroup analyses on PT involvement with aerobic or strengthening exercises for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Standardized ES	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Exercise strength	Disability 13-26 weeks	Baker, 2001 ¹⁶⁰ Lund, 2008 ²⁵⁰ Kuptniratsaikul, 2002 ²⁴⁰	Studies: 3; Subjects: 490	Medium	-0.187 (-0.364, -0.009)	consistent	no	precise	Small	Low
	PT involvement	Lund, 2008 ²⁵⁰ Kuptniratsaikul, 2002 ²⁴⁰	Studies: 2; Subjects: 444	Medium	-0.20 (-0.38, -0.01)	consistent	no	precise	Small	Low
Exercise strength	Disability >26 weeks	Kuptniratsaikul, 2002 ²⁴⁰ Ettinger, 1997 ¹⁹⁵	Studies: 2; Subjects: 687	Medium	-0.158 (-0.478, 0.162)	inconsistent	yes	precise	NA	Low
	PT involvement	Kuptniratsaikul, 2002 ²⁴⁰	Studies: 1; Subjects: 392	Medium	0.00 (-0.20; 0.20)	NA	NA	imprecise	NA	Low
Exercise strength	Pain 6-13 weeks	Swank, 2011 ²⁹³ Schilke, 1996 ²⁸⁵ Kuptniratsaikul, 2002 ²⁴⁰ Gur, 2002 ²¹² Jan, 2008 ²²⁷ Cheing, 2002 ¹⁸¹ Weng, 2009 ³¹⁹ Doi, 2008 ¹⁹² Lin, 2009 ²⁴⁷ Lund, 2008 ²⁵⁰ Borjesson, 1996 ¹⁷⁰ Lim, 2008 ²⁰ Bennell, 201 ¹⁶⁷	Studies: 13; Subjects: 1404	high	-0.64 (-0.886, -0.394)	inconsistent	yes	precise	Moderate	Low
	PT involvement	Kuptniratsaikul, 2002 ²⁴⁰ Jan, 2008 ²²⁷ Cheing, 2002 ¹⁸¹ Weng, 2009 ³¹⁹ Doi, 2008 ¹⁹² Lin, 2009 ²⁴⁷ Lund, 2008 ²⁵⁰ Borjesson, 1996 ¹⁷⁰ Lim, 2008 ²⁰ Bennell, 2010 ¹⁶⁷	Studies: 10; Subjects: 1288	Medium	-0.51 (-0.70, -0.31)	inconsistent	yes	precise	Moderate	Low

Appendix Table F25. Subgroup analyses on PT involvement with aerobic or strengthening exercises for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Standardized ES	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Exercise strength	Pain 13-26 weeks	Baker, 2001 ¹⁶⁰ Topp, 2002 ³¹⁰ Lund, 2008 ²⁵⁰ Kuptniratsaikul, 2002 ²⁴⁰	Studies: 4; Subjects: 592	Medium	-0.348 (-0.518, -0.179)	consistent	no	precise	Small	Low
	PT involvement	Lund, 2008 ²⁵⁰ Kuptniratsaikul, 2002 ²⁴⁰	Studies: 2; Subjects: 444	Medium	-0.42 (-0.61, -0.23)	consistent	no	precise	Small	Low
Exercise strength	Pain >26 weeks	Ettinger, 1997 ¹⁹⁵ Kuptniratsaikul, 2002 ²⁴⁰ Weng, 2009 ³¹⁹	Studies: 3; Subjects: 786	Medium	-0.688 (-1.239, -0.137)	inconsistent	yes	precise	Moderate	Low
	PT involvement	Kuptniratsaikul, 2002 ²⁴⁰ Weng, 2009 ³¹⁹	Studies: 2; Subjects: 490	Medium	-0.84 (-1.69, 0.01)	inconsistent	yes	imprecise	NA	Low
Exercise strength	QL 6-13 weeks	Doi, 2008 ¹⁹² Lund, 2008 ²⁵⁰	Studies: 2; Subjects: 194	Medium	-0.324 (-0.72, 0.071)	consistent	no	imprecise	NA	Low
	PT involvement	Doi, 2008 ¹⁹² Lund, 2008 ²⁵⁰	Studies: 2; Subjects: 194	Medium	-0.324 (-0.72, 0.071)	consistent	no	imprecise	NA	Low
Exercise strength	Function composite 6-13 weeks	Jan, 2008 ²²⁷ Weng, 2009 ³¹⁹ Lin, 2009 ²⁴⁷ Lim, 2008 ²⁰ Lund, 2008 ²⁵⁰ Bennell, 2010 ¹⁶⁷	Studies: 6; Subjects: 521	Medium	-0.85 (-1.138, -0.562)	inconsistent	yes	precise	Large	Low
	PT involvement	Jan, 2008 ²²⁷ Weng, 2009 ³¹⁹ Lin, 2009 ²⁴⁷ Lim, 2008 ²⁰ Lund, 2008 ²⁵⁰ Bennell, 2010 ¹⁶⁷	Studies: 6; Subjects: 521	Medium	-0.85 (-1.138, -0.562)	inconsistent	yes	precise	Large	Low
Exercise strength	Function composite 13-26 weeks	Baker, 2001 ¹⁶⁰ Lund, 2008 ²⁵⁰ Topp, 2002 ³¹⁰	Studies: 3; Subjects: 200	Medium	-0.355 (-0.613, -0.097)	consistent	no	imprecise	Small	Low
	PT involvement	Lund, 2008 ²⁵⁰	Studies: 1; Subjects: 52	Medium	-0.18 (-0.73, 0.36)	NA	NA	imprecise	NA	Low
Exercise strength	Function composite >26 weeks	Weng, 2009 ³¹⁹ Ettinger, 1997 ¹⁹⁵	Studies: 2; Subjects: 394	Medium	-1.012 (-1.971, -0.053)	inconsistent	yes	imprecise	Large	Low
	PT involvement	Weng, 2009 ³¹⁹	Studies: 1; Subjects: 99	Medium	-1.37 (-2.93, 0.19)	NA	NA	imprecise	NA	Low

Appendix Table F25. Subgroup analyses on PT involvement with aerobic or strengthening exercises for adults with knee OA (continued)

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Risk of bias	Standardized ES	Consistency	Statistical heterogeneity	Precision	Strength of the association	Evidence
Exercise strength	Gait function 6-13 weeks	Kuptniratsaikul, 2002 ²⁴⁰ Gur, 2002 ²¹² Jan, 2008 ²²⁷ Cheing, 2004 ¹⁸² Lin, 2009 ²⁴⁷ Borjesson, 1996 ¹⁷⁰ Lim, 2008 ²⁰ Bennell, 2010 ¹⁶⁷ Swank, 2011 ²⁹³	Studies: 9; Subjects: 958	high	-0.479 (-0.797, -0.161)	inconsistent	yes	precise	Small	Low
	PT involvement	Kuptniratsaikul, 2002 ²⁴⁰ Jan, 2008 ²²⁷ Cheing, 2004 ¹⁸² Lin, 2009 ²⁴⁷ Borjesson, 1996 ¹⁷⁰ Lim, 2008 ²⁰ Bennell, 2010 ¹⁶⁷	Studies: 7; Subjects: 862	high	-0.28 (-0.54, -0.01)	Inconsistent	yes	precise	Small	Low
Exercise strength	Gait function 13-26 weeks	Topp, 2002 ³¹⁰ Kuptniratsaikul, 2002 ²⁴⁰	Studies: 2; Subjects: 494	Medium	-0.464 (-0.841, -0.087)	Consistent	no	precise	Small	Low
	PT involvement	Kuptniratsaikul, 2002 ²⁴⁰	Studies: 1; Subjects: 392	Medium	-0.73 (-0.94, -0.53)	NA	NA	imprecise	Moderate	Low
Exercise strength	Gait function >26 weeks	Kuptniratsaikul, 2002 ²⁴⁰ Ettinger, 1997 ¹⁹⁵	Studies: 2; Subjects: 687	Medium	-0.392 (-0.586, -0.198)	Consistent	no	precise	Small	Low
	PT involvement	Kuptniratsaikul, 2002 ²⁴⁰	Studies: 1; Subjects: 392	Medium	-0.48 (-0.68, -0.28)	NA	NA	imprecise	Small	Low

Appendix Table F26. Pooled subgroup analyses: Assess clinical importance of treatment effects of physical therapy interventions on pain measured with VAS for adults with knee OA

Physical therapy interventions	Outcomes	Author, year	Studies, subjects	Nonstandardized mean difference (95%CI)	Statistical heterogeneity
Diathermy	Pain <6 weeks	Callaghan, 2005 ¹⁷⁵ Fukuda, 2011 ²⁰⁵ Akyol, 2010 ¹⁵⁵	Studies: 3; Subjects: 156	-18.4 (-28; -8.8)	I-squared=0, p-value=0.60
Diathermy	Pain 6-13 weeks	Cetin, 2008 ¹⁷⁸ Akyol, 2010 ¹⁵⁵	Studies: 2; Subjects: 80	-0.7 (-8.2; 6.8)	I-squared=0, p-value=0.69
Estim	Pain <6 weeks	Law, 2004 ²⁴³ Cheing, 2002 ¹⁸¹ Itoh, 2008 ²²⁴ Pietrosimone, 2009 ²⁷⁶ Grimmer, 1992 ²¹¹	Studies: 5; Subjects: 229	-17.2 (-23.1; -11.4)	I-squared=0.23, p-value=0.23
Estim	Pain 6-13 weeks	Cheing, 2002 ¹⁸¹ Cetin, 2008 ¹⁷⁸ Itoh, 2008 ²²⁴	Studies: 3; Subjects: 138	0.1 (-6.2; 6.3)	I-squared=0, p-value=0.827
Exercise aerobic	Pain 6-13 weeks	Yip, 2007 ³²⁴ Yip, 2008 ³²⁶ Kovar, 1992 ²³⁸ Bautch, 1997 ¹⁶⁵ Peloquin, 1999 ²⁷⁴ Keefe, 2004 ²³³ Aglamis, 2008 ¹⁵⁴	Studies: 7; Subjects: 656	-12.2 (-24.7, 0.3)	I-squared=0.94, p-value=0
Exercise aerobic	Pain 14-26 weeks	Yip, 2007 ³²⁴ Yip, 2008 ³²⁶	Studies: 2; Subjects: 277	-2.4 (-7.7; 3.0)	I-squared=0, p-value=0.43
Exercise aerobic	Pain >26 weeks	Yip, 2008 ³²⁶ Sullivan, 1998 ³³¹	Studies: 2; Subjects: 197	-7.2 (-13.5; -1.0)	I-squared=0, p-value=0.53
Exercise strength	Pain 6-13 weeks	Swank, 2011 ²⁹³ Kuptniratsaikul, 2002 ²⁴⁰ Cheing, 2002 ¹⁸¹ Weng, 2009 ³¹⁹ Doi, 2008 ¹⁹²	Studies: 5; Subjects: 871	-9.0 (-11.6; -6.4)	I-squared=0.48, p-value=0.07
Exercise strength	Pain >26 weeks	Kuptniratsaikul, 2002 ²⁴⁰ Weng, 2009 ³¹⁹	Studies: 2; Subjects: 590	-12.8 (-22.9; -2.7)	I-squared=0.92, p-value=0
Ultrasound	Pain <6 weeks	Tascioglu, 2010 ²⁹⁶ Ozgonenel, 2009 ²⁷⁰	Studies: 2; Subjects: 157	-10.5 (-18.6; -2.4)	I-squared=0.52, p-value=0.13
Ultrasound	Pain 6-13 weeks	Huang, 2005 ²²³ Huang, 2005 ²²² Cetin, 2008 ¹⁷⁸	Studies: 3; Subjects: 360	-6.9 (-11.7; -2.0)	I-squared=0.78, p-value=0.003

Bold: significant results and effect size larger than minimally clinical important difference, defined as -10.

Appendix Table F27. Effects of physical therapy interventions on clinically important improvement in pain, and global assessment of treatment success; results from individual RCTs

Author, year Physical therapy	Outcome	Events in active/control; Total sample size	Relative risk (95% CI)	Absolute risk difference (95% CI)	Number needed to treat (95% CI)
Odabasi, 2008 ²⁶⁶ pack	WOMAC ($\geq 26\%$) in disability	26/0, 60	53.0.(3.4;831.7)	0.87.(0.73;1.00)	
Garland, 2007 ²⁰⁷ estim	50% or greater improvement in Function composite	11/1, 58	5.4.(0.7;38.5)	0.23.(0.06;0.40)	4.(2;18)
Garland, 2007 ²⁰⁷ estim	50% or greater improvement in Function joint	9/1, 58	4.4.(0.6;32.1)	0.18.(0.01;0.34)	6.(3;83)
Kirkley, 1999 ⁸⁶ brace	Clinical Success	16/6 69	2.4.(1.1;5.5)	0.26.(0.05;0.47)	4.(2;19)
Pajareya, 2003 ²⁷² brace	Complete recovery	2/0 119	5.1.(0.2;103.7)	0.03.(-0.02;0.09)	
Pajareya, 2003 ²⁷² brace	Much improvement	18/14 119	1.3.(0.7;2.4)	0.07.(-0.09;0.23)	
Rattanachaiyanont, 2008 ⁸ diathermy	Improvement in global assessment	31/26 113	1.3.(0.9;1.9)	0.15.(-0.03;0.33)	
Zizic, 1995 ³²⁹ estim	50% improvement in all 3 primary efficacy variables	10/2 78	4.5.(1.1;19.3)	0.19.(0.04;0.34)	5.(3;25)
Garland, 2007 ²⁰⁷ estim	50% or greater improvement	15/1 58	7.3.(1.0;51.3)	0.33.(0.15;0.51)	3.(2;7)
Garland, 2007 ²⁰⁷ estim	50% or greater improvement of more than 4 over 6 outcomes	10/0 58	10.5.(0.6;170.2)	0.26.(0.10;0.41)	4.(2;10)
Hay, 2006 ²¹⁴ exercise aerobic	Much better in global assessment	15/11 183	1.3.(0.6;2.7)	0.04.(-0.06;0.14)	
Pisters, 2010 ³ exercise ED	Improved on Patient Global Assessment	27/16 101	1.4.(0.9;2.3)	0.14.(-0.05;0.33)	
Odabasi, 2008 ²⁶⁶ pack	Patient global assessment of >39%	24/2 60	12.0.(3.1;46.3)	0.73.(0.56;0.90)	1.(1;2)
Odabasi, 2008 ²⁶⁶ pack	Physician global assessment of >39%	23/2 60	11.5.(3.0;44.5)	0.70.(0.52;0.88)	1.(1;2)
Nicolakis, 2002 ²⁶⁴ PEMF	Subjective success %	10/4 32	2.8.(1.1;7.2)	0.43.(0.12;0.74)	2.(1;8)

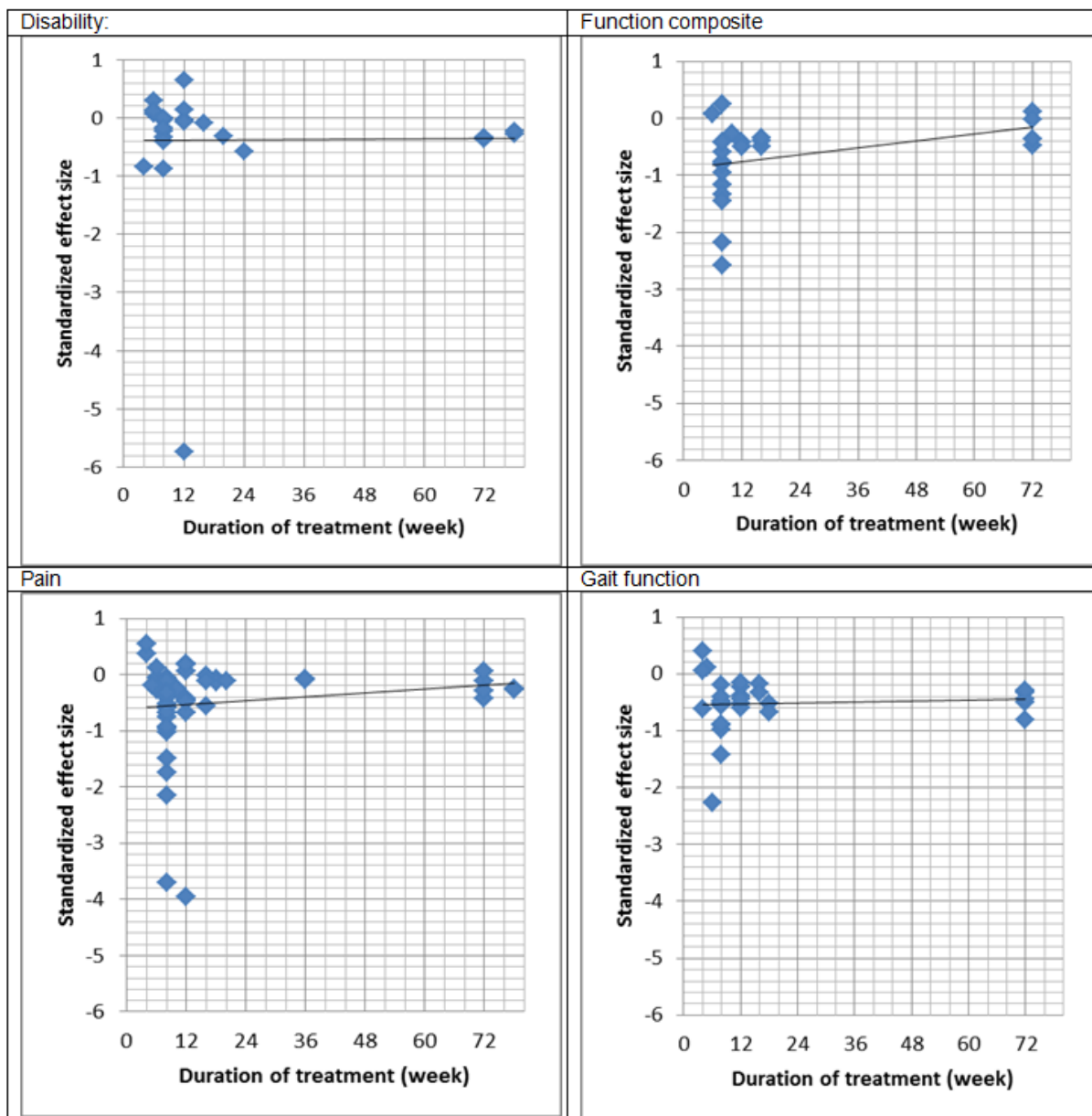
Appendix Table F27. Effects of physical therapy interventions on clinically important improvement in pain, and global assessment of treatment success; results from individual RCTs (continued)

Author, year Physical therapy	Outcome	Events in active/control; Total sample size	Relative risk (95% CI)	Absolute risk difference (95% CI)	Number needed to treat (95% CI)
Battisti, 2004 ¹⁶⁴ PEMF	Total recovery	21/19 60	1.1.(0.8;1.6)	0.07.(-0.17;0.30)	
Fargas-Babjak, 1989 ¹⁹⁸ estim	> 25% improvement in pain on VAS	14/5 37	2.7.(1.2;5.9)	0.46.(0.17;0.75)	2.(1;6)
Fargas-Babjak, 1989 ¹⁹⁸ estim	> 25% improvement in pain on West Have Yale Scale	13/5 37	2.5.(1.1;5.5)	0.41.(0.11;0.70)	2.(1;9)
Thomas, 2005 ³³⁵ exercise aerobic	50% improvement in knee pain	61/31 379	1.3.(0.9;1.9)	0.07.(-0.02;0.15)	
Garland, 2007 ²⁰⁷ estim	50% or greater improvement in Pain	17/3 58	2.8.(0.9;8.3)	0.28.(0.05;0.50)	4.(2;19)
Garland, 2007 ²⁰⁷ estim	50% or greater improvement in Pain	15/2 58	3.7.(0.9;14.4)	0.28.(0.07;0.49)	4.(2;14)
McKnight, 2010 ⁹ education	Clinically meaningful change in Pain	63/64 186	0.9.(0.8;1.1)	-0.04.(-0.17;0.09)	
McKnight, 2010 ⁹ exercise strength	Clinically meaningful change in Pain	63/56 182	1.0.(0.8;1.3)	0.02.(-0.12;0.16)	
Cushnaghan, 1994 ¹⁸⁶ taping	Improvement in pain	2/2 28	1.0.(0.2;6.1)	0.00.(-0.26;0.26)	
Hinman, 2003 ²¹⁵ taping	Improvement in pain	21/3 58	7.0.(2.3;20.9)	0.62.(0.42;0.82)	2.(1;2)
Battisti, 2004 ¹⁶⁴ PEMF	Pain regressed completely	27/23 60	1.2.(0.9;1.5)	0.13.(-0.05;0.32)	
Odabasi, 2008 ²⁶⁶ pack	VAS (>=40.8%) in Pain	15/0 60	31.0.(1.9;495.6)	0.50.(0.32;0.68)	2.(1;3)

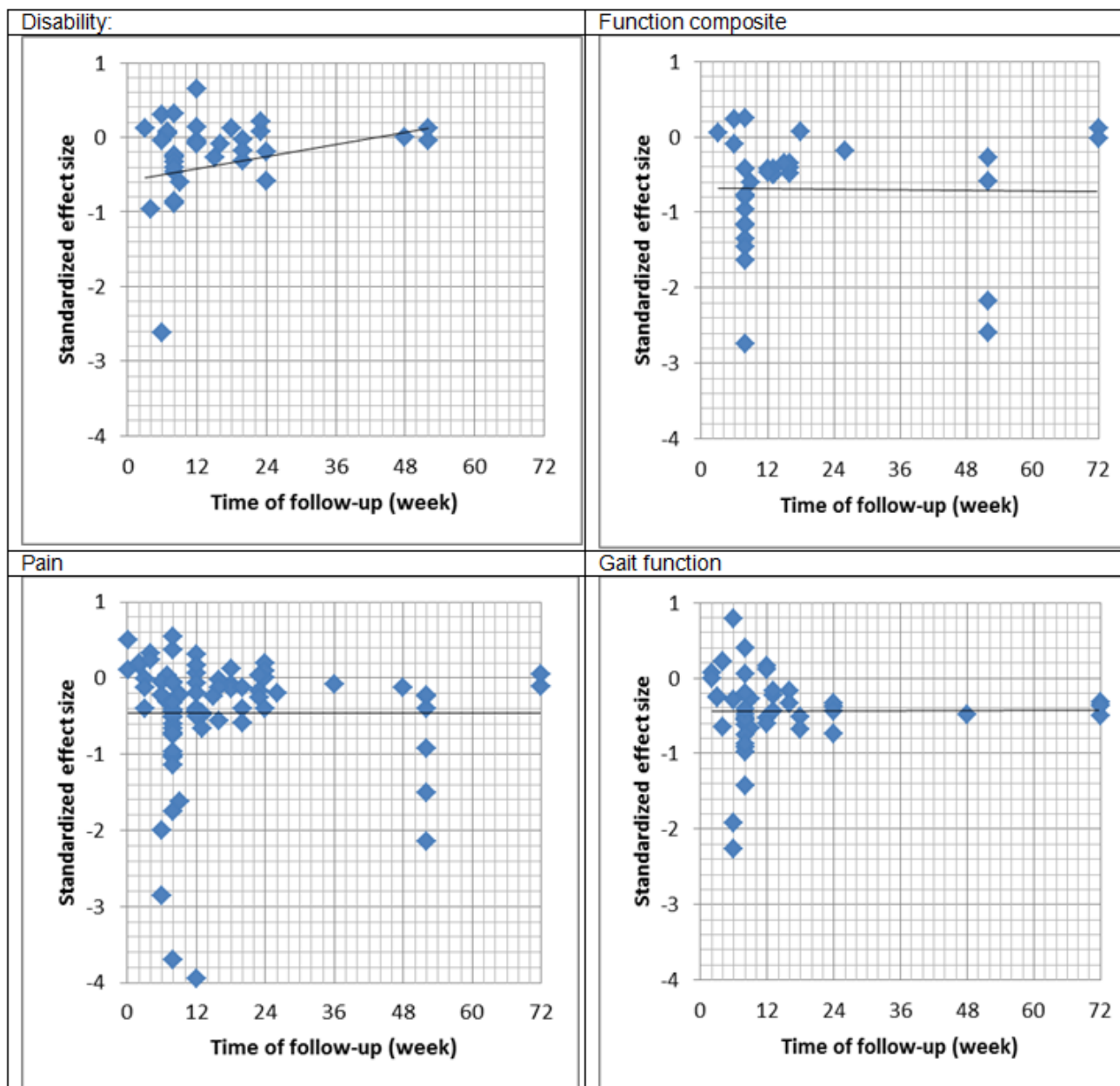
Appendix Table F28. Significant effects of aerobic exercise on minimal clinically important differences (MCID) in outcomes; results from individual RCTs

Author	Outcome	Mean difference	Lower 95% CI	Upper 95% CI	Met criteria of lax MCID	Met criteria of strict MCID	Met criteria of absolute MCID	Inclusion in pooled analyses
Deyle, 2000 ¹⁸⁹	disability	-471.9	-732.5	-211.3	1	1	.	*
Aglamis, 2009 ⁴⁰	disability	50.8	44.9	56.7			1	
Aglamis, 2009 ⁴⁰	disability	47.5	35.5	59.5	1	1	.	
Jan, 2009 ²²⁶	Function composite	-14.9	-20.1	-9.7	1	1	.	*
Evcik, 2002 ¹³³	Function composite	-10.5	-12.4	-8.6	1	1	.	*
Hay, 2006 ²¹⁴	Function composite	-5.9	-10.0	-1.9	1	1	.	*
Fransen, 2001 ²⁰⁴	Function composite	3.1	0.6	5.6	.	.	1	
Peterson, 1993 ³³³	Gait function	-111.0	-161.0	-61.0	1	1	.	*
Ettinger, 1997 ¹⁹⁵	Gait function	123.0	78.7	167.3	0	0	.	
Deyle, 2000 ¹⁸⁹	Gait function	-77.7	-136.8	-18.6	1	0	.	*
Messier, 2004 ³³⁰	Gait function	-42.8	-78.7	-7.0	0	0	.	
Focht, 2005 ³³⁴	Gait function	-140.0	-227.1	-52.9	0	0	.	*
Peloquin, 1999 ²⁷⁴	Gait function	-42.2	-70.2	-14.2	0	0	.	*
Aglamis, 2008 ¹⁵⁴	Gait function	-50.8	-56.7	-44.9	1	1	.	*
Aglamis, 2008 ¹⁵⁴	global assessment	-6.2	-7.7	-4.7	1	1	.	*
Yip, 2008 ³²⁶	global assessment	0.4	0.0	0.9	0	0	.	
Aglamis, 2008 ¹⁵⁴	Health	-7.0	-8.2	-5.8	1	1	.	*
Evcik, 2002 ¹³³	Pain	-11.4	-13.1	-9.7	1	1	.	
Kovar, 1992 ²³⁸	Pain	-1.0	-1.8	-0.2	1	1	.	*
Ettinger, 1997 ¹⁹⁵	Pain	-0.3	-0.4	-0.2	0	0	.	
Sullivan, 1998 ³³¹	Pain	-1.2	-2.3	0.0	1	1	.	*
Yip, 2007 ³²⁴	Pain	-7.1	-13.5	-0.6	0	0	.	*
Hay, 2006 ²¹⁴	Pain	-1.6	-2.8	-0.5	1	1	.	*
Peloquin, 1999 ²⁷⁴	Pain	-0.9	-1.5	-0.2	1	1	.	*
Aglamis, 2009 ⁴⁰	Pain	25.0	9.7	40.3	.	.	1	
Messier, 1997 ³³²	Pain	-0.4	-0.7	0.0	1	1	.	

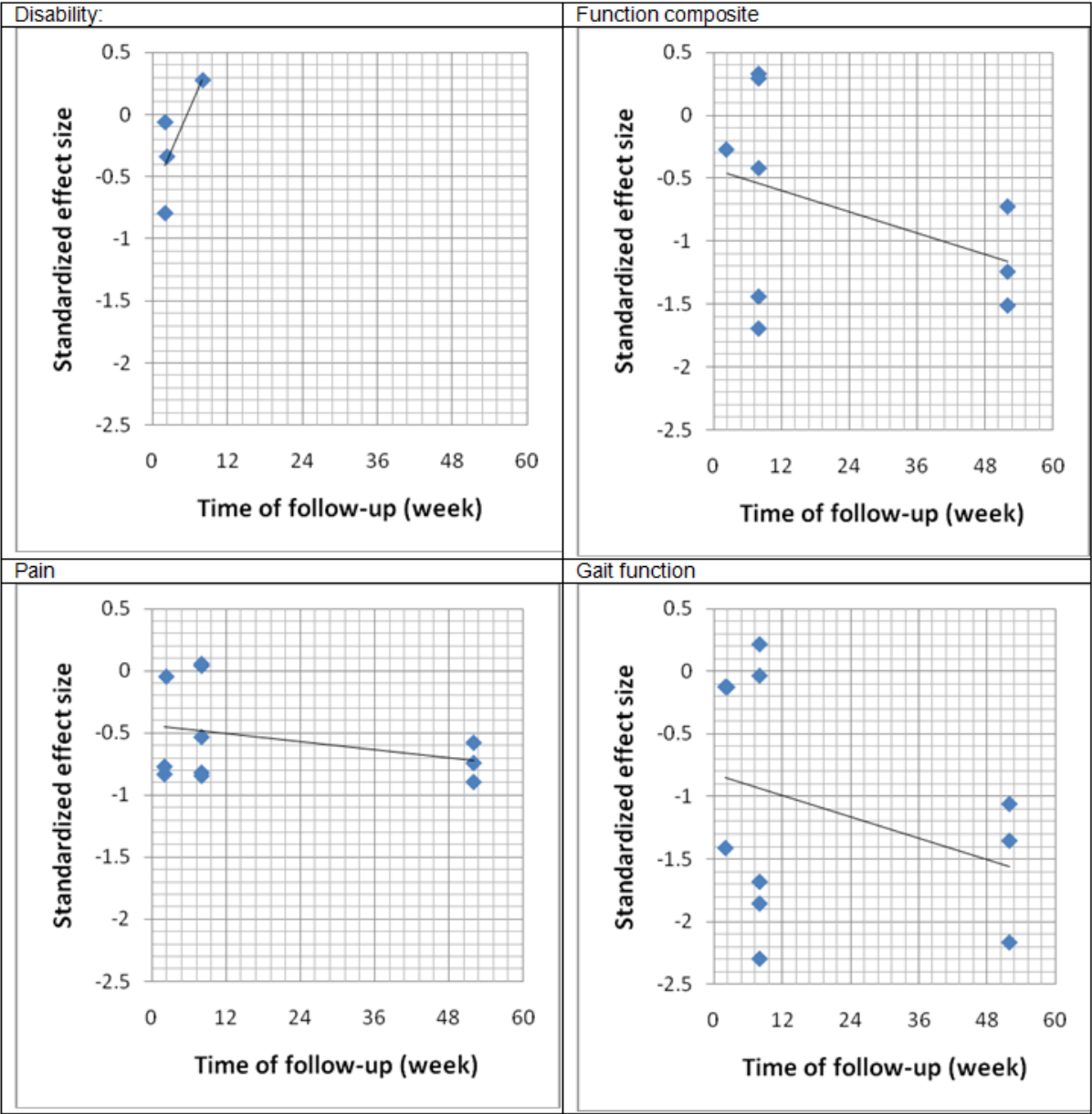
Appendix Figure F1. Associations between duration of treatment and intermediate/patient-centered outcomes, after exercise (including aerobic, strengthening, aquatic, proprioception, and Tai Chi). The longest followup standardized effect size in each study was used for this analysis



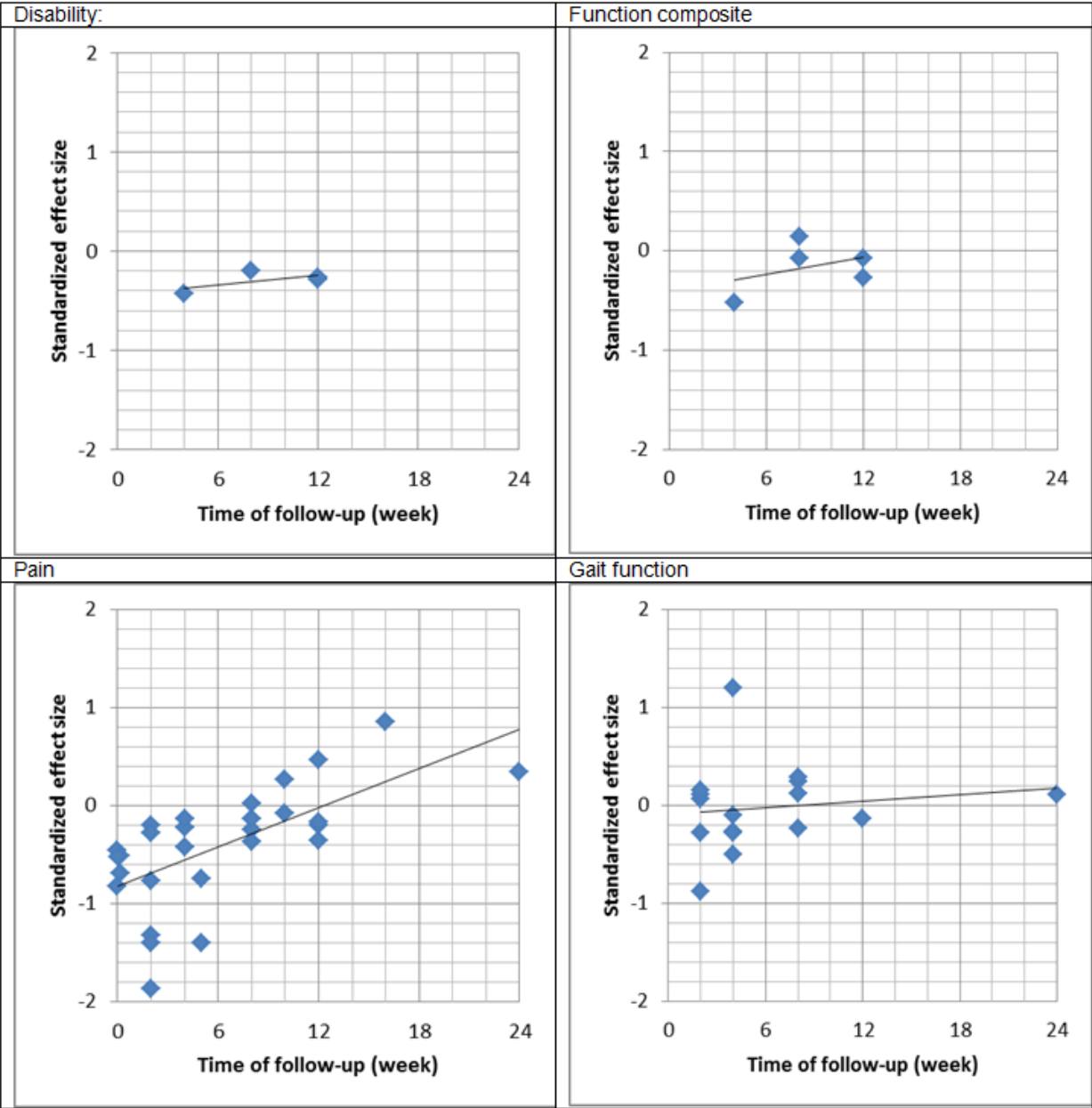
Appendix Figure F2. Associations between the time of followup and intermediate/ patient-centered outcomes, after exercise (including aerobic, strengthening, aquatic, proprioception, and Tai Chi)



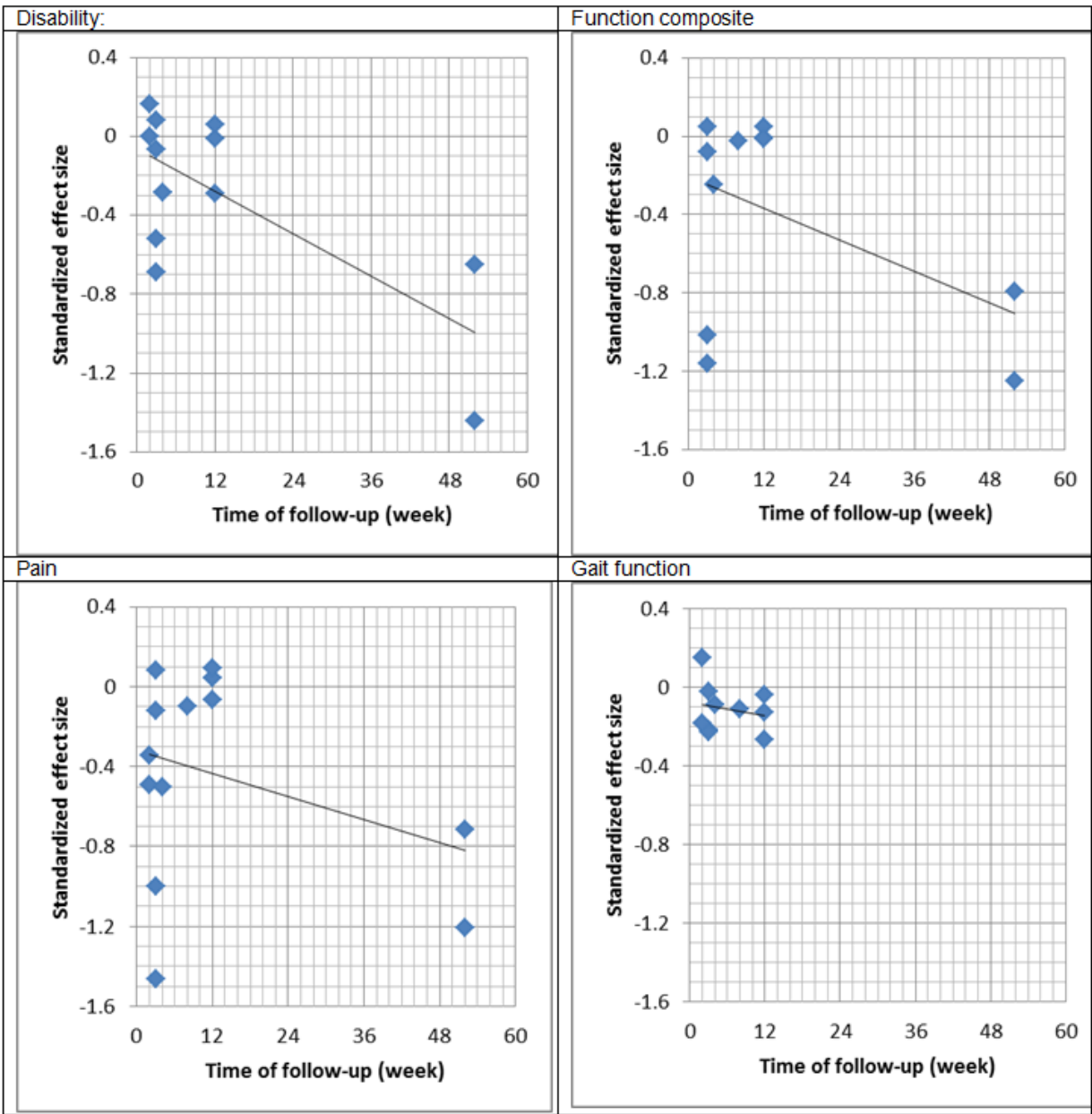
Appendix Figure F3. Associations between the time of followup and outcomes after ultrasound



Appendix Figure F4. Associations between the time of followup and intermediate/ patient-centered outcomes, after electrical stimulation



Appendix Figure F5. Association between time of followup and intermediate/ patient-centered outcomes, after diathermy



Appendix Table F29. Description of tools

Name	Number of items	Short description; references
Numerical Rating Scale (NRS)	Not applicable since it is a 11--point numerical rating scale	NRS measures pain severity by asking the patient to select a number (from 0 to 10) to represent how severe the pain is. Another possible customary range for NRS is 0-100. ³³⁶ A high score indicates a high level of symptoms ³³⁷
SF-36 (The MOS (Medical Outcomes Study) 36-Item Short-Form Health Survey)	36 items ³³⁸	SF-36 measures eight health concepts and two summary scales, physical and mental: <ol style="list-style-type: none"> 1) Physical functioning 2) Role limitations because of physical health problems 3) Bodily pain 4) Social functioning 5) General mental health (psychological distress and psychological well-being) 6) Role limitations because of emotional problems 7) Vitality (energy/fatigue) 8) General health perceptions ³³⁸ The scores for the SF-36 scale range from 0 to 100, with a higher score indicating better health status ³³⁹
American Academy of Orthopedic Surgeons (AAOS) Sports Knee Rating Scale	27 items	This is an instrument developed by AAOS. It consists of 6 scales. ³⁴⁰ <ol style="list-style-type: none"> 1) Lower Limb Core Scale: It consists of symptoms attributable to the knee only; has seven items combined into three subscales: <ul style="list-style-type: none"> • Pain attributed to the lower limb • Stiffness and swelling • Function 2) Knee Giving Way Scale that consists of 4 items 3) Knee Locking or Catching Scale that consists of 4 items 4) Preinjury function scale that consists of 4 items 5) Current (postinjury) Limitations on Activity Scale that consists of 4 items 6) Pain on Activity Scale that consists of 4 items
Bellamy et al. Low Intensity Symptom State-attainment Index (BLISS)	Not applicable	BLISS (Bellamy et al. Low Intensity Symptom State-attainment) Index is a group of attainment criteria according to which "better is good, but good is best" with respect to goal attainment. ³⁴¹ Pain is selected as the primary measure for the BLISS analysis. There are five analyses that are considered when measuring BLISS: <ol style="list-style-type: none"> 1) Time to first BLISS day (a measure of initial pain relief), from baseline. The time to first BLISS day from baseline is determined by calculating the number of elapsed days. 2) BLISS days per patient over 12 months. The number of BLISS days over 12 months is calculated on a per-patient basis using the patient's WOMAC pain subscale score. The line joining the WOMAC scores and the intersection of the BLISS line is used to estimate the number of BLISS days. 3) Patients with a BLISS response at month 12 4) Patients with a BLISS response at any time during the study, and 5) Number of BLISS periods per patient over 12 months. The number of BLISS periods during the 12 months is calculated as patients who may be in a BLISS period more than once, that is, have WOMAC pain scores below the threshold, then above, then below. There are five threshold levels of BLISS response based on the WOMAC Pain Scale (WOMAC-P),

Appendix Table F29. Description of tools (continued)

Name	Number of items	Short description; references
		from a very low level of pain to higher levels of pain. The threshold levels of the WOMAC-P includes: WOMAC pain score <5 NU, <10 NU, <15 NU, <20 NU, and <25 NU (0 = no pain, 100= extreme pain).
Chronic Pain Grade	7 items	<p>Chronic Pain Grade is a measure of chronic pain severity in three dimensions: persistence, intensity and disability.³⁴²</p> <p>This instrument provides a score which enables patients with chronic pain to be classified into one of four hierarchical categories according to pain severity or interference: Grade I, low disability-low intensity; Grade II, low disability-high intensity; Grade III high disability-moderately limiting; and Grade IV, high disability-severely limiting.</p> <p>The measures of chronic pain severity includes³⁴³:</p> <ol style="list-style-type: none"> 1) Characteristic Pain Intensity, that is, the average of 0-10 ratings of pain right now, average pain, and worst pain multiplied by 10 to yield a 0-100 score (Dworkin et al. 1990) 2) Days in Pain in the prior 6 months 3) Time since Onset, or the elapsed time since the first episode of the pain condition 4) Disability Score, the average of three 0-10 interference ratings multiplied by 10 to yield a 0-100 score 5) Disability Days, the number of days in the prior 6 months that the subject was unable to carry out usual activities (work, school, housework) due to the pain condition of interest. The points for disability days are as follow: <ol style="list-style-type: none"> i) 0-6 days: 0 points ii) 7-14 days: 1 point iii) 15-30 days: 2 points iv) 31+ days: 3 points <p>Grade I: Characteristic Pain Intensity less than 50, and less than 3 Disability Points Grade II: Characteristic Pain Intensity of 50 or greater, and less than 3 Disability Points Grade III: 3-4 Disability Points, regardless of Characteristic Pain Intensity Grade IV: 5-6 Disability Points, regardless of Characteristic Pain Intensity</p>
Short Physical Performance Battery (SPPB)	3 tests	<p>The SPPB score is derived from the performance in three objective tests: usual walking speed over 4 m, five timed repeated chair rises, and standing balance (SB).³⁴⁴</p> <p>Each test is scored from 0 to 4, and the sum of three scores gives a total score ranging from 0 to 12 (12 = best).³⁴⁵</p>
Fast self-paced walk time (completed over 40 meters)	Not applicable	<p>Patients are timed while they walk two lengths (turn excluded) of a 20-m indoor course in response to the instruction: "walk as quickly as you can without overexerting yourself."³⁴⁶</p>
Health assessment questionnaire (HAQ)		<p>The HAQ questionnaire addresses eight aspects of functional status: dressing and grooming, arising, eating, walking, hygiene, reach, grip, and general activity. For each aspect, responses to the questions are coded as follows: 0, no difficulty; 1, some difficulty; 2, much difficulty; and 3, unable to perform. Any aspect requiring assistance, mechanical or otherwise, receives a score of 2. The highest scores in each aspect are summed and divided by eight to yield a summary measure of disability. Hence, scores range from 0 to 3, with higher numbers indicating worse disabilities.^{347, 348}</p>
International Knee Documentation Committee	18 questions	<p>There are 18 questions (10 main questions, plus 8 sub questions regarding activity limitations due to knee disorders) in 3 subsets: symptoms, sports activities, and function. Items are ranked according to presence or absence of symptoms, a 5-point Likert scale, a 6-point Likert scale, or an</p>

Appendix Table F29. Description of tools (continued)

Name	Number of items	Short description; references
		11-point (ie, 0-10) scale. ³⁴⁹ The IKDC Subjective Knee Form was designed as an evaluative measure to detect improvement or deterioration in symptoms, function, and sports activity experienced by patients with a variety of knee conditions, including ligament and meniscal injuries, articular cartilage lesions, and patellofemoral pain. ³⁵⁰ The IKDC Subjective Knee Evaluation Form is scored by summing the scores for the individual items and then transforming the score to a scale that ranges from 0 to 100. A score of 100 is interpreted to mean no limitation with activities of daily living or sports activities and the absence of symptoms.
Patient global assessment of disease status	None	This is assessed by the question, "Considering all the ways your arthritis affects you, mark an "x" through the line for how well you are doing". The answer is indicated on a 0-100mm VAS scale. Higher scores indicate worse status.
Investigator global assessment of disease status	None	This is assessed by the question, "Make a global assessment of the patient's disease status by marking an "x" in one box below"; 0 = very well, 1 = well, 2 = fair, 3 = poor, 4 = very poor".
Knee extensor force in Newtons	None	Bilateral isometric knee extensor muscle force is assessed using a load cell (XTran Model S1W; Applied Measurement, Victoria, Australia) fixed onto the metal framework of a chair and connected to a simple software program sampling at 80 Hz. During assessment patients are seated on the chair with the back and thigh well supported, hands resting on the thighs, the foot free, and the knee passively drawn into 90° flexion by gravity. A soft cuff, attached via an adjustable non-elastic metal cord to the load cell, is fitted with Velcro just above the ankle. Patients are asked to build up their force and then to "push" or "pull" as hard as they could for 5 seconds. ³⁵¹
Knee flexor force in Newtons	None	Bilateral isometric knee flexor muscle force is assessed using a load cell (XTran Model S1W; Applied Measurement, Victoria, Australia) fixed onto the metal framework of a chair and connected to a simple software program sampling at 80 Hz. During assessment patients are seated on the chair with the back and thigh well supported, hands resting on the thighs, the foot free, and the knee passively drawn into 90° flexion by gravity. A soft cuff, attached via an adjustable non-elastic metal cord to the load cell, is fitted with Velcro just above the ankle. Patients are asked to build up their force and then to "push" or "pull" as hard as they could for 5 seconds. ³⁵¹
Knee, Injury and Osteoarthritis Outcome Score (KOOS)	42 items	The KOOS questionnaire covers five dimensions that are as follows: pain (nine items), symptoms (seven items), activities of daily living (17 items), sport and recreation function (five items), and knee-related quality of life (four items). Each item can be answered by a 5-point Likert scale (0-4). Each of the five scores is calculated as the sum of the items included, in accordance with score calculations of the WOMAC Osteoarthritis Index. Scores are then transformed to a 0-100 scale, with zero representing extreme knee problems and 100 representing no knee problems. ³⁵²
Lequesne Knee Index	10 items	The Lequesne OA index directly aggregates symptoms and functions which are not graded separately. ³⁵³ The index includes three sections with a total of 10 questions. The first section (1A-1E) asks about pain or discomfort at 'night' (1A), 'after getting up in the morning' (1B), 'when standing' (1C), and 'when walking' (1D). Question 1E addresses pain 'when rising from sitting' (knee index) and pain when 'sitting 2h' (hip index). Questions 1C and 1E are graded dichotomously: 0=no, 1=yes. Questions 1A, 1B and 1D have three categories with 0=no;

Appendix Table F29. Description of tools (continued)

Name	Number of items	Short description; references
		<p>categories 1 and 2 are different for each question (1A: 1 = only with movement or in certain positions, 2 = with no movement; 1B: 1 = more than one but less than 15 min, 2 = 15 min or more; 1D: 1 = only after walking some distance, 2 = initially and increasingly with continued walking). The second section asks about the maximum walk distance [graded from 0 = unlimited to 6 = less than 100m (328 ft). If patients use one or more walking aids the score is upgraded by one and two points, respectively.</p> <p>The third section addresses physical function disability with four categories graded from 0 = without difficulty to 2 = unable to do so. The knee index asks about 'climbing one flight of stairs upward', 'downward', 'squatting' and 'walking on uneven ground'. The hip index asks about 'putting on socks', 'pick up an object on the floor', 'going up or down one flight of stairs' and 'getting out of a car or a chair'.</p> <p>The Lequesne OA index is scored as the sum of all questions. The score range of each section is from 0 to 8 resulting in a total score ranging from 0 to 24.</p>
Modified Lysholm Knee Scoring Scale	8 items	<p>The Modified Lysholm Knee Scoring Scale was first described by Tegner and Lysholm in 1985.³⁴⁹ Eight symptoms and disabilities are assessed: limping, use of support, locking or catching, instability, pain, swelling, difficulty with stair climbing, and difficulty with squatting. Points range from 5 for the absence of a limp, lack of use of support, or no problems squatting, up to 25 for no pain or no instability.</p>
Six minute walk test	Not applicable	<p>Patients are instructed to cover as much distance as possible during the 6 minute time frame with opportunity to stop and rest if required.³⁴⁶</p>
Timed Up and Go Time (TUG)	Not applicable	<p>Patients are required to rise from a standard arm chair, walk at a safe and comfortable pace to a tape mark 3-m away, then return to a sitting position in the chair.³⁴⁶</p>
Short form Arthritis Impact Measurement Scale 2 (AIMS2-SF)	26 items	<p>The AIMS2 is a self-administered questionnaire with 78 items that include information on patients' socio-demographic and clinical characteristics, as well as 26 core items that form the AIMS2 – SF.³⁵⁴</p> <p>The AIMS2-SF has 26-items that measures 5 different domains of health status. Respondents are asked to indicate, on a 5-point Likert scale, how much of their time is limited due to physical function (mobility, walking, and bending, self-care, etc.), role function (work), and social function (social activities and support), and how much of the time they are bothered by symptoms (arthritis pain) and affect (level of tension and mood).³⁵⁵</p>
Algofunctional index for osteoarthritis (same as Lequesne index)	10 questions	<p>It consists of 8 points for pain, 8 for the maximum distance walked, and 8 for activities of daily living.</p>
Functional Reach Test	Not applicable	<p>Functional reach can be measured using an electronic functional reach device or clinically by using a 48-inch "yardstick".³⁵⁶</p> <p>In the electronic method, the individuals are asked to assume a position of normal, relaxed stance near the center of a force platform. In this position their shoulders should be perpendicular to the reach instrument device. In order to maintain identical foot placement during all testing conditions, the foot position is traced on a sheet of paper attached to the surface of the platform. The stance width is obtained from the foot tracing by measuring the distance between the medial borders of the heels.</p> <p>The electronic functional reach measurement device is elevated to the height of the acromion. Subjects are then required to extend the right arm horizontally (approximately 90°) and place a</p>

Appendix Table F29. Description of tools (continued)

Name	Number of items	Short description; references
		<p>closed fist against the sliding handle (position 1). Then they are asked to slide the handle bar as far forward as they comfortably could without taking a step or losing their balance (position 2). Functional reach is defined as the mean difference between positions 1 and 2, over three trials. The clinically accessible measure of reach consists of a 48-inch yardstick" secured to the wall at the height of the right acromion. During this procedure, the platform foot tracing is placed on the floor and subjects are asked to assume the identical foot position as in the electronic method. They are then asked to make a fist and extend their arm forward as in the previous test (position 1) and the placement of the end of the third metacarpal along the yardstick is recorded. Then, they have to reach as far forward as they could without losing their balance or taking a step (position 2), and the placement of the end of the third metacarpal is again recorded. Functional reach is defined as the mean difference between positions 1 and 2 over three trials.</p>
Giving Way Test	Not applicable	<p>It is one of the items of the Knee Standardized Clinical Interview (KNE-SCI) questionnaire³⁵⁷. The subject is asked: "Does the knee feel as if it's going to give away?" If yes, "has it actually given way in the last 6 months?" If yes, "How often has it given way in the last 6 months?"</p>
Step Test	Not applicable	<p>It is a clinical test of balance that incorporates dynamic single limb stance.³⁵⁸ During this test, the subjects are required to stand unsupported with the feet parallel to each other and a block 5 cm directly in front of them. Subjects are then advised which leg was the stepping leg and asked to place the whole foot onto the block, then return it fully back down to the floor. This procedure is repeated as fast as possible. The subject is not supposed to move the other foot during the test period. One completed step comprised placing the foot fully onto the block and then on the floor. The number of times the subject completed one step usually over 15 seconds is recorded.</p>
Arthritis Self- Efficacy Scale (ASES)	20 items	<p>The ASES measures self-efficacy in 3 domains ³⁵⁹:</p> <ol style="list-style-type: none"> 1) pain management, 2) physical function, and 3) other arthritis symptoms <p>It uses a visual analog scale in which a higher score indicates greater self-efficacy, a positive result. The total possible range is 0-100.^{360, 361}</p>
Standing Balance Test	Not applicable	<p>It is a timed, single-leg standing balance test that is done during clinical examination. It is a measure of the number of seconds for which a subject is able to stand unsupported on one foot while looking straight ahead with hands on hips.³⁶²</p>
Knee Proprioception Test	Not applicable	<p>To assess knee proprioception, a device based on recommendations by Sharma L. and Pai et al. is used.³⁶³</p> <p>This device consists of a chair with a computer-controlled motor and transmission system and 2 attached free-moving arms. Each arm supports the subject's shank and foot. The joint of each arm is moved by a computer-controlled stepper motor and transmission system for angular displacement. The foot/ankle is attached with an air splint to the footrest, which is a moving component of the apparatus. Angular motion is detected by angular displacement and force transducers. Two handheld buttons were attached to the tray.</p> <p>Each time, the leg is moved to a starting position of 30° knee flexion. Following a random delay, the subjects are asked to extend the knee further with an angular velocity of 0.3°/second. They are then instructed to push a handheld button at the moment of definite detection of knee joint position change. The angular displacement between the starting position at 30° flexion and the position in</p>

Appendix Table F29. Description of tools (continued)

Name	Number of items	Short description; references
Knee Patient-Specific Index (KPSI)	43 items	<p>the extension direction at the instance when the button was pushed is recorded as the measure of knee joint proprioception. A low value indicates good proprioception.</p> <p>The KPSI consists of 43 items divided into three main areas:³⁶⁴</p> <ol style="list-style-type: none"> 1) symptoms 2) bothersome activities, and 3) difficulties with physical function <p>The number of items in the scale varies with the individual's selection of attributes (items) relevant to them.</p> <p>Patients can add additional specific individual concerns to the existing 43 items.</p> <p>Patients can separately rate the severity and importance of their complaint(s) using seven response categories. For severity, the response categories are as follows: not severe, minimally severe, somewhat severe, moderately severe, very severe, extremely severe, and most severe imaginable.</p> <p>For importance, the response categories are as follows: not important at all, minimally important, a little important, important, moderately important, very important, and extremely important. If an item was deemed not applicable (e.g., the symptom of knee swelling was no longer present) then the item was not rated for either severity or importance.</p> <p>The raw score is transformed to a 0-100 scale with higher scores indicating worse outcomes.</p>
Influence of Rheumatic Disease on General Health & Lifestyle (IRGL)	70 items	<p>The IRGL (Involved van Reuma op Gezondheid en Leefwijze = Influence of Rheumatic Disease on General Health & Lifestyle) is a Dutch version of the Arthritis Impact Measurement Scale.³⁶⁵</p> <p>It consists of 12 scales encompassing four health dimensions:</p> <ol style="list-style-type: none"> 1) Physical functioning: <ol style="list-style-type: none"> i) Mobility scale: 7 items ii) Self-care scale: 8 items iii) Pain scale: 6 items 2) Psychological functioning: <ol style="list-style-type: none"> i) Anxiety scale: 10 items ii) Depressed mood scale: 6 items iii) Cheerful mood scale: 6 items 3) Social functioning: <ol style="list-style-type: none"> i) Perceived support scale: 5 items ii) Actual support scale: 3 items iii) Mutual visit: 2 items iv) Social network scale: One item for number of neighbors with whom one associates and one item for the number of friends one has. 4) Disease impact: It measures the disease impact on several domains of daily life like work, activities, leisure, relationships, sexuality, food, sleep. <ol style="list-style-type: none"> i) Disease impact scale: 10 items that measure Impact activities scale: 5 items.³⁶⁶

Appendix Table F30. Average size, percentage of women, and patient age in the studies of the association between intermediate and clinical outcomes

Country	Variable	Mean	Sum	Minimum	Maximum
Total	sample	656	41,329	10	10150
Total	age in years	64.7		54	80
Total	% of women	68.7		0	100
US.	age in years	66.0		55.6	80.0
U.S.	sample	618	10,503	50	3407
U.S.	% of women	70.4		0.0	100.0
Canada	age in years	63.5		54.6	76.3
Canada	sample	60	715	10	152
Canada	% of women	66.1		32.5	100.0
Finland	age in years	70.7		70.7	70.7
Finland	sample	88	88	88	88
Finland	% of women	75.0		75.0	75.0
France	age in years	63.8		58.3	67.0
France	sample	2096	10,481	134	6085
France	% of women	61.1		55.6	68.0
Italy	age in years	65.7		65.7	65.7
Italy	sample	233	233	233	233
Italy	% of women	71.2		71.2	71.2
Spain	age in years	71.0		71.0	71.0
Spain	sample	10150	10,150	10150	10150
Spain	% of women	56.3		56.3	56.3
The Netherlands	age in years	62.4		54.0	69.3
The Netherlands	sample	153	1,070	63	288
The Netherlands	% of women	77.1		65.0	88.4
UK	age in years	63.2		60.2	65.5
UK	sample	833	5,833	17	4057
UK	% of women	59.6		54.1	69.1
Australia	age in years	66.1		62.5	68.9
Australia	sample	182	729	105	259
Australia	% of women	61.3		53.0	64.2
Japan	age in years	71.4		71.4	71.4
Japan	sample	130	130	130	130
Japan	% of women	100.0		100.0	100.0
Multinational	age in years	66.7		66.7	66.7
Multinational	sample	600	600	600	600
Multinational	% of women	72.5		72.5	72.5
Not reported	age in years	63.8		60.0	65.8
Not reported	sample	100	399	57	205
Not reported	% of women	67.8		52.6	80.0
Singapore	age in years	66.5		66.5	66.5
Singapore	sample	258	258	258	258
Singapore	% of women	83.0		83.0	83.0
Turkey	age in years	59.4		59.4	59.4
Turkey	sample	140	140	140	140
Turkey	% of women	74.3		74.3	74.3

Appendix Table F31. Quality of diagnostic studies

Author, year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Comments
Bieleman, 2009 ³⁶⁷	Yes	Yes	No	Unclear	Unclear	Yes	No	Yes	Yes	Yes	Unclear	Not relevant	Yes	Yes	No withdrawals
Salaffi, 2004 ³³⁶	Yes	Unclear	Yes	Unclear	No	Yes	Yes	Yes	Yes	Yes	Unclear	Not relevant	Yes	Yes	No withdrawals

Definitions of criteria:

Criterion number	Definition	Explanation
1	Spectrum of patient's representative of the patients who will receive the test in practice?	Yes if community or primary care; no if others; unclear if not specified
2	Selection criteria clearly described	Yes if inclusion and exclusion criteria exist; unclear if missing one of them; no if missing both
3	Reference standard likely to correctly classify the target intervention	Yes if ACR; no if others
4	Time period between reference standard and index test	Yes if no more than 2 weeks, no if more than 2 weeks, unclear if unknown
5	Whole sample or a random selection of the sample receive verification using a reference standard of diagnosis	Yes if random selection or no sampling; no if non-random selection; unclear is unknown
6	Received same reference standard regardless of the index test	Yes if all received gold standard method
7	Reference standard independent of the index test	Yes if ACR as gold standard; no if clinical diagnosis/others
8	Index test described in detail	All yes (inclusion criteria of the studies)
9	Reference test described in detail	Yes if detailed description; unclear if clinical diagnosis without clear definitions
10	Index test interpreted without knowledge of the results of the reference standard	All yes
11	Reference standard results interpreted without knowledge of the index test	Yes if blinding, no if not blinding; unclear if not mentioned
12	Same clinical data available when test results were interpreted as would be available when the test is used in practice	Not relevant-omitted from quality assessment as Whiting's suggestions Whiting, 2003 ³⁶⁸
13	Not interpretable/intermediate test results reported	No if the results did not have multijoint OA
14	Withdrawals explained	No if there are withdraw cases

Appendix Table F32. Association between intermediate and clinical outcomes-diagnostic value of the tests

Author, year Study characteristics	Index method	Reference method	Outcome	Sensitivity	Specificity	Positive likelihood ratio	Negative likelihood ratio	Diagnostic odds ratio
Bieleman, 2009 ³⁶⁷ Country: The Netherlands Age: >45 Sample: 92	SF-36:physical function: cut-off point<60	Functional Capacity Evaluation	Work limitations	33.0	97.0	11.0	0.69	15.9
Bieleman, 2009 ³⁶⁷ Country: The Netherlands Age: >45 Sample: 92	WOMAC: function: cut-off point>-21	Functional Capacity Evaluation	Work limitations	51.0	88.0	4.3	0.56	7.6.8
Salaffi, 2004 ³³⁶ Country: Italy Age: >18 Sample: 233	Baseline NRS score <=4 and much better on PGIC scale	Patients' Global Impression of Change (PGIC)	Percent change in Numerical Rating Scale score	96.1	91.2	10.9	0.04	255.4
Salaffi, 2004 ³³⁶ Country: Italy Age: >18 Sample: 233	Baseline NRS score >4 to <=7 and much better on PGIC scale	PGIC	Percent change in NRS score	92.5	82.9	5.4	0.09	59.8
Salaffi, 2004 ³³⁶ Country: Italy Age: >18 Sample: 233	Baseline NRS score >7 to 10 and much better on PGIC scale	PGIC	Percent change in NRS score	91.4	90.1	9.2	0.10	96.7
Salaffi, 2004 ³³⁶ Country: Italy Age: >18 Sample: 233	Much better on PGIC scale	PGIC	Percent change in NRS score	83.9	92.6	11.3	0.17	65.2

Bold- large positive predictive likelihood ratios suggesting conclusive increase in the likelihood of outcome

Appendix Table F33. Association between gait and functional performance

Author, year Study characteristics	Adjustment	Gait measure	Functional outcome	Regression model	Mean (95% CI)
Rejeski, 1998 ³⁶⁹ Country: U.S. Age: NR Sample: 439	Baseline knee pain, 18-month knee pain, 18-month self-efficacy, baseline self-efficacy	Baseline stair climb time	Effect of treatment on stair climb time	Linear	0.92 (0.76; 1.08)
Rejeski, 1998 ³⁶⁹ Country: U.S. Age: NR Sample: 439	Baseline knee pain, 18-month knee pain, 18-month self-efficacy, baseline self-efficacy, aerobic, resistance training	Baseline stair climb time	Effect of treatment on stair climb time	Linear	0.93 (0.77; 1.09)
Bennell, 2004 ³⁷⁰ Country: Australia Age: >50 Sample: 259	NR	TUG (Timed Up and Go test)	Maximal Activity Profile (represents the highest oxygen-demanding activity the participant is still able to perform) score	Linear	-0.96 (-1.37; -0.55)
Bennell, 2004 ³⁷⁰ Country: Australia Age: >50 Sample: 259	NR	Walking speed	Maximal Activity Profile (represents the highest oxygen-demanding activity the participant is still able to perform) score	Linear	7.91 (2.27; 13.55)
Topp, 2000 ³⁷¹ Country: U.S. Age: NR Sample: 78	NR	WOMAC: Physical function	Time to get up off of the floor	Linear	0.4, P value 0
Topp, 2000 ³⁷¹ Country: U.S. Age: NR Sample: 78	NR	WOMAC: Physical function	Time to ascend stairs (s)	Linear	0.35, P value 0
Topp, 2000 ³⁷¹ Country: U.S. Age: NR Sample: 78	NR	WOMAC: Physical function	Time to descend stairs (s)	Linear	0.47, P value 0
Nebel, 2009 ³⁷² Country: U.S. Age: NR Sample: 179	NR	WOMAC: Physical function	Gait Speed (m/s) (at fast speed)	Linear	-0.169, P value 0.042

Bold- statistically significant results

Appendix Table F34. Association between strength and functional performance

Author and year Study characteristics	Adjustment	Strength measure	Functional outcome	Regression model	Mean (95% CI)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Quadriceps strength (mm Hg):200-299 vs. ≥300	WOMAC: Physical function	Cox regression	1.08 (0.79; 1.47)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Quadriceps strength (mm Hg): 141-200 vs. ≥300	WOMAC: Physical function	Cox regression	1.27 (0.93; 1.73)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Quadriceps strength (mm Hg):≤140 vs. ≥300	WOMAC: Physical function	Cox regression	1.52 (1.12; 2.06)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Hamstring strength (mm Hg):140-184 vs. ≥185	WOMAC: Physical function	Cox regression	1.10 (0.81; 1.50)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Hamstring strength (mm Hg): 101-139 vs. ≥185	WOMAC: Physical function	Cox regression	1.31 (0.97; 1.76)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Hamstring strength (mm Hg): ≤100 vs. ≥185	WOMAC: Physical function	Cox regression	1.51 (1.12; 2.02)
Wood, 2008 ³⁶² Country: UK Age: >50 Sample: 741	NR	20-30 kg of Force (quadriceps femoris muscle strength) vs. >30	WOMAC: Physical function	Logistic	1.29 (0.83; 2.01)
Wood, 2008 ³⁶² Country: UK Age: >50 Sample: 741	NR	10-20 kg of Force (quadriceps femoris muscle strength)vs. >30	WOMAC: Physical function	Logistic	<u>2.37 (1.57; 3.59)</u>
Wood, 2008 ³⁶² Country: UK Age: >50 Sample: 741	NR	≤10 kg of Force (quadriceps femoris muscle strength)vs. >30	WOMAC: Physical function	Logistic	<u>5.17 (3.01; 8.86)</u>
Van Der Esch, 2006 ³⁷⁴ Country: The Netherlands Age: >40 Sample: 86	NR	Muscle strength	Walking time	Linear	-72.73 (-97.99; -47.47)

Appendix Table F34. Association between strength and functional performance (continued)

Author and year Study characteristics	Adjustment	Strength measure	Functional outcome	Regression model	Mean (95% CI)
Van Der Esch, 2006 ³⁷⁴ Country: The Netherlands Age: >40 Sample: 86	NR	Interaction between muscle strength* and laxity (knee instability)	Walking time	Linear	-12.24 (-19.67; -4.81)
Van Der Esch, 2006 ³⁷⁴ Country: The Netherlands Age: >40 Sample: 86	NR	Muscle strength	WOMAC: Physical function	Linear	-31.49 (-40.27; -22.71)
Van Der Esch, 2006 ³⁷⁴ Country: The Netherlands Age: >40 Sample: 86	NR	Interaction between muscle strength* and laxity (knee instability)	WOMAC: Physical function	Linear	-2.34 (-4.93; 0.25)
Hunt, 2010 ³⁷⁵ Country: NR Age: NR Sample: 57	Disease severity, Symptoms (bilateral vs. unilateral), Lower extremity alignment, WOMAC pain	Quadriceps torque	Balance performance (center of pressure path length)	Linear	-7.94 (-15.13; -0.74)
Jadelis, 2001 ³⁷⁶ Country: U.S. Age: >65 Sample: 480	Ankle strength, knee*ankle interaction	Knee strength	Anteroposterior dynamic balance	Linear	0.28 P-value <0.001
Jadelis, 2001 ³⁷⁶ Country: U.S. Age: >65 Sample: 480	Pain, radiographic score, BMI, gender, foot length	Knee strength	Anteroposterior dynamic balance	Linear	0.42 P-value <0.001
Jadelis, 2001 ³⁷⁶ Country: U.S. Age: >65 Sample: 480	Pain, radiographic score, BMI, gender, foot length, ankle strength	Knee strength	Anteroposterior dynamic balance	Linear	0.32 P-value <0.001
Jadelis, 2001 ³⁷⁶ Country: U.S. Age: >65 Sample: 480	Pain, radiographic score, BMI, gender, foot length, ankle strength, pain*knee interaction	Knee strength	Anteroposterior dynamic balance	Linear	0.33 P-value <0.001

Appendix Table F34. Association between strength and functional performance (continued)

Author and year Study characteristics	Adjustment	Strength measure	Functional outcome	Regression model	Mean (95% CI)
Jadelis, 2001 ³⁷⁶ Country: U.S. Age: >65 Sample: 480	Knee strength, knee*ankle strength	Ankle strength	Anteroposterior dynamic balance	Linear	0.32 P-value <0.001
Jadelis, 2001 ³⁷⁶ Country: U.S. Age: >65 Sample: 480	Pain, radiographic score, BMI, gender, foot length, knee strength	Ankle strength	Anteroposterior dynamic balance	Linear	0.28 P-value <0.001
Jadelis, 2001 ³⁷⁶ Country: U.S. Age: >65 Sample: 480	Pain, radiographic score, BMI, gender, foot length, knee strength, pain*knee interaction	Ankle strength	Anteroposterior dynamic balance	Linear	0.28 P-value<0.001
Sharma, 2003 ³⁷⁷ Country: U.S. Age: NR Sample: 257	Age, BMI, knee pain intensity, and disease severity (higher K/L grade of the 2 knees)	Hamstring strength, ft-lbs	WOMAC: Physical function	Logistic	0.86/20 ft-lbs (0.60; 1.23)
Sharma, 2003 ³⁷⁷ Country: U.S. Age: NR Sample: 257	Age, BMI, knee pain intensity, and disease severity (higher K/L grade of the 2 knees)	Quadriceps strength, ft-lbs	WOMAC: Physical function	Logistic	0.88/20 ft-lbs (0.70; 1.11)
Sharma, 2003 ³⁷⁷ Country: U.S. Age: NR Sample: 257	Age, BMI, knee pain intensity, and disease severity (higher K/L grade of the 2 knees)	Proprioceptive inaccuracy, degrees	WOMAC: Physical function	Logistic	1.09/1° (0.88; 1.34)
Maly, 2007 ³⁷⁸ Country: Canada Age: >50 Sample: 54	Self-efficacy (measured by the Functional Self- Efficacy subscale of the Arthritis Self-Efficacy Scale)	Quadriceps strength	Walking performance (Six Minute Walk test)	Linear	1.12 (0.28; 1.96)
Maly, 2007 ³⁷⁸ Country: Canada Age: >50 Sample: 54	Self-efficacy (measured by the Functional Self- Efficacy subscale	Hamstrings strength	Walking performance (Six Minute Walk test)	Linear	1.41 (0.18; 2.64)

Appendix Table F34. Association between strength and functional performance (continued)

Author and year Study characteristics	Adjustment	Strength measure	Functional outcome	Regression model	Mean (95% CI)
	of the Arthritis Self-Efficacy Scale)				
van der Esch, 2008 ³⁷⁹ Country: The Netherlands Age: >40 Sample: 63	NR	Muscle strength (Nm/kg)	Walking time (100m walking test)	Linear	-53.94 (-68.89; -38.99)
van der Esch, 2008 ³⁷⁹ Country: The Netherlands Age: >40 Sample: 63	NR	Muscle strength (Nm/kg)	Walking time (100m walking test)	Linear	-52.17 (-66.83; -37.51)
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, anxiety, depression, activation, radiographic score	MVC (kgF) (voluntary quadriceps strength)	WOMAC: Physical function	Linear	-0.11 (-0.15; -0.07)
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, anxiety, depression, MVC, radiographic score	Quadriceps activation (%)	WOMAC: Physical function	Linear	-0.05 (-0.36; 0.26)
Topp, 2000 ³⁷¹ Country: U.S. Age: NR Sample: 78	NR	Maximum knee extension torque in affected leg by body weight	Time to get down to the floor	Linear	-16.71, P value 0
Topp, 2000 ³⁷¹ Country: U.S. Age: NR Sample: 78	NR	Maximum isometric torque in unaffected leg by body weight	Time to get up off of the floor	Linear	-28.74, P value 0
Topp, 2000 ³⁷¹ Country: U.S. Age: NR Sample: 78	NR	Maximum isometric torque in affected leg by body weight	Time to ascend stairs (s)	Linear	-16.79, P value 0.04
Topp, 2000 ³⁷¹ Country: U.S. Age: NR Sample: 78	NR	Maximum knee flexion torque in unaffected leg by body weight	Time to ascend stairs (s)	Linear	-29.3, P value 0.02
Topp, 2000 ³⁷¹ Country: U.S. Age: NR	NR	Maximum knee flexion torque in unaffected leg by body weight	Time to descend stairs (s)	Linear	-45.63, P value 0

Appendix Table F34. Association between strength and functional performance (continued)

Author and year Study characteristics	Adjustment	Strength measure	Functional outcome	Regression model	Mean (95% CI)
Sample: 78					
van der Esch, 2008 ³⁷⁹ Country: The Netherlands Age: >40 Sample: 63	NR	Muscle strength (Nm/kg)	Get Up and Go time	Linear	-9.97 (-13.18; -6.76)
van der Esch, 2008 ³⁷⁹ Country: The Netherlands Age: >40 Sample: 63	NR	Muscle strength (Nm/kg)	WOMAC: Physical function	Linear	-17.24 (-24.04; -10.44)
van der Esch, 2008 ³⁷⁹ Country: The Netherlands Age: >40 Sample: 63	NR	Muscle strength (Nm/kg)	Get Up and Go time	Linear	-10.00 (-13.16; -6.84)
van der Esch, 2008 ³⁷⁹ Country: The Netherlands Age: >40 Sample: 63	NR	Muscle strength (Nm/kg)	WOMAC: Physical function	Linear	-15.83 (-22.71; -8.95)

Bold- statistically significant results; underlined- large magnitude of the association

Appendix Table F35. Association between balance and functional performance

Author, year Study characteristics	Adjustment	Balance measure	Functional outcome	Regression model	Mean (95% CI)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, inactivity gelling, local tender point count	Single-leg standing balance (s): 10-29 vs. 30	WOMAC: Physical function	Cox regression	1.12 (0.80; 1.55)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, inactivity gelling, local tender point count	Single-leg standing balance (s): 4-9 vs. 30	WOMAC: Physical function	Cox regression	1.22 (0.88; 1.67)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, inactivity gelling, local tender point count	Single-leg standing balance (s): <4 vs. 30	WOMAC: Physical function	Cox regression	1.21 (0.85; 1.72)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Local tender point count	Single-leg standing balance (s): 10-29 vs. 30	WOMAC: Physical function	Cox regression	1.27 (0.92; 1.74)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Local tender point count	Single-leg standing balance (s): 4-9 vs. 30	WOMAC: Physical function	Cox regression	1.50 (1.12; 2.01)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Local tender point count	Single-leg standing balance (s): <4 vs. 30	WOMAC: Physical function	Cox regression	1.49 (1.09; 2.04)

Bold- statistically significant results

Appendix Table F36. Association between intermediate outcomes and disability

Author, year Study characteristics	Adjustment	Intermediate outcome	Outcomes	Regression model	Regression coefficient (95% CI)
van Baar, 1998 ³⁸¹ Country: The Netherlands Age: NR Sample: 112	Pain coping: worrying, resting; range of motion; medication: NSAID; age	Muscle strength	Observed disability determined by studying videos of the patients' performance of a series of standardized tasks using an adaptation of the method described by Keefe	Linear	-0.24 P value ≤0.01
van Baar, 1998 ³⁸¹ Country: The Netherlands Age: NR Sample: 112	Pain coping: resting; range of motion; pain	Muscle strength	Self-reported disability-IRGL, mobility subscale	Linear	-0.22 P value ≤0.01
van Baar, 1998 ³⁸¹ Country: The Netherlands Age: NR Sample: 112	Pain coping: worrying, resting; muscle strength; medication: NSAID; age	Range of Motion	Observed disability determined by studying videos of the patients' performance of a series of standardized tasks using an adaptation of the method described by Keefe	Linear	-0.27 P value ≤0.01
van Baar, 1998 ³⁸¹ Country: The Netherlands Age: NR Sample: 112	Pain coping: resting; muscle strength; pain	Range of motion	Self-reported disability-IRGL, mobility subscale	Linear	-0.28 P value ≤0.01
Clark, 1998 ³⁸² Country: U.S. Age: >40 Sample: 415	Education, employment, comorbidity, crepitus, bony enlargement, joint tenderness	Osteoarthritis of the Knee Severity Index	SF-36: Role function with physical limitations	Linear	-1.19 P value <0.001
Clark, 1998 ³⁸² Country: U.S. Age: >40 Sample: 415	Age, education, comorbidity, crepitus, employment, bony enlargement	Joint tenderness	SF-36: Physical function	Linear	1.07 P value 0.69
Clark, 1998 ³⁸² Country: U.S. Age: >40 Sample: 415	Age, education, comorbidity, crepitus, employment, bony enlargement	Joint tenderness	SF-36: Role function with physical limitations	Linear	-0.84 P value 0.83

Appendix Table F36. Association between intermediate outcomes and disability (continued)

Author, year Study characteristics	Adjustment	Intermediate outcome	Outcomes	Regression model	Regression coefficient (95% CI)
van Baar, 1998 ³⁸¹ Country: The Netherlands Age: NR Sample: 112	Pain coping: resting; muscle strength; range of motion	Pain	Self-reported disability-IRGL, mobility subscale	Linear	0.21 P value ≤0.05
van Baar, 1998 ³⁸¹ Country: The Netherlands Age: NR Sample: 112	Pain coping: worrying; muscle strength; medication: NSAID; age; range of motion	Pain coping: Resting	Observed disability determined by studying videos of the patients' performance of a series of standardized tasks using an adaptation of the method described by Keefe	Linear	0.21 P value ≤0.01
van Baar, 1998 ³⁸¹ Country: The Netherlands Age: NR Sample: 112	Pain; muscle strength; range of motion	Pain coping: Resting	Self-reported disability-IRGL, mobility subscale	Linear	0.26 P value ≤0.01
van Baar, 1998 ³⁸¹ Country: The Netherlands Age: NR Sample: 112	Pain coping: resting; muscle strength; medication: NSAID; age; range of motion	Pain coping: Worrying	Observed disability determined by studying videos of the patients' performance of a series of standardized tasks using an adaptation of the method described by Keefe	Linear	0.20 P value ≤0.05
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength	ROM	Self-reported limitations	Linear	0.252, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength, pain	ROM	Self-reported limitations	Linear	0.153, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength, pain, comorbidity	ROM	Self-reported limitations	Linear	0.133, P value <0.05
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength	ROM hip internal rotation	Self-reported limitations	Linear	0.153, P value <0.05
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength, pain	ROM: Hip internal rotation	Self-reported limitations	Linear	0.044, P value NR
van Dijk, 2009 ³⁸³ Country: The Netherlands	Muscle strength, pain, comorbidity	ROM: Hip internal rotation	Self-reported limitations	Linear	0.041, P value NR

Appendix Table F36. Association between intermediate outcomes and disability (continued)

Author, year Study characteristics	Adjustment	Intermediate outcome	Outcomes	Regression model	Regression coefficient (95% CI)
Age: >50 Sample: 288					
Maly, 2006 ³⁸⁴ Country: Canada Age: >50 Sample: 54	NR	Peak knee extension angle (°)	SF-36 (disability)	Linear	-6.42, P value 0.001
Maly, 2006 ³⁸⁴ Country: Canada Age: >50 Sample: 54	NR	Range knee flexion/extension angle (°)	SF-36 (disability)	Linear	3.04, P value 0.021
Steultjens, 2000 ³⁶⁵ Country: The Netherlands Age: NR Sample: 198	NR	Knee flexion (ROM)	Observed disability	Linear	-0.154, P value NR
Steultjens, 2000 ³⁶⁵ Country: The Netherlands Age: NR Sample: 198	NR	Hip extension (ROM)	Observed disability	Linear	-0.201, P value <0.05
Steultjens, 2000 ³⁶⁵ Country: The Netherlands Age: NR Sample: 198	NR	Hip abduction (ROM)	Observed disability	Linear	-0.186, P value NR
Steultjens, 2000 ³⁶⁵ Country: The Netherlands Age: NR Sample: 198	NR	Hip external rotation (ROM)	Observed disability	Linear	-0.224, P value <0.05
Steultjens, 2000 ³⁶⁵ Country: The Netherlands Age: NR Sample: 198	NR	Knee flexion (ROM)	Self-reported disability	Linear	-0.195, P value <0.05
Steultjens, 2000 ³⁶⁵ Country: The Netherlands Age: NR Sample: 198	NR	Hip extension (ROM)	Self-reported disability	Linear	-0.279, P value <0.01
Steultjens, 2000 ³⁶⁵ Country: The Netherlands Age: NR Sample: 198	NR	Hip external rotation (ROM)	Self-reported disability	Linear	-0.331, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength	ROM: Hip flexion	Performance -based limitations	Linear, standardized beta coefficient	-0.21, P value <0.01

Appendix Table F36. Association between intermediate outcomes and disability (continued)

Author, year Study characteristics	Adjustment	Intermediate outcome	Outcomes	Regression model	Regression coefficient (95% CI)
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	ROM: Hip flexion	Self-reported limitations in activities	Linear, standardized beta coefficient	0.376, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	ROM: Hip flexion	Performance -based limitations in activities	Linear, standardized beta coefficient	-0.401, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	ROM: Hip internal rotation	Self-reported limitations in activities	Linear, standardized beta coefficient	0.246, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	ROM: Hip internal rotation	Performance -based limitations in activities	Linear, standardized beta coefficient	-0.125, P value <0.05
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	ROM: Hip external rotation	Self-reported limitations in activities	Linear, standardized beta coefficient	0.175, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	ROM: Hip external rotation	Performance -based limitations in activities	Linear, standardized beta coefficient	-0.238, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	ROM: Knee flexion	Self-reported limitations in activities	Linear, standardized beta coefficient	0.204, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	ROM: Knee flexion	Performance -based limitations in activities	Linear, standardized beta coefficient	-0.296, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	ROM: Knee extension	Self-reported limitations in activities	Linear, standardized beta coefficient	-0.008, P value NR
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	ROM: Knee extension	Performance -based limitations in activities	Linear, standardized beta coefficient	-0.246, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands	Muscle strength	Muscle strength knee extension	Self-reported limitations	Linear	0.215, P value <0.01

Appendix Table F36. Association between intermediate outcomes and disability (continued)

Author, year Study characteristics	Adjustment	Intermediate outcome	Outcomes	Regression model	Regression coefficient (95% CI)
Age: >50 Sample: 288					
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength, pain	Muscle strength knee extension	Self-reported limitations	Linear	0.136, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength, pain, comorbidity	Muscle strength knee extension	Self-reported limitations	Linear	0.128, P value <0.01
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, depression, anxiety, activation (%), radiographic score	MVC (Maximum voluntary contraction of quadriceps) (kgF): >30	Disability (WOMAC function score >19)	Logistic	1.00 (1.00; 1.00) reference
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, depression, anxiety, activation (%), radiographic score	MVC (Maximum voluntary contraction of quadriceps) (kgF): 20-30	Disability (WOMAC function score >19)	Logistic	1.48 (0.37; 5.93)
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, depression, anxiety, activation (%), radiographic score	MVC (Maximum voluntary contraction of quadriceps) (kgF): 10-20	Disability (WOMAC function score >19)	Logistic	4.88 (1.18; 20.14)
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, depression, anxiety, activation (%), radiographic score	MVC (Maximum voluntary contraction of quadriceps) (kgF): <=10	Disability (WOMAC function score >19)	Logistic	8.23 (1.53; 44.38)
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, depression, anxiety, activation (%), radiographic score	MVC (Maximum voluntary contraction) (kgF): >40	Disability (SF-36 function score <90)	Logistic	1.00 (1.00; 1.00) reference
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, depression, anxiety, activation (%), radiographic score	MVC (Maximum voluntary contraction) (kgF): 30 -40	Disability (SF-36 function score <90)	Logistic	3.04 (0.86; 10.71)
O'Reilly, 1998 ³⁸⁰ Country: UK	Age, sex, BMI, depression, anxiety,	MVC (Maximum voluntary contraction)	Disability (SF-36 function score <90)	Logistic	3.77 (1.02; 13.91)

Appendix Table F36. Association between intermediate outcomes and disability (continued)

Author, year Study characteristics	Adjustment	Intermediate outcome	Outcomes	Regression model	Regression coefficient (95% CI)
Age: >40 Sample: 300 each of cases and controls	activation (%), radiographic score	(kgF): 20-30			
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, depression, anxiety, activation (%), radiographic score	MVC (Maximum voluntary contraction) (kgF): <=20	Disability (SF-36 function score <90)	Logistic	4.98 (1.08; 22.97)
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength	Muscle strength hip abduction	Performance -based limitations	Linear	-0.184, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength, pain	Muscle strength hip abduction	Performance -based limitations	Linear	-0.174, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength, pain, cognitive functioning	Muscle strength hip abduction	Performance -based limitations	Linear	-0.186, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength, pain, cognitive functioning, age/BMI	Muscle strength hip abduction	Performance -based limitations	Linear	-0.17, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	Muscle strength hip abduction	Self-reported limitations in activities	Linear	0.318, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	Muscle strength hip abduction	Performance -based limitations in activities	Linear	-0.356, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	Muscle strength knee extension	Self-reported limitations in activities	Linear	0.306, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	NR	Muscle strength knee extension	Performance -based limitations in activities	Linear	-0.274, P value <0.01

Bold- statistically significant results

Appendix Table F37. Association between joint mobility and functional performance

Author, year Study characteristics	Adjustment	Joint mobility measure	Functional outcome	Regression model	Mean (95% CI)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Bilateral knee pain, inactivity gelling	Duration of morning stiffness (min): ≤30 vs. none	WOMAC: Physical function	Cox regression	1.47 (1.13; 1.89)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Bilateral knee pain, inactivity gelling	Duration of morning stiffness (min): >30 vs. none	WOMAC: Physical function	Cox regression	1.55 (0.99; 2.43)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, inactivity gelling, bilateral knee pain, age	Duration of morning stiffness(min): ≤30 vs. none	WOMAC: Physical function	Cox regression	1.32 (1.01; 1.73)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, inactivity gelling, bilateral knee pain, age, local tender point count, single-leg standing balance	Duration of morning stiffness(min): ≤30 vs. none	WOMAC: Physical function	Cox regression	1.25 (0.95; 1.65)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, inactivity gelling, bilateral knee pain, age, local tender point count, single-leg standing balance, prevalent knee radiographic OA	Duration of morning stiffness(min): ≤30 vs. none	WOMAC: Physical function	Cox regression	1.25 (0.95; 1.65)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, inactivity gelling, bilateral knee pain, age	Duration of morning stiffness(min): ≥30 vs. none	WOMAC: Physical function	Cox regression	1.22 (0.75; 2.00)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, inactivity gelling, bilateral knee pain, age, local tender point count, single-leg standing balance	Duration of morning stiffness(min): ≥30 vs. none	WOMAC: Physical function	Cox regression	1.15 (0.70; 1.89)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, inactivity gelling, bilateral knee pain, age, local tender point count, single-leg standing balance, prevalent knee radiographic OA	Duration of morning stiffness(min): ≥30 vs. none	WOMAC: Physical function	Cox regression	1.16 (0.70; 1.91)

Appendix Table F37. Association between joint mobility and functional performance (continued)

Author, year Study characteristics	Adjustment	Joint mobility measure	Functional outcome	Regression model	Mean (95% CI)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Hip rotation: Either Internal or external rotation $\leq 23^\circ$ vs. $\geq 23^\circ$	WOMAC: Physical function	Cox regression	1.17 (0.90; 1.51)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Hip rotation: Internal and external rotation $< 23^\circ$ vs. $\geq 23^\circ$	WOMAC: Physical function	Cox regression	1.16 (0.81; 1.68)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Bilateral knee pain, duration of morning stiffness	Inactivity gelling: Yes vs. No	WOMAC: Physical function	Cox regression	1.34 (0.98; 1.83)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age	Inactivity gelling: Yes vs. No	WOMAC: Physical function	Cox regression	1.23 (0.89; 1.71)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, local tender point count, single-leg standing balance	Inactivity gelling: Yes vs. No	WOMAC: Physical function	Cox regression	1.19 (0.86; 1.66)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, local tender point count, single-leg standing balance, prevalent knee radiographic OA	Inactivity gelling: Yes vs. No	WOMAC: Physical function	Cox regression	1.19 (0.85; 1.65)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Knee flexion: Range of movement: $< 120^\circ$ vs. $\geq 120^\circ$	WOMAC: Physical function	Cox regression	1.30 (0.98; 1.71)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Locking: Pseudo-locking vs. no	WOMAC: Physical function	Cox regression	1.12 (0.81; 1.57)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Locking: True locking vs. no	WOMAC: Physical function	Cox regression	1.36 (0.68; 2.74)

Bold- statistically significant results

Appendix Table F38. Association between joint stability and alignment with functional performance

Author, year Study characteristics	Adjustment	Joint stability and alignment measure	Functional outcome	Regression model	Mean (95% CI)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Giving way: Yes vs. No	WOMAC: Physical function	Cox regression	1.33 (1.08; 1.64)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Anteroposterior instability: Possible/definite vs. none	WOMAC: Physical function	Cox regression	0.85 (0.60; 1.20)
Kauppila, 2009 ³⁸⁵ Country: Finland Age: >60 Sample: 88	BMI, gender, comorbidity, flexion and extension relative peak torque of the affected leg, stair test, 15m walk-test, WOMAC pain, malalignments, restricted ROM, and previous surgery of the lower extremity	Antero-posterior laxity (knee instability) of the knee	WOMAC: Physical function	Linear	11.30 (3.21; 19.35)
Kauppila, 2009 ³⁸⁵ Country: Finland Age: >60 Sample: 88	BMI, gender, comorbidity, flexion and extension relative peak torque of the affected leg, stair test, 15m walk-test, WOMAC pain, malalignments, restricted ROM, and previous surgery of the lower extremity, antero- posterior laxity (knee instability)	Antero-posterior laxity (knee instability) of the knee and WOMAC pain	WOMAC: Physical function	Linear	-0.53 (-0.94; - 0.13)
Van Der Esch, 2006 ³⁷⁴ Country: The Netherlands Age: >40 Sample: 86	NR	Joint laxity (knee instability)	WOMAC: Physical function	Linear	-1.04 (-1.84; - 0.24)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Intercondylar gap in standing (cm): >0 vs. 0	WOMAC: Physical function	Cox regression	0.93 (0.72; 1.19)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Intermalleolar gap in standing (cm): >0 vs. 0	WOMAC: Physical function	Cox regression	1.16 (0.93; 1.43)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Fixed flexion deformity: Yes vs. no	WOMAC: Physical function	Cox regression	1.09 (0.80; 1.48)
Hunt, 2010 ³⁷⁵ Country: NR Age: NR Sample: 57	Disease severity, symptoms(bilateral vs. unilateral), WOMAC pain, quadriceps torque	Lower extremity alignment	Balance performance (center of pressure path length)	Linear	-2.73 (-4.74; - 0.72)

Appendix Table F38. Association between joint stability and alignment with functional performance (continued)

Author, year Study characteristics	Adjustment	Joint stability and alignment measure	Functional outcome	Regression model	Mean (95% CI)
Sharma, 2003 ³⁷⁷ Country: U.S. Age: NR Sample: 257	Age, BMI, knee pain intensity, and disease severity (higher K/L grade of the 2 knees)	Laxity (knee instability), degrees	WOMAC: Physical function	Logistic	1.58/3^u (1.04; 2.40)
Bold- statistically significant results					
NR –Not reported					

Appendix Table F39. Association between pain and poor functional status

Author, year Study characteristics	Adjustment	Independent measure	Functional outcome	Regression Model	Regression coefficient (95% CI)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Patellofemoral joint compression: Glide pain vs. no pain	Poor WOMAC functional outcome	Cox regression	1.29 (0.99; 1.70)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Incident pain: Yes vs. No	Poor WOMAC functional outcome	Cox regression	1.24 (0.97; 1.53)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Bilateral knee pain :Yes vs. No	Poor WOMAC functional outcome	Cox regression	1.46 (1.12; 1.90)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, inactivity gelling, duration of morning stiffness, age, local tender point count, single-leg standing balance, prevalent knee radiographic OA	Bilateral knee pain :Yes vs. No	Poor WOMAC functional outcome	Cox regression	1.14 (0.86; 1.51)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, chronic pain grade, inactivity gelling, Bilateral knee pain, duration of morning stiffness, age, local tender point count, single-leg standing balance, prevalent knee radiographic OA	Chronic pain grade: II vs. I	Poor WOMAC functional outcome	Cox regression	1.19 (0.92; 1.54)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, chronic pain grade, inactivity gelling, Bilateral knee pain, duration of morning stiffness, age, local tender point count, single-leg standing balance, prevalent knee radiographic OA	Chronic pain grade: III vs. I	Poor WOMAC functional outcome	Cox regression	1.34 (0.93; 1.92)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, chronic pain grade, inactivity gelling, Bilateral knee pain, duration of morning stiffness, age, local tender point count, single-leg standing balance, prevalent knee radiographic OA	Chronic pain grade: IV vs. I	Poor WOMAC functional outcome	Cox regression	1.15 (0.78; 1.70)
Kauppi, 2009 ³⁸⁵ Country: Finland Age: >60 Sample: 88	BMI, gender, comorbidity, flexion and extension relative peak torque of the affected leg, stair test, 15m walk-test, antero-posterior laxity (knee instability), malalignments, restricted ROM, and previous surgery of the lower extremity	WOMAC: Pain	Poor WOMAC functional outcome	Linear	0.68 (0.52; 0.84)

Appendix Table F39. Association between pain and poor functional status (continued)

Author, year Study characteristics	Adjustment	Independent measure	Functional outcome	Regression Model	Regression coefficient (95% CI)
Hunt, 2010 ³⁷⁵ Country: NR Age: NR Sample: 57	Disease severity, symptoms(bilateral vs. unilateral), lower extremity alignment, quadriceps torque	WOMAC: Pain	Balance performance (center of pressure path length)	Linear	2.57 (0.86; 4.29)
Rejeski, 1998 ³⁶⁹ Country: U.S. Age: NR Sample: 439	Baseline self-efficacy, 18-month knee pain, 18-month self-efficacy, baseline stair climb time	Baseline knee pain	Effect of treatment on stair climb time	Linear	-0.48 (-1.21; 0.25)
Wolfe, 1999 ³⁸⁶ Country: U.S. Age: NR Sample: 2115	Age, sex	Back pain	WOMAC: Stiffness	Linear	0.90 (0.08; 1.72)
Jadelis, 2001 ³⁷⁶ Country: U.S. Age: >65 Sample: 480	Radiographic score, BMI, gender, foot length, knee strength, ankle strength, pain*knee interaction	Pain (knee pain scale)	Anteroposterior dynamic balance	Linear	-0.07 P value =0.120
van Baar, 1998 ³⁸¹ Country: The Netherlands Age: NR Sample: 112	Pain coping: retreating	Psychological well being: Cheerfulness	Pain (VAS)	Linear	-0.21 P value <=0.05
Clark, 1998 ³⁸² Country: U.S. Age: >40 Sample: 415	Education, employment, comorbidity, crepitus, bony enlargement, joint tenderness	Osteoarthritis of the Knee Severity Index	SF-36: Bodily pain	Linear	-1.14 P value <0.001
Clark, 1998 ³⁸² Country: U.S. Age: >40 Sample: 415	Age, education, comorbidity, crepitus, employment, bony enlargement	Joint tenderness	SF-36: Bodily pain	Linear	-1.88 P value 0.38
van Baar, 1998 ³⁸¹ Country: The Netherlands Age: NR Sample: 112	Cheerfulness	Pain coping: Retreating	Pain (VAS)	Linear	0.36 P value ≤0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength, pain	VAS pain	Self-reported limitations	Linear	-0.595, P value <0.01

Appendix Table F39. Association between pain and poor functional status (continued)

Author, year Study characteristics	Adjustment	Independent measure	Functional outcome	Regression Model	Regression coefficient (95% CI)
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength, pain, comorbidity	VAS pain	Self-reported limitations	Linear	-0.576, P value <0.01
Maly, 2006 ³⁸⁴ Country: Canada Age: >50 Sample: 54	NR	Pain	SF-36 (disability)	Linear	-0.52, P value 0.001
Topp, 2000 ³⁷¹ Country: U.S. Age: NR Sample: 78	NR	Pain when getting down to the floor	Time to get down to the floor	Linear	-1.35, P value 0
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength, pain	VAS pain	Performance -based limitations	Linear	0.156, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength, pain, cognitive functioning	VAS pain	Performance -based limitations	Linear	0.134, P value <0.05
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Muscle strength, pain, cognitive functioning, age/BMI	VAS pain	Performance -based limitations	Linear	0.161, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	VAS pain	Self-reported limitations in activities	Linear	-0.675, P value <0.01
van Dijk, 2009 ³⁸³ Country: The Netherlands Age: >50 Sample: 288	Unadjusted	VAS pain	Performance -based limitations in activities	Linear	0.296, P value <0.01
Maly, 2007 ³⁷⁸ Country: Canada Age: >50 Sample: 54	Self-efficacy (measured by the Functional Self-Efficacy subscale of the Arthritis Self-Efficacy Scale)	Pain	Walking performance (Six Minute Walk test)	Linear	-0.13 (-0.42; 0.16)

Appendix Table F39. Association between pain and poor functional status (continued)

Author, year Study characteristics	Adjustment	Independent measure	Functional outcome	Regression Model	Regression coefficient (95% CI)
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, anxiety, depression, MVC, activation, radiographic score	WOMAC: Pain	WOMAC: Physical function	Linear	0.44 (0.05; 0.83)

Bold- statistically significant results

Appendix Table F40. Association between intermediate outcomes with pain and physical performance

Author, year Study characteristics	Adjustment	Independent measure	Clinical outcomes	Regression Model	Regression coefficient (95% CI)
Rejeski, 1998 ³⁶⁹ Country: U.S. Age: NR Sample: 439	18-month knee pain, baseline GHS(general health status) scores, aerobic, resistance training	Baseline knee pain: KPS (Knee Pain Scale)	Effect of treatment on health perception using RAND 36-item health survey	Linear	3.28 (1.22; 5.34)
Rejeski, 1998 ³⁶⁹ Country: U.S. Age: NR Sample: 439	18-month knee pain, baseline knee pain, aerobic, resistance training	Baseline GHS scores	Effect of treatment on health perception using RAND 36-item health survey	Linear	0.74 (0.66; 0.82)
Harrison, 2004 ³⁵⁹ Country: U.S. Age: >50 Sample: 50	Functional self-efficacy	WOMAC: Pain	Poor WOMAC functional outcome	Linear	0.63 p-value<0.001
Harrison, 2004 ³⁵⁹ Country: U.S. Age: >50 Sample: 50	Functional self-efficacy	Balance	Timed measurements of 3 functions summed to provide a final physical performance score (in seconds): 1) walking 20m, 2)climbing up and down 9 stairs, and 3)going from sitting to standing for 5 repetitions	Linear	-0.48 p-value<0.001
Harrison, 2004 ³⁵⁹ Country: U.S. Age: >50 Sample: 50	Balance	Functional self-efficacy (Arthritis Self-Efficacy Scale)	Timed measurements of 3 functions summed to provide a final physical performance score (in seconds): 1) walking 20m, 2)climbing up and down 9 stairs, and 3)going from sitting to standing for 5 repetitions	Linear	-0.27 p-value <0.05
Van Der Esch, 2006 ³⁷⁴ Country: The Netherlands Age: >40 Sample: 86	NR	Joint laxity (knee instability)	Walking time	Linear	0.70 (-0.38; 1.78)
Harrison, 2004 ³⁵⁹ Country: U.S. Age: >50 Sample: 50	Pain	Functional self-efficacy (Arthritis Self-Efficacy Scale)	WOMAC: Physical function	Linear	0.34 p-value <0.001
Wolfe, 1999 ³⁸⁶ Country: U.S. Age: NR Sample: 625	Age, sex	Fatigue	WOMAC: Pain	Linear	4.85 (3.69; 6.01)

Appendix Table F40. Association between intermediate outcomes with pain and physical performance (continued)

Author, year Study characteristics	Adjustment	Independent measure	Clinical outcomes	Regression Model	Regression coefficient (95% CI)
Wolfe, 1999 ³⁸⁶ Country: U.S. Age: NR Sample: 625	Age, sex	Depression	WOMAC: Pain	Linear	0.95 (0.52; 1.38)
Astephen Wilson, 2011 ³⁸⁷ Country: Canada Age: >35 Sample: 40	NR	Gait speed	WOMAC pain severity	Linear	-10.20 (-15.30; -5.10)
Clark, 1998 ³⁸² Country: U.S. Age: >40 Sample: 415	Education, employment, comorbidity, crepitus, bony enlargement, joint tenderness	Osteoarthritis of the Knee Severity Index	SF-36: Physical function	Linear	-1.36 P value <0.001
Sharma, 2003 ³⁷⁷ Country: U.S. Age: NR Sample: 257	Age, BMI, and disease severity (higher K/L grade of the 2 knees)	0-18 month increase in knee pain intensity, mm on VAS	WOMAC: Physical function	Logistic	1.48/20 mm (1.12; 1.95)
Sharma, 2003 ³⁷⁷ Country: U.S. Age: NR Sample: 257	Age, BMI, and disease severity (higher K/L grade of the 2 knees)	Knee pain intensity, mm on VAS	WOMAC: Physical function	Logistic	1.12/20 mm (0.90; 1.40)
Clark, 1998 ³⁸² Country: U.S. Age: >40 Sample: 415	Education, employment, comorbidity, crepitus, bony enlargement, joint tenderness	Osteoarthritis of the Knee Severity Index	SF-36: General health perceptions	Linear	-0.53 P value <0.001
Clark, 1998 ³⁸² Country: U.S. Age: >40 Sample: 415	Age, education, comorbidity, crepitus, employment, bony enlargement	Joint tenderness	SF-36: General health perceptions	Linear	2.21 P value 0.31

Bold- statistically significant results

Appendix Table F41. Association between pain and functional performance

Author, year Study characteristics	Adjustment	Pain measure	Functional outcome	Regression model	Mean (95%CI)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, inactivity gelling, single-leg standing balance, prevalent knee radiographic OA	Local tender point count:1 vs. 0	WOMAC: Physical function	Cox regression	1.15 (0.83; 1.58)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, inactivity gelling, single-leg standing balance, prevalent knee radiographic OA	Local tender point count:2 vs. 0	WOMAC: Physical function	Cox regression	1.33 (0.97; 1.83)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, inactivity gelling, single-leg standing balance, prevalent knee radiographic OA	Local tender point count:3 vs. 0	WOMAC: Physical function	Cox regression	1.33 (0.94; 1.86)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, anxiety, duration of morning stiffness, bilateral knee pain, age, inactivity gelling, single-leg standing balance, prevalent knee radiographic OA	Local tender point count:4-6 vs. 0	WOMAC: Physical function	Cox regression	1.25 (0.89; 1.76)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Single-leg standing balance	Local tender point count:1 vs. 0	WOMAC: Physical function	Cox regression	1.16 (0.84; 1.58)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Single-leg standing balance	Local tender point count:2 vs. 0	WOMAC: Physical function	Cox regression	1.45 (1.06; 1.96)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Single-leg standing balance	Local tender point count:3 vs. 0	WOMAC: Physical function	Cox regression	1.54 (1.12; 2.12)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Single-leg standing balance	Local tender point count:4-6 vs. 0	WOMAC: Physical function	Cox regression	1.48 (1.07; 2.04)

Bold- statistically significant results

Appendix Table F42. Association between intermediate outcomes and Adjusted Activity Score, derived by subtracting the number of activities the participant is no longer able to perform from the value of the MAS; reflective of an individual's typical daily physical activities

Author, year Study characteristics	Adjustment	Intermediate outcome	Regression model	Regression coefficient (95% CI)
Bennell, 2004 ³⁷⁰ Country: Australia Age: >50 Sample: 259	NR	VAS: Restriction	Linear	-1.46 (-2.03; -0.88)
Bennell, 2004 ³⁷⁰ Country: Australia Age: >50 Sample: 259	NR	TUG test	Linear	-0.83 (-1.34; -0.33)
Bennell, 2004 ³⁷⁰ Country: Australia Age: >50 Sample: 259	NR	Step test	Linear	0.58 (0.11; 1.06)
Bennell, 2004 ³⁷⁰ Country: Australia Age: >50 Sample: 259	NR	Walking speed	Linear	13.28 (6.23; 20.33)
Bold- statistically significant results				
NR – Not reported				

Appendix Table F43. Association between intermediate outcomes and doctor indication for patients to undergo total joint replacement within a year after consultation

Author, year Study characteristics	Intermediate outcome	Regression model	Regression coefficient (95% CI)
Boutron, 2008 ³⁸⁸ Country: France Age: >45 Sample: 2,540	Lequesne score (>severity threshold)	Logistic	<u>2.36 (1.71; 3.26)</u>
Boutron, 2008 ³⁸⁸ Country: France Age: >45 Sample: 2,540	Number of days with pain per month (10 days)	Logistic	1.39 (1.10; 1.75)
Boutron, 2008 ³⁸⁸ Country: France Age: >45 Sample: 2,540	SF-36: PCS (measures HRQoL)	Logistic	0.97 (0.95; 0.99)
Boutron, 2008 ³⁸⁸ Country: France Age: >45 Sample: 2,540	Number of days with disability per month (10 days)	Logistic	1.50 (1.19; 1.91)
Boutron, 2008 ³⁸⁸ Country: France Age: >45 Sample: 2,540	Patients' opinion of their disability (moderate/severe)	Logistic	1.57 (1.01; 2.20)

Bold- statistically significant results; underlined-large magnitude of the association

Appendix Table F44. Association between self reported health outcomes and poor functional status

Author, year Study characteristics	Adjustment	Intermediate outcome	Clinical outcome	Regression model	Regression coefficient (95% CI)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Self-reported swelling in past month: Yes vs. No	Poor WOMAC functional outcome	Cox regression	1.27 (1.03; 1.56)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	Unadjusted	Self-reported dramatic swelling: Yes vs. No	Poor WOMAC functional outcome	Cox regression	1.09 (0.83; 1.44)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, age, chronic pain grade, inactivity gelling, bilateral knee pain, duration of morning stiffness, local tender point count, single-leg standing balance, prevalent knee radiographic OA	Anxiety (0-21): Possible (8-11) vs. none (0-7)	Poor WOMAC functional outcome	Cox regression	1.29 (1.01; 1.64)
Thomas, 2008 ³⁷³ Country: UK Age: >50 Sample: 621	BMI, age, chronic pain grade, inactivity gelling, bilateral knee pain, duration of morning stiffness, local tender point count, single-leg standing balance, prevalent knee radiographic OA	Anxiety (0-21): Probable (12-21) vs. none (0-7)	Poor WOMAC functional outcome	Cox regression	1.31 (0.94; 1.82)
Rejeski, 1998 ³⁶⁹ Country: U.S. Age: NR Sample: 439	Baseline knee pain, 18-month knee pain, 18-month self- efficacy, baseline stair climb time	Baseline Self-efficacy	Effect of treatment on stair climb time	Linear	0.02 (0.001; 0.04)
Wolfe, 1999 ³⁸⁶ Country: U.S. Age: NR Sample: 625	Age, sex	Depression	WOMAC: Physical function	Linear	3.30 (1.85; 4.75)
Wolfe, 1999 ³⁸⁶ Country: U.S. Age: NR Sample: 625	Age, sex	Depression	WOMAC: Stiffness	Linear	0.27 (0.07; 0.47)
Wolfe, 1999 ³⁸⁶ Country: U.S. Age: NR Sample: 625	Age, sex	Fatigue	WOMAC: Stiffness	Linear	2.19 (1.64; 2.74)
Wolfe, 1999 ³⁸⁶ Country: U.S.	Age, sex	Fatigue	WOMAC: Physical function	Linear	17.58 (13.62; 21.54)

Appendix Table F44. Association between self reported health outcomes and poor functional status (continued)

Author, year Study characteristics	Adjustment	Intermediate outcome	Clinical outcome	Regression model	Regression coefficient (95% CI)
Age: NR Sample: 625					
Sharma, 2003 ³⁷⁷ Country: U.S. Age: NR Sample: 257	Age, BMI, knee pain intensity, and disease severity (higher K/L grade of the 2 knees)	Mental health score (SF-36 mental health)	WOMAC: Physical function	Logistic	0.58/5 points (0.39; 0.86)
Sharma, 2003 ³⁷⁷ Country: U.S. Age: NR Sample: 257	Age, BMI, knee pain intensity, and disease severity (higher K/L grade of the 2 knees)	Role functioning emotional score (SF-36 role emotional)	Chair-stand performance (Time required for 5 repetitions of rising from a chair and sitting down, using the protocol.	Logistic	0.99/1 unit (0.75; 1.32)
Sharma, 2003 ³⁷⁷ Country: U.S. Age: NR Sample: 257	Age, BMI, knee pain intensity, and disease severity (higher K/L grade of the 2 knees)	Self-efficacy score (Arthritis Self-Efficacy Scale)	WOMAC: Physical function	Logistic	0.80/5 points (0.65; 0.98)
Sharma, 2003 ³⁷⁷ Country: U.S. Age: NR Sample: 257	Age, BMI, knee pain intensity, and disease severity (higher K/L grade of the 2 knees)	Self-efficacy score (Arthritis Self-Efficacy Scale)	Chair-stand performance (Time required for 5 repetitions of rising from a chair and sitting down, using the protocol	Logistic	0.86/5 points (0.68; 1.09)
Sharma, 2003 ³⁷⁷ Country: U.S. Age: NR Sample: 257	Age, BMI, knee pain intensity, and disease severity (higher K/L grade of the 2 knees)	Social support score (Medical Outcomes Study Social Support Survey)	WOMAC: Physical function	Logistic	0.85/10 points (0.73; 0.98)
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, depression, MVC, activation (%), radiographic score	Anxiety: HAD score >=8 vs. <8	Disability (WOMAC function score >19)	Logistic	1.91 (0.89; 4.05)
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, depression, MVC, activation (%), radiographic score	Anxiety: HAD score >=8 vs. <8	Disability (SF-36 function score <90)	Logistic	2.04 (0.95; 4.36)
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases	Age, sex, BMI, depression, MVC, activation, radiographic score	Anxiety	WOMAC: Physical function	Linear	0.43 (0.08; 0.78)

Appendix Table F44. Association between self reported health outcomes and poor functional status (continued)

Author, year Study characteristics	Adjustment	Intermediate outcome	Clinical outcome	Regression model	Regression coefficient (95% CI)
and controls					
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, anxiety, MVC, activation (%), radiographic score	Depression: HAD score ≥8 vs. <8	Disability (WOMAC function score >19)	Logistic	6.15 (2.10; 17.98)
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, anxiety, MVC, activation (%), radiographic score	Depression: HAD score ≥8 vs. <8	Disability (SF-36 function score <90)	Logistic	8.27 (0.91; 83.94)
O'Reilly, 1998 ³⁸⁰ Country: UK Age: >40 Sample: 300 each of cases and controls	Age, sex, BMI, anxiety, MVC, activation, radiographic score	Depression	WOMAC: Physical function	Linear	2.15 (2.01; 2.29)
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Time*Center for Epidemiologic Studies Depression Scale depression score	WOMAC: Pain	Linear	0.02 (0.01 to 0.03)
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Time*Center for Epidemiologic Studies Depression Scale depression score	WOMAC Disability	Linear	0.05 (0.02 to 0.09)
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of	Time*Center for Epidemiologic Studies Depression Scale depression score	20-m Walk	Linear	-0.001 (-0.001 to - 0.0004)

Appendix Table F44. Association between self reported health outcomes and poor functional status (continued)

Author, year Study characteristics	Adjustment	Intermediate outcome	Clinical outcome	Regression model	Regression coefficient (95% CI)
	generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time				
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Time*Center for Epidemiologic Studies Depression Scale depression score	Repeated chair stand	Linear	-0.001 (-0.001 to -0.0001)
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Time*Center for Epidemiologic Studies Depression Scale dichotomized depression score (>16)	WOMAC: Pain	Linear	0.59 (0.18 to 1.01)
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Time*Center for Epidemiologic Studies Depression Scale dichotomized depression score (>16)	WOMAC Disability	Linear	1.93 (0.59 to 3.27)
Riddle, 2011 ³⁸⁹ Country: U.S.	Baseline outcome score in quartiles, sex, gender, race,	Time*Center for Epidemiologic Studies	20-m Walk	Linear	-0.01 (-0.03 to 0.01)

Appendix Table F44. Association between self reported health outcomes and poor functional status (continued)

Author, year Study characteristics	Adjustment	Intermediate outcome	Clinical outcome	Regression model	Regression coefficient (95% CI)
Age: >45 Sample: 3,407	comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Depression Scale dichotomized depression score (>16)			
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Time*Center for Epidemiologic Studies Depression Scale dichotomized depression score (>16)	Repeated chair stand	Linear	-0.01 (-0.03 to 0.00)
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Time*SF-12 (Mental Health Component Summary)	WOMAC: Pain	Linear	-0.01 (-0.02 to 0.00)
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Time*SF-12 (Mental Health Component Summary)	WOMAC Disability	Linear	-0.02 (-0.05 to 0.01)

Appendix Table F44. Association between self reported health outcomes and poor functional status (continued)

Author, year Study characteristics	Adjustment	Intermediate outcome	Clinical outcome	Regression model	Regression coefficient (95% CI)
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Time*SF-12 (Mental Health Component Summary)	20-m Walk	Linear	0.0004 (-0.01 to 0.00)
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Time*SF-12 (Mental Health Component Summary)	Repeated chair stand	Linear	-0.00008 (-0.0004 to 0.0010)
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Time*confidence measure from Knee injury and Osteoarthritis Outcome Score	WOMAC: Pain	Linear	0.06 (-0.02 to 0.15)
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most	Time*confidence measure from Knee injury and Osteoarthritis Outcome Score	WOMAC Disability	Linear	0.21 (-0.06 to 0.48)

Appendix Table F44. Association between self reported health outcomes and poor functional status (continued)

Author, year Study characteristics	Adjustment	Intermediate outcome	Clinical outcome	Regression model	Regression coefficient (95% CI)
	severe knee flexor contracture, time				
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Time*confidence measure from Knee injury and Osteoarthritis Outcome Score	20-m Walk	Linear	0.00 (-0.01 to 0.00)
Riddle, 2011 ³⁸⁹ Country: U.S. Age: >45 Sample: 3,407	Baseline outcome score in quartiles, sex, gender, race, comorbidity, income, knee OA status, BMI, presence of generalized OA, longest knee pain duration, history of knee injury, PASE score, most severe varus/valgus alignment, weakest knee extensor strength, most severe knee flexor contracture, time	Time*confidence measure from Knee injury and Osteoarthritis Outcome Score	Repeated chair stand	Linear	0.00 (0.00 to 0.00)
Snijders, 2011 ³⁹⁰ Country: The Netherlands Age: >50 Sample: 231	Age, gender, BMI, index joint (knee or hip), duration of complaints, K&L score and past treatment.	WOMAC: Physical function	Checklist Individual Strength questionnaire fatigue	Linear	0.38 (0.27 to 0.50)
Snijders, 2011 ³⁹⁰ Country: The Netherlands Age: >50 Sample: 231	Age, gender, BMI, index joint (knee or hip), duration of complaints, K&L score and past treatment.	WOMAC: Pain	Checklist Individual Strength questionnaire fatigue	Linear	-0.08 (-0.20 to 0.04)
Snijders, 2011 ³⁹⁰ Country: The Netherlands Age: >50 Sample: 231	Age, gender, BMI, index joint (knee or hip), duration of complaints, K&L score and past treatment.	WOMAC: Physical function	Checklist Individual Strength questionnaire activity	Linear	0.14 (0.08 to 0.19)
Snijders, 2011 ³⁹⁰ Country: The Netherlands Age: >50 Sample: 231	Age, gender, BMI, index joint (knee or hip), duration of complaints, K&L score and past treatment.	WOMAC: Pain	Checklist Individual Strength questionnaire activity	Linear	-0.06 (-0.11 to 0.01)
Snijders, 2011 ³⁹⁰ Country: The Netherlands	Age, gender, BMI, index joint (knee or hip), duration of	WOMAC: Physical function	Checklist Individual Strength questionnaire	Linear	0.12 (0.01 to 0.23)

Appendix Table F44. Association between self reported health outcomes and poor functional status (continued)

Author, year Study characteristics	Adjustment	Intermediate outcome	Clinical outcome	Regression model	Regression coefficient (95% CI)
Age: >50 Sample: 231	complaints, K&L score and past treatment.		fatigue		
Snijders, 2011 ³⁹⁰ Country: The Netherlands Age: >50 Sample: 231	Age, gender, BMI, index joint (knee or hip), duration of complaints, K&L score and past treatment.	WOMAC: Pain	Checklist Individual Strength questionnaire fatigue	Linear	-0.04 (-0.14 to 0.06)
Snijders, 2011 ³⁹⁰ Country: The Netherlands Age: >50 Sample: 231	Age, gender, BMI, index joint (knee or hip), duration of complaints, K&L score and past treatment.	WOMAC: Physical function	Checklist Individual Strength questionnaire activity	Linear	0.06 (0.01 to 0.10)
Snijders, 2011 ³⁹⁰ Country: The Netherlands Age: >50 Sample: 231	Age, gender, BMI, index joint (knee or hip), duration of complaints, K&L score and past treatment.	WOMAC: Pain	Checklist Individual Strength questionnaire activity	Linear	0.04 (0.00 to 0.09)

Bold- statistically significant results

Appendix Table F45. Correlation between intermediate and clinical outcomes in adults with knee OA

Exposure	Outcomes	Number of hypotheses with different strength of correlation			Total number of hypotheses tested	% hypotheses with strong (>50%) correlation
		<20%	20-50%	>50%		
Social isolation	Function	2	3	0	5	0
Social function	Function	0	2	0	2	0
Social function	Pain	0	1	0	1	0
Self-Efficacy	Disability	0	1	0	1	0
Self-Efficacy	Pain	0	2	0	2	0
Self-Efficacy	WOMAC-pain	0	1	0	1	0
Quality of Life	Disability	0	1	0	1	0
Quality of Life	Pain	2	0	0	2	0
Quality of Life	WOMAC-pain	1	0	0	1	0
Learned Resourcefulness	Function	7	7	0	14	0
Learned Resourcefulness	Pain	4	0	0	4	0
Irritability	Function	1	1	0	2	0
Irritability	Pain	0	1	0	1	0
Irritability	Social function	0	1	0	1	0
Helplessness	Disability	0	1	0	1	0
Helplessness	Pain	0	2	0	2	0
Helplessness	WOMAC-pain	0	1	0	1	0
Frustration	Function	0	1	1	2	50
Frustration	Pain	0	1	0	1	0
Fear Avoidance beliefs	Disability	0	1	0	1	0
Fear Avoidance beliefs	Pain	0	1	0	1	0
Fear Avoidance beliefs	Self-reported disability	0	1	0	1	0
Fatigue	Disability	0	1	0	1	0
Fatigue	Pain	0	2	0	2	0
Fatigue	WOMAC-pain	1	0	0	1	0
Energy	Function	1	4	0	5	0
Emotional reaction	Function	2	3	0	5	0
Depression	Disability	2	0	0	2	0
Depression	Function	1	10	3	14	21
Depression	Pain	3	4	0	7	0
Depression	Self-reported disability	1	0	0	1	0
Depression	WOMAC-pain	1	0	0	1	0
Cheerfulness	Disability	0	2	0	2	0
Cheerfulness	Pain	0	1	0	1	0

Appendix Table F46. Strength of correlation in validation testing of the tools to measure outcomes in adults with knee OA

Tool	Number of hypotheses showing weak (<20%) correlation	Number of hypotheses showing medium (20-50%) correlation	Number of hypotheses showing strong (50-75%) correlation	Number of hypotheses showing very strong (>75%) correlation	% of hypotheses showing strong (>50%) correlation	Total number of hypotheses
Total	139	368	269	47	38.4	823
WOMAC	17	36	36	14	48.5	103
WOMAC- SF	3	5	3	3	42.9	14
36- Item Short Form Health Survey (SF-36)	2	17	10	0	34.5	29
Visual Analogue Scale (VAS)	0	1	0	0	0.0	1
EQ-5D	0	5	0	0	0.0	5
Health Assessment Questionnaire (HAQ) Disability Index	1	0	6	0	85.7	7
Health Assessment Questionnaire (HAQ): Pain	1	0	4	0	80.0	5
Health Assessment Questionnaire (HAQ): Patient global assessment	1	0	0	0	0.0	1
Human Activity Profile (AAS)	1	4	3	0	37.5	8
Human Activity Profile (MAS)	1	7	0	0	0.0	8
Arthritis Impact Measurement Scale (AIMS)	25	35	6	0	9.1	66
Arthritis Impact Measurement Scale (AIMS) 2-SF	28	77	18	2	16.0	125
Extendable goniometer	0	0	1	0	100.0	1
Get Up and Go Test	3	7	0	0	0.0	10
Isokinetic dynamometer	1	2	2	0	40.0	5
Joint Specific Multidimensional Assessment of Pain (J-MAP)	4	15	6	0	24.0	25

Appendix Table F46. Strength of correlation in validation testing of the tools to measure outcomes in adults with knee OA (continued)

Tool	Number of hypotheses showing weak (<20%) correlation	Number of hypotheses showing medium (20-50%) correlation	Number of hypotheses showing strong (50-75%) correlation	Number of hypotheses showing very strong (>75%) correlation	% of hypotheses showing strong (>50%) correlation	Total number of hypotheses
Knee Society Clinical Rating system	0	3	1	0	25.0	4
Knee Pain Scale (KPS)	5	20	7	0	21.9	32
Knee Patient - Specific (KPS)I)	0	7	6	1	50.0	14
Lower Extremity Activity Profile (LEAP)	0	4	0	0	0.0	4
Lequesne index	6	10	6	0	27.3	22
McGill Pain Questionnaire –Pain Rating Index (MPQ-PRI)	1	0	7	0	87.5	8
Numerical rating scale (NRS)	0	1	7	1	88.9	9
Performance and Activity scale (PAS)	1	0	0	0	0.0	1
Progressive Goal Attainment Program (PGAP)	16	18	2	0	5.6	36
Proprioceptive test	1	0	0	0	0.0	1
Walking speed	2	2	1	1	33.3	6
Walking Impairment Questionnaire (WIQ)	0	27	12	0	30.8	39

Bold: more than 50% of hypotheses found strong correlation

Appendix Table F47. Strength of correlation by validity type of the tools to measure outcomes in adults with knee OA

Tools	Validity Type	% of hypotheses showing strong (>50%) correlation	Total number of hypotheses
WOMAC	construct validity	44.6	65
WOMAC	convergent validity	75.0	20
WOMAC	divergent validity	33.3	18
WOMAC- SF	construct validity	42.9	14
36- Item Short Form Health Survey (SF-36)	construct validity	29.6	27
36- Item Short Form Health Survey (SF-36)	convergent validity	100.0	2
Health Assessment Questionnaire (HAQ) Disability Index	construct validity	83.3	6
Health Assessment Questionnaire (HAQ) Disability Index	convergent validity	100.0	1
Health Assessment Questionnaire (HAQ): pain	construct validity	80.0	5
Health Assessment Questionnaire (HAQ): patient global assessment	convergent validity	0.0	1
Human Activity Profile (AAS)	construct validity	37.5	8
Human Activity Profile (MAS)	construct validity	0.0	8
Arthritis Impact Measurement (AIMS)	construct validity	0.0	12
Arthritis Impact Measurement (AIMS)	convergent validity	11.1	54
Arthritis Impact Measurement (AIMS)2-SF	construct validity	0.0	10
Arthritis Impact Measurement (AIMS)2-SF	discriminant validity	17.4	115
Balance test	construct validity	75.0	4
Endurance	construct validity	33.3	3
Extendable goniometer	concurrent validity	100.0	1
Get Up and Go Test	concurrent validity	0.0	10
Grip strength	construct validity	0.0	3
Isokinetic dynamometer	construct validity	40.0	5
Joint Specific Multidimensional Assessment of Pain (J-MAP)	convergent and discriminant validity	24.0	25
Knee Society Clinical Rating system	construct validity	25.0	4
Knee Pain Scale (KPS)	construct validity	21.9	32
Knee Pain Specific Index (KPS)I	construct validity	50.0	14
Lower Extremity Activity Profile (LEAP)	construct validity	0.0	4
Lequesne index	construct validity	25.0	12
Lequesne index	convergent validity	50.0	6
Lequesne index	divergent validity	0.0	4
McGill Pain Questionnaire –Pain Rating Index (MPQ-PRI)	construct validity	87.5	8
Numerical rating scale (NRS)	construct validity	88.9	9
Progressive Goal Attainment Program (PGAP)	construct validity	5.6	36
Walking speed	construct validity	33.3	6
Walking Impairment Questionnaire (WIQ)	concurrent validity	26.9	26
Walking Impairment Questionnaire (WIQ)	construct validity	41.7	12

Bold: 50% or more hypotheses found strong correlation

Appendix Table F48. Average size, percentage of women, and patient age in studies with validation of the tool to measure outcomes in adults with knee OA

Country	Variable	Mean	Sum	Minimum	Maximum
Total	Age in years	228	14563	10	1924
Total	Sample	64.3473		29.4	79
Total	% of women	62.83768		0	100
U.S.	Age in years	64.5		43.8	79.0
U.S.	Sample	223	4012	17	655
U.S.	% of women	56.3		0.0	81.0
Canada	Age in years	63.7		54.6	69.7
Canada	Sample	309	2782	10	1924
Canada	% of women	63.5		43.7	100.0
Denmark	Age in years	29.4		29.4	29.4
Denmark	Sample	200	200	200	200
Denmark	% of women	35.0		35.0	35.0
Finland	Age in years	60.0		60.0	60.0
Finland	Sample	130	130	130	130
Finland	% of women	68.5		68.5	68.5
France	Age in years	66.6		65.7	67.1
France	Sample	666	3328	88	1218
France	% of women	67.0		59.0	70.1
Germany	Age in years	71.0		71.0	71.0
Germany	Sample	38	38	38	38
Germany	% of women	57.9		57.9	57.9
Italy	Age in years	65.9		63.5	68.2
Italy	Sample	153	305	61	244
Italy	% of women	79.7		59.4	100.0
multi	Age in years	68.8		67.5	70.0
multi	Sample	391	781	84	697
multi	% of women	43.6		28.2	58.9
Sweden	Age in years	48.0		48.0	48.0
Sweden	Sample	52	52	52	52
Sweden	% of women	48.1		48.1	48.1
Switzerland	Age in years	66.9		64.2	70.0
Switzerland	Sample	93	463	51	161
Switzerland	% of women	65.5		40.0	80.0
Netherlands	Age in years	64.0		54.9	68.0
Netherlands	Sample	106	740	24	198
Netherlands	% of women	68.8		37.0	80.1
UK	Age in years	66.8		63.0	69.5
UK	Sample	166	1165	58	230
UK	% of women	67.9		53.7	88.0
Australia	Age in years	68.1		66.3	69.0
Australia	Sample	129	516	62	259
Australia	% of women	67.5		61.3	75.2
Turkey	Age in years	55.6		55.6	55.6
Turkey	Sample	51	51	51	51
Turkey	% of women	100.0		100.0	100.0

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Endurance			
Lankhorst, 1982 ⁹² Index: Endurance Reference: Maximal isometric torque	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis 0.282 P value: NR
Lankhorst, 1982 ⁹² Index: Endurance Reference: Walking speed, number of steps and stair climbing	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis -0.178 P value: NR
Lankhorst, 1982 ⁹² Index: Endurance Reference: Endurance and maximal impulse	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis -0.917 P value: NR
Gait			
Collins, 2008 ³⁹¹ Index: WIQ: Speed subscale Reference: WOMAC: Pain	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking speed Concurrent validity	Pearson r correlation -0.42 P value: <0.001
Collins, 2008 ³⁹¹ Index: WIQ: Speed subscale Reference: WOMAC: Stiffness subscale	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking speed Concurrent validity	Pearson r correlation -0.24 P value: <0.02
Collins, 2008 ³⁹¹ Index: WIQ: Speed subscale Reference: WOMAC: Total score	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking speed Concurrent validity	Pearson r correlation -0.51 P value: <0.001
Collins, 2008 ³⁹¹ Index: WIQ: Speed subscale Reference: WOMAC: Function subscale	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking speed Concurrent validity	Pearson r correlation -0.52 P value: <0.001
Collins, 2008 ³⁹¹ Index: WIQ: Speed subscale Reference: Body Mass Index	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking speed Concurrent validity	Pearson r correlation -0.37 P value: <0.001
Collins, 2008 ³⁹¹ Index: WIQ: Speed subscale Reference: Body Fat (%)	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking speed Concurrent validity	Pearson r correlation -0.26 P value: 0.007
Collins, 2008 ³⁹¹ Index: WIQ: Speed subscale Reference: History (Duration of OA)	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking speed Concurrent validity	Pearson r correlation -0.24 P value: <0.03
Collins, 2008 ³⁹¹ Index: WIQ: Speed subscale Reference: History (American Rheumatism Association Functional Class)	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking speed Concurrent validity	Spearman rank correlation coefficient -0.33 P value: 0.001

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Possley, ³⁹² Index: WIQ: Walking speed subscale Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Not depressed patients category Domain: walking speed Construct validity	Pearson r correlation 0.59 P value: <0.001
Possley, ³⁹² Index: WIQ: Walking speed subscale Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed patients category Domain: walking speed Construct validity	Pearson r correlation 0.41 P value: <0.01
Possley, ³⁹² Index: WIQ: Walking speed subscale Reference: 3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed patients category Domain: walking speed Construct validity	Pearson r correlation 0.33 P value: <0.05
Possley, ³⁹² Index: WIQ: Walking speed subscale Reference: 3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Non-Depressed patients category Domain: walking speed Construct validity	Pearson r correlation 0.57 P value: <0.001
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (AAS) Reference: Walking speed (m/s)	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient 0.63 P value: <0.001
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (MAS) Reference: Walking speed (m/s)	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient 0.44 P value: <0.001
Barker, 2004 ³⁹³ Index: Sit-stand Reference: Walking speed	UK Size: 123 Mean age: 69.5 % of females: 53.7	Construct validity	Spearman's rank correlation coefficient 0.391 P value: <0.01
Barker, 2004 ³⁹³ Index: Walking speed Reference: WOMAC: Pain subscale	UK Size: 123 Mean age: 69.5 % of females: 53.7	Construct validity	Spearman's rank correlation coefficient 0.357 P value: <0.01
Barker, 2004 ³⁹³ Index: Walking speed Reference: VAS pain	UK Size: 123 Mean age: 69.5 % of females: 53.7	Construct validity	Spearman's rank correlation coefficient 0.394 P value: <0.01
Barker, 2004 ³⁹³ Index: Walking speed Reference: Power (Leg extensor power)	UK Size: 123 Mean age: 69.5 % of females: 53.7	Construct validity	Spearman's rank correlation coefficient 0.519 P value: <0.05
Lankhorst, 1982 ⁹² Index: Maximal impulse Reference: Walking speed, number of steps and stair climbing	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis -0.178 P value: NR
Lankhorst, 1982 ⁹² Index: Maximal isometric torque Reference: Walking speed, number of steps and stair climbing	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis -0.13 P value: NR

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Lankhorst, 1982 ⁹² Index: Number of steps Reference: Walking speed, number of steps and stair climbing	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis 0.723 P value: NR
Lankhorst, 1982 ⁹² Index: Stair climbing Reference: Walking speed, number of steps and stair climbing	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis 0.868 P value: NR
Lankhorst, 1982 ⁹² Index: Walking speed Reference: Endurance and maximal impulse	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis 0.136 P value: NR
Lankhorst, 1982 ⁹² Index: Walking speed Reference: Maximal isometric torque	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis 0.138 P value: NR
Lankhorst, 1982 ⁹² Index: Walking speed Reference: Walking speed, number of steps and stair climbing	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis 0.903 P value: NR
Goniometer			
Gibson, 2010 ³⁹⁴ Index: Extendable goniometer (non-radiographic measurement of frontal plane alignment) Reference: Radiographic measurement of frontal plane alignment	U.S. Size: 55 Mean age: 62.9 % of females: 74	Concurrent validity	Pearson's correlation coefficient 0.75 P value: <0.001
Proprioception			
Birmingham, 2001 ³⁹⁵ Index: Balance test (stable surface) Reference: Proprioceptive test	Canada Size: 20 Mean age: 59 % of females: NR	Construct validity	Pearson product-moment correlation -0.08 P value: 0.75
Range of motion-			
Denison, 1980 ³⁹⁶ Index: Morning stiffness Reference: Grip strength	U.S. Size: 157 Mean age: 69 % of females: 75	Construct validity	Spearman's rank correlation coefficient 0.1 P value: NR
Meenan, 1980 ³⁹⁷ Index: AIMS: Dexterity subscale: Likert format of the scale Reference: Clinical history (age)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: dexterity Convergent validity	Pearson correlation coefficient 0.14 P value: NR
Meehan, 1980 ³⁹⁷ Index: AIMS: Dexterity subscale: Likert format of the scale Reference: Doctor's opinion of number of joints affected (joint count)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: dexterity Convergent validity	Pearson correlation coefficient 0.25 P value: <0.05

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Meehan, 1980 ³⁹⁷ Index: AIMS: Dexterity subscale: Likert format of the scale Reference: Doctor's opinion of patient's functional level	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: dexterity Convergent validity	Pearson correlation coefficient 0.39 P value: <0.01
Meehan, 1980 ³⁹⁷ Index: AIMS: Dexterity subscale: Likert format of the scale Reference: Doctor's opinion of patient's recent disease activity	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: dexterity Convergent validity	Pearson correlation coefficient 0.35 P value: <0.01
Meehan, 1980 ³⁹⁷ Index: AIMS: Dexterity subscale: Likert format of the scale Reference: Questionnaire item: patient perception of general health	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: dexterity Convergent validity	Pearson correlation coefficient 0.5 P value: <0.01
Meehan, 1980 ³⁹⁷ Index: AIMS: Dexterity subscale: Likert format of the scale Reference: Questionnaire item: patient perception of recent disease activity	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: dexterity Convergent validity	Pearson correlation coefficient 0.41 P value: <0.01
Wright, 2010 ³⁶⁴ Index: KPSI Reference: WOMAC: Stiffness scale	Canada Size: 100 Mean age: 69.7 % of females: 67	Domain: stiffness Construct validity	Pearson coefficient 0.61 P value: NR
Faucet, 2002 ³⁹⁸ Index: Lequesne index Reference: WOMAC: Stiffness subscale	France Size: 88 Mean age: 67.11 % of females: 67.05	Convergent validity	Spearman's rank correlation coefficient 0.48 P value: NR
Denison, 1980 ³⁹⁶ Index: Morning stiffness Reference: Client assessment of "Good days": "How many "good days" have you had out of the last seven?" (The client was asked to interpret words such as "condition" and "good days" in his or her own terms.)	U.S. Size: 157 Mean age: 69 % of females: 75	Construct validity	Spearman's rank correlation coefficient 0.23 P value: NR
Denison, 1980 ³⁹⁶ Index: Morning stiffness Reference: Client assessment of ability to deal: "Overall how would you rate your ability to deal with your arthritis and the problems it causes; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Construct validity	Spearman's rank correlation coefficient 0.19 P value: NR

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Denison, 1980 ³⁹⁶ Index: Morning stiffness Reference: Client assessment of joint condition: "Overall how would you rate the condition of your joints; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Construct validity	Spearman's rank correlation coefficient 0.05 P value: NR
Denison, 1980 ³⁹⁶ Index: Morning stiffness Reference: Grip strength	U.S. Size: 157 Mean age: 69 % of females: 75	Construct validity	Spearman's rank correlation coefficient 0.1 P value: NR
Faucet, 2002 ³⁹⁸ Index: WOMAC: Stiffness subscale Reference: Lequesne stiffness score	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: stiffness Convergent validity	Spearman rank correlation coefficient 0.51 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Stiffness subscale Reference: Circumference of the thigh	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: stiffness Divergent validity	Spearman rank correlation coefficient 0.23 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Stiffness subscale Reference: Hospital Anxiety and Depression Scale(Score of anxiety)	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: stiffness Divergent validity	Spearman rank correlation coefficient 0.27 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Stiffness subscale Reference: Hospital Anxiety and Depression Scale(Score of depression)	France Size: 88 Mean age: 67.11% of females: 67.05	Domain: stiffness Divergent validity	Spearman rank correlation coefficient 0.17 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Stiffness subscale Reference: Kellgren-Lawrence	France Size: 88 Mean age: 67.11% of females: 67.05	Domain: stiffness Divergent validity	Spearman rank correlation coefficient 0.12 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Stiffness subscale Reference: WOMAC: function subscale	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: stiffness Divergent validity	Spearman rank correlation coefficient 0.74 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Stiffness subscale Reference: WOMAC: stiffness subscale	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: stiffness Divergent validity	Spearman rank correlation coefficient 0.61 P value: NR
Possley, ³⁹² Index: WOMAC :Stiffness subscale Reference: 3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Non-depressed category Domain: stiffness Construct validity	Pearson r correlation 0.03 P value: NR
Possley, ³⁹² Index: WOMAC: Stiffness subscale Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Non-depressed category Domain: stiffness Construct validity	Pearson r correlation -0.02 P value: NR
Possley, ³⁹² Index: WOMAC: Stiffness subscale Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed category Domain: stiffness Construct validity	Pearson r correlation 0.04 P value: NR

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Possley, 1992 ³⁹² Index: WOMAC: Stiffness subscale Reference: 3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed category Domain: stiffness Construct validity	Pearson r correlation 0.12 P value: NR
Stucki, 1998 ³⁵³ Index: WOMAC knee: Stiffness Reference: Extension deficit	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: stiffness Construct validity	Spearman's rank correlation coefficient 0.33 P value:
Stucki, 1998 ³⁵³ Index: WOMAC knee: Stiffness Reference: Flexion	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: stiffness Construct validity	Spearman's rank correlation coefficient -0.36 P value: <0.05
Stucki, 1998 ³⁵³ Index: WOMAC knee: Stiffness Reference: Kellgren -Lawrence scale	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: stiffness Construct validity	Spearman's rank correlation coefficient 0.24 P value: NR
Bruce, 2004 ³⁹⁹ Index: WOMAC: Stiffness Reference: HAQ: Patient global assessment	U.S. Size: 271 Mean age: 65.7 % of females: 79	Domain: stiffness Convergent validity	Spearman rank correlation coefficient 0.54 P value: NR
Bruce, 2004 ³⁹⁹ Index: WOMAC: Stiffness Reference: Total Knee Score	U.S. Size: 271 Mean age: 65.7 % of females: 79	Domain: stiffness Convergent validity	Spearman rank correlation coefficient 0.08 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Traditional WOMAC Reference: KOOS stiffness	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.6 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Modified short-form WOMAC Reference: KOOS stiffness	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.61 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Short-form WOMAC function scale Reference: KOOS stiffness	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.58 P value: NR
Strength			
Deniston, 1980 ³⁹⁶ Index: Grip strength Reference: Client assessment of "Good days": "How many "good days" have you had out of the last seven? (The client was asked to interpret words such as "condition" and 'good days" in his or her own terms.)	U.S. Size: 157 Mean age: 69 % of females: 75	Construct validity	Spearman's rank correlation coefficient 0.05 P value: NR
Deniston, 1980 ³⁹⁶ Index: Grip strength Reference: Client assessment of ability to deal: "Overall how would you rate your ability to deal with your arthritis and the problems it causes; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Construct validity	Spearman's rank correlation coefficient 0.03 P value: NR

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Deniston, 1980 ³⁹⁶ Index: Grip strength Reference: Client assessment of joint condition: "Overall how would you rate the condition of your joints; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Construct validity	Spearman's rank correlation coefficient 0.22 P value: NR
Stuultjens, 2001 ⁴⁰¹ Index: Hip abduction: ipsilateral side: dynamometer Reference: Hip abduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.83 P value: <0.01
Stuultjens, 2001 ⁴⁰¹ Index: Hip abduction: ipsilateral side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.5 P value: <0.01
Stuultjens, 2001 ⁴⁰¹ Index: Hip abduction: ipsilateral side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.6 P value: <0.01
Stuultjens, 2001 ⁴⁰¹ Index: Hip abduction: contralateral side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.6 P value: <0.01
Stuultjens, 2001 ⁴⁰¹ Index: Hip abduction: contralateral side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.63 P value: <0.01
Stuultjens, 2001 ⁴⁰¹ Index: Hip abduction: ipsilateral side: dynamometer Reference: Knee flexion: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.65 P value: <0.01
Stuultjens, 2001 ⁴⁰¹ Index: Hip abduction: contralateral side: dynamometer Reference: Knee flexion: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.69 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Hip abduction: ipsilateral side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.7 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip abduction: contralateral side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.73 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip adduction: contralateral side: dynamometer Reference: Hip abduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.76 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip adduction: contralateral side: dynamometer Reference: Hip abduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.76 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip adduction: ipsilateral side: dynamometer Reference: Hip adduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.8 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip adduction: contralateral side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.55 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip adduction: ipsilateral side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.56 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip adduction: ipsilateral side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.57 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Hip adduction: ipsilateral side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.65 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip adduction: contralateral side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.69 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip adduction: contralateral side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.69 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip adduction: contralateral side: dynamometer Reference: Knee flexion: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.7 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip adduction: ipsilateral side: dynamometer Reference: Hip abduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.71 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip adduction: ipsilateral side: dynamometer Reference: Hip abduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.71 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip adduction: ipsilateral side: dynamometer Reference: Knee flexion: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.71 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: ipsilateral side: dynamometer Reference: Hip extension: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.8 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: contralateral side: dynamometer Reference: Hip internal rotation: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.37 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: ipsilateral side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.37 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: ipsilateral side: dynamometer Reference: Hip internal rotation: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.4 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: contralateral side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.42 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: contralateral side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.45 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: ipsilateral side: dynamometer Reference: Hip adduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.46 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: ipsilateral side: dynamometer Reference: Hip abduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.48 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: contralateral side: dynamometer Reference: Hip external rotation: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.49 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steuultjens, 2001 ⁴⁰¹ Index: Hip extension: ipsilateral side: dynamometer Reference: Hip adduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.5 P value: <0.01
Steuultjens, 2001 ⁴⁰¹ Index: Hip extension: ipsilateral side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.5 P value: <0.01
Steuultjens, 2001 ⁴⁰¹ Index: Hip extension: contralateral side: dynamometer Reference: Hip abduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.51 P value: <0.01
Steuultjens, 2001 ⁴⁰¹ Index: Hip extension: contralateral side: dynamometer Reference: Hip adduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.52 P value: <0.01
Steuultjens, 2001 ⁴⁰¹ Index: Hip extension: ipsilateral side: dynamometer Reference: Hip abduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.53 P value: <0.01
Steuultjens, 2001 ⁴⁰¹ Index: Hip extension: ipsilateral side: dynamometer Reference: Hip external rotation: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.53 P value: <0.01
Steuultjens, 2001 ⁴⁰¹ Index: Hip extension: ipsilateral side: dynamometer Reference: Hip internal rotation: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.53 P value: <0.01
Steuultjens, 2001 ⁴⁰¹ Index: Hip extension: contralateral side: dynamometer Reference: Hip adduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.54 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: contralateral side: dynamometer Reference: Hip external rotation: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.55 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: ipsilateral side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.55 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: ipsilateral side: dynamometer Reference: Hip external rotation: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.56 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: contralateral side: dynamometer Reference: Hip abduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.57 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: ipsilateral side: dynamometer Reference: Knee flexion: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.6 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: contralateral side: dynamometer Reference: Hip internal rotation: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.61 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: contralateral side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74. 80	Correlation	Pearson correlation coefficient 0.61 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip extension: contralateral side: dynamometer Reference: Knee flexion: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.64 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: ipsilateral side: dynamometer Reference: Hip external rotation: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.8 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: ipsilateral side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.58 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: ipsilateral side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.59 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: contralateral side: dynamometer Reference: Hip adduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.6 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: contralateral side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.63 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: contralateral side: dynamometer Reference: Hip abduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.66 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: contralateral side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.66 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: ipsilateral side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.66 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: contralateral side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.66 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: ipsilateral side: dynamometer Reference: Hip abduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.67 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: contralateral side: dynamometer Reference: Hip adduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.7 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: contralateral side: dynamometer Reference: Knee flexion: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.7 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: ipsilateral side: dynamometer Reference: Hip abduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.72 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: ipsilateral side: dynamometer Reference: Hip adduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.72 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: ipsilateral side: dynamometer Reference: Hip adduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.72 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: contralateral side: dynamometer Reference: Hip abduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.74 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Hip external rotation: ipsilateral side: dynamometer Reference: Knee flexion: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.75 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Hip internal rotation: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.76 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.77 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Knee flexion: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.8 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Hip internal rotation: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.46 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Hip extension: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.53 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Hip extension: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.59 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.6 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Hip adduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.64 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Hip abduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.66 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Hip abduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.68 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.68 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Hip adduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.69 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Hip external rotation: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.71 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion contralateral side: dynamometer Reference: Hip external rotation: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.72 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Hip external rotation: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.77 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Knee flexion: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.81 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Hip flexion: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.84 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Hip extension: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.54 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Hip extension: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.58 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.59 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Hip internal rotation: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.6 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.64 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.65 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Hip internal rotation: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.66 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Hip abduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.67 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Hip abduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.69 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Hip external rotation: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.7 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Hip adduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.72 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip flexion ipsilateral side: dynamometer Reference: Hip adduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.73 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: contralateral side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.76 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: contralateral side: dynamometer Reference: Hip external rotation: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.77 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: contralateral side: dynamometer Reference: Hip external rotation: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.82 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: ipsilateral side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.3 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: ipsilateral side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.42 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: ipsilateral side: dynamometer Reference: Knee flexion: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.51 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: ipsilateral side: dynamometer Reference: Hip abduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.54 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: ipsilateral side: dynamometer Reference: Hip abduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.54 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: ipsilateral side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.55 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: ipsilateral side: dynamometer Reference: Hip adduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.58 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: ipsilateral side: dynamometer Reference: Hip adduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.6 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: contralateral side: dynamometer Reference: Hip adduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.61 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: ipsilateral side: dynamometer Reference: Hip external rotation: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.62 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: contralateral side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.63 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: contralateral side: dynamometer Reference: Hip abduction: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.64 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: contralateral side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.66 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: ipsilateral side: dynamometer Reference: Hip internal rotation: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.67 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: contralateral side: dynamometer Reference: Hip abduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.71 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: contralateral side: dynamometer Reference: Knee flexion: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.71 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: ipsilateral side: dynamometer Reference: Hip external rotation: ipsilateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.73 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Hip internal rotation: contralateral side: dynamometer Reference: Hip adduction: contralateral side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.75 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Knee extension: affected side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.77 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Knee flexion: affected side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.8 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Knee flexion: unaffected side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.51 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Knee flexion: unaffected side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.63 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Knee flexion: affected side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.68 P value: <0.01

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Knee flexion: affected side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.73 P value: <0.01
Lin, 2001 ⁴⁰² Index: Physical performance measures Reference: WOMAC: Pain scale	UK Size: 106 Mean age: 69.4 % of females: 88	Domain: chair -rise Construct validity	Spearman correlation 0.33 P value: <0.005
Lin, 2001 ⁴⁰² Index: Physical performance measures Reference: WOMAC: Stiffness scale	UK Size: 106 Mean age: 69.4 % of females: 88	Domain: walking Construct validity	Spearman correlation 0.33 P value: <0.005
Lin, 2001 ⁴⁰² Index: Physical performance measures Reference: WOMAC: Stiffness scale	UK Size: 106 Mean age: 69.4 % of females: 88	Domain: chair -rise Construct validity	Spearman correlation 0.36 P value: <0.005
Lin, 2001 ⁴⁰² Index: Physical performance measures Reference: WOMAC: Stiffness scale	UK Size: 106 Mean age: 69.4 % of females: 88	Domain: stairs: descending Construct validity	Spearman correlation 0.37 P value: <0.005
Lin, 2001 ⁴⁰² Index: Physical performance measures Reference: WOMAC: Pain scale	UK Size: 106 Mean age: 69.4 % of females: 88	Domain: walking Construct validity	Spearman correlation 0.38 P value: <0.005
Lin, 2001 ⁴⁰² Index: Physical performance measures Reference: WOMAC: Pain scale	UK Size: 106 Mean age: 69.4 % of females: 88	Domain: stairs: descending Construct validity	Spearman correlation 0.38 P value: <0.005
Lin, 2001 ⁴⁰² Index: Physical performance measures Reference: WOMAC: Stiffness scale	UK Size: 106 Mean age: 69.4 % of females: 88	Domain: stairs: ascending Construct validity	Spearman correlation 0.38 P value: <0.005
Lin, 2001 ⁴⁰² Index: Physical performance measures Reference: WOMAC: Pain scale	UK Size: 106 Mean age: 69.4 % of females: 88	Domain: stairs: ascending Construct validity	Spearman correlation 0.45 P value: <0.005
Lin, 2001 ⁴⁰² Index: Physical performance measures Reference: WOMAC: Physical function scale	UK Size: 106 Mean age: 69.4 % of females: 88	Domain: walking Construct validity	Spearman correlation 0.48 P value: <0.005
Lin, 2001 ⁴⁰² Index: Physical performance measures Reference: WOMAC: Physical function scale	UK Size: 106 Mean age: 69.4 % of females: 88	Domain: stairs: descending Construct validity	Spearman correlation 0.52 P value: <0.005
Lin, 2001 ⁴⁰² Index: Physical performance measures Reference: WOMAC: Physical function scale	UK Size: 106 Mean age: 69.4 % of females: 88	Domain: stairs: ascending Construct validity	Spearman correlation 0.53 P value: <0.005
Lin, 2001 ⁴⁰² Index: Physical performance measures Reference: WOMAC: Physical function scale	UK Size: 106 Mean age: 69.4 % of females: 88	Domain: chair -rise Construct validity	Spearman correlation 0.54 P value: <0.005

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Lankhorst, 1982 ⁹² Index: Maximal impulse Reference: Walking speed, number of steps and stair climbing	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis -0.178 P value:
Lankhorst, 1982 ⁹² Index: Maximal impulse Reference: Endurance and maximal impulse	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis -0.893 P value:
Lankhorst, 1982 ⁹² Index: Maximal impulse Reference: Maximal isometric torque	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis -0.382 P value:
Lankhorst, 1982 ⁹² Index: Maximal isometric torque Reference: Walking speed, number of steps and stair climbing	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis -0.13 P value:
Lankhorst, 1982 ⁹² Index: Maximal isometric torque Reference: Endurance and maximal impulse	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis -0.023 P value:
Lankhorst, 1982 ⁹² Index: Maximal isometric torque Reference: Maximal isometric torque	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis -0.972 P value:
Van Der Esch, 2006 ³⁷⁴ Index: Isokinetic dynamometer (joint laxity) Reference: Isokinetic dynamometer (total muscle strength)	The Netherlands Size: 86 Mean age: 63.6 % of females: 76	Construct validity	Pearson's correlation coefficient -0.34 P value: <0.05
Van Der Esch, 2006 ³⁷⁴ Index: Isokinetic dynamometer (joint laxity) Reference: Walking time	The Netherlands Size: 86 Mean age: 63.6 % of females: 76	Construct validity	Pearson's correlation coefficient 0.25 P value: <0.05
Van Der Esch, 2006 ³⁷⁴ Index: Isokinetic dynamometer (total muscle strength) Reference: Walking time	The Netherlands Size: 86 Mean age: 63.6 % of females: 76	Construct validity	Pearson's correlation coefficient -0.5 P value: <0.001
Van Der Esch, 2006 ³⁷⁴ Index: Isokinetic dynamometer (joint laxity) Reference: WOMAC physical function	The Netherlands Size: 86 Mean age: 63.6 % of females: 76	Construct validity	Pearson's correlation coefficient 0.03 P value: 0.799
Van Der Esch, 2006 ³⁷⁴ Index: Isokinetic dynamometer (total muscle strength) Reference: WOMAC physical function	The Netherlands Size: 86 Mean age: 63.6 % of females: 76	Construct validity	Pearson's correlation coefficient -0.61 P value: <0.001

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Steultjens, 2001 ⁴⁰¹ Index: Knee extension: affected side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.77 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Knee flexion: affected side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.73 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Knee flexion: unaffected side: dynamometer Reference: Knee extension: affected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.51 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Knee flexion: affected side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.68 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Knee flexion: unaffected side: dynamometer Reference: Knee extension: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.63 P value: <0.01
Steultjens, 2001 ⁴⁰¹ Index: Knee flexion: affected side: dynamometer Reference: Knee flexion: unaffected side: dynamometer	The Netherlands Size: 122 Mean age: Mean for hip OA=67.8 and for knee OA=68.2 % of females: 74.80	Correlation	Pearson correlation coefficient 0.8 P value: <0.01
Clark, 1998 ³⁸² Index: Knees ever give away Reference: Osteoarthritis Severity Scale: Pain with rest assessed by 2 questions about pain and stiffness while: 1) Resting 2) Sleeping	U.S. Size: 415 Mean age: 66 % of females: 0	Construct validity	Pearson correlation coefficient 0.29 P value: NR
Clark, 1998 ³⁸² Index: Knees ever give away Reference: Osteoarthritis Severity Scale: Impaired mobility assessed by 2 questions about impaired function: 1) limping 2) knees giving way with activity	U.S. Size: 415 Mean age: 66 % of females: 0	Construct validity	Pearson correlation coefficient 0.33 P value: NR

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Clark, 1998 ³⁸² Index: Knees ever give away Reference: Osteoarthritis Severity Scale: global severity assessed by 4 questions: 1) Persistence of pain in worst knee; 2) Intensity of pain in worst knee; 3) Diurnal duration of pain and stiffness in the worst knee; 4) Frequency of severe pain in the worst knee	U.S. Size: 415 Mean age: 66 % of females: 0	Construct validity	Pearson correlation coefficient 0.37 P value: NR
Clark, 1998 ³⁸² Index: Knees ever give away Reference: Osteoarthritis Severity Scale: Pain with activity assessed by 3 questions about pain and stiffness during: 1) walking 2) using stairs 3) standing	U.S. Size: 415 Mean age: 66 % of females: 0	Construct validity	Pearson correlation coefficient 0.37 P value: NR
Clark, 1998 ³⁸² Index: Knees ever give away Reference: Osteoarthritis Severity Scale: Assessed by 12 questions: 1) Persistence of pain in worst knee; 2) Intensity of pain in worst knee; 3) Diurnal duration of pain and stiffness in the worst knee; 4) Frequency of severe pain in the worst knee; 5) Pain and stiffness	U.S. Size: 415 Mean age: 66 % of females: 0	Construct validity	Pearson correlation coefficient 0.42 P value: NR
Balance			
Birmingham, 2001 ³⁹⁵ Index: Balance test (foam surface) Reference: Degenerative changes (radiograph)	Canada Size: 20 Mean age: 59 % of females: NR	Construct validity	Pearson product-moment correlation 0.58 P value: 0.007
Birmingham, 2001 ³⁹⁵ Index: Balance test (stable surface) Reference: Degenerative changes (radiograph)	Canada Size: 20 Mean age: 59 % of females: NR	Construct validity	Pearson product-moment correlation 0.55 P value: 0.013
Birmingham, 2001 ³⁹⁵ Index: Balance test (stable surface) Reference: Balance test (foam surface)	Canada Size: 20 Mean age: 59 % of females: NR	Construct validity	Pearson product-moment correlation 0.89 P value: <0.0001
Transfers			
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer frequency Reference: 6 min walk test	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer frequency Construct validity	NR 0.2 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer frequency Reference: 6 min walk test	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation frequency Construct validity	NR 0.224 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer intensity Reference: 6 min walk test	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer intensity Construct validity	NR 0.274 P value: NR

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer intensity Reference: 6 min walk test	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation intensity Construct validity	NR 0.277 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer frequency Reference: CES -D (depression scale)	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer frequency Construct validity	NR 0.118 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation frequency Reference: CES -D (depression scale)	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation frequency Construct validity	NR 0.056 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer intensity Reference: CES -D (depression scale)	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer intensity Construct validity	NR 0.192 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation intensity Reference: CES -D (depression scale)	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation intensity Construct validity	NR 0.093 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer frequency Reference: FAST Functional Performance Inventory: Ambulation ADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer frequency Construct validity	NR 0.47 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation frequency Reference: FAST Functional Performance Inventory: Ambulation ADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation frequency Construct validity	NR 0.642 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer intensity Reference: FAST Functional Performance Inventory: Ambulation ADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer intensity Construct validity	NR 0.42 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation intensity Reference: FAST Functional Performance Inventory: Ambulation ADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation intensity Construct validity	NR 0.604 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer frequency Reference: FAST Functional Performance Inventory: Transfer ADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer frequency Construct validity	NR 0.565 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation frequency Reference: FAST Functional Performance Inventory: Transfer ADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation frequency Construct validity	NR 0.423 P value: NR

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer intensity Reference: FAST Functional Performance Inventory: Transfer ADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer intensity Construct validity	NR 0.573 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation intensity Reference: FAST Functional Performance Inventory: Transfer ADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation intensity Construct validity	NR 0.41 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer frequency Reference: FAST Functional Performance Inventory: ADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer frequency Construct validity	NR 0.211 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation frequency Reference: FAST Functional Performance Inventory: ADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation frequency Construct validity	NR 0.165 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer intensity Reference: FAST Functional Performance Inventory: ADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer intensity Construct validity	NR 0.297 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation intensity Reference: FAST Functional Performance Inventory: ADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation intensity Construct validity	NR 0.211 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer frequency Reference: FAST Functional Performance Inventory: IADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer frequency Construct validity	NR 0.355 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation frequency Reference: FAST Functional Performance Inventory: IADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation frequency Construct validity	NR 0.377 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer intensity Reference: FAST Functional Performance Inventory: IADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer intensity Construct validity	NR 0.338 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation intensity Reference: FAST Functional Performance Inventory: IADL subscale	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation intensity Construct validity	NR 0.351 P value: NR

Appendix Table F49. Correlation between index methods to measure intermediate outcomes and reference standards in patients with knee OA (continued)

Author, year Index; reference methods	Country; Size; mean age, % of females	Domain; validity type	Estimate, significance
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer frequency Reference: MPQ	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer frequency Construct validity	NR 0.519 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation frequency Reference: MPQ	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation frequency Construct validity	NR 0.455 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer intensity Reference: MPQ	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer intensity Construct validity	NR 0.572 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation intensity Reference: MPQ	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation intensity Construct validity	NR 0.499 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer frequency Reference: Stair climb	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer frequency Construct validity	NR 0.226 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation frequency Reference: Stair climb	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation frequency Construct validity	NR 0.234 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Transfer intensity Reference: Stair climb	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: transfer intensity Construct validity	NR 0.305 P value: NR
Rejeski, 1995 ⁴⁰³ Index: KPS: Ambulation intensity Reference: Stair climb	U.S. Size: 440 Mean age: 68.8 % of females: 69.32	Domain: ambulation intensity Construct validity	NR 0.322 P value: NR

Bold-strong correlations of >50%; NR-not reported

Appendix Table F50. Validity of the functional tests in patients with knee OA

Author, year Index; Reference methods	Country; Size Mean age; % of females	Validity	Estimate, significance
Barker, 2004 ³⁹³ Index: Sit-stand Reference: Power (Leg extensor power)	UK Size: 123 Mean age: 69.5 % of females: 53.7	Construct validity	Spearman's rank correlation coefficient 0.392 P value: <0.01
Barker, 2004 ³⁹³ Index: Sit-stand Reference: VAS: Pain	UK Size: 123 Mean age: 69.5 % of females: 53.7	Construct validity	Spearman's rank correlation coefficient 0.383 P value: <0.01
Barker, 2004 ³⁹³ Index: Sit-stand Reference: WOMAC: Pain subscale	UK Size: 123 Mean age: 69.5 % of females: 53.7	Construct validity	Spearman's rank correlation coefficient 0.292 P value: <0.01
Piva, 2004 ⁴⁰⁴ Index: Get Up and Go Test Reference: ADLS (Activities of Daily Living of the Knee Outcome Surgery)	U.S. Size: 105 Mean age: 62 % of females: 76.19	Concurrent validity	Pearson Product-Moment correlation coefficient -0.34 P value: <0.001
Piva, 2004 ⁴⁰⁴ Index: Get Up and Go Test Reference: SF-36: Bodily pain	U.S. Size: 105 Mean age: 62 % of females: 76.19	Concurrent validity	Pearson Product-Moment correlation coefficient -0.27 P value: 0.005
Piva, 2004 ⁴⁰⁴ Index: Get Up and Go Test Reference: SF-36: General health	U.S. Size: 105 Mean age: 62 % of females: 76.19	Concurrent validity	Pearson Product-Moment correlation coefficient -0.28 P value: 0.005
Piva, 2004 ⁴⁰⁴ Index: Get Up and Go Test Reference: SF-36: Mental health	U.S. Size: 105 Mean age: 62 % of females: 76.19	Concurrent validity	Pearson Product-Moment correlation coefficient -0.34 P value: <0.001
Piva, 2004 ⁴⁰⁴ Index: Get Up and Go Test Reference: SF-36: Physical function	U.S. Size: 105 Mean age: 62 % of females: 76.19	Concurrent validity	Pearson Product-Moment correlation coefficient -0.44 P value: <0.001
Piva, 2004 ⁴⁰⁴ Index: Get Up and Go Test Reference: SF-36: Role-emotional	U.S. Size: 105 Mean age: 62 % of females: 76.19	Concurrent validity	Pearson Product-Moment correlation coefficient -0.23 P value: 0.021
Piva, 2004 ⁴⁰⁴ Index: Get Up and Go Test Reference: SF-36: Role-physical	U.S. Size: 105 Mean age: 62 % of females: 76.19	Concurrent validity	Pearson Product-Moment correlation coefficient -0.15 P value: 0.128
Piva, 2004 ⁴⁰⁴ Index: Get Up and Go Test Reference: SF-36: Social function	U.S. Size: 105 Mean age: 62 % of females: 76.19	Concurrent validity	Pearson Product-Moment correlation coefficient -0.17 P value: 0.081
Piva, 2004 ⁴⁰⁴ Index: Get Up and Go Test Reference: SF-36: Vitality	U.S. Size: 105 Mean age: 62 % of females: 76.19	Concurrent validity	Pearson Product-Moment correlation coefficient -0.13 P value: 0.195
Piva, 2004 ⁴⁰⁴ Index: Get Up and Go Test Reference: WOMAC: Likert version	U.S. Size: 105 Mean age: 62 % of females: 76.19	Concurrent validity	Pearson Product-Moment correlation coefficient 0.39 P value: <0.001

Appendix Table F50. Validity of the functional tests in patients with knee OA (continued)

Author, year Index; Reference methods	Country; Size Mean age; % of females	Validity	Estimate, significance
Lankhorst, 1982 ⁹² Index: Number of steps Reference: Endurance and maximal impulse	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis -0.031 P value: NR
Lankhorst, 1982 ⁹² Index: Number of steps Reference: Maximal isometric torque	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis 0.609 P value: NR
Lankhorst, 1982 ⁹² Index: Stair climbing Reference: Endurance and maximal impulse	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis 0.297 P value: NR
Lankhorst, 1982 ⁹² Index: Stair climbing Reference: Maximal isometric torque	The Netherlands Size: 24 Mean age: NR % of females: NR	Construct validity	Factor analysis 0.034 P value: NR
Steultjens, 1999 ⁴⁰⁵ Index: IRGL dexterity Reference: Keefe and Block (adapted version) + subscales of 4 questionnaires (The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale that is a Dutch adaptation of the Arthritis Impact Measurement Scales; Nottingham Health Profile mobility subscale; EuroQoL mobility subscale; QR & S questionnaire (Questionnaire Rising and Sitting Down))	Netherlands Size: 198 Mean age: 68 % of females: 78.3	Factor analysis	Factor analysis 0.11 P value: NR
Steultjens, 1999 ⁴⁰⁵ Index: IRGL dexterity Reference: The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale and EuroQoL self-care subscale that measures self-reported disability in self-care	Netherlands Size: 198 Mean age: 68 % of females: 78.3	Factor analysis	Factor analysis 0.67 P value: NR

Abbreviations:

J-MAP: Joint-Specific Multidimensional Assessment of Pain
SF-36: 36-Item Short Form Health Survey
KPS: Knee Pain Scale
CES –D: Center for Epidemiologic Studies Depression Scale
FAST: Fitness and Arthritis in Seniors Trial
ADL: Activities of Daily Living
IADL: Instrumental Activities of Daily Living
KPSI: Knee Patient -Specific Index

Appendix Table F50. Validity of the functional tests in patients with knee OA (continued)

LEAP: Lower Extremity Activity Profile
MPQ-PRI: McGill Pain Questionnaire- Pain Rating Index
WIQ: Walking Impairment Questionnaire
AIMS2-SF: Short form Arthritis Impact Measurement Scale 2
EQ-5D: EuroQoL (first part consisting of 5 questions covering 5 dimensions)
MCS: Mental Component Summary
EQ-VAS: EuroQoL-Visual Analogue Scale
HAQ: DI: Health Assessment Questionnaire: Disability Index
WOMAC: Western Ontario McMaster Universities Osteoarthritis Index
HAQ: Health Assessment Questionnaire
AAS: Adjusted Activity Score
VAS: Visual Analogue Scale
TUG: Timed Up and Go Test
MAS: Maximal Activity Score
IRGL: The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale

Appendix Table F51. Validity of the scales in patients with knee OA

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain affect subscale Reference: AIMS2 (Arthritis Impact Measurement Scale) pain	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain affect Convergent and discriminant validity	NR 0.56 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain sensory subscale Reference: AIMS2 (Arthritis Impact Measurement Scale) pain	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain sensory Convergent and discriminant validity	NR 0.49 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain affect subscale Reference: AIMS2 walking and bending	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain affect Convergent and discriminant validity	NR 0.53 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain sensory subscale Reference: AIMS2 walking and bending	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain sensory Convergent and discriminant validity	NR 0.43 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain affect subscale Reference: General Health Satisfaction	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain affect Convergent and discriminant validity	NR 0.64 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain sensory subscale Reference: General Health Satisfaction	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain sensory Convergent and discriminant validity	NR 0.36 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain affect subscale Reference: J-MAP: pain sensory subscale	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain affect Convergent and discriminant validity	NR 0.56 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain affect subscale Reference: Perceived stress scale	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain affect Convergent and discriminant validity	NR 0.19 P value: NR
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain sensory subscale Reference: Perceived stress scale	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain sensory Convergent and discriminant validity	NR 0.32 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain affect subscale Reference: SF-36: Bodily pain	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain affect Convergent and discriminant validity	NR 0.59 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain sensory subscale Reference: SF-36: Bodily pain	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain sensory Convergent and discriminant validity	NR 0.63 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain affect subscale Reference: SF-36: General health	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain affect Convergent and discriminant validity	NR 0.34 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain sensory subscale Reference: SF-36: General health	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain sensory Convergent and discriminant validity	NR 0.36 P value: <0.001

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain affect subscale Reference: SF-36: Mental health	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain affect Convergent and discriminant validity	NR 0.33 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain sensory subscale Reference: SF-36: Mental health	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain sensory Convergent and discriminant validity	NR 0.33 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain affect subscale Reference: SF-36: Physical functioning	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain affect Convergent and discriminant validity	NR 0.44 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain sensory subscale Reference: SF-36: Physical functioning	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain sensory Convergent and discriminant validity	NR 0.4 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain affect subscale Reference: SF-36: Role emotional	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain affect Convergent and discriminant validity	NR 0.08 P value: NR
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain sensory subscale Reference: SF-36: Role emotional	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain sensory Convergent and discriminant validity	NR 0.17 P value: NR
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain affect subscale Reference: SF-36: Role physical	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain affect Convergent and discriminant validity	NR 0.24 P value: <0.01
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain sensory subscale Reference: SF-36: Role physical	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain sensory Convergent and discriminant validity	NR 0.15 P value: NR
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain affect subscale Reference: SF-36: Social functioning	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain affect Convergent and discriminant validity	NR 0.44 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain sensory subscale Reference: SF-36: Social functioning	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain sensory convergent and discriminant validity	NR 0.42 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain affect subscale Reference: SF-36: Vitality	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain affect Convergent and discriminant validity	NR 0.29 P value: <0.001
O'Malley, 2003 ⁴⁰⁶ Index: J-MAP: Pain sensory subscale Reference: SF-36: Vitality	U.S. Size: 180 Mean age: 56 % of females: 7	Domain: pain sensory Convergent and discriminant validity	NR 0.31 P value: <0.001

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Steultjens, 1999 ⁴⁰⁵ Index: Keefe and Block (adapted version) Reference: Keefe and Block (adapted version) + subscales of 4 questionnaires (The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale that is a Dutch adaptation of the Arthritis Impact Measurement Scales; Nottingham Health Profile mobility subscale; EuroQoL mobility subscale; QR & S questionnaire (Questionnaire Rising and Sitting Down))	The Netherlands Size: 198 Mean age: 68 % of females: 78.3	Factor analysis	Factor analysis 0.79 P value: NR
Steultjens, 1999 ⁴⁰⁵ Index: Keefe and Block (adapted version) Reference: The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale and EuroQoL self-care subscale that measures self-reported disability in self-care	The Netherlands Size: 198 Mean age: 68 % of females: 78.3	Factor analysis	Factor analysis -0.01 P value: NR
Lingard, 2001 ⁴⁰⁷ Index: Knee Society Clinical Rating system: Pain score Reference: SF-36: Bodily pain score	U.S., UK and Australia Size: 697 Mean age: 70 % of females: 58.9	Domain: pain Construct validity	Pearson coefficient 0.31 P value: NR
Lingard, 2001 ⁴⁰⁷ Index: Knee Society Clinical Rating system: Function score Reference: SF-36:Physical Functioning score	U.S., UK and Australia Size: 697 Mean age: 70 % of females: 58.9	Domain: function Construct validity	Pearson coefficient 0.63 P value: NR
Lingard, 2001 ⁴⁰⁷ Index: Knee Society Clinical Rating system: Pain score Reference: WOMAC: Pain scale	U.S., UK and Australia Size: 697 Mean age: 70 % of females: 58.9	Domain: pain Construct validity	Pearson coefficient 0.44 P value: NR
Lingard, 2001 ⁴⁰⁷ Index: Knee Society Clinical Rating system: Function score Reference: WOMAC: Function score	U.S., UK and Australia Size: 697 Mean age: 70 % of females: 58.9	Domain: function Construct validity	Pearson coefficient 0.46 P value: NR
Wright, 2010 ³⁶⁴ Index: KPSI Reference: Knee Society score, pain score	Canada Size: 100 Mean age: 69.7 % of females: 67	Construct validity	Pearson coefficient 0.47 P value: NR
Wright, 2010 ³⁶⁴ Index: KPSI Reference: Knee Society score, function score	Canada Size: 100 Mean age: 69.7 % of females: 67	Construct validity	Pearson coefficient 0.36 P value: NR
Wright, 2010 ³⁶⁴ Index: KPSI Reference: SF-36:Pain	Canada Size: 100 Mean age: 69.7 % of females: 67	Construct validity	Pearson coefficient 0.6 P value: NR
Wright, 2010 ³⁶⁴ Index: KPSI Reference: SF-36:Physical function	Canada Size: 100 Mean age: 69.7 % of females: 67	Construct validity	Pearson coefficient 0.56 P value: NR
Wright, 2010 ³⁶⁴ Index: KPSI Reference: SF-36: Role physical	Canada Size: 100 Mean age: 69.7 % of females: 67	Construct validity	Pearson coefficient 0.38 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Wright, 2010 ³⁶⁴ Index: KPSI Reference: SF-36: Vitality	Canada Size: 100 Mean age: 69.7 % of females: 67	Construct validity	Pearson coefficient 0.39 P value: NR
Wright, 2010 ³⁶⁴ Index: KPSI Reference: SF-36: General health	Canada Size: 100 Mean age: 69.7 % of females: 67	Construct validity	Pearson coefficient 0.32 P value: NR
Wright, 2010 ³⁶⁴ Index: KPSI Reference: SF-36: Physical component summary	Canada Size: 100 Mean age: 69.7 % of females: 67	Construct validity	Pearson coefficient 0.53 P value: NR
Wright, 2010 ³⁶⁴ Index: KPSI Reference: Timed get-up-and-go (TUG)	Canada Size: 100 Mean age: 69.7 % of females: 67	Construct validity	Pearson coefficient 0.59 P value: NR
Wright, 2010 ³⁶⁴ Index: KPSI Reference: 50-ft walk	Canada Size: 100 Mean age: 69.7 % of females: 67	Construct validity	Pearson coefficient 0.26 P value: NR
Wright, 2010 ³⁶⁴ Index: KPSI Reference: WOMAC: Pain scale	Canada Size: 100 Mean age: 69.7 % of females: 67	Construct validity	Pearson coefficient 0.72 P value: NR
Wright, 2010 ³⁶⁴ Index: KPSI Reference: WOMAC: Physical function scale	Canada Size: 100 Mean age: 69.7 % of females: 67	Construct validity	Pearson coefficient 0.79 P value: NR
Finch, 1995 ⁴⁰⁸ Index: LEAP: Satisfaction with social activities Reference: Global functional rating	Canada Size: 32 Mean age: 66 % of females: 43.7	Domain: change in patient satisfaction social activities Construct validity	Pearson coefficient 0.456 P value: 0.013
Finch, 1995 ⁴⁰⁸ Index: LEAP: Sleep and rest satisfaction Reference: Global functional rating	Canada Size: 32 Mean age: 66 % of females: 43.7	Domain: change in sleep and rest satisfaction Construct validity	Pearson coefficient 0.366 P value: 0.046
Finch, 1995 ⁴⁰⁸ Index: LEAP: Patient satisfaction with emotional health Reference: SPW (Self-Paced Walk)	Canada Size: 32 Mean age: 66 % of females: 43.7	Domain: change in patient satisfaction with emotional health Construct validity	Pearson coefficient 0.44 P value: 0.015
Finch, 1995 ⁴⁰⁸ Index: LEAP Reference: ROM (range of motion)	Canada Size: 32 Mean age: 66 % of females: 43.7	Domain: functional ability	The lack of significant correlations between ROM and the LEAP suggests that range of a given joint is not as crucial a component of physical function as once thought. This means we cannot assume that increase in ROM reflects improved functional ability P value: NS

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Stucki, 1998 ³⁵³ Index: Lequesne knee: Composite Reference: Extension deficit	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: composite Construct validity	Spearman's rank correlation coefficient 0.39 P value: <0.05
Stucki, 1998 ³⁵³ Index: Lequesne knee: Function Reference: Extension deficit	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: function Construct validity	Spearman's rank correlation coefficient 0.38 P value: <0.05
Stucki, 1998 ³⁵³ Index: Lequesne knee: Pain Reference: Extension deficit	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: pain Construct validity	Spearman's rank correlation coefficient 0.37 P value: NR
Stucki, 1998 ³⁵³ Index: Lequesne knee: Walk distance Reference: Extension deficit	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: walk distance Construct validity	Spearman's rank correlation coefficient 0.17 P value: NR
Stucki, 1998 ³⁵³ Index: Lequesne knee: Composite Reference: Flexion	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: composite Construct validity	Spearman's rank correlation coefficient -0.51 P value: <0.01
Stucki, 1998 ³⁵³ Index: Lequesne knee: Function Reference: Flexion	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: function Construct validity	Spearman's rank correlation coefficient -0.62 P value: <0.01
Stucki, 1998 ³⁵³ Index: Lequesne knee: Pain Reference: Flexion	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: pain Construct validity	Spearman's rank correlation coefficient -0.16 P value: NR
Stucki, 1998 ³⁵³ Index: Lequesne knee: Walk distance Reference: Flexion	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: walk distance Construct validity	Spearman's rank correlation coefficient -0.48 P value: <0.05
Stucki, 1998 ³⁵³ Index: Lequesne knee: Composite Reference: Kellgren-Lawrence scale	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: composite Construct validity	Spearman's rank correlation coefficient 0.47 P value: <0.01
Stucki, 1998 ³⁵³ Index: Lequesne knee: Function Reference: Kellgren-Lawrence scale	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: function Construct validity	Spearman's rank correlation coefficient 0.59 P value: <0.01
Stucki, 1998 ³⁵³ Index: Lequesne knee: Pain Reference: Kellgren-Lawrence scale	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: pain Construct validity	Spearman's rank correlation coefficient 0.1 P value: NR
Stucki, 1998 ³⁵³ Index: Lequesne knee: Walk distance Reference: Kellgren-Lawrence scale	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: walk distance Construct validity	Spearman's rank correlation coefficient 0.42 P value: <0.05
Faucher, 2002 ³⁹⁸ Index: Lequesne index Reference: VAS Dw (VAS discomfort in walking for daily living activities)	France Size: 88 Mean age: 67.11% of females: 67.05	Convergent validity	Spearman's rank correlation coefficient 0.64 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Faucher, 2002 ³⁹⁸ Index: Lequesne index Reference: VAS handicap	France Size: 88 Mean age: 67.11 % of females: 67.05	convergent validity	Spearman's rank correlation coefficient 0.38 P value: NR
Faucher, 2002 ³⁹⁸ Index: Lequesne index Reference: VAS pain score	France Size: 88 Mean age: 67.11 % of females: 67.05	Convergent validity	Spearman's rank correlation coefficient 0.45 P value: NR
Faucher, 2002 ³⁹⁸ Index: Lequesne index Reference: WOMAC: Pain subscale	France Size: 88 Mean age: 67.11 % of females: 67.05	Convergent validity	Spearman's rank correlation coefficient 0.56 P value: NR
Faucher, 2002 ³⁹⁸ Index: Lequesne index Reference: Circumference of the thigh	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: functional limitation Divergent validity	Spearman's rank correlation coefficient 0.17 P value: NR
Faucher, 2002 ³⁹⁸ Index: Lequesne index Reference: Hospital Anxiety and Depression Scale (Score of anxiety)	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: functional limitation Divergent validity	Spearman's rank correlation coefficient 0.15 P value: NR
Faucher, 2002 ³⁹⁸ Index: Lequesne index Reference: Hospital Anxiety and Depression Scale (Score of depression)	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: functional limitation Divergent validity	Spearman's rank correlation coefficient 0.30 P value: NR
Faucher, 2002 ³⁹⁸ Index: Lequesne index Reference: Kellgren-Lawrence	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: functional limitation Divergent validity	Spearman's rank correlation coefficient 0.11 P value: NR
Faucher, 2002 ³⁹⁸ Index: Lequesne index Reference: WOMAC: Function subscale	France Size: 88 Mean age: 67.11 % of females: 67.05	Convergent validity	Spearman's rank correlation coefficient 0.75 P value: NR
Salaffi, 1991 ⁴⁰⁹ Index: MPQ-PRI affective (Italian version) Reference: AIMS (Italian version of Arthritis Impact Measurement Scale)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: affective Construct validity	Pearson's product moment correlation 0.567 P value: <0.001
Salaffi, 1991 ⁴⁰⁹ Index: MPQ-PRI evaluative (Italian version) Reference: AIMS (Italian version of Arthritis Impact Measurement Scale)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: evaluative Construct validity	Pearson's product moment correlation 0.559 P value: <0.001
Salaffi, 1991 ⁴⁰⁹ Index: MPQ-PRI sensory (Italian version) Reference: AIMS (Italian version of Arthritis Impact Measurement Scale)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: sensory Construct validity	Pearson's product moment correlation 0.59 P value: <0.001
Salaffi, 1991 ⁴⁰⁹ Index: MPQ-PRI total (Italian version) Reference: AIMS (Italian version of Arthritis Impact Measurement Scale)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: total Construct validity	Pearson's product moment correlation 0.607 P value: <0.001

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Salaffi, 1991 ⁴⁰⁹ Index: MPQ-PRI affective (Italian version) Reference: PAS (Performance and Activity scale)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: affective Construct validity	Pearson's product moment correlation -0.508 P value: <0.001
Salaffi, 1991 ⁴⁰⁹ Index: MPQ-PRI evaluative (Italian version) Reference: PAS (Performance and Activity scale)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: evaluative Construct validity	Pearson's product moment correlation -0.184 P value: NR
Salaffi, 1991 ⁴⁰⁹ Index: MPQ-PRI sensory (Italian version) Reference: PAS (Performance and Activity scale)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: sensory Construct validity	Pearson's product moment correlation -0.652 P value: <0.001
Salaffi, 1991 ⁴⁰⁹ Index: MPQ-PRI total (Italian version) Reference: PAS (Performance and Activity scale)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: total Construct validity	Pearson's product moment correlation -0.608 P value: <0.001
Stieltjens, 1999 ⁴⁰⁵ Index: Nottingham Health Profile mobility Reference: Keefe and Block (adapted version) + subscales of 4 questionnaires (The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale that is a Dutch adaptation of the Arthritis Impact Measurement Scales; Nottingham Health Profile mobility subscale; EuroQoL mobility subscale; QR & S questionnaire (Questionnaire Rising and Sitting Down))	Netherlands Size: 198 Mean age: 68 % of females: 78.3	Factor analysis	Factor analysis 0.72 P value: NR
Stieltjens, 1999 ⁴⁰⁵ Index: Nottingham Health Profile mobility Reference: The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale and EuroQoL self-care subscale that measures self-reported disability in self-care	Netherlands Size: 198 Mean age: 68 % of females: 78.3	Factor analysis	Factor analysis 0.21 P value: NR
Ornetti, 2011 ⁴¹⁰ Index: Patient NRS: "What is the degree of difficulty you have experienced for the daily activities during the last 48 hours due to your (knee or hip) OA?" Reference: Physician NRS	France Size: 881 Mean age: 67.1% of females: 69.5	Construct validity	Spearman's correlation coefficient 0.6 P value: <0.001
Ornetti, 2011 ⁴¹⁰ Index: Patient NRS: "What is the degree of difficulty you have experienced for the daily activities during the last 48 hours due to your (knee or hip) OA?" Reference: VAS: Pain	France Size: 881 Mean age: 67.1% of females: 69.5	Construct validity	Spearman's correlation coefficient 0.666 P value: <0.001
Ornetti, 2011 ⁴¹⁰ Index: Physician NRS Reference: VAS: Pain	France Size: 881 Mean age: 67.1% of females: 69.5	Construct validity	Spearman's correlation coefficient 0.508 P value: <0.001

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Ornetti, 2011 ⁴¹⁰ Index: Patient NRS: "What is the degree of difficulty you have experienced for the daily activities during the last 48 hours due to your (knee or hip) OA?" Reference: VAS: Patient global assessment	France Size: 881 Mean age: 67.1% of females: 69.05	Construct validity	Spearman's correlation coefficient 0.714 P value: <0.001
Ornetti, 2011 ⁴¹⁰ Index: Physician NRS Reference: VAS: Patient global assessment	France Size: 881 Mean age: 67.1% of females: 69.5	Construct validity	Spearman's correlation coefficient 0.532 P value: <0.001
Ornetti, 2011 ⁴¹⁰ Index: Patient NRS: "What is the degree of difficulty you have experienced for the daily activities during the last 48 hours due to your (knee or hip) OA?" Reference: VAS: Physician global assessment	France Size: 881 Mean age: 67.1% of females: 69.05	Construct validity	Spearman's correlation coefficient 0.555 P value: <0.001
Ornetti, 2011 ⁴¹⁰ Index: Physician NRS Reference: VAS: Physician global assessment	France Size: 881 Mean age: 67.1% of females: 69.05	Construct validity	Spearman's correlation coefficient 0.785 P value: <0.001
Ornetti, 2011 ⁴¹⁰ Index: Patient NRS: "What is the degree of difficulty you have experienced for the daily activities during the last 48 hours due to your (knee or hip) OA?" Reference: WOMAC: Function subscale	France Size: 881 Mean age: 67.1% of females: 69.05	Construct validity	Spearman's correlation coefficient 0.616 P value: <0.001
Ornetti, 2011 ⁴¹⁰ Index: Physician NRS Reference: WOMAC: Function subscale	France Size: 881 Mean age: 67.1% of females: 69.05	Construct validity	Spearman's correlation coefficient 0.458 P value: <0.001
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Dependence Reference: "How many "good days" have you had out of the last seven?" (The client was asked to interpret words such as "condition" and "good days" in his or her own terms.)	U.S. Size: 157 Mean age: 69 % of females: 75	In dumps category Domain: Dependence Construct validity	Spearman's Rank correlation coefficient 0.07 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Dependence Reference: "How many "good days" have you had out of the last seven?" (The client was asked to interpret -words such as "condition" and "good days" in his or her own terms.)	U.S. Size: 157 Mean age: 69 % of females: 75	Not in dumps category Domain: Dependence Construct validity	Spearman's Rank correlation coefficient 0.09 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Difficulty Reference: "How many "good days" have you had out of the last seven?" (The client was asked to interpret -words such as "condition" and "good days" in his or her own terms.)	U.S. Size: 157 Mean age: 69 % of females: 75	In dumps category Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.44 P value: <0.01

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Difficulty Reference: "How many "good days" have you had out of the last seven?" (The client was asked to interpret -words such as "condition" and "good days" in his or her own terms.)	U.S. Size: 157 Mean age: 69 % of females: 75	Not in dumps category Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.49 P value: <0.01
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Pain Reference: "How many "good days" have you had out of the last seven?" (The client was asked to interpret words such as "condition" and "good days" in his or her own terms.)	U.S. Size: 157 Mean age: 69 % of females: 75	In dumps category Domain: Pain Construct validity	Spearman's Rank correlation coefficient 0.57 P value: <0.01
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Pain Reference: "How many "good days" have you had out of the last seven?" (The client was asked to interpret words such as "condition" and "good days" in his or her own terms.)	U.S. Size: 157 Mean age: 69 % of females: 75	Not in dumps category Domain: Pain Construct validity	Spearman's Rank correlation coefficient 0.51 P value: <0.01
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Total status Reference: "How many "good days" have you had out of the last seven?" (The client was asked to interpret words such as "condition" and "good days" in his or her own terms.)	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Total status Construct validity	Spearman's Rank correlation coefficient 0.44 P value: <0.01
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Total status Reference: "How many "good days" have you had out of the last seven?" (The client was asked to interpret words such as "condition" and "good days" in his or her own terms.)	U.S. Size: 157 Mean age: 69 % of females: 75	In dumps category Domain: Total status Construct validity	Spearman's Rank correlation coefficient 0.47 P value: <0.01
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Joint condition Reference: Client assessment of "Good days": "How many "good days" have you had out of the last seven?" (The client was asked to interpret words such as "condition" and "good days" in his or her own terms.)	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.4 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Pain Reference: Client assessment of "Good days": "How many "good days" have you had out of the last seven?" (The client was asked to interpret words such as "condition" and "good days" in his or her own terms.)	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.46 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Dependence Reference: Client assessment of ability to deal: "Overall how would you rate your ability to deal with your arthritis and the problems it causes; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Pain Construct validity	Spearman's Rank correlation coefficient 0.18 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Difficulty Reference: Client assessment of ability to deal: "Overall how would you rate your ability to deal with your arthritis and the problems it causes; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.26 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Joint condition Reference: Client assessment of ability to deal: "Overall how would you rate your ability to deal with your arthritis and the problems it causes; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.24 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Pain Reference: Client assessment of ability to deal: "Overall how would you rate your ability to deal with your arthritis and the problems it causes; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.2 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Dependence Reference: Client assessment of joint condition: "Overall how would you rate the condition of your joints; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Pain Construct validity	Spearman's Rank correlation coefficient 0.32 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Difficulty Reference: Client assessment of joint condition: "Overall how would you rate the condition of your joints; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.33 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Joint condition Reference: Client assessment of joint condition: "Overall how would you rate the condition of your joints; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.39 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Pain Reference: Client assessment of joint condition: "Overall how would you rate the condition of your joints; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.37 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Dependence Reference: Grip strength	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Pain Construct validity	Spearman's Rank correlation coefficient 0.12 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Difficulty Reference: Grip strength	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.26 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Joint condition Reference: Grip strength	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.2 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Pain Reference: Grip strength	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.07 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Dependence Reference: Morning stiffness	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Pain Construct validity	Spearman's Rank correlation coefficient 0.06 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Difficulty Reference: Morning stiffness	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.14 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Joint condition Reference: Morning stiffness	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.08 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Pain Reference: Morning stiffness	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.01 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Dependence Reference: Professional assessment of ability to deal: "Overall how would you rate the client's ability to deal with his arthritis and the problems it causes; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Pain Construct validity	Spearman's Rank correlation coefficient -0.09 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Difficulty Reference: Professional assessment of ability to deal: "Overall how would you rate the client's ability to deal with his arthritis and the problems it causes; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.08 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Joint condition Reference: Professional assessment of ability to deal: "Overall how would you rate the client's ability to deal with his arthritis and the problems it causes; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.04 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Pain Reference: Professional assessment of ability to deal: "Overall how would you rate the client's ability to deal with his arthritis and the problems it causes; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.14 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Dependence Reference: Professional assessment of joint condition: "Overall how would you rate the client's joint status; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Pain Construct validity	Spearman's Rank correlation coefficient 0.11 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Difficulty Reference: Professional assessment of joint condition: "Overall how would you rate the client's joint status; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient -0.11 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Joint condition Reference: Professional assessment of joint condition: "Overall how would you rate the client's joint status; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient 0.2 P value: NR
Deniston, 1980 ³⁹⁶ Index: PGAP instrument: Pain Reference: Professional assessment of joint condition: "Overall how would you rate the client's joint status; would you say excellent, good, fair, or poor?"	U.S. Size: 157 Mean age: 69 % of females: 75	Domain: Difficulty Construct validity	Spearman's Rank correlation coefficient -0.22 P value: NR
Possley, ³⁹² Index: SF-36 Physical Composite Score Reference: 3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Nondepressed patients Domain: physical composite Construct validity	Pearson r correlation coefficient 0.3 P value: 0.05
Possley, ³⁹² Index: SF-36 Physical Composite Score Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Nondepressed patients Domain: physical composite Construct validity	Pearson r correlation coefficient 0.25 P value: 0.05
Possley, ³⁹² Index: SF-36 Physical Composite Score Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed patients Domain: physical composite Construct validity	Pearson r correlation coefficient 0.3 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Possley, ³⁹² Index: SF-36 Physical Composite Score Reference: -3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed patients Domain: physical composite Construct validity	Pearson r correlation coefficient 0.22 P value: NR
Clark, 1998 ³⁸² Index: SF-36: Bodily pain Reference: Osteoarthritis Severity Scale: Assessed by 12 questions: 1)Persistence of pain in worst knee; 2) Intensity of pain in worst knee; 3)Diurnal duration of pain and stiffness in the worst knee; 4) Frequency of severe pain in the worst knee; 5) Pain and stiffness while walking; 6)Pain and stiffness while using stairs; 7)Pain and stiffness while standing; 8)Pain and stiffness while resting; 9)Pain and stiffness while sleeping;10)Sensations of crepitus: clicking or sandpaper sensation; 11) Impaired function : limping; 12)Impaired function: knees giving way with activity	U.S. Size: 415 Mean age: 66 % of females: 0	Construct validity	Pearson correlation coefficient -0.58 P value: NR
Lingard, 2001 ⁴⁰⁷ Index: SF-36: Bodily pain score Reference: Knee Society Clinical Rating system: Pain score	U.S., UK and Australia Size: 697 Mean age: 70 % of females: 58.9	Domain: pain Construct validity	Pearson coefficient 0.35 P value: NR
Lingard, 2001 ⁴⁰⁷ Index: SF-36: Bodily pain score Reference: WOMAC: pain scale	U.S., UK and Australia Size: 697 Mean age: 70 % of females: 58.9	Domain: pain Construct validity	Pearson coefficient 0.5 P value: NR
Clark, 1998 ³⁸² Index: SF-36: General health perceptions Reference: Osteoarthritis Severity Scale	U.S. Size: 415 Mean age: 66 % of females: 0	Construct validity	Pearson correlation coefficient -0.35 P value: NR
Clark, 1998 ³⁸² Index: SF-36: Physical component summary Reference: Osteoarthritis Severity Scale	U.S. Size: 415 Mean age: 66 % of females: 0	Construct validity	Pearson correlation coefficient -0.48 P value: NR
Clark, 1998 ³⁸² Index: SF-36: Physical function index Reference: Osteoarthritis Severity Scale	U.S. Size: 415 Mean age: 66 % of females: 0	Construct validity	Pearson correlation coefficient -0.54 P value: NR
Clark, 1998 ³⁸² Index: SF-36: Role performance with physical limitations Reference: Osteoarthritis Severity Scale	U.S. Size: 415 Mean age: 66 % of females: 0	Construct validity	Pearson correlation coefficient -0.4 P value: NR
Clark, 1998 ³⁸² Index: SF-36: social functioning Reference: Osteoarthritis Severity Scale	U.S. Size: 415 Mean age: 66 % of females: 0	Construct validity	Pearson correlation coefficient -0.47 P value: NR
Clark, 1998 ³⁸² Index: SF-36: vitality Reference: Osteoarthritis Severity Scale	U.S. Size: 415 Mean age: 66 % of females: 0	Construct validity	Pearson correlation coefficient -0.37 P value: NR
Roos, 1999 ⁴¹¹ Index: SF-36:Bodily pain subscale Reference: WOMAC: Likert version: Function scale	Sweden Size: 52 Mean age: 48 % of females: 48.08	Domain: bodily pain Construct validity	Spearman's correlation coefficient 0.65 P value: <0.002

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Roos, 1999 ⁴¹¹ Index: SF-36:Bodily pain subscale Reference: WOMAC: Likert version :Pain scale	Sweden Size: 52 Mean age: 48 % of females: 48.08	Domain: bodily pain Construct validity	Spearman's correlation coefficient 0.67 P value: <0.002
Roos, 1999 ⁴¹¹ Index: SF-36:Bodily pain subscale Reference: WOMAC: Likert version: Stiffness	Sweden Size: 52 Mean age: 48 % of females: 48.08	Domain: bodily pain Construct validity	Spearman's correlation coefficient 0.44 P value: <0.002
Brazier, 1999 ⁴¹² Index: SF-36:Pain Reference: WOMAC: Pain subscale	UK Size:230 Mean age: 67.6 % of females: NR	Domain: function Convergent validity	Spearman's rank correlation coefficient 0.7 P value: NR
Roos, 1999 ⁴¹¹ Index: SF-36:Physical function subscale Reference: WOMAC: Likert version: Function scale	Sweden Size: 52 Mean age: 48 % of females: 2548.08	Domain: physical function Construct validity	Spearman's correlation coefficient 0.64 P value: <0.002
Roos, 1999 ⁴¹¹ Index: SF-36:Physical function subscale Reference: WOMAC: Likert version: Pain scale	Sweden Size: 52 Mean age: 48 % of females: 48.08	Domain: physical function Construct validity	Spearman's correlation coefficient 0.4 P value: <0.002
Roos, 1999 ⁴¹¹ Index: SF-36:Physical function subscale Reference: WOMAC: Likert version: Stiffness	Sweden Size: 52 Mean age: 48 % of females: 48.08	Domain: physical function Construct validity	Spearman's correlation coefficient 0.45 P value: <0.002
Brazier, 1999 ⁴¹² Index: SF-36:Physical functioning Reference: WOMAC: Function subscale	UK Size: 230 Mean age:67.6 -% of females: NR	Convergent validity	Spearman's rank correlation coefficient 0.7 P value: NR
Lingard, 2001 ⁴⁰⁷ Index: SF-36:Physical Functioning score Reference: Knee Society Clinical Rating system: Function score	U.S., UK and Australia Size: 697 Mean age: 70 % of females: 58.9	Domain: function Construct validity	Pearson coefficient 0.72 P value: NR
Lingard, 2001 ⁴⁰⁷ Index: SF-36:Physical Functioning score Reference: WOMAC: Function score	U.S., UK and Australia Size: 697 Mean age: 70 % of females: 58.9	Domain: function Construct validity	Pearson coefficient 0.69 P value: NR
Roos, 1999 ⁴¹¹ Index: SF-36:Question 11a:"I seem to get sick a little easier than other people" definitely true-definitely false (1-5) Reference: WOMAC: Likert version: Function scale	Sweden Size: 52 Mean age: 48 % of females: 48.08	Domain: quality of life Construct validity	Spearman's correlation coefficient 0.03 P value: NR
Roos, 1999 ⁴¹¹ Index: SF-36:Question 11a:"I seem to get sick a little easier than other people" definitely true-definitely false (1-5) Reference: WOMAC: Likert version: Pain scale	Sweden Size: 52 Mean age: 48 % of females: 48.08	Domain: quality of life Construct validity	Spearman's correlation coefficient 0.08 P value: NR
Roos, 1999 ⁴¹¹ Index: SF-36:Question 11a:"I seem to get sick a little easier than other people" definitely true-definitely false (1-5) Reference: WOMAC: Likert version: Stiffness	Sweden Size: 52 Mean age: 48 % of females: 48.08	Domain: quality of life Construct validity	Spearman's correlation coefficient -0.21 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Steultjens, 1999 ⁴⁰⁵ Index: The QR & S high chair Reference: Keefe and Block (adapted version) + subscales of 4 questionnaires (The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale that is a Dutch adaptation of the Arthritis Impact Measurement Scales; Nottingham Health Profile mobility subscale; EuroQoL mobility subscale; QR & S questionnaire (Questionnaire Rising and Sitting Down))	Netherlands Size: 198 Mean age: 68 % of females: 78.3	Factor analysis	Factor analysis 0.84 P value: NR
Steultjens, 1999 ⁴⁰⁵ Index: The QR & S high chair Reference: The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale and EuroQoL self-care subscale that measures self-reported disability in self-care	Netherlands Size: 198 Mean age: 68 % of females: 78.3	Factor analysis	Factor analysis -0.06 P value: NR
Steultjens, 1999 ⁴⁰⁵ Index: The QR & S low chair Reference: The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale and EuroQoL self-care subscale that measures self-reported disability in self-care	Netherlands Size: 198 Mean age: 68 % of females: 78.3	Factor analysis	Factor analysis -0.18 P value: NR
Barker, 2004 ³⁹³ Index: VAS: Pain Reference: Power (Leg extensor power)	UK Size: 123 Mean age: 69.5 % of females: 53.7	Construct validity	Spearman's rank correlation coefficient 0.273 P value: <0.01
Collins, 2008 ³⁹¹ Index: WIQ: Stair-climbing subscale Reference: 3-minute test (Actual number of stairs ascended and descended)	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: stair-climbing concurrent validity	Pearson r correlation 0.44 P value: <0.001
Collins, 2008 ³⁹¹ Index: WIQ: Distance subscale Reference: 6-minute walk distance	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation 0.52 P value: <0.001
Collins, 2008 ³⁹¹ Index: WIQ: Distance subscale Reference: WOMAC: Pain subscale	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.45 P value: <0.001
Collins, 2008 ³⁹¹ Index: WIQ: Speed subscale Reference: WOMAC: Pain subscale	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.42 P value: <0.001
Collins, 2008 ³⁹¹ Index: WIQ: Stair-climbing subscale Reference: WOMAC: Pain subscale	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.49 P value: <0.001
Collins, 2008 ³⁹¹ Index: WIQ: Distance subscale Reference: WOMAC: Stiffness subscale	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.23 P value: 0.02

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Collins, 2008 ³⁹¹ Index: WIQ: Stair-climbing subscale Reference: WOMAC: Stiffness subscale	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.3 P value: 0.002
Collins, 2008 ³⁹¹ Index: WIQ: Distance subscale Reference: WOMAC: Total score	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.49 P value: <0.001
Collins, 2008 ³⁹¹ Index: WIQ: Stair-climbing subscale Reference: WOMAC: Total score	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.55 P value: <0.001
Collins, 2008 ³⁹¹ Index: WIQ: Distance subscale Reference: WOMAC: Function subscale	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.5 P value: <0.001
Collins, 2008 ³⁹¹ Index: WIQ: Stair-climbing subscale Reference: WOMAC: Function subscale	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.56 P value: <0.001
Collins, 2008 ³⁹¹ Index: WIQ: Distance subscale Reference Body Mass Index	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.32 P value: 0.001
Collins, 2008 ³⁹¹ Index: WIQ: Distance subscale Reference: Body Fat(%)	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.24 P value: 0.012
Collins, 2008 ³⁹¹ Index: WIQ: Distance subscale Reference: History (Duration of OA)	U.S. Size: 112 Mean age: 64.47 % of females: 88.5711.43	Domain: walking distance concurrent validity	Pearson r correlation -0.23 P value: <0.03
Collins, 2008 ³⁹¹ Index: WIQ: Distance subscale Reference: History (ARA (American Rheumatism Association) Functional Class)	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Spearman rank correlation coefficient -0.24 P value: <0.02
Collins, 2008 ³⁹¹ Index: WIQ: stair-climbing subscale Reference: Body Mass Index	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.29 P value: 0.002
Collins, 2008 ³⁹¹ Index: WIQ: Stair-climbing subscale Reference: Body Fat(%)	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.21 P value: 0.03
Collins, 2008 ³⁹¹ Index: WIQ: Stair-climbing subscale Reference: History (ARA (American Rheumatism Association) Functional Class)	U.S. Size: 112 Mean age: 64.47 % of females: 11.43	Domain: walking distance concurrent validity	Pearson r correlation -0.27 P value: 0.01
Possley, ³⁹² Index: WIQ: Stair climbing ability subscale Reference: 3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Not depressed patients Domain: stair climbing ability Construct validity	Pearson r correlation 0.51 P value: <0.001

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Possley, ³⁹² Index: WIQ: Walking distance subscale Reference: 3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Domain: walking distance Construct validity	Pearson r correlation 0.52 P value: <0.001
Possley, ³⁹² Index: WIQ: Stair climbing ability subscale Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Not depressed patients Domain: stair climbing ability Construct validity	Pearson r correlation 0.44 P value: <0.001
Possley, ³⁹² Index: WIQ: Stair climbing ability subscale Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed patients Domain: stair climbing ability Construct validity	Pearson r correlation 0.43 P value: <0.01
Possley, ³⁹² Index: WIQ: Stair climbing ability subscale Reference: - 3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed patients Domain: stair climbing ability Construct validity	Pearson r correlation 0.3 P value: NR
Possley, ³⁹² Index: WIQ: Walking distance subscale Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Not depressed patients Domain: walking distance Construct validity	Pearson r correlation 0.5 P value: <0.001
Possley, ³⁹² Index: WIQ: Walking distance subscale Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed patients Domain: walking distance Construct validity	Pearson r correlation 0.49 P value: <0.001
Possley, ³⁹² Index: WIQ: Walking distance subscale Reference: 3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed patients Domain: walking distance Construct validity	Pearson r correlation 0.33 P value: <0.05
Collins, 2008 ³⁹¹ Index: WIQ: Stair-climbing subscale Reference: : History (ARA (American Rheumatism Association) Functional Class)	U.S. Size: 112 Mean age: 64.47 % of females: 88.57	Domain: walking distance Correlation	Pearson r correlation -0.3 P value: 0.002
Salaffi, 1991 ⁴⁰⁹ Index: AIMS (Italian version of Arthritis Impact Measurement Scale) dimension: Physical function Reference: Total Knee Score calculated from grading 10 radiological variables of the knee (osteoporosis, joint space, sclerosis, geode, osteophyte, erosion, malalignment, soft tissue swelling, meniscal, tendinous or ligamentous calcifications, and chondromatosis)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: physical function Construct validity	Pearson's product moment correlation 0.127 P value: NR
Salaffi, 1991 ⁴⁰⁹ Index: AIMS (Italian version of Arthritis Impact Measurement Scale) subscale: ADL Reference: Total Knee Score calculated from grading 10 radiological variables of the knee (osteoporosis, joint space, sclerosis, geode, osteophyte, erosion, malalignment, soft tissue swelling, meniscal, tendinous or ligamentous calcifications, and chondromatosis)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: ADL Construct validity	Pearson's product moment correlation 0.188 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Salaffi, 1991 ⁴⁰⁹ Index: AIMS (Italian version of Arthritis Impact Measurement Scale) subscale: Dexterity Reference: Total Knee Score calculated from grading 10 radiological variables of the knee (osteoporosis, joint space, sclerosis, geode, osteophyte, erosion, malalignment, soft tissue swelling, meniscal, tendinous or ligamentous calcifications, and chondromatosis)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: dexterity Construct validity	Pearson's product moment correlation 0.049 P value: NR
Salaffi, 1991 ⁴⁰⁹ Index: AIMS (Italian version of Arthritis Impact Measurement Scale) subscale: Household activities Reference: Total Knee Score calculated from grading 10 radiological variables of the knee (osteoporosis, joint space, sclerosis, geode, osteophyte, erosion, malalignment, soft tissue swelling, meniscal, tendinous or ligamentous calcifications, and chondromatosis)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: household activities Construct validity	Pearson's product moment correlation 0.218 P value: NR
Salaffi, 1991 ⁴⁰⁹ Index: AIMS (Italian version of Arthritis Impact Measurement Scale) subscale: Mobility Reference: Total Knee Score calculated from grading 10 radiological variables of the knee (osteoporosis, joint space, sclerosis, geode, osteophyte, erosion, malalignment, soft tissue swelling, meniscal, tendinous or ligamentous calcifications, and chondromatosis)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: mobility Construct validity	Pearson's product moment correlation 0.002 P value: NR
Salaffi, 1991 ⁴⁰⁹ Index: AIMS (Italian version of Arthritis Impact Measurement Scale) subscale: Pain Reference: Total Knee Score calculated from grading 10 radiological variables of the knee (osteoporosis, joint space, sclerosis, geode, osteophyte, erosion, malalignment, soft tissue swelling, meniscal, tendinous or ligamentous calcifications, and chondromatosis)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: pain Construct validity	Pearson's product moment correlation 0.208 P value: NR
Salaffi, 1991 ⁴⁰⁹ Index: AIMS (Italian version of Arthritis Impact Measurement Scale) subscale: Physical activity Reference: Total Knee Score calculated from grading 10 radiological variables of the knee (osteoporosis, joint space, sclerosis, geode, osteophyte, erosion, malalignment, soft tissue swelling, meniscal, tendinous or ligamentous calcifications, and chondromatosis)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: physical activity Construct validity	Pearson's product moment correlation 0.059 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Salaffi, 1991 ⁴⁰⁹ Index: AIMS (Italian version of Arthritis Impact Measurement Scale) subscale: Social activity Reference: Total Knee Score calculated from grading 10 radiological variables of the knee (osteoporosis, joint space, sclerosis, geode, osteophyte, erosion, malalignment, soft tissue swelling, meniscal, tendinous or ligamentous calcifications, and chondromatosis)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: social activity Construct validity	Pearson's product moment correlation 0.244 P value: NR
Salaffi, 1991 ⁴⁰⁹ Index: AIMS (Italian version of Arthritis Impact Measurement Scale) total Reference: Total Knee Score calculated from grading 10 radiological variables of the knee (osteoporosis, joint space, sclerosis, geode, osteophyte, erosion, malalignment, soft tissue swelling, meniscal, tendinous or ligamentous calcifications, and chondromatosis)	Italy Size: 61 Mean age: 63.5 % of females: 100	Domain: total Construct validity	Pearson's product moment correlation 0.218 P value: NR
Meenan, 1980 ³⁹⁷ Index: AIMS: Activities of daily living subscale: Likert format of the scale Reference: Clinical history (Age)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: activities of daily living Convergent validity	Pearson correlation coefficient 0.12 P value: NR
Meenan, 1980 ³⁹⁷ Index: AIMS: Mobility subscale: Likert format of the scale Reference: Clinical history (Age)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: mobility Convergent validity	Pearson correlation coefficient 0.31 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Physical activity subscale: Likert format of the scale Reference: Clinical history (Age)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: physical activity convergent validity	Pearson correlation coefficient 0.49 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Social activity subscale: Likert format of the scale Reference: Clinical history (Age)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: social activity Convergent validity	Pearson correlation coefficient 0.18 P value: <0.05
Meenan, 1980 ³⁹⁷ Index: AIMS: Social role subscale: Likert format of the scale Reference: Clinical history (Age)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: social role Convergent validity	Pearson correlation coefficient 0.4 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Pain subscale: Likert format of the scale Reference: Clinical history (Age)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: pain Convergent validity	Pearson correlation coefficient 0.25 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Activities of daily living subscale: Likert format of the scale Reference: Doctor's opinion of number of joints affected (joint count)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: activities of daily living Convergent validity	Pearson correlation coefficient 0.28 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Meenan, 1980 ³⁹⁷ Index: AIMS: Mobility subscale: Likert format of the scale Reference: Doctor's opinion of number of joints affected (joint count)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: mobility Convergent validity	Pearson correlation coefficient 0.11 P value: NR
Meenan, 1980 ³⁹⁷ Index: AIMS: Physical activity subscale: Likert format of the scale Reference: Doctor's opinion of number of joints affected (joint count)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: physical activity Convergent validity	Pearson correlation coefficient 0.18 P value: NR
Meenan, 1980 ³⁹⁷ Index: AIMS: Social activity subscale: Likert format of the scale Reference: Doctor's opinion of number of joints affected (joint count)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: social activity Convergent validity	Pearson correlation coefficient 0.02 P value: NR
Meenan, 1980 ³⁹⁷ Index: AIMS: Social role subscale: Likert format of the scale Reference: Doctor's opinion of number of joints affected (joint count)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: social role Convergent validity	Pearson correlation coefficient 0.14 P value: NR
Meenan, 1980 ³⁹⁷ Index: AIMS: Pain subscale: Likert format of the scale Reference: Doctor's opinion of number of joints affected (joint count)	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: pain Convergent validity	Pearson correlation coefficient 0.18 P value: <0.05
Meenan, 1980 ³⁹⁷ Index: AIMS: Activities of daily living subscale: Likert format of the scale Reference: Doctor's opinion of patient's functional level	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: activities of daily living Convergent validity	Pearson correlation coefficient 0.39 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Mobility subscale: Likert format of the scale Reference: Doctor's opinion of patient's functional level	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: mobility Convergent validity	Pearson correlation coefficient 0.41 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Physical activity subscale: Likert format of the scale Reference: Doctor's opinion of patient's functional level	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: physical activity Convergent validity	Pearson correlation coefficient 0.51 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Social activity subscale: Likert format of the scale Reference: Doctor's opinion of patient's functional level	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: social activity Convergent validity	Pearson correlation coefficient 0.23 P value: <0.05
Meenan, 1980 ³⁹⁷ Index: AIMS: Social role subscale: Likert format of the scale Reference: Doctor's opinion of patient's functional level	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: social role Convergent validity	Pearson correlation coefficient 0.55 P value: <0.01

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Meenan, 1980 ³⁹⁷ Index: AIMS: Pain subscale: Likert format of the scale Reference: doctor's opinion of patient's functional level	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: pain Convergent validity	Pearson correlation coefficient 0.36 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Activities of daily living subscale: Likert format of the scale Reference: Doctor's opinion of patient's recent disease activity	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: activities of daily living Convergent validity	Pearson correlation coefficient 0.39 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Social activity subscale: Likert format of the scale Reference: Questionnaire item: patient perception of general health	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: social activity Convergent validity	Pearson correlation coefficient 0.4 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Social role subscale: Likert format of the scale Reference: Questionnaire item: patient perception of general health	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: social role Convergent validity	Pearson correlation coefficient 0.38 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Pain subscale: Likert format of the scale Reference: Questionnaire item: patient perception of general health	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: pain Convergent validity	Pearson correlation coefficient 0.56 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Activities of daily living subscale: Likert format of the scale Reference: Questionnaire item: patient perception of recent disease activity	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: activities of daily living Convergent validity	Pearson correlation coefficient 0.29 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Mobility subscale: Likert format of the scale Reference: Questionnaire item: patient perception of recent disease activity	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: mobility Convergent validity	Pearson correlation coefficient 0.27 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Physical activity subscale: Likert format of the scale Reference: Questionnaire item: patient perception of recent disease activity	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: physical activity Convergent validity	Pearson correlation coefficient 0.47 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Social activity subscale: Likert format of the scale Reference: Questionnaire item: patient perception of recent disease activity	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: social activity Convergent validity	Pearson correlation coefficient 0.31 P value: <0.01

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Meenan, 1980 ³⁹⁷ Index: AIMS: Social role subscale: Likert format of the scale Reference: Questionnaire item: patient perception of recent disease activity	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: social role Convergent validity	Pearson correlation coefficient 0.35 P value: <0.01
Meenan, 1980 ³⁹⁷ Index: AIMS: Pain subscale: Likert format of the scale Reference: Questionnaire item: patient perception of recent disease activity	U.S. Size: 104 Mean age: 53 % of females: 70.19	Domain: pain Convergent validity	Pearson correlation coefficient 0.68 P value: <0.01
Ren, 1999 ³⁵⁴ Index: AIMS2-SF: Lower body limitations domain Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Construct validity	Correlation coefficient (not specified) 0.42 P value: NR
Ren, 1999 ³⁵⁴ Index: AIMS2-SF: Upper body limitations domain Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Construct validity	Correlation coefficient (not specified) 0.22 P value: NR
Ren, 1999 ³⁵⁴ Index: AIMS2-SF: Upper body limitations domain Reference: AIMS2-SF: Lower body limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Construct validity	Correlation coefficient (not specified) 0.44 P value: NR
Ren, 1999 ³⁵⁴ Index: AIMS2-SF: Lower body limitations domain Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Construct validity	Correlation coefficient (not specified) 0.3 P value: NR
Ren, 1999 ³⁵⁴ Index: AIMS2-SF: Symptom bother domain Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Construct validity	Correlation coefficient (not specified) 0.22 P value: NR
Ren, 1999 ³⁵⁴ Index: AIMS2-SF: Upper body limitations domain Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Construct validity	Correlation coefficient (not specified) 0.28 P value: NR
Ren, 1999 ³⁵⁴ Index: AIMS2-SF: Lower body limitations domain Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Construct validity	Correlation coefficient (not specified) 0.31 P value: NR
Ren, 1999 ³⁵⁴ Index: AIMS2-SF: Symptom bother domain Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Construct validity	Correlation coefficient (not specified) 0.43 P value: NR
Ren, 1999 ³⁵⁴ Index: AIMS2-SF: Upper body limitations domain Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Construct validity	Correlation coefficient (not specified) 0.30 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Comb or brush your hair" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.20 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Drive a car or use public transportation" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.28 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Get together with friends or relatives" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.38 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Go to a meeting of a church, club, team, or other group" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.22 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "In a bed or a chair for most or all of the day" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.24 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Morning stiffness lasts more than one hour" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.41 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Need help to get dressed" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.18 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Need help to get in or out of bed" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.15 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "On the telephone with close friends or relatives" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.12 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Pain makes it difficult for you to sleep" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.44 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Reach shelves that were above your head" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.25 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Severe pain from arthritis" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.23 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Trouble doing vigorous activities" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.26 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Trouble walking several blocks/climbing a few flights of stairs" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.23 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Unable to walk unless assisted" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.17 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Write with a pen or pencil" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.26 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Comb or brush your hair" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.42 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Drive a car or use public transportation" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.48 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Get together with friends or relatives" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.30 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Go to a meeting of a church, club, team, or other group" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.37 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "In a bed or a chair for most or all of the day" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.68 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Morning stiffness lasts more than one hour" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.24 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Need help to get dressed" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.64 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Need help to get in or out of bed" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.61 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "On the telephone with close friends or relatives" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.21 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Pain makes it difficult for you to sleep" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.34 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Reach shelves that were above your head" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.53 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Severe pain from arthritis" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.1 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Trouble doing vigorous activities" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.52 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Trouble walking several blocks/climbing a few flights of stairs" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.63 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Unable to walk unless assisted" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.56 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Write with a pen or pencil" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.13 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Comb or brush your hair" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.27 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Drive a car or use public transportation" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.37 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Get together with friends or relatives" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.55 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Go to a meeting of a church, club, team, or other group" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.4 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "In a bed or a chair for most or all of the day" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.25 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Morning stiffness lasts more than one hour" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.19 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Need help to get dressed" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.21 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Need help to get in or out of bed" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.21 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "On the telephone with close friends or relatives" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.49 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Pain makes it difficult for you to sleep" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.16 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Reach shelves that were above your head" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.26 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Severe pain from arthritis" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.12 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Trouble doing vigorous activities" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.13 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Trouble walking several blocks/climbing a few flights of stairs" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.16 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Unable to walk unless assisted" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.23 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Write with a pen or pencil" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.19 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Comb or brush your hair" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.17 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Drive a car or use public transportation" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.25 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Get together with friends or relatives" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.19 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Go to a meeting of a church, club, team, or other group" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.24 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "In a bed or a chair for most or all of the day" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.26 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Morning stiffness lasts more than one hour" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.64 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Need help to get dressed" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.22 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Need help to get in or out of bed" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.22 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "On the telephone with close friends or relatives" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Pain makes it difficult for you to sleep" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.65 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Reach shelves that were above your head" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.27 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Severe pain from arthritis" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.64 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Trouble doing vigorous activities" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.44 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Trouble walking several blocks/climbing a few flights of stairs" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.49 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Unable to walk unless assisted" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.02 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Write with a pen or pencil" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.17 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Comb or brush your hair" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.65 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Drive a car or use public transportation" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.37 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Get together with friends or relatives" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.36 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Go to a meeting of a church, club, team, or other group" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.22 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "In a bed or a chair for most or all of the day" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.28 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Morning stiffness lasts more than one hour" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.21 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Need help to get dressed" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.45 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Need help to get in or out of bed" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.31 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "On the telephone with close friends or relatives" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: Social function Discriminant validity	Correlation coefficient (not specified) 0.13 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Pain makes it difficult for you to sleep" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.32 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Reach shelves that were above your head" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.64 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Severe pain from arthritis" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: bothered by symptoms Discriminant validity	Correlation coefficient (not specified) 0.17 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Trouble doing vigorous activities" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.3 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Trouble walking several blocks/climbing a few flights of stairs" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.29 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Unable to walk unless assisted" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.28 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Write with a pen or pencil" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.6 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Button a shirt or blouse" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.24 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Turn a key in a lock" Reference: AIMS2-SF: Affect domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.3 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Button a shirt or blouse" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.29 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Turn a key in a lock" Reference: AIMS2-SF: Lower limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.39 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Button a shirt or blouse" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.22 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Turn a key in a lock" Reference: AIMS2-SF: Social function domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.23 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Button a shirt or blouse" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.17 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Turn a key in a lock" Reference: AIMS2-SF: Symptom bother domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.18 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Button a shirt or blouse" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.82 P value: NR
Ren, 1999 ³⁵⁴ Index: Item of AIMS2-SF: "Turn a key in a lock" Reference: AIMS2-SF: Upper limitations domain	U.S. Size: 147 Mean age: 66 % of females: 81	Domain: physical function Discriminant validity	Correlation coefficient (not specified) 0.79 P value: NR
Steultjens, 1999 ⁴⁰⁵ Index: EuroQoL mobility Reference: Keefe and Block (adapted version) + subscales of 4 questionnaires (The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale that is a Dutch adaptation of the Arthritis Impact Measurement Scales; Nottingham Health Profile mobility subscale; EuroQoL mobility subscale; QR & S questionnaire (Questionnaire Rising and Sitting Down))	The Netherlands Size: 198 Mean age: 68 % of females: 78.3	Factor analysis	Factor analysis 0.31 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Steultjens, 1999 ⁴⁰⁵ Index: EuroQoL self-care Reference: Keefe and Block (adapted version) + subscales of 4 questionnaires (The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale that is a Dutch adaptation of the Arthritis Impact Measurement Scales; Nottingham Health Profile mobility subscale; EuroQoL mobility subscale; QR & S questionnaire (Questionnaire Rising and Sitting Down))	The Netherlands Size: 198 Mean age: 68 % of females: 78.3	Factor analysis	Factor analysis -0.09 P value: NR
Steultjens, 1999 ⁴⁰⁵ Index: EuroQoL mobility Reference: The Influence of Rheumatic Disease on General Health and Lifestyle mobility subscale and EuroQoL self-care subscale that measures self-reported disability in self-care	The Netherlands Size: 198 Mean age: 68 % of females: 78.3	Factor analysis	Factor analysis 0.21 P value: NR
Fransen, 1999 ⁴¹³ Index: EQ-5D Reference: EQ-VAS	Australia Size: 82 Mean age: 68 % of females: 69.5	Construct validity	Spearman's rho, rank correlation coefficient 0.42 P value: NR
Fransen, 1999 ⁴¹³ Index: EQ-5D Reference: SF-36 MCS	Australia Size: 82 Mean age: 68 % of females: 69.5	Construct validity	Spearman's rho, rank correlation coefficient 0.39 P value: NR
Fransen, 1999 ⁴¹³ Index: EQ-5D Reference: SF-36 PCS	Australia Size: 82 Mean age: 68 % of females: 69.5	Construct validity	Spearman's rho, rank correlation coefficient 0.2 P value: NR
Fransen, 1999 ⁴¹³ Index: EQ-5D Reference: WOMAC: Function subscale	Australia Size: 82 Mean age: 68 % of females: 69.5	Construct validity	Spearman's rho, rank correlation coefficient -0.33 P value: NR
Fransen, 1999 ⁴¹³ Index: EQ-5D Reference: WOMAC: Pain subscale	Australia Size: 82 Mean age: 68 % of females: 69.5	Construct validity	Spearman's rho, rank correlation coefficient -0.3 P value: NR
Bruce, 2004 ³⁹⁹ Index: HAQ: DI Reference: HAQ: Pain	U.S. Size: 271 Mean age: 65.7 % of females: 79	Construct validity	Spearman rank correlation coefficient 0.62 P value: NR
Bruce, 2004 ³⁹⁹ Index: HAQ: DI Reference: HAQ: Patient global assessment	U.S. Size: 271 Mean age: 65.7 % of females: 79	Construct validity	Spearman rank correlation coefficient 0.59 P value: NR
Bruce, 2004 ³⁹⁹ Index: HAQ: DI Reference: Total Knee Score	U.S. Size: 271 Mean age: 65.7 % of females: 79	Construct validity	Spearman rank correlation coefficient 0.13 P value: NR
Bruce, 2004 ³⁹⁹ Index: HAQ: DI Reference: WOMAC: Function	U.S. Size: 271 Mean age: 65.7 % of females: 79	Construct validity	Spearman rank correlation coefficient 0.71 P value: NR

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Bruce, 2004 ³⁹⁹ Index: HAQ: DI Reference: WOMAC: Pain	U.S. Size: 271 Mean age: 65.7 % of females: 79	Construct validity	Spearman rank correlation coefficient 0.64 P value: NR
Bruce, 2004 ³⁹⁹ Index: HAQ: DI Reference: WOMAC: Stiffness	U.S. Size: 271 Mean age: 65.7 % of females: 79	Construct validity	Spearman rank correlation coefficient 0.61 P value: NR
Brazier, 1999 ⁴¹² Index: HAQ Disability Index Reference: WOMAC: Function subscale	UK Size: Mean age: Knee replacement sample: 71 and Rheumatology clinic sample: 64 % of females: NR	Convergent validity	Spearman's rank correlation coefficient 0.68 P value: NR
Bruce, 2004 ³⁹⁹ Index: HAQ: Pain Reference: HAQ: Patient global assessment	U.S. Size: 271 Mean age: 65.7 % of females: 79	Construct validity	Spearman rank correlation coefficient 0.62 P value: NR
Bruce, 2004 ³⁹⁹ Index: HAQ: Pain Reference: Total Knee Score	U.S. Size: 271 Mean age: 65.7 % of females: 79	Construct validity	Spearman rank correlation coefficient 0.12 P value: NR
Bruce, 2004 ³⁹⁹ Index: HAQ: Pain Reference: WOMAC: Function	U.S. Size: 271 Mean age: 65.7 % of females: 79	Construct validity	Spearman rank correlation coefficient 0.66 P value: NR
Bruce, 2004 ³⁹⁹ Index: HAQ: pain Reference: WOMAC: pain	U.S. Size: 271 Mean age: 65.7 % of females: 79	Construct validity	Spearman rank correlation coefficient 0.7 P value: NR
Bruce, 2004 ³⁹⁹ Index: HAQ: pain Reference: WOMAC: stiffness	U.S. Size: 271 Mean age: 65.7 % of females: 79	Construct validity	Spearman rank correlation coefficient 0.59 P value: NR
Bruce, 2004 ³⁹⁹ Index: HAQ: Patient global assessment Reference: Total Knee Score	U.S. Size: 271 Mean age: 65.7 % of females: 79	Convergent validity	Spearman rank correlation coefficient 0.18 P value: NR
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (AAS) Reference: Step test (N)	Australia Size: 259 Mean age: 68.1 % of females: 64.1	Construct validity	Spearman correlation coefficient 0.52 P value: <0.001
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (AAS) Reference: TUG test (s)	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient -0.59 P value: <0.001
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (AAS) Reference: VAS (cm)	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient -0.48 P value: <0.001
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (AAS) Reference: VAS: Pain at rest (cm)	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient -0.19 P value: <0.01

Appendix Table F51. Validity of the scales in patients with knee OA (continued)

Author, year; Index; Reference methods	Country; Size; Mean age; % of females	Domain; validity type	Estimate, significance
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (AAS) Reference: VAS: Pain on movement (cm)	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient -0.39 P value: <0.01
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (AAS) Reference: WOMAC: Pain	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient -0.32 P value: <0.001
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (AAS) Reference: WOMAC: Physical function	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient -0.39 P value: <0.001
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (MAS) Reference: Step test (N)	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient 0.34 P value: <0.001
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (MAS) Reference: TUG test (s)	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient -0.46 P value: <0.001
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (MAS) Reference: VAS (cm)	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient -0.27 P value: <0.001
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (MAS) Reference: VAS: Pain at rest (cm)	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient -0.18 P value: <0.01
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (MAS) Reference: VAS: Pain on movement (cm)	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient -0.27 P value: <0.01
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (MAS) Reference: WOMAC: Pain	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient -0.23 P value: <0.001
Bennell, 2004 ³⁷⁰ Index: Human Activity Profile (MAS) Reference: WOMAC: Physical function	Australia Size: 259 Mean age: 68.9 % of females: 64.1	Construct validity	Spearman correlation coefficient -0.23 P value: <0.001

Appendix Table F52. Validity of Western Ontario and McMaster Universities Osteoarthritis Index

Author, year Index and reference methods	Country Size , Mean age % of females	Domain Validity type	Validity estimate and significance
Stucki, 1998 ³⁵³ Index: WOMAC knee: Composite Reference: Extension deficit	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: composite Construct validity	Spearman's rank correlation coefficient 0.38 P value: <0.05
Stucki, 1998 ³⁵³ Index: WOMAC knee: Function Reference: Extension deficit	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: function Construct validity	Spearman's rank correlation coefficient 0.45 P value: <0.05
Stucki, 1998 ³⁵³ Index: WOMAC knee: Pain Reference: Extension deficit	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: pain Construct validity	Spearman's rank correlation coefficient 0.42 P value: <0.05
Stucki, 1998 ³⁵³ Index: WOMAC knee: Composite Reference: Flexion	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: composite Construct validity	Spearman's rank correlation coefficient -0.44 P value: <0.05
Stucki, 1998³⁵³ Index: WOMAC knee: Function Reference: Flexion	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: function Construct validity	Spearman's rank correlation coefficient -0.54 P value: <0.01
Stucki, 1998 ³⁵³ Index: WOMAC knee: Pain Reference: Flexion	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: pain Construct validity	Spearman's rank correlation coefficient -0.27 P value: NR
Stucki, 1998 ³⁵³ Index: WOMAC knee: Composite Reference: Kellgren -Lawrence scale	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: composite Construct validity	Spearman's rank correlation coefficient 0.34 P value: NR
Stucki, 1998 ³⁵³ Index: WOMAC knee: Function Reference: Kellgren -Lawrence scale	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: function Construct validity	Spearman's rank correlation coefficient 0.44 P value: <0.05
Stucki, 1998 ³⁵³ Index: WOMAC knee: Pain Reference: Kellgren -Lawrence scale	Switzerland Size: 51 Mean age: 70 % of females: 67	Domain: pain Construct validity	Spearman's rank correlation coefficient 0.28 P value: NR
Wolfe, 1999³⁸⁶ Index: WOMAC Pain scale Reference: HAQ disability index	U.S. Size: 625 Mean age: 67.8 % of females: 66.5	Construct validity	Spearman correlation coefficient 0.727 P value: NR
Wolfe, 1999³⁸⁶ Index: WOMAC Function Reference: HAQ disability index	U.S. Size: 625 Mean age: 67.8 % of females: 66.5	Construct validity	Spearman correlation coefficient 0.779 P value: NR
Brazier, 1999⁴¹² Index: WOMAC: Function subscale Reference: WOMAC: Pain subscale	UK Size: 230 Mean age: 67.6 % of females: NR	Domain: function Convergent validity	Spearman's rank correlation coefficient 0.65 P value: NR

Appendix Table F52. Validity of Western Ontario and McMaster Universities Osteoarthritis Index (continued)

Author, year Index and reference methods	Country Size, Mean age % of females	Domain Validity type	Validity estimate and significance
Brazier, 1999⁴¹² Index: WOMAC: Function subscale Reference: WOMAC: Stiffness subscale	UK Size: 230 Mean age: 67.6 % of females: NR	Domain: function Convergent validity	Spearman's rank correlation coefficient 0.63 P value: NR
Lingard, 2001⁴⁰⁷ Index: WOMAC: Function score Reference: Knee Society Clinical Rating system: Function score	U.S., UK and Australia Size: 697 Mean age: 70 % of females: 58.9	Domain: function Construct validity	Pearson coefficient 0.58 P value: NR
Lingard, 2001⁴⁰⁷ Index: WOMAC: Pain scale Reference: Knee Society Clinical Rating system: Pain score	U.S., UK and Australia Size: 697 Mean age: 70 % of females: 58.9	Domain: pain Construct validity	Pearson coefficient 0.68 P value: NR
Lingard, 2001⁴⁰⁷ Index: WOMAC: Pain scale Reference: SF-36: Bodily pain score	U.S., UK and Australia Size: 697 Mean age: 70 % of females: 58.9	Domain: pain Construct validity	Pearson coefficient 0.51 P value: NR
Lingard, 2001⁴⁰⁷ Index: WOMAC: Function score Reference: SF-36: Physical Functioning score	U.S., UK and Australia Size: 697 Mean age: 70 % of females: 58.9	Domain: function Construct validity	Pearson coefficient 0.57 P value: NR
Faucher, 2002³⁹⁸ Index: WOMAC: Function subscale Reference: Lequesne function score	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: functional limitation Convergent validity	Spearman rank correlation coefficient 0.72 P value: NR
Faucher, 2002³⁹⁸ Index: WOMAC: Pain scale Reference: Lequesne pain score	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: pain Convergent validity	Spearman rank correlation coefficient 0.43 P value: NR
Faucher, 2002³⁹⁸ Index: WOMAC: Function subscale Reference: VAS (VAS discomfort in walking for daily living activities)	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: functional limitation Convergent validity	Spearman rank correlation coefficient 0.72 P value: NR
Faucher, 2002³⁹⁸ Index: WOMAC: Function subscale Reference: VAS handicap	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: functional limitation Convergent validity	Spearman rank correlation coefficient 0.37 P value: NR
Faucher, 2002³⁹⁸ Index: WOMAC: Pain scale Reference: VAS pain score	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: pain Convergent validity	Spearman rank correlation coefficient 0.69 P value: NR
Faucher, 2002³⁹⁸ Index: WOMAC: Function subscale Reference: Circumference of the thigh	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: functional limitation Divergent validity	Spearman rank correlation coefficient 0.36 P value: NR
Faucher, 2002³⁹⁸ Index: WOMAC: Pain subscale Reference: Circumference of the thigh	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: pain Divergent validity	Spearman rank correlation coefficient 0.26 P value: NR

Appendix Table F52. Validity of Western Ontario and McMaster Universities Osteoarthritis Index (continued)

Author, year Index and reference methods	Country Size , Mean age % of females	Domain Validity type	Validity estimate and significance
Faucher, 2002 Index: WOMAC: Function subscale Reference: Hospital Anxiety and Depression Scale(Score of anxiety)	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: functional limitation Divergent validity	Spearman rank correlation coefficient 0.38 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Pain subscale Reference: Hospital Anxiety and Depression Scale(Score of anxiety)	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: pain Divergent validity	Spearman rank correlation coefficient 0.38 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Function subscale Reference: Hospital Anxiety and Depression Scale(Score of depression)	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: functional limitation Divergent validity	Spearman rank correlation coefficient 0.35 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Pain subscale Reference: Hospital Anxiety and Depression Scale(Score of depression)	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: pain Divergent validity	Spearman rank correlation coefficient 0.27 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Function subscale Reference: Kellgren-Lawrence	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: functional limitation Divergent validity	Spearman rank correlation coefficient 0.18 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Pain subscale Reference: Kellgren-Lawrence	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: pain Divergent validity	Spearman rank correlation coefficient 0.01 P value: NR
Faucher, 2002³⁹⁸ Index: WOMAC: Function subscale Reference: WOMAC: Function subscale	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: functional limitation Divergent validity	Spearman rank correlation coefficient 0.74 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Pain subscale Reference: WOMAC: Stiffness subscale	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: pain Divergent validity	Spearman rank correlation coefficient 0.61 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Pain subscale Reference: WOMAC: Function subscale	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: pain Divergent validity	Spearman rank correlation coefficient 0.84 P value: NR
Faucher, 2002 ³⁹⁸ Index: WOMAC: Function subscale Reference: WOMAC: Stiffness subscale	France Size: 88 Mean age: 67.11 % of females: 67.05	Domain: functional limitation Divergent validity	Spearman rank correlation coefficient 0.84 P value: NR
Bruce, 2004 ³⁹⁹ Index: WOMAC: Pain Reference: WOMAC: Stiffness	U.S. Size: 271 Mean age: 65.7 % of females: 79	Domain: pain Construct validity	Spearman rank correlation coefficient 0.71 P value: NR
Bruce, 2004 ³⁹⁹ Index: WOMAC: Function Reference: WOMAC: Pain	U.S. Size: 271 Mean age: 65.7 % of females: 79	Domain: function Construct validity	Spearman rank correlation coefficient 0.86 P value: NR

Appendix Table F52. Validity of Western Ontario and McMaster Universities Osteoarthritis Index (continued)

Author, year Index and reference methods	Country Size , Mean age % of females	Domain Validity type	Validity estimate and significance
Bruce, 2004³⁹⁹ Index: WOMAC: Function Reference: WOMAC: Stiffness	U.S. Size: 271 Mean age: 65.7 % of females: 79	Domain: function Construct validity	Spearman rank correlation coefficient 0.76 P value: NR
Bruce, 2004³⁹⁹ Index: WOMAC: Function Reference: HAQ: Patient global assessment	U.S. Size: 271 Mean age: 65.7 % of females: 79	Domain: function Convergent validity	Spearman rank correlation coefficient 0.68 P value: NR
Bruce, 2004³⁹⁹ Index: WOMAC: Pain Reference: HAQ: Patient global assessment	U.S. Size: 271 Mean age: 65.7 % of females: 79	Domain: pain Convergent validity	Spearman rank correlation coefficient 0.66 P value: NR
Bruce, 2004 ³⁹⁹ Index: WOMAC: Function Reference: Total Knee Score	U.S. Size: 271 Mean age: 65.7 % of females: 79	Domain: function Convergent validity	Spearman rank correlation coefficient 0.49 P value: NR
Bruce, 2004 ³⁹⁹ Index: WOMAC: Pain Reference: Total Knee Score	U.S. Size: 271 Mean age: 65.7 % of females: 79	Domain: pain Convergent validity	Spearman rank correlation coefficient 0.19 P value: NR
Barker, 2004 ³⁹³ Index: WOMAC: Function subscale Reference: Power (Leg extensor power)	UK Size: 123 Mean age: 69.5 % of females: 53.7	Domain: function Construct validity	Spearman's rank correlation coefficient 0.374 P value: <0.01
Barker, 2004³⁹³ Index: WOMAC: Pain subscale Reference: VAS pain	UK Size: 123 Mean age: 69.5 % of females: 53.7	Domain: pain Construct validity	Spearman's rank correlation coefficient 0.654 P value: <0.05
Barker, 2004 ³⁹³ Index: WOMAC: Pain subscale Reference: Power (Leg extensor power)	UK Size: 123 Mean age: 69.5 % of females: 53.7	Domain: pain Construct validity	Spearman's rank correlation coefficient 0.388 P value: <0.01
Barker, 2004 ³⁹³ Index: WOMAC: Function subscale Reference: Sit-stand	UK Size: 123 Mean age: 69.5 % of females: 53.7	Domain: function Construct validity	Spearman's rank correlation coefficient 0.361 P value: <0.01
Barker, 2004³⁹³ Index: WOMAC: Function subscale Reference: VAS: pain	UK Size: 123 Mean age: 69.5 % of females: 53.7	Domain: function Construct validity	Spearman's rank correlation coefficient 0.64 P value: <0.05
Barker, 2004 ³⁹³ Index: WOMAC: Function subscale Reference: Walking speed	UK Size: 123 Mean age: 69.5 % of females: 53.7	Domain: function Construct validity	Spearman's rank correlation coefficient 0.348 P value: <0.01
Barker, 2004³⁹³ Index: WOMAC: Function subscale Reference: WOMAC: Pain subscale	UK Size: 123 Mean age: 69.5 % of females: 53.7	Domain: function Construct validity	Spearman's rank correlation coefficient 0.807 P value: <0.05
Angst, 2005⁴¹⁴ Index: WOMAC factor: Ascending/descending Reference: Validation questionnaire: Patient rating	Switzerland Size: 76 Mean age: 68.1 % of females: 80	Construct validity	Kappa 0.62 P value: <0.01

Appendix Table F52. Validity of Western Ontario and McMaster Universities Osteoarthritis Index (continued)

Author, year Index and reference methods	Country Size , Mean age % of females	Domain Validity type	Validity estimate and significance
Angst, 2005 ⁴¹⁴ Index: WOMAC factor: Ascending/descending Reference: Validation questionnaire: Physician rating	Switzerland Size: 76 Mean age: 68.1 % of females: 80	Construct validity	Kappa 0.22 P value: NR
Angst, 2005⁴¹⁴ Index: WOMAC factor: Bending Reference: Validation questionnaire: Patient rating	Switzerland Size: 76 Mean age: 68.1 % of females: 80	Construct validity	Kappa 0.66 P value: <0.01
Angst, 2005 ⁴¹⁴ Index: WOMAC factor: Bending Reference: Validation questionnaire: Physician rating	Switzerland Size: 76 Mean age: 68.1 % of females: 80	Construct validity	Kappa 0.09 P value: NR
Angst, 2005⁴¹⁴ Index: WOMAC factor: Lying/sitting Reference: Validation questionnaire: Patient rating	Switzerland Size: 76 Mean age: 68.1 % of females: 80	Construct validity	Kappa 0.65 P value: <0.01
Angst, 2005 ⁴¹⁴ Index: WOMAC factor: Lying/sitting Reference: Validation questionnaire :Physician rating	Switzerland Size: 76 Mean age: 68.1 % of females: 80	Construct validity	Kappa 0.27 P value: 0.01<=p<0.05
Angst, 2005⁴¹⁴ Index: WOMAC factor: Standing/walking Reference: Validation questionnaire : Patient rating	Switzerland Size: 76 Mean age: 68.1 % of females: 80	Construct validity	Kappa 0.68 P value: <0.01
Angst, 2005 ⁴¹⁴ Index: WOMAC factor: Standing/walking Reference: Validation questionnaire :Physician rating	Switzerland Size: 76 Mean age: 68.1 % of females: 80	Construct validity	Kappa 0.17 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Traditional WOMAC Reference: Knee Society score, function score	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.4 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Traditional WOMAC Reference: KOOS quality of life	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.2 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Traditional WOMAC Reference: KOOS sport	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.18 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Traditional WOMAC Reference: Visual Analogue scale for pain	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.37 P value: NR

Appendix Table F52. Validity of Western Ontario and McMaster Universities Osteoarthritis Index (continued)

Author, year Index and reference methods	Country Size , Mean age % of females	Domain Validity type	Validity estimate and significance
Yang, 2007⁴⁰⁰ Index: Traditional WOMAC Reference: KOOS activities of daily living	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.98 P value: NR
Yang, 2007⁴⁰⁰ Index: Traditional WOMAC Reference: KOOS pain	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.75 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Modified short-form WOMAC Reference: Knee Society score, function score	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.37 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Short-form WOMAC function scale Reference: Knee Society score, function score	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.41 P value: NR
Yang, 2007⁴⁰⁰ Index: Short-form WOMAC function scale Reference: KOOS pain	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.66 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Modified short-form WOMAC Reference: KOOS quality of life	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.2 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Short-form WOMAC function scale Reference: KOOS quality of life	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.18 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Modified short-form WOMAC Reference: KOOS sport	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.15 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Short-form WOMAC function scale Reference: KOOS sport	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.17 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Modified short-form WOMAC Reference: Visual Analogue scale for pain	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.39 P value: NR
Yang, 2007 ⁴⁰⁰ Index: Short-form WOMAC function scale Reference: Visual Analogue scale for pain	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.33 P value: NR
Yang, 2007⁴⁰⁰ Index: Modified short-form WOMAC Reference: KOOS activities of daily living	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.94 P value: NR
Yang, 2007⁴⁰⁰ Index: Short-form WOMAC function scale Reference: KOOS activities of daily living	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.97 P value: NR

Appendix Table F52. Validity of Western Ontario and McMaster Universities Osteoarthritis Index (continued)

Author, year Index and reference methods	Country Size , Mean age % of females	Domain Validity type	Validity estimate and significance
Yang, 2007 ⁴⁰⁰ Index: Modified short-form WOMAC Reference: KOOS pain	The Netherlands Size: 100 Mean age: 54.9 % of females: 37	Construct validity	Lin's concordance correlation coefficient 0.79 P value: NR
Baron, 2007 ³³⁷ Index: WOMAC- LF: function Reference: NRS: Functional impairment	France Size: 878 Mean age: 65.7 % of females: 69.24	Domain: function Convergent validity	Spearman's correlation coefficient 0.64 P value: NR
Baron, 2007 ³³⁷ Index: WOMAC- LF: function Reference: NRS: Pain	France Size: 878 65.7 % of females: 69.24	Domain: function Convergent validity	Spearman's correlation coefficient 0.52 P value: NR
Baron, 2007 ³³⁷ Index: WOMAC- LF: function Reference: NRS: Global assessment	France Size: 878 65.7 % of females: 69.24	Domain: function Convergent validity	Spearman's correlation coefficient 0.53 P value: NR
Baron, 2007 ³³⁷ Index: WOMAC- SF: function Reference: NRS: Functional impairment	France Size: 878 65.7 % of females: 69.24	Domain: function Convergent validity	Spearman's correlation coefficient 0.65 P value: NR
Baron, 2007 ³³⁷ Index: WOMAC- SF: function Reference: NRS (11-point numerical rating scale, score ranging from 0 to high): pain	France Size: 65.7 % of females: 69.24	Domain: function Convergent validity	Spearman's correlation coefficient 0.54 P value: NR
Baron, 2007 ³³⁷ Index: WOMAC- SF: function Reference: NRS: Global assessment	France Size: 878 65.7 % of females: 69.24	Domain: function Convergent validity	Spearman's correlation coefficient 0.56 P value: NR
Seror, 2008 ⁴¹⁵ Index: WOMAC: Function scale-French-Canadian version Reference: Individualized WOMAC multiplicative: Likert 5: "Importance questionnaire" (derived from the WOMAC function subscale) that asked patients to rate how important it was to them to remove disability in each activity addressed by the WOMAC function items (from not important at all, to extremely important)	France Size: 1,218 Mean age: 66.9 % of females: 70.1	Construct validity	Spearman correlation 0.93 P value: <0.001
Seror, 2008 ⁴¹⁵ Index: WOMAC: Function scale-French-Canadian version Reference: Individualized WOMAC multiplicative: Likert 3: "importance questionnaire" (derived from the WOMAC function subscale) that asked patients to rate how important it was to them to remove disability in each activity addressed by the	France Size: 1,218 Mean age: 66.9 % of females: 70.1	Construct validity	Spearman correlation 0.95 P value: <0.001

Appendix Table F52. Validity of Western Ontario and McMaster Universities Osteoarthritis Index (continued)

Author, year Index and reference methods	Country Size , Mean age % of females	Domain Validity type	Validity estimate and significance
WOMAC function items (from not important at all, to extremely important)			
Seror, 2008⁴¹⁵ Index: WOMAC: Function scale-French-Canadian version Reference: Individualized WOMAC multiplicative: VAS:"importance questionnaire "(derived from the WOMAC function subscale) that asked patients to rate how important it was to them to remove disability in each activity addressed by the WOMAC function items (from not important at all, to extremely important)	France Size: 1,218 Mean age: 66.9 % of females: 70.1	Construct validity	Spearman correlation 0.93 P value: <0.001
Seror, 2008⁴¹⁵ Index: WOMAC: Function scale-French-Canadian version Reference: Individualized WOMAC additive: Likert "importance questionnaire "(derived from the WOMAC function subscale) that asked patients to rate how important it was to them to remove disability in each activity addressed by the WOMAC function items (from not important at all, to extremely important)	France Size: 1,218 Mean age: 66.9 % of females: 70.1	Construct validity	Spearman correlation 0.85 P value: <0.001
Seror, 2008⁴¹⁵ Index: WOMAC: Function scale-French-Canadian version Reference: Individualized WOMAC additive: Likert 3:"importance questionnaire "(derived from the WOMAC function subscale) that asked patients to rate how important it was to them to remove disability in each activity addressed by the WOMAC function items (from not important at all, to extremely important)	France Size: 1,218 Mean age: 66.9 % of females: 70.1	Construct validity	Spearman correlation 0.93 P value: <0.001
Seror, 2008⁴¹⁵ Index: WOMAC: Function scale-French-Canadian version Reference: Individualized WOMAC additive: VAS:"importance questionnaire "(derived from	France Size: 1,218 Mean age: 66.9 % of females: 70.1	Construct validity	Spearman correlation 0.79 P value: <0.001

Appendix Table F52. Validity of Western Ontario and McMaster Universities Osteoarthritis Index (continued)

Author, year Index and reference methods	Country Size , Mean age % of females	Domain Validity type	Validity estimate and significance
the WOMAC function subscale) that asked patients to rate how important it was to them to remove disability in each activity addressed by the WOMAC function items (from not important at all, to extremely important)			
Seror, 2008⁴¹⁵ Index: WOMAC: Function scale-French-Canadian version Reference: The "preference questionnaire": patients had to select the five items of the WOMAC function they considered the most important by answering to the following question: "Could you choose from the 17-item list, the 5 you consider the most important to be improved upon?"	France Size: 1,218 Mean age: 66.9 % of females: 70.1	Construct validity	Spearman correlation 0.81 P value: <0.001
Possley, ³⁹² Index: WOMAC: Function subscale Reference: 3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Non-depressed category Domain: physical function Construct validity	Pearson r correlation -0.5 P value: <0.001
Possley, ³⁹² Index: WOMAC: Pain subscale Reference: 3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Non-depressed category Domain: pain Construct validity	Pearson r correlation -0.28 P value: <0.05
Possley, ³⁹² Index: WOMAC: Function subscale Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Non-depressed category Domain: physical function Construct validity	Pearson r correlation -0.49 P value: <0.001
Possley, ³⁹² Index: WOMAC: Function subscale Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed category Domain: physical function Construct validity	Pearson r correlation -0.09 P value: NR
Possley, ³⁹² Index: WOMAC: Function subscale Reference 3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed category Domain: physical function Construct validity	Pearson r correlation -0.06 P value: NR
Possley, ³⁹² Index: WOMAC: Pain subscale Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Non-depressed category Domain: pain Construct validity	Pearson r correlation -0.28 P value: NR

Appendix Table F52. Validity of Western Ontario and McMaster Universities Osteoarthritis Index (continued)

Author, year Index and reference methods	Country Size , Mean age % of females	Domain Validity type	Validity estimate and significance
Possley, ³⁹² Index: WOMAC: Pain subscale Reference: 6 minute walk	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed category Domain: pain Construct validity	Pearson r correlation -0.06 P value: NR
Possley, ³⁹² Index: WOMAC: Pain subscale Reference: 3-minute stair climb/descend	U.S. Size: 105 Mean age: 67.5 % of females: 11	Depressed category Domain: pain Construct validity	Pearson r correlation -0.01 P value: NR
Ornetti, 2011 ⁴¹⁰ Index: WOMAC: Function subscale Reference: VAS: Pain	France Size: 881 Mean age: 67.1 % of females: 69.5	Domain: physical function Construct validity	Spearman's correlation coefficient 0.486 P value: <0.001
Ornetti, 2011 ⁴¹⁰ Index: WOMAC: Function subscale Reference: VAS: Patient global assessment	France Size: 881 Mean age: 67.1 % of females: 69.5	Domain: physical function Construct validity	Spearman's correlation coefficient 0.53 P value: <0.001
Ornetti, 2011 ⁴¹⁰ Index: WOMAC: Function subscale Reference: VAS: Physician global assessment	France Size: 881 Mean age: 67.1 % of females: 69.5	Domain: physical function Construct validity	Spearman's correlation coefficient 0.458 P value: <0.001
Bold-strong correlations of >50%			

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Getting in and out of bath	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=1.53
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Going down stairs	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=1.41
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Heavy chores	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=1.25
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Going upstairs	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=1.20
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Lying down	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=1.13
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Bending	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=1.07
Wolfe, 1999⁴¹⁶ Index: WOMAC function scale: Putting on socks	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=0.99
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Shopping	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=0.98
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Walking on flat ground	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=0.94
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Getting on and off the toilet	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=0.93
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Sitting	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=0.92
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Standing	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=0.89
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Taking off socks	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=0.88

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Wolfe, 1999⁴¹⁶ Index: WOMAC function scale: Arising from bed	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=0.85
Wolfe, 1999⁴¹⁶ Index: WOMAC function scale: Arising from sitting	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=0.81
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Light chores	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=0.78.
Wolfe, 1999 ⁴¹⁶ Index: WOMAC function scale: Getting in and out of a car	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: function Rasch analysis (unidimensionality)	INFIT statistic=0.73
Wolfe, 1999⁴¹⁶ Index: WOMAC pain scale: Sitting pain	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: pain Rasch analysis (unidimensionality)	INFIT statistic=0.88
Wolfe, 1999 ⁴¹⁶ Index: WOMAC pain scale: Night pain	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: pain Rasch analysis (unidimensionality)	INFIT statistic=1.20
Wolfe, 1999 ⁴¹⁶ Index: WOMAC pain scale: Pain walking	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: pain Rasch analysis (unidimensionality)	INFIT statistic=0.87
Wolfe, 1999 ⁴¹⁶ Index: WOMAC pain scale: Standing pain	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: pain Rasch analysis (unidimensionality)	INFIT statistic=0.96
Wolfe, 1999 ⁴¹⁶ Index: WOMAC pain scale: Pain on stairs	U.S. Size: 655 Mean age: 67.8 % of females: 76.5	Domain: pain Rasch analysis (unidimensionality)	INFIT statistic=1.12
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Pain	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Pain-at night in bed Rasch analysis (unidimensionality)	Outfit MNSQ =1.60
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Stiffness	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Stiffness morning Rasch analysis (unidimensionality)	Outfit MNSQ =1.54
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Pain	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Pain-sitting or lying Rasch analysis (unidimensionality)	Outfit MNSQ =1.08
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Pain	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Pain-walking on flat Rasch analysis (unidimensionality)	Outfit MNSQ =1.00
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Pain	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Pain-standing upright Rasch analysis (unidimensionality)	Outfit MNSQ =0.92

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Pain	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Pain-going up/down stairs Rasch analysis (unidimensionality)	Outfit MNSQ =0.79
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-light domestic duties Rasch analysis (unidimensionality)	Outfit MNSQ =0.98
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-lying in bed Rasch analysis (unidimensionality)	Outfit MNSQ =1.06
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-getting on/off toilet Rasch analysis (unidimensionality)	Outfit MNSQ =0.91
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-sitting Rasch analysis (unidimensionality)	Outfit MNSQ =0.84
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-walking on flat Rasch analysis (unidimensionality)	Outfit MNSQ =0.84
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-taking off socks Rasch analysis (unidimensionality)	Outfit MNSQ =0.81
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-rising from bed Rasch analysis (unidimensionality)	Outfit MNSQ =0.74
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-standing Rasch analysis (unidimensionality)	Outfit MNSQ =1.03
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-going shopping Rasch analysis (unidimensionality)	Outfit MNSQ =0.89
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-putting on socks Rasch analysis (unidimensionality)	Outfit MNSQ =0.90
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-getting in/out of bath Rasch analysis (unidimensionality)	Outfit MNSQ =1.08
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-getting in/out of car Rasch analysis (unidimensionality)	Outfit MNSQ =0.76
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-ascending stairs Rasch analysis (unidimensionality)	Outfit MNSQ =0.98

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function- descending stairs Rasch analysis (unidimensionality)	Outfit MNSQ =1.12
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-bending to floor Rasch analysis (unidimensionality)	Outfit MNSQ =0.96
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-rising from sitting Rasch analysis (unidimensionality)	Outfit MNSQ =0.65
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Physical function	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Physical function-heavy domestic duties Rasch analysis (unidimensionality)	Outfit MNSQ =1.01
Ryser, 1999 ⁴¹⁷ Index: WOMAC-Stiffness	Switzerland Size: 161 Mean age: 67 % of females: 70	Domain: Stiffness day Rasch analysis (unidimensionality)	Outfit MNSQ =1.21
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting on/off toilet" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis:(unidimensionality)	Infit MNSQ=1.34 -
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting on/off -toilet" in the community sample and WOMAC -physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.32 -
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain sitting or lying" in the community sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.22
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain sitting or lying" in the community sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.32
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain sitting or lying" in the preoperative surgery sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.27
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Night pain" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.1.11

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Night pain" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age:68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.13
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Night pain" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age:68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.13
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Night pain" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.14
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain sitting or lying" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.98
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain sitting or lying" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.00
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain sitting or lying" in the preoperative surgery sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.20
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain sitting or lying" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.93
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain sitting or lying" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age; 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.95
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain standing" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.0.96
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain standing" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.96

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain standing" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.92
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain standing" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.95
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain up/downstairs" in the community sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.81
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain up/downstairs" in the community sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.80
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain up/downstairs" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.98
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain up/downstairs" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.97
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain up/downstairs" in the preoperative surgery sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.94
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain up/downstairs" in the preoperative surgery sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.94
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain up/downstairs" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.05
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain up/downstairs" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.04

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain walking on flat" in the community sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.84
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain walking on flat" in the community sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.84
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain walking on flat" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.96
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain walking on flat" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.95
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain walking on flat" in the preoperative surgery sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.84
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain walking on flat" in the preoperative surgery sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.84
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain walking on flat" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.95
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain walking on flat" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.91
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Bending to the floor" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.23
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Bending to the floor" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.24

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Bending to the floor" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.24
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Bending to the floor" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.22
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Descending stairs" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.24
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Descending stairs" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.21
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from bed" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.78
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from bed" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.79
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Taking off socks/stockings" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.26

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Taking off socks/stockings" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age:68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.58
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Taking off socks/stockings" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.48
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Ascending stairs" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.94
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Ascending stairs" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.94
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Ascending stairs" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.92
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Ascending stairs" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.92
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Ascending stairs" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.98
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Ascending stairs" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.97

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Ascending stairs" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.95
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Ascending stairs" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.94
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Bending to the floor" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.13
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Bending to the floor" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.13
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Bending to the floor" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.20
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Bending to the floor" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.19
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Descending stairs" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.09
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Descending stairs" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.08

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Descending stairs" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.07
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Descending stairs" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.07
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Descending stairs" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.23
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Descending stairs" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.19
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of bath" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.10
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of bath" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.13
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of bath" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.14
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of bath" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.14

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of car" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.91
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of car" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.91
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of car" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.93
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of car" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.92
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of car" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.87
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of car" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.86
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of car" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.86
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of car" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.86

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting on/off toilet" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.86
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting on/off toilet" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.87
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Going shopping" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.04
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Going shopping" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.06
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Going shopping" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.96
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Going shopping" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.99
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Going shopping" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.88
Davis, 2003 ⁴¹⁸ Index: WOMAC: function subscale:"Going shopping" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.88

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Going shopping" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.87
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Going shopping" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.90
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Heavy domestic duties" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.97
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Heavy domestic duties" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.96
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Heavy domestic duties" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.13
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Heavy domestic duties" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.10
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Light domestic duties" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.05
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Light domestic duties" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.07

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Light domestic duties" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.02
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Light domestic duties" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.03
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Light domestic duties" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.94
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Light domestic duties" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.93
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Light domestic duties" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.89
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Light domestic duties" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.87
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Lying in bed" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.04
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Lying in bed" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.06
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Lying in bed" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.99

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Lying in bed" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.99
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Lying in bed" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.13
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Lying in bed" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.19
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Lying in bed" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.14
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Lying in bed" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.17
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Putting on socks/ stockings" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.86
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Putting on socks/ stockings" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.84
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Putting on socks/ stockings" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.88
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Putting on socks/ stockings" in the community	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.87

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
sample and WOMAC physical function dimension of 17 items			
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Putting on socks/ stockings" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.07
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Putting on socks/ stockings" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.08
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Putting on socks/ stockings" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.10
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Putting on socks/ stockings" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.08
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from bed" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.75
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from bed" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.81
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from bed" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.84
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from bed" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.84

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale: "Rising from bed" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.85
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale: "Rising from bed" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.85
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale: "Rising from sitting" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.81
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale: "Rising from sitting" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.81
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale: "Rising from sitting" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.82
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale: "Rising from sitting" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.81
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale: "Rising from sitting" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.84

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from sitting" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.83
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from sitting" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.82
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from sitting" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.83
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Sitting" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.92
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Sitting" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.90
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Sitting" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.92
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Sitting" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.90
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Sitting" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.97
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Sitting" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.97

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Sitting" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.97
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Sitting" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.94
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Standing" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.02
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Standing" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 s % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.01
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Standing" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.99
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Standing" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.98
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Standing" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.07
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Standing" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.07

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Standing" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.08
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Standing" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.08
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Taking off socks/stockings" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.20
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Taking off socks/stockings" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.00
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Taking off socks/stockings" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.99
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Taking off socks/stockings" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.01
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Taking off socks/stockings" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.99
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Walking on flat" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.03

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Walking on flat" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.07
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Walking on flat" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=1.01
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Walking on flat" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=1.05
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Walking on flat" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.95
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Walking on flat" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.94
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Walking on flat" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Infit MNSQ=0.97
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Walking on flat" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Unidimensionality	Outfit MNSQ=0.98
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Ascending stairs" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-level scaling (item-difficulty)	Logit = -1.04

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Ascending stairs" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.98
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Ascending stairs" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.87
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Ascending stairs" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.76
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Bending to the floor" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.76
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Bending to the floor" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.72
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Bending to the floor" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.61
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Bending to the floor" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.51
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Descending stairs" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.79

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Descending stairs" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.74
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Descending stairs" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.53
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Descending stairs" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.44
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of bath" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 1.30
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of bath" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.38
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of car" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.07
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of car" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.04
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of car" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.64

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting in/out of car" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.54
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting on/off toilet" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -1.47
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Getting on/off toilet" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.59
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Going shopping" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.28
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Going shopping" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.25
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Going shopping" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.67
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Going shopping" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.58
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Heavy domestic duties" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.08

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Heavy domestic duties" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age:68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -1.37
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Light domestic duties" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.20
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Light domestic duties" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.18
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Light domestic duties" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.66
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Light domestic duties" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.73
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Lying in bed" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.61
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Lying in bed" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.60
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Lying in bed" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 1.12

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Lying in bed" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 1.18
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Putting on socks/ stockings" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.25
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Putting on socks/ stockings" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.25
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Putting on socks/ stockings" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.19
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Putting on socks/ stockings" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.10
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from bed" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.35
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from bed" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.35

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from bed" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.24
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from bed" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.31
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from sitting" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.54
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from sitting" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.49
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from sitting" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.40
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Rising from sitting" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.31
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Sitting" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.73
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Sitting" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.73

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Sitting" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 1.38
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Sitting" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 1.44
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Standing" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.11
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Standing" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.13
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Standing" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.13
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Standing" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.21
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Taking off socks/stockings" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 1.24
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Taking off socks/stockings" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 1.22
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Taking	Canada Size: 1,924 Mean age: 68.2	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.22

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
off socks/stockings" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	% of females: 44.96		
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Taking off socks/stockings" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.29
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Walking on flat" in the community sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.38
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Walking on flat" in the community sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.39
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Walking on flat" in the preoperative surgery sample and WOMAC physical function dimension of 14 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.16
Davis, 2003 ⁴¹⁸ Index: WOMAC: Function subscale:"Walking on flat" in the preoperative surgery sample and WOMAC physical function dimension of 17 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.24
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Night pain" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit =0.54
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Night pain" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit =0.62
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain sitting or lying" in the community sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit =1.27
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain sitting or lying"	Canada Size: 1924 Mean age: 68.2	Rasch analysis: Interval-scaling (item-difficulty)	Logit =0.87

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
in the community sample and WOMAC pain dimension of 5 items	% of females: 44.96		
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain sitting or lying" in the preoperative surgery sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit =1.70
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain sitting or lying" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit =1.24
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain standing" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.15
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain standing" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.05
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain up/downstairs" in the community sample and WOMAC pain dimension of 3 items	Canada Size: 1,,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -1.38
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain up/downstairs" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -1.23
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain up/downstairs" in the preoperative surgery sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -1.60
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain up/downstairs" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -1.59
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain walking on flat" in the community sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = 0.11
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain walking on flat" in the community sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.04

Appendix Table F53. Rasch analysis* of Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Index test	Country; Size; Mean age; % of females	Domain Type of the analysis	Results
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain walking on flat" in the preoperative surgery sample and WOMAC pain dimension of 3 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.04
Davis, 2003 ⁴¹⁸ Index: WOMAC: Pain:"Pain walking on flat" in the preoperative surgical sample and WOMAC pain dimension of 5 items	Canada Size: 1,924 Mean age: 68.2 % of females: 44.96	Rasch analysis: Interval-scaling (item-difficulty)	Logit = -0.21

Significance and interpretation:

Fit range is 0.80 to 1.20 for both Infit and Outfit statistics; fit greater than 1.2 represent noise in the data, and generally indicate that the item does not belong to the unidimensionality construct, and fit statistics below 0.80 indicate that the item is "muted" or often has interdependence with another item⁴¹⁸

*- The Rasch model is probabilistic, and provides estimates of item difficulty on interval-level scaling based on a logit function. For the WOMAC, items are calibrated on a hierarchy of easiest to most difficult on a positive to negative scale; that is, more difficult items are indicated by negative item logit values. The mean logit for a group of items that fit the Rasch model should be zero, with a standard deviation of one⁴¹⁸

Appendix Table F54. Association between gait and patient centered outcomes

Author, year	Study/Adjustment	Gait	Outcome	Estimate	Mean	Lower 95% CI	Upper 95% CI
Verghese, 2006 ⁴¹⁹	The Einstein Aging study Age, Sex	Any abnormality: Overall vs. normal gait	Institutionalization (Nursing Home or Assisted Living Facility Placement)	HR	2.12	1.33	3.37
Verghese, 2006 ⁴¹⁹		Any abnormality: Mild (walks without assistance) vs. normal gait	Institutionalization (Nursing Home or Assisted Living Facility Placement)	HR	1.99	1.18	3.36
Verghese, 2006 ⁴¹⁹		Any abnormality: Moderate (uses walking aids) - Severe (uses a wheelchair or stands with assistance) vs. normal gait	Institutionalization (Nursing Home or Assisted Living Facility Placement)	HR	2.67	1.47	4.84
Verghese, 2006 ⁴¹⁹		Non-neurological abnormality: Overall (from causes such as arthritis, cardiac disease, chronic lung disease, and peripheral vascular disease) vs. normal gait	Institutionalization (Nursing Home or Assisted Living Facility Placement)	HR	1.29	0.79	2.13
Verghese, 2006 ⁴¹⁹		Non-neurological abnormality: Mild (walks without assistance) vs. normal gait	Institutionalization (Nursing Home or Assisted Living Facility Placement)	HR	0.98	0.51	1.88
Verghese, 2006 ⁴¹⁹		Non-neurological abnormality: Moderate-severe Moderate (uses walking aids) - Severe (uses a wheelchair or stands with assistance) vs. normal gait	Institutionalization (Nursing Home or Assisted Living Facility Placement)	HR	1.87	0.99	3.53
Verghese, 2006 ⁴¹⁹		Any abnormality: Overall vs. normal gait	Institutionalization (Nursing Home or Assisted Living Facility Placement) or Death	HR	2.16	1.45	3.24
Verghese, 2006 ⁴¹⁹		Any abnormality: Mild (walks without assistance) vs. normal gait	Institutionalization (Nursing Home or Assisted Living Facility Placement) or Death	HR	1.76	1.01	2.84
Verghese, 2006 ⁴¹⁹		Any abnormality: Moderate (uses walking aids) - Severe (uses a wheelchair or stands with assistance) vs. normal gait	Institutionalization (Nursing Home or Assisted Living Facility Placement) or Death	HR	3.18	1.94	5.21

Appendix Table F54. Association between gait and patient centered outcomes (continued)

Author, year	Study/Adjustment	Gait	Outcome	Estimate	Mean	Lower 95% CI	Upper 95% CI
Verghese, 2006 ⁴¹⁹		Non-neurological abnormality: Overall vs. normal gait	Institutionalization (Nursing Home or Assisted Living Facility Placement) or Death	HR	1.55	1.02	2.36
Verghese, 2006 ⁴¹⁹		Non-neurological abnormality: Mild (walks without assistance) Overall vs. normal gait	Institutionalization (Nursing Home or Assisted Living Facility Placement) or Death	HR	1	0.66	1.79
Verghese, 2006 ⁴¹⁹		Non-neurological abnormality: Moderate-severe Moderate (uses walking aids) - Severe (uses a wheelchair or stands with assistance) Overall vs. normal gait	Institutionalization (Nursing Home or Assisted Living Facility Placement) or Death	HR	2.54	1.52	4.23
Woo, 1999 ⁴²⁰	Chinese elderly People Age, sex	Walking speed (16ft)	Dependency (Bartel Index <20)	OR	1.094	1.05	1.14
Woo, 1999 ⁴²⁰		Stride length (ft)	Dependency (Bartel Index <20)	OR	0.153	0.07	0.33
Woo, 1999 ⁴²⁰		Stride length (ft)	Institutionalization	OR	0.095	0.03	0.3
Jylha, 2001 ⁴²¹	the Women's Health and Aging Study Chronic conditions, cognitive functioning, depressive symptoms, demographic characteristics	Difficulty in Walking One Quarter Mile- A little	Fair or Poor Self-rated Health	OR	0.73	0.45	1.19
Jylha, 2001 ⁴²¹		Difficulty in Walking One Quarter Mile- Some-	Fair or Poor Self-rated Health	OR	1.1	0.68	1.78
Jylha, 2001 ⁴²¹		Difficulty in Walking One Quarter Mile- A lot	Fair or Poor Self-rated Health	OR	2.31	1.47	3.63
Jylha, 2001 ⁴²¹		Difficulty in Walking One Quarter Mile- Not able	Fair or Poor Self-rated Health	OR	2.2	1.34	3.59
Jylha, 2001 ⁴²¹		2nd quartile (cutoff < 1.143 m/s) vs. > 1.143m/s	Fair or Poor Self-rated Health	OR	1.33	0.86	2.06
Jylha, 2001 ⁴²¹		3rd quartile (cutoff < 0.889 m/s)vs. > 1.143m/s	Fair or Poor Self-rated Health	OR	1.98	1.24	3.17
Jylha, 2001 ⁴²¹		4th quartile (cutoff < 0.625 m/s)vs. > 1.143m/s	Fair or Poor Self-rated Health	OR	2.32	1.29	4.17
Onder, 2005 ⁴²²	the Women's Health and Aging Study Age, Race	0.31 m/s vs. <0.31 m/s	Incident ADL Disability (Progressive)	RR	0.65	0.52	0.82

Appendix Table F54. Association between gait and patient centered outcomes (continued)

Author, year	Study/Adjustment	Gait	Outcome	Estimate	Mean	Lower 95% CI	Upper 95% CI
Onder, 2005 ⁴²²		0.31 m/s vs. <0.31 m/s	Incident ADL Disability (Catastrophic)	RR	0.72	0.53	0.99
Onder, 2005 ⁴²²		0.31 m/s vs. <0.31 m/s	Incident Mobility Disability (Progressive)	RR	0.27	0.19	0.38
Onder, 2005 ⁴²²		0.31 m/s vs. <0.31 m/s	Incident Mobility Disability (Catastrophic)	RR	0.57	0.41	0.8
Onder, 2005 ⁴²²		0.31 m/s vs. <0.31 m/s	Incident Upper Extremity Disability (Progressive); disability lifting 4.5kg	RR	0.7	0.54	0.91
Onder, 2005 ⁴²²		0.31 m/s vs. <0.31 m/s	Incident Upper Extremity Disability (Catastrophic); disability lifting 4.5kg	RR	0.64	0.48	0.86

Bold-strong correlations of >50%

Appendix Table F55. Minimum clinically important differences in the Western Ontario McMaster Universities Osteoarthritis Index

Author, year Method; worst to best scale	Reference	Definition of minimum clinically important differences
Dougados, 2000 ⁴²³ Method: Anchor Worst to best: Varies WOMAC, Lequesne Functional Severity Index, Global VAS	OARSI Responder Criteria—Proposition A: This emphasizes the domain 'pain'. A 'high' improvement in pain was sufficient to define a responder. However, using this set of criteria, a patient can be also considered as a responder if an improvement of 'moderate' magnitude is observed in two of the three domains, i.e. pain, function and patient's global assessment. OARSI Responder Criteria—Proposition B: This scenario applies equal importance to 'pain' and 'function', requiring a 'high' response of one OR the other. Alternatively, a 'moderate' magnitude of response could be present in two of the three domains.	If there was a 'high' improvement in pain: improvement of at least 40% was required (ranging from 40 to 60%) together with an absolute improvement of at least 20 NU (normalized units) ranging from 20 to 30. If there was moderate improvement in pain, function, and patient's global assessment: a relative improvement ranging from 15 to 35% and an absolute improvement ranging from 10 to 20 NU. Relative change: percentage of change during the study (final minus baseline over baseline*100); absolute change: absolute change during the study (final minus baseline on a 0-100 interval scale).
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 10 to 0 (for each of the 24 items) WOMAC: function scale	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month follow up, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories "much worse," "slightly worse," "equal," "slightly better," and "much better."	The mean score difference between the "equal" group and the "slightly better" group =0.67 was the MCID for improvement
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 10 to 0 (for each of the 24 items) WOMAC: function scale	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month follow up, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories "much worse," "slightly worse," "equal," "slightly better," and "much better."	The mean score difference between the "equal" group and the "slightly better" group =1.33 was the MCID for worsening
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 10 to 0 (for each of the 24 items) WOMAC global	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month follow up, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories "much worse," "slightly worse," "equal," "slightly better," and "much better."	The mean score difference between the "equal" group and the "slightly better" group =0.67 was the MCID for improvement
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 10 to 0 (for each of the 24 items) WOMAC global	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month follow up, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories	The mean score difference between the "equal" group and the "slightly better" group =1.29 was the MCID for worsening

Appendix Table F55. Minimum clinically important differences in the Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Method; worst to best scale	Reference	Definition of minimum clinically important differences
	"much worse," "slightly worse," "equal," "slightly better," and "much better."	
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 10 to 0 (for each of the 24 items) WOMAC: pain scale	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month follow up, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories "much worse," "slightly worse," "equal," "slightly better," and "much better."	The mean score difference between the "equal" group and the "slightly better" group =0.75 was the MCID for improvement
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 10 to 0 (for each of the 24 items) WOMAC: pain scale	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month follow up, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories "much worse," "slightly worse," "equal," "slightly better," and "much better."	The mean score difference between the "equal" group and the "slightly better" group =1.10 was the MCID for worsening
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 10 to 0 (for each of the 24 items) WOMAC: stiffness scale	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month follow up, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories "much worse," "slightly worse," "equal," "slightly better," and "much better."	The mean score difference between the "equal" group and the "slightly better" group =0.51 was the MCID for worsening
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 10 to 0 (for each of the 24 items) WOMAC: stiffness scale	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month follow up, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories "much worse," "slightly worse," "equal," "slightly better," and "much better."	The mean score difference between the "equal" group and the "slightly better" group =0.72 was the MCID for improvement
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: WOMAC: stiffness scale	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination. The second was the patient's self-assessment (at the 3 month follow up) of the global change in health status between baseline and the 3 month follow up measured by the "transitional" scale.	Patients who had more than 0.29 increase (S.D.=3.11) in score (from baseline) perceived their condition as worse
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: WOMAC: pain scale	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health	Patients who had more than 0.64 increase (SD=2.01) in score (from baseline) perceived their condition as worse

Appendix Table F55. Minimum clinically important differences in the Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Method; worst to best scale	Reference	Definition of minimum clinically important differences
	status between baseline and the 3 month follow up measured by the "transitional" scale.	
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: WOMAC: function scale	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health status between baseline and the 3 month follow up measured by the "transitional" scale.	Patients who had more than 0.80 decrease (S.D.=1.82) in score (from baseline) perceived their condition as improved
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: global	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health status between baseline and the 3 month follow up measured by the "transitional" scale.	Patients who had more than 0.82 decrease (S.D.=1.71) in score (from baseline) perceived their condition as improved
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: pain scale	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health status between baseline and the 3 month follow up measured by the "transitional" scale.	Patients who had more than 0.83 decrease (S.D.=1.72) in score (from baseline) perceived their condition as improved
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: global	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health status between baseline and the 3 month follow up measured by the "transitional" scale.	Patients who had more than 0.96 increase (S.D.=1.98) in score (from baseline) perceived their condition as worse
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: stiffness scale	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health status between baseline and the 3 month follow up measured by the "transitional" scale.	Patients who had more than 1.01 decrease (S.D.=1.63) in score (from baseline) perceived their condition as improved
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: function scale	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health	Patients who had more than 1.03 (S.D.=1.88) increase in score (from baseline) perceived their condition as worse

Appendix Table F55. Minimum clinically important differences in the Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Method; worst to best scale	Reference	Definition of minimum clinically important differences
	status between baseline and the 3 month follow up measured by the "transitional" scale.	
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: pain scale	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health status between baseline and the 3 month follow up measured by the "transitional" scale.	Patients who had more than 14% increase (SD=44%) in score (from baseline) perceived their condition as worse
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: function scale	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health status between baseline and the 3 month follow up measured by the "transitional" scale.	Patients who had more than 17% decrease (S.D.=39%) in score (from baseline) perceived their condition as improved
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: global	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health status between baseline and the 3 month follow up measured by the "transitional" scale.	Patients who had more than 18% decrease (S.D.=37%) in score (from baseline) perceived their condition as improved
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: pain scale	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health status between baseline and the 3 month follow up measured by the "transitional" scale.	Patients who had more than 18% decrease (S.D.=37%) in score (from baseline) perceived their condition as improved
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: global	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health status between baseline and the 3 month follow up measured by the "transitional" scale.	Patients who had more than 21% increase (S.D.=43%) in score (from baseline) perceived their condition as worse
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: function scale	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health	Patients who had more than 22% (S.D.=41%) increase in score (from baseline) perceived their condition as worse

Appendix Table F55. Minimum clinically important differences in the Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Method; worst to best scale	Reference	Definition of minimum clinically important differences
	status between baseline and the 3 month follow up measured by the "transitional" scale.	
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: stiffness scale	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health status between baseline and the 3 month follow up measured by the "transitional" scale.	Patients who had more than 22% decrease (S.D.=35%) in score (from baseline) perceived their condition as improved
Angst, 2002 ⁴²⁵ Method: Anchor Worst to best: 10 to 0 WOMAC: stiffness scale	2 concepts were used to measure changes in the patients' health status. The first was the 2 point measure in WOMAC scores resulting in effects defined by the difference of the score between the 3 month follow up and the baseline examination ⁶ . The second was the patient's self-assessment (at the 3 month follow up) of the global change in health status between baseline and the 3 month follow up measured by the "transitional" scale.	Patients who had more than 6% increase (S.D.=67%) in score (from baseline) perceived their condition as worse
Bellamy, 2002 ⁴²⁶ Method: Anchor Worst to best: 96-0 WOMAC LK3.0 (telephonic assessment)	WOMAC LK3.0 (office assessment)	Equivalence was to be inferred if the 95% confidence limits for the differences between the office and telephone scores were within $\pm 20\%$ of the mean office scores. There was excellent agreement between the mean office and telephone scores, with mean differences for the WOMAC LK3.0 pain, stiffness, and function, and total scores of 0.09, 0.12, 0.78, and 0.98, respectively. These differences are also well within the protocol-defined equivalence criteria of ± 1.7 , ± 0.9 , ± 6.4 and ± 9.1 , respectively, for pain, stiffness, physical function, and total WOMAC LK 3.0 scores, and represent differences from office scores of 0.9, 2.6, 2.4, and 2.2%, respectively.
Link, 2003 ⁴²⁷ Method: Anchor Worst to best: 300 to 0 WOMAC	MRI	The grade IIa cartilage loss corresponded to median and IQR scores of 295 (180-430), 193(73.8-227), and 863 (180-944) on the WOMAC pain, stiffness, and function scales, respectively.
Link, 2003 ⁴²⁷ Method: Anchor Worst to best: 300 to 0 WOMAC	MRI	The grade IIb cartilage loss corresponded to median and IQR scores of 140 (90-190), 125(66-228.5), and 209 (81-287) on the WOMAC pain, stiffness, and function scales, respectively.

Appendix Table F55. Minimum clinically important differences in the Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Method; worst to best scale	Reference	Definition of minimum clinically important differences
Link, 2003 ⁴²⁷ Method: Anchor Worst to best: 300 to 0 WOMAC	MRI	The grade III cartilage loss corresponded to median and IQR scores of 111 (41-190), 50(30-200), and 206 (115-286) on the WOMAC pain, stiffness, and function scales, respectively.
Link, 2003 ⁴²⁷ Method: Anchor Worst to best: 300 to 0 WOMAC	MRI	When patients had grade I cartilage abnormality corresponding median scores on WOMAC pain scale, stiffness, and function scale were: 23, 25 and 151, respectively.
Tubach, 2005 ⁴²⁸ Method: Anchor Worst to best: 100-0 WOMAC: function scale	At the final visit, patients' opinions of their state was recorded by their answering "Yes" or "No" to "Taking into account all the activities you have during your daily life, your level of pain, and also your functional impairment, do you consider that your current state is satisfactory?". PASS was estimated by constructing a curve of cumulative percentages of patients as a function of the score of interest at the final visit among patients who considered their state satisfactory.	Patients with knee OA and in the intermediate tertile of score considered their state satisfactory if their function score was less than 33.0 mm on the WOMAC function scale
Tubach, 2005 ⁴²⁸ Method: Anchor Worst to best: 100-0 WOMAC: function scale	At the final visit, patients' opinions of their state was recorded by their answering "Yes" or "No" to "Taking into account all the activities you have during your daily life, your level of pain, and also your functional impairment, do you consider that your current state is satisfactory?". PASS was estimated by constructing a curve of cumulative percentages of patients as a function of the score of interest at the final visit among patients who considered their state satisfactory.	Patients with knee OA and in the low tertile of score considered their state satisfactory if their function score was less than 20.4mm on the WOMAC function scale
Tubach, 2005 ⁴²⁸ Method: Anchor Worst to best: 100-0 WOMAC: function scale	At the final visit, patients' opinions of their state was recorded by their answering "Yes" or "No" to "Taking into account all the activities you have during your daily life, your level of pain, and also your functional impairment, do you consider that your current state is satisfactory?". PASS was estimated by constructing a curve of cumulative percentages of patients as a function of the score of interest at the final visit among patients who considered their state satisfactory.	Patients with knee OA considered their state satisfactory if their function score was less than 31.0 mm on the WOMAC function scale
Tubach, 2005 ⁴²⁹ Method: Anchor Worst to best: 100-0 WOMAC: function scale	At the final visit, patients assessed their response to NSAID treatment on a five point Likert scale (none=no good at all, ineffective drug; poor=some effect but unsatisfactory; fair=reasonable effect but could be better; good=satisfactory effect with occasional episodes of pain or stiffness; excellent=ideal response, virtually pain free). The MCII was determined in patients whose assessment of response to treatment was measured on a five point Likert scale and who had completed the final visit. The MCII was estimated for both the absolute (final value-baseline value) and the relative ((final value-baseline value)/baseline value) changes in each patient reported outcome. It was estimated by constructing a curve of cumulative percentages of patients as a function of the change in score (for example, difference in pain score) among	Patients with knee OA and in the high tertile of the WOMAC function score considered themselves clinically improved if the decrease in function score exceeded 20.4 mm on the WOMAC function scale

Appendix Table F55. Minimum clinically important differences in the Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Method; worst to best scale	Reference	Definition of minimum clinically important differences
	patients whose final evaluation of response to treatment was “good, satisfactory effect with occasional episodes of pain or stiffness”.	
Tubach, 2005 ⁴²⁹ Method: Anchor Worst to best: 100-0 WOMAC: function scale	At the final visit, patients assessed their response to NSAID treatment on a five point Likert scale (none=no good at all, ineffective drug; poor=some effect but unsatisfactory; fair=reasonable effect but could be better; good=satisfactory effect with occasional episodes of pain or stiffness; excellent=ideal response, virtually pain free). The MCII was determined in patients whose assessment of response to treatment was measured on a five point Likert scale and who had completed the final visit. The MCII was estimated for both the absolute (final value-baseline value) and the relative ((final value-baseline value)/baseline value) changes in each patient reported outcome. It was estimated by constructing a curve of cumulative percentages of patients as a function of the change in score (for example, difference in pain score) among patients whose final evaluation of response to treatment was “good, satisfactory effect with occasional episodes of pain or stiffness”.	Patients with knee OA and in the intermediate tertile of the WOMAC function score considered themselves clinically improved if the decrease in function score exceeded 11.8 mm on the WOMAC function scale
Tubach, 2005 ⁴²⁹ Method: Anchor Worst to best: 100-0 WOMAC: function scale	At the final visit, patients assessed their response to NSAID treatment on a five point Likert scale (none=no good at all, ineffective drug; poor=some effect but unsatisfactory; fair=reasonable effect but could be better; good=satisfactory effect with occasional episodes of pain or stiffness; excellent=ideal response, virtually pain free). The MCII was determined in patients whose assessment of response to treatment was measured on a five point Likert scale and who had completed the final visit. The MCII was estimated for both the absolute (final value-baseline value) and the relative ((final value-baseline value)/baseline value) changes in each patient reported outcome. It was estimated by constructing a curve of cumulative percentages of patients as a function of the change in score (for example, difference in pain score) among patients whose final evaluation of response to treatment was “good, satisfactory effect with occasional episodes of pain or stiffness”.	Patients with knee OA and in the low tertile of the WOMAC function score considered themselves clinically improved if the decrease in function score exceeded 5.3 mm on the WOMAC function scale
Tubach, 2005 ⁴²⁹ Method: Anchor Worst to best: 100-0 WOMAC: function scale	At the final visit, patients assessed their response to NSAID treatment on a five point Likert scale (none=no good at all, ineffective drug; poor=some effect but unsatisfactory; fair=reasonable effect but could be better; good=satisfactory effect with occasional episodes of pain or stiffness; excellent=ideal response, virtually pain free). The MCII was determined in patients whose assessment of response to treatment was measured on a five point Likert scale and who had completed the final visit. The MCII was estimated for both the absolute (final value-baseline value) and the relative ((final value-baseline value)/baseline value) changes in each patient reported outcome. It was estimated by constructing a curve of cumulative percentages of patients as a function of the change in score (for example, difference in pain score) among	Patients with knee OA considered themselves clinically improved if the decrease in function score exceeded 9.1 mm on the WOMAC function scale

Appendix Table F55. Minimum clinically important differences in the Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Method; worst to best scale	Reference	Definition of minimum clinically important differences
	patients whose final evaluation of response to treatment was “good, satisfactory effect with occasional episodes of pain or stiffness”.	
Tubach, 2005 ⁴³⁰ Method: Anchor Worst to best: 100-0 WOMAC: function subscale	(1) “What is the level of pain above which you experience difficulties?” (This could be considered close to the external anchor for the PASS.) (2) “What is the level of pain above which you would consider taking a pain killer drug?” (This could be considered close to the external anchor for the LDAS.)	The minimum clinically important improvement in the high tertile of score is -20 (absolute change)
Tubach, 2005 ⁴³⁰ Method: Anchor Worst to best: 100-0 WOMAC: function subscale	(1) “What is the level of pain above which you experience difficulties?” (This could be considered close to the external anchor for the PASS.) (2) “What is the level of pain above which you would consider taking a pain killer drug?” (This could be considered close to the external anchor for the LDAS.)	The minimal clinically important improvement in the intermediate tertile of score is -12 (absolute change)
Tubach, 2005 ⁴³⁰ Method: Anchor Worst to best: 100-0 WOMAC: function subscale	(1) “What is the level of pain above which you experience difficulties?” (This could be considered close to the external anchor for the PASS.) (2) “What is the level of pain above which you would consider taking a pain killer drug?” (This could be considered close to the external anchor for the LDAS.)	The minimum clinically important improvement in the low tertile of score is -5 (absolute change)
Weigl, 2006 ⁴³¹ Method: Anchor Worst to best: Varies WOMAC; Transition scale (that investigates the current state of health of the OA joint at the 6 months follow-up compared to its state 6 months earlier (baseline examination))	The transition scale investigates the current state of health of the OA joint at the 6-month follow-up compared to its state 6 months earlier (at baseline examination).	Three different definitions of responder: 1) For the WOMAC global score, a percentage change ($100 \times (\text{change of score} / \text{baseline score})$) greater or equal to 18% represents an MCID in improvement; 2) patients who reported a slightly or a much better health status on the transition scale were classified as responders; 3) responders had to show an MCID in improvement on the WOMAC global score and report a health improvement on the transition scale
Stratford, 2007 ⁴³² Method: Anchor Worst to best: 4-0 for each of the 5 items WOMAC LK 3.1	The five pain items of WOMAC that were analyzed were: (1) walking on flat ground; (2) going up or down stairs; (3) at night while in bed; (4) sitting or lying; and (5) standing upright.	90% of stable patients will display random fluctuations equal to or less than 3.94 when assessed on multiple occasions
Tanner, 2007 ³⁴⁹ Method: Anchor Worst to best: 100 to 0 WOMAC	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from “on sick leave/disability” to “participation in competitive sports such as soccer at a national or	23/24 (96%) of the WOMAC questions had a mean importance ranking of at least 3 (score on a Likert scale of 0 to 5, with 0 being not experienced and 5 being experienced and very important)

Appendix Table F55. Minimum clinically important differences in the Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Method; worst to best scale	Reference	Definition of minimum clinically important differences
	international elite level."	
Tanner, 2007 ³⁴⁹ Method: Anchor Worst to best: 100 to 0 WOMAC	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	7 questions had a top-20 FIP scores (FIP=frequency*mean importance; the greater the FIP, the more important a symptom or disability is to patients. A high FIP indicates that a symptom or disability is both frequently experienced and most important to patients)
Tanner, 2007 ³⁴⁹ Method: Anchor Worst to best: 100 to 0 WOMAC	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	At least 51% of the patients with mild to moderate OA endorsed 23/24 (96%) of the WOMAC questions
Tanner, 2007 ³⁴⁹ Method: Anchor Worst to best: 100 to 0 WOMAC	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	Only 2/24 questions had a mean importance ranking of 1 or less
Bieleman, 2009 ³⁶⁷ Method: Anchor Worst to best: 68-0 WOMAC (Dutch versions)function scale	Functional Capacity Evaluation (FCE)	The cut-off point for the WOMAC scale the cut-off point was ≥ 21 where subjects had work limitations that corresponded to the physical work limitations on the FCE scale
White, 2010 ⁴³³ Method: Anchor Worst to best: WOMAC: physical function	The definitions of MCII were that they were anchored to patient-based indicators of improvement and defined meaningful improvement relative to baseline WOMAC physical function scores. The definitions of MCII 26% and MCII Tertile were estimated in a group of people with knee pain reporting a "good, satisfactory effect with occasional episodes of pain or stiffness" following a 4-week course of nonsteroid anti-	3 definitions of MCII (Minimum Clinically Important Improvement) for WOMAC physical function: MCII 26% and MCII 17% defines meaningful improvement as a 26% and 17% decrease in WOMAC physical function (final value minus baseline value/baseline value),

Appendix Table F55. Minimum clinically important differences in the Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Method; worst to best scale	Reference	Definition of minimum clinically important differences
	inflammatory drug (NSAID). The MCII 17% definition was from a group of people with knee OA who underwent 3 to 4 weeks of inpatient rehabilitation.	respectively, with a minimum absolute decrease of 2 out of 68. MCII Tertile defines meaningful improvement as absolute values (final value minus baseline value) dependent on baseline WOMAC physical function scores. Those with a decrease of 3.6, 8.0, and 13.9 out of 68 were considered to reach meaningful improvement within low, medium, and high baseline tertile categories, respectively.
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 100 to 0 WOMAC: pain subscale	Patients had to answer a question about improvement in their knee at 6 months and 2 years after intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse", and "a great deal worse".	At 6 months: Mean change in WOMAC pain score of 37.58(19.71) was equivalent to patient reporting "A great deal better".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 100 to 0 WOMAC: function subscale	Patients had to answer a question about improvement in their knee at 6 months and 2 years after intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse", and "a great deal worse".	At 6 months: Mean change in WOMAC function score of 34.58 (19.33) was equivalent to patient reporting "A great deal better".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 100 to 0 WOMAC: stiffness subscale	Patients had to answer a question about improvement in their knee at 6 months and 2 years after intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse", and "a great deal worse".	At 6 months: Mean change in WOMAC stiffness score of 34.74(28.38) was equivalent to patient reporting "A great deal better".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 100 to 0 WOMAC: pain subscale	Patients had to answer a question about improvement in their knee at 6 months and 2 years after intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse", and "a great deal worse".	At 6 months: Mean change in WOMAC pain score of 22.87(18.13) was equivalent to patient reporting "somewhat better". This was considered the MCID (minimal clinically important difference).
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 100 to 0 WOMAC: function subscale	Patients had to answer a question about improvement in their knee at 6 months and 2 years after intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse", and "a great deal worse".	At 6 months: Mean change in WOMAC function score of 19.01(17.48) was equivalent to patient reporting "somewhat better". This was considered the MCID (minimum clinically important difference).
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 100 to 0 WOMAC: stiffness subscale	Patients had to answer a question about improvement in their knee at 6 months and 2 years after intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse", and "a great deal worse".	At 6 months: Mean change in WOMAC stiffness score of 14.53(26.50) was equivalent to patient reporting "somewhat better". This was considered the MCID (minimal clinically important difference).
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 100 to 0 WOMAC: pain subscale	Patients had to answer a question about improvement in their knee at 6 months and 2 years after intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse", and "a great deal worse".	At 6 months: Mean change in WOMAC pain score of 12.10(19.01) was equivalent to patient reporting "equal".
Escobar, 2007 ⁴³⁴ Method: Anchor	All patients had to answer a question about improvement in their knee at 6 months and 2 years after the intervention. The possible responses	At 6 months: Mean change in WOMAC function score of 9.46(16.36) was equivalent to patient

Appendix Table F55. Minimum clinically important differences in the Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Method; worst to best scale	Reference	Definition of minimum clinically important differences
Worst to best: 100 to 0 WOMAC: function subscale	were "a great deal better", "somewhat better", "equal", "somewhat worse", and "a great deal worse".	reporting "equal".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 100 to 0 WOMAC: stiffness subscale	All patients had to answer a question about improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse", and "a great deal worse".	At 6 months: Mean change in WOMAC stiffness score of 7.42(25.77) was equivalent to patient reporting "equal".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 100 to 0 WOMAC: pain subscale	All patients had to answer a question about improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse", and "a great deal worse".	At 6 months: Mean change in WOMAC pain score of 7.71(22.07) was equivalent to patient reporting "worse"
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 100 to 0 WOMAC: function subscale	All patients had to answer a question about improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse", and "a great deal worse".	At 6 months: Mean change in WOMAC function score of 0.27(23.38) was equivalent to patient reporting "worse"
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 100 to 0 WOMAC: stiffness subscale	All patients had to answer a question about improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse", and "a great deal worse".	At 6 months: Mean change in WOMAC stiffness score of -3.29(32.50) was equivalent to patient reporting "worse"
Quintana, 2006 ³³⁹ Method: Anchor Worst to best: 100 to 0 WOMAC: pain subscale	Six months after the intervention, patients were sent another letter with the questionnaires and additional questions on the clinical aspects of their disease and satisfaction with the intervention. The satisfaction question was dichotomized as being satisfied or not. At this time, patients answered a transitional question about their joint improvement after the intervention. The possible responses included "a great deal better," "somewhat better," "equal," "somewhat worse," or "a great deal worse."	The minimum clinical importance for pain subscale of WOMAC was at 22.60.
Quintana, 2006 ³³⁹ Method: Anchor Worst to best: 100 to 0 WOMAC: functional limitation subscale	Six months after the intervention, patients were sent another letter with the questionnaires and additional questions on the clinical aspects of their disease and satisfaction with the intervention. The satisfaction question was dichotomized as being satisfied or not. At this time, patients answered a transitional question about their joint improvement after the intervention. The possible responses included "a great deal better," "somewhat better," "equal," "somewhat worse," or "a great deal worse."	The minimum clinical importance for functional limitation subscale of WOMAC was at 17.67.
Quintana, 2006 ³³⁹ Method: Anchor Worst to best: 100 to 0 WOMAC: stiffness subscale	Six months after the intervention, patients were sent another letter with the questionnaires and additional questions on the clinical aspects of their disease and satisfaction with the intervention. The satisfaction question was dichotomized as being satisfied or not. At this time, patients answered a transitional question about their joint improvement after the intervention. The possible responses included "a great deal better," "somewhat better," "equal," "somewhat worse," or "a great deal worse."	The minimum clinical importance for stiffness subscale of WOMAC was at 12.94.

Appendix Table F55. Minimum clinically important differences in the Western Ontario McMaster Universities Osteoarthritis Index (continued)

Author, year Method; worst to best scale	Reference	Definition of minimum clinically important differences
Ornetti, 2011 ⁴¹⁰ Method: Anchor Worst to best: 100 to 0 WOMAC: function subscale	All patients had to assess their current global state (global PASS) by answering 'Yes' or 'No' in answer to the question 'Taking into account all the activities you have during your daily life, your level of pain, and also your functional impairment, do you consider that your current state is satisfactory?'.	Patients considered their global state as satisfactory if the WOMAC function was >28.06 (95% CI: 25.74 to 30.38). Global PASS is defined as the value of measurement beyond which patients consider their global state as satisfactory.
Ornetti, 2011 ⁴¹⁰ Method: Anchor Worst to best: 100 to 0 WOMAC: function subscale	PASS for functional state :The PASS of each function scale was defined as the 75th centile of the absolute score among patients who considered their final state as satisfactory	Patients considered their functional state as satisfactory if the WOMAC function was >28.40 (95% CI: 26.03 to 30.78). Function PASS is defined as the value of measurement beyond which patients consider their functional state as satisfactory.
Ornetti, 2011 ⁴¹⁰ Method: Anchor Worst to best: 100 to 0 WOMAC: function subscale	All patients had to assess their degree of improvement of global state (global MCII); on a three-point Likert scale (worsened function, no change, improved function). Among patients who improved, the degree of improvement was scored on a four-point Likert scale (poor, fair, good, excellent)	Patients considered their global state as improved for a change of WOMAC function scale ≥ 17.13 (95% CI: -20.07 to -14.19). Global MCII is defined as the smallest change in global state that signifies an important improvement in a patient's symptoms.
Ornetti, 2011 ⁴¹⁰ Method: Anchor Worst to best: 100 to 0 WOMAC: function subscale	MCII for functional state: The MCII of each function scale was defined as the 75th centile of the absolute change in score among patients whose final evaluation of response to NSAID was improved (improvement good or excellent).	Patients considered their functional state as improved for a change of WOMAC function scale ≥ 17.02 (95% CI: -20.15 to -13.90). Functional MCII is defined as the smallest change in functional state that signifies an important improvement in a patient's symptoms.

Appendix Table F56. Minimum clinically important differences in the Visual Analogue Scale (anchor method)

Author, year Test; Worst to best, Condition	Reference	Definition of minimum clinically important differences
Tubach, 2005 ⁴²⁸ Test: Visual Analogue Scale Worst to best: 100-0 Disease status	At the final visit, patients' opinions of their state was recorded by their answering "Yes" or "No" to "Taking into account all the activities you have during your daily life, your level of pain, and also your functional impairment, do you consider that your current state is satisfactory?". PASS (Patient Acceptable Symptom State) was estimated by constructing a curve of cumulative percentages of patients as a function of the score of interest at the final visit among patients who considered their state satisfactory.	Patients with knee OA and in the high tertile of score considered their state satisfactory if the patient global assessment score was less than 34.4 mm on the 0-100mm VAS scale.
Tubach, 2005 ⁴²⁹ Test: Visual Analogue Scale Worst to best: 100-0 Disease status	At the final visit, patients assessed their response to NSAID treatment on a five point Likert scale (none=no good at all, ineffective drug; poor=some effect but unsatisfactory; fair=reasonable effect but could be better; good=satisfactory effect with occasional episodes of pain or stiffness; excellent=ideal response, virtually pain free). The MCII was determined in patients whose assessment of response to treatment was measured on a five point Likert scale and who had completed the final visit. The MCII was estimated for both the absolute (final value-baseline value) and the relative ((final value-baseline value)/baseline value) changes in each patient reported outcome. It was estimated by constructing a curve of cumulative percentages of patients as a function of the change in score (for example, difference in pain score) among patients whose final evaluation of response to treatment was "good, satisfactory effect with occasional episodes of pain or stiffness".	Patients with knee OA and in the high tertile of the VAS score considered themselves clinically improved if the decrease in disease activity (improvement in global assessment) exceeded 43.2mm on the 0-100mm VAS scale.
Tubach, 2005 ⁴²⁸ Test: Visual Analogue Scale Worst to best: 100-0 Disease status	At the final visit, patients' opinions of their state was recorded by their answering "Yes" or "No" to "Taking into account all the activities you have during your daily life, your level of pain, and also your functional impairment, do you consider that your current state is satisfactory?". PASS was estimated by constructing a curve of cumulative percentages of patients as a function of the score of interest at the final visit among patients who considered their state satisfactory.	Patients with knee OA and in the intermediate tertile of score considered their state satisfactory if the patient global assessment score was less than 34.3 mm on the 0-100mm VAS scale.
Tubach, 2005 ⁴²⁹ Test: Visual Analogue Scale Worst to best: 100-0 Disease status	At the final visit, patients assessed their response to NSAID treatment on a five point Likert scale (none=no good at all, ineffective drug; poor=some effect but unsatisfactory; fair=reasonable effect but could be better; good=satisfactory effect with occasional episodes of pain or stiffness; excellent=ideal response, virtually pain free). The MCII was determined in patients whose assessment of response to treatment was measured on a five point Likert scale and who had completed the final visit. The MCII was estimated for both the absolute (final value-baseline value) and the relative ((final value-baseline value)/baseline value) changes in each patient reported outcome. It was Estimated by constructing a curve of cumulative percentages of patients as a function	Patients with knee OA and in the intermediate tertile of the VAS score considered themselves clinically improved if the decrease in disease activity (improvement in global assessment) exceeded 24.6mm on the 0-100mm VAS scale.

Appendix Table F56. Minimum clinically important differences in the Visual Analogue Scale (anchor method) (continued)

Author, year Test; Worst to best, Condition	Reference	Definition of minimum clinically important differences
	of the change in score (for example, difference in pain score) among patients whose final evaluation of response to treatment was “good, satisfactory effect with occasional episodes of pain or stiffness”.	
Tubach, 2005 ⁴²⁸ Test: Visual Analogue Scale Worst to best: 100-0 Disease status	At the final visit, patients’ opinions of their state was recorded by their answering “Yes” or “No” to “Taking into account all the activities you have during your daily life, your level of pain, and also your functional impairment, do you consider that your current state is satisfactory?”. PASS was estimated by constructing a curve of cumulative percentages of patients as a function of the score of interest at the final visit among patients who considered their state satisfactory.	Patients with knee OA and in the low tertile of score considered their state satisfactory if the patient global assessment score was less than 28.3mm on the 0-100mm VAS scale.
Tubach, 2005 ⁴²⁹ Test: Visual Analogue Scale Worst to best: 100-0 Disease status	At the final visit, patients assessed their response to NSAID treatment on a five point Likert scale (none=no good at all, ineffective drug; poor=some effect but unsatisfactory; fair=reasonable effect but could be better; good=satisfactory effect with occasional episodes of pain or stiffness; excellent=ideal response, virtually pain free). The MCII was determined in patients whose assessment of response to treatment was measured on a five point Likert scale and who had completed the final visit. The MCII was estimated for both the absolute (final value-baseline value) and the relative ((final value-baseline value)/baseline value) changes in each patient reported outcome. It was estimated by constructing a curve of cumulative percentages of patients as a function of the change in score (for example, difference in pain score) among patients whose final evaluation of response to treatment was “good, satisfactory effect with occasional episodes of pain or stiffness”.	Patients with knee OA and in the low tertile of the VAS score considered themselves clinically improved if the decrease in disease activity (improvement in global assessment) exceeded 6.4 mm on the 0-100mm VAS scale.
Tubach, 2005 ⁴²⁸ Test: Visual Analogue Scale Worst to best: 100-0 Disease status	At the final visit, patients’ opinions of their state was recorded by their answering “Yes” or “No” to “Taking into account all the activities you have during your daily life, your level of pain, and also your functional impairment, do you consider that your current state is satisfactory?”. PASS was estimated by constructing a curve of cumulative percentages of patients as a function of the score of interest at the final visit among patients who considered their state satisfactory.	Patients with knee OA considered their state satisfactory if the patient assessment score was less than 32.0 mm on the 0-100mm VAS scale.
Tubach, 2005 ⁴²⁹ Test: Visual Analogue Scale Worst to best: 100-0 Disease status	At the final visit, patients assessed their response to NSAID treatment on a five point Likert scale (none=no good at all, ineffective drug; poor=some effect but unsatisfactory; fair=reasonable effect but could be better; good=satisfactory effect with occasional episodes of pain or stiffness; excellent=ideal response, virtually pain free). The MCII was determined in patients whose assessment of response to treatment was measured on a five point Likert scale and who had completed the final visit. The MCII was Estimated for both the absolute (final value-baseline value) and the relative ((final value-baseline value)/baseline value) changes in each patient reported outcome. It was Estimated by constructing a curve of cumulative percentages of patients as a	Patients with knee OA considered themselves clinically improved if the decrease in disease activity (improvement in global assessment) exceeded 18.3 mm on the 0-100mm VAS scale.

Appendix Table F56. Minimum clinically important differences in the Visual Analogue Scale (anchor method) (continued)

Author, year Test; Worst to best, Condition	Reference	Definition of minimum clinically important differences
	function of the change in score (for example, difference in pain score) among patients whose final evaluation of response to treatment was “good, satisfactory effect with occasional episodes of pain or stiffness”.	
Tanner, 2007 ³⁴⁹ Test: Knee Disorders Subjective Form of Visual Analogue Scale Mild to moderate OA	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient’s activity score from 0 to 10 was assigned, with corresponding definitions ranging from “on sick leave/disability” to “participation in competitive sports such as soccer at a national or international elite level.”	10 of the VAS questions had a mean importance ranking of at least 3 (score on a Likert scale of 0 to 5, with 0 being not experienced and 5 being experienced and very important)
Tanner, 2007 ³⁴⁹ Test: Knee Disorders Subjective Form of Visual Analogue Scale Mild to moderate OA	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient’s activity score from 0 to 10 was assigned, with corresponding definitions ranging from “on sick leave/disability” to “participation in competitive sports such as soccer at a national or international elite level.”	4 questions had a top-20 FIP scores (FIP=frequency*mean importance; the greater the FIP, the more important a symptom or disability is to patients. A high FIP indicates that a symptom or disability is both frequently experienced and most important to patients)
Tanner, 2007 ³⁴⁹ Test: Knee Disorders Subjective Form of Visual Analogue Scale Mild to moderate OA	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient’s activity score from 0 to 10 was assigned, with corresponding definitions ranging from “on sick leave/disability” to “participation in competitive sports such as soccer at a national or international elite level.”	At least 51% of the patients with mild to moderate OA endorsed 25 (89%) of the VAS questions.
Tanner, 2007 ³⁴⁹ Test: Knee Disorders Subjective Form of Visual Analogue Scale Mild to moderate OA	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient’s activity score from 0 to 10 was assigned, with corresponding definitions ranging from “on	Five questions had a mean importance ranking of 1 or less

Appendix Table F56. Minimum clinically important differences in the Visual Analogue Scale (anchor method) (continued)

Author, year Test; Worst to best, Condition	Reference	Definition of minimum clinically important differences
	sick leave/disability” to “participation in competitive sports such as soccer at a national or international elite level.”	
Tubach, 2005 ⁴²⁸ Test: Visual Analogue Scale Worst to best: 100-0 Pain	At the final visit, patients’ opinions of their state was recorded by their answering “Yes” or “No” to “Taking into account all the activities you have during your daily life, your level of pain, and also your functional impairment, do you consider that your current state is satisfactory?”. PASS was estimated by constructing a curve of cumulative percentages of patients as a function of the score of interest at the final visit among patients who considered their state satisfactory.	Patients with knee OA and in the high tertile of score considered their state satisfactory if their pain score was less than 36.4 mm on the 0-100mm VAS scale.
Tubach, 2005 ⁴²⁹ Test: Visual Analogue Scale Worst to best: 100-0 Pain	At the final visit, patients assessed their response to NSAID treatment on a five point Likert scale (none=no good at all, ineffective drug; poor=some effect but unsatisfactory; fair=reasonable effect but could be better; good=satisfactory effect with occasional episodes of pain or stiffness; excellent=ideal response, virtually pain free).The MCII was determined in patients whose assessment of response to treatment was measured on a five point Likert scale and who had completed the final visit. The MCII was estimated for both the absolute (final value-baseline value) and the relative ((final value-baseline value)/baseline value) changes in each patient reported outcome. It was estimated by constructing a curve of cumulative percentages of patients as a function of the change in score (for example, difference in pain score) among patients whose final evaluation of response to treatment was “good, satisfactory effect with occasional episodes of pain or stiffness”.	Patients with knee OA and in the high tertile of the VAS score considered themselves clinically improved if the decrease in pain exceeded 36.6 mm on the 0-100mm VAS scale.
Tubach, 2005 ⁴²⁸ Test: Visual Analogue Scale Worst to best: 100-0 Pain	At the final visit, patients’ opinions of their state was recorded by their answering “Yes” or “No” to “Taking into account all the activities you have during your daily life, your level of pain, and also your functional impairment, do you consider that your current state is satisfactory?”. PASS was estimated by constructing a curve of cumulative percentages of patients as a function of the score of interest at the final visit among patients who considered their state satisfactory.	Patients with knee OA and in the intermediate tertile of score considered their state satisfactory if their pain score was less than 34.5mm on the 0-100mm VAS scale
Tubach, 2005 ⁴²⁹ Test: Visual Analogue Scale Worst to best: 100-0 Pain	At the final visit, patients assessed their response to NSAID treatment on a five point Likert scale (none=no good at all, ineffective drug; poor=some effect but unsatisfactory; fair=reasonable effect but could be better; good=satisfactory effect with occasional episodes of pain or stiffness; excellent=ideal response, virtually pain free).The MCII was determined in patients whose assessment of response to treatment was measured on a five point Likert scale and who had completed the final visit. The MCII was estimated for both the absolute (final value-baseline value) and the relative ((final value-baseline value)/baseline value) changes in each patient reported outcome. It was estimated by constructing a curve of cumulative percentages of patients as a	Patients with knee OA and in the intermediate tertile of the VAS score considered themselves clinically improved if the decrease in pain exceeded 27.4 mm on the 0-100mm VAS scale

Appendix Table F56. Minimum clinically important differences in the Visual Analogue Scale (anchor method) (continued)

Author, year Test; Worst to best, Condition	Reference	Definition of minimum clinically important differences
	function of the change in score (for example, difference in pain score) among patients whose final evaluation of response to treatment was "good, satisfactory effect with occasional episodes of pain or stiffness".	
Tubach, 2005 ⁴²⁸ Test: Visual Analogue Scale Worst to best: 100-0 Pain	At the final visit, patients' opinions of their state was recorded by their answering "Yes" or "No" to "Taking into account all the activities you have during your daily life, your level of pain, and also your functional impairment, do you consider that your current state is satisfactory?". PASS was estimated by constructing a curve of cumulative percentages of patients as a function of the score of interest at the final visit among patients who considered their state satisfactory.	Patients with knee OA and in the low tertile of score considered their state satisfactory if their pain score was less than 27.0 mm on the 0-100mm VAS scale
Tubach, 2005 ⁴²⁹ Test: Visual Analogue Scale Worst to best: 100-0 Pain	At the final visit, patients assessed their response to NSAID treatment on a five point Likert scale (none=no good at all, ineffective drug; poor=some effect but unsatisfactory; fair=reasonable effect but could be better; good=satisfactory effect with occasional episodes of pain or stiffness; excellent=ideal response, virtually pain free). The MCII was determined in patients whose assessment of response to treatment was measured on a five point Likert scale and who had completed the final visit. The MCII was estimated for both the absolute (final value-baseline value) and the relative ((final value-baseline value)/baseline value) changes in each patient reported outcome. It was estimated by constructing a curve of cumulative percentages of patients as a function of the change in score (for example, difference in pain score) among patients whose final evaluation of response to treatment was "good, satisfactory effect with occasional episodes of pain or stiffness".	Patients with knee OA and in the low tertile of the VAS score considered themselves clinically improved if the decrease in pain exceeded 10.8 mm on the 0-100mm VAS scale
Tubach, 2005 ⁴²⁸ Test: Visual Analogue Scale Worst to best: 100-0 Pain	At the final visit, patients' opinions of their state was recorded by their answering "Yes" or "No" to "Taking into account all the activities you have during your daily life, your level of pain, and also your functional impairment, do you consider that your current state is satisfactory?". PASS was estimated by constructing a curve of cumulative percentages of patients as a function of the score of interest at the final visit among patients who considered their state satisfactory.	Patients with knee OA considered their state satisfactory if their pain score was less than 32.3 mm on the 0-100mm VAS scale
Tubach, 2005 ⁴²⁹ Test: Visual Analogue Scale Worst to best: 100-0 Pain	At the final visit, patients assessed their response to NSAID treatment on a five point Likert scale (none=no good at all, ineffective drug; poor=some effect but unsatisfactory; fair=reasonable effect but could be better; good=satisfactory effect with occasional episodes of pain or stiffness; excellent=ideal response, virtually pain free). The MCII was determined in patients whose assessment of response to treatment was measured on a five point Likert scale and who had completed the final visit. The MCII was estimated for both the absolute (final value-baseline value) and the relative ((final value-baseline value)/baseline	Patients with knee OA considered themselves clinically improved if the decrease in pain exceeded 19.9 mm on the 0-100mm VAS scale.

Appendix Table F56. Minimum clinically important differences in the Visual Analogue Scale (anchor method) (continued)

Author, year Test; Worst to best, Condition	Reference	Definition of minimum clinically important differences
	value) changes in each patient reported outcome. It was estimated by constructing a curve of cumulative percentages of patients as a function of the change in score (for example, difference in pain score) among patients whose final evaluation of response to treatment was "good, satisfactory effect with occasional episodes of pain or stiffness".	
Tubach, 2005 ⁴³⁰ Test: Visual Analogue Scale Worst to best: 100-0 Pain	(1) "What is the level of pain above which you experience difficulties?" (This could be considered close to the external anchor for the PASS.) (2) "What is the level of pain above which you would consider taking a pain killer drug?" (This could be considered close to the external anchor for the LDAS (low disease activity state).)	The minimum clinically important improvement in the high tertile of score is -37 (absolute change).
Tubach, 2005 ⁴³⁰ Test: Visual Analogue Scale Worst to best: 100-0 Pain	(1) "What is the level of pain above which you experience difficulties?" (This could be considered close to the external anchor for the PASS.) (2) "What is the level of pain above which you would consider taking a pain killer drug?" (This could be considered close to the external anchor for the LDAS.)	The minimum clinically important improvement in the intermediate tertile of score is -27 (absolute change).
Tubach, 2005 ⁴³⁰ Test: Visual Analogue Scale Worst to best: 100-0 Pain	(1) "What is the level of pain above which you experience difficulties?" (This could be considered close to the external anchor for the PASS.) (2) "What is the level of pain above which you would consider taking a pain killer drug?" (This could be considered close to the external anchor for the LDAS.)	The minimum clinically important improvement in the low tertile of score is -11 (absolute change).
Tubach, 2005 ⁴³⁰ Test: Visual Analogue Scale Worst to best: 100-0 Patient's global assessment	(1) "What is the level of pain above which you experience difficulties?" (This could be considered close to the external anchor for the PASS.) (2) "What is the level of pain above which you would consider taking a pain killer drug?" (This could be considered close to the external anchor for the LDAS.)	The minimum clinically important improvement in the high tertile of score is -43(absolute change).
Tubach, 2005 ⁴³⁰ Test: Visual Analogue Scale Worst to best: 100-0 Patient's global assessment	(1) "What is the level of pain above which you experience difficulties?" (This could be considered close to the external anchor for the PASS.) (2) "What is the level of pain above which you would consider taking a pain killer drug?" (This could be considered close to the external anchor for the LDAS.)	The minimum clinically important improvement in the intermediate tertile of score is -25 (absolute change)
Tubach, 2005 ⁴³⁰ Test: Visual Analogue Scale Worst to best: 100-0 Patient's global assessment	(1) "What is the level of pain above which you experience difficulties?" (This could be considered close to the external anchor for the PASS.) (2) "What is the level of pain above which you would consider taking a pain killer drug?" (This could be considered close to the external anchor for the LDAS.)	The minimum clinically important improvement in the low tertile of score is -6 (absolute change)
Bellamy, 2001 ⁴³⁵ Test: Visual Analogue Scale :pain(physician assessment) Worst to best: 100-0 Pain	Delphi exercise to define minimum clinically important differences	The MCID for physicians overall assessment of pain =15 on the VAS scale
Bellamy, 2001 ⁴³⁵ Test: Visual Analogue Scale	Delphi exercise to define minimum clinically important differences	The MCID for physicians overall assessment of stiffness =15 on the VAS scale

Appendix Table F56. Minimum clinically important differences in the Visual Analogue Scale (anchor method) (continued)

Author, year Test; Worst to best, Condition	Reference	Definition of minimum clinically important differences
(physician assessment of morning stiffness) Worst to best: 100-0 Stiffness		
Bellamy, 2001 ⁴³⁵ Test: Visual Analogue Scale (Physician assessment of physical disability) Worst to best: 100-0 Disability	Delphi exercise to define minimum clinically important differences	The MCID for physicians overall assessment of physical disability on the VAS scale =15
Bellamy, 2001 ⁴³⁵ Test: Visual Analogue Scale (Physician assessment of disease activity) Worst to best: 100-0 Disease activity	Delphi exercise to define minimum clinically important differences	The MCID for physician's global assessment of disease activity on the VAS scale =15
Bellamy, 2001 ⁴³⁵ Test: Visual Analogue Scale (patient pain at rest) Worst to best: 100-0 Pain	Delphi exercise to define minimum clinically important differences	The MCID for patient pain at rest on the VAS scale =10.5
Bellamy, 2001 ⁴³⁵ Test: Visual Analogue Scale (patient pain on movement) Worst to best: 100-0 Pain	Delphi exercise to define minimum clinically important differences	The MCID for patient pain on movement on the VAS scale =17.5
Bellamy, 2001 ⁴³⁵ Test: Visual Analogue Scale (patient overall assessment of pain) Worst to best: 100-0 Pain	Delphi exercise to define minimum clinically important differences	The MCID for patient overall assessment of pain on the VAS scale =15
Bellamy, 2001 ⁴³⁵ Test: Visual Analogue Scale (patient's overall assessment of morning stiffness) Worst to best: 100-0 Stiffness	Delphi exercise to define minimum clinically important differences	The MCID for patient overall assessment of morning stiffness on the VAS scale =17.5

Appendix Table F56. Minimum clinically important differences in the Visual Analogue Scale (anchor method) (continued)

Author, year Test; Worst to best, Condition	Reference	Definition of minimum clinically important differences
Bellamy, 2001 ⁴³⁵ Test: Visual Analogue Scale (patient's overall assessment of physical disability) Worst to best: 100-0 Physical disability	Delphi exercise to define minimum clinically important differences	The MCID for patient overall assessment of physical disability on the VAS scale =15
Bellamy, 2001 ⁴³⁵ Test: Visual Analogue Scale (patient's global assessment of disease activity) Worst to best: 100-0 Disease activity	Delphi exercise to define minimum clinically important differences	The MCID for patient's global assessment of disease activity on the VAS scale =20

Appendix Table F57. Minimum clinically important differences in the Short-Form Questionnaire-36 (SF-36)

Author, year; Method; Worst to best; Scale	Reference	Definition of minimum clinically important differences
Quintana, 2006 ³³⁹ Method: Anchor Worst to best: 0-100 SF-36: bodily pain	Six months after the intervention, patients were sent a letter with the questionnaires and additional questions on the clinical aspects of their disease and satisfaction with the intervention. The satisfaction question was dichotomized as being satisfied or not. At this time, patients answered a transitional question about their joint improvement after the intervention. The possible responses included "a great deal better," "somewhat better," "equal," "somewhat worse," or "a great deal worse."	The MCID (minimal clinically importance) for bodily pain of SF-36 was at 12.83
Quintana, 2006 ³³⁹ Method: Anchor Worst to best: 0-100 SF-36: general health	Six months after the intervention, patients were sent a letter with the questionnaires and additional questions on the clinical aspects of their disease and satisfaction with the intervention. The satisfaction question was dichotomized as being satisfied or not. At this time, patients answered a transitional question about their joint improvement after the intervention. The possible responses included "a great deal better," "somewhat better," "equal," "somewhat worse," or "a great deal worse."	The MCID for general health of SF-36 was at 0.11
Quintana, 2006 ³³⁹ Method: ANCHOR Worst to best: 0-100 SF-36: mental health	Six months after the intervention, patients were sent a letter with the questionnaires and additional questions on the clinical aspects of their disease and satisfaction with the intervention. The satisfaction question was dichotomized as being satisfied or not. At this time, patients answered a transitional question about their joint improvement after the intervention. The possible responses included "a great deal better," "somewhat better," "equal," "somewhat worse," or "a great deal worse."	The MCID for mental health of SF-36 was at 0.76
Quintana, 2006 ³³⁹ Method: Anchor Worst to best: 0-100 SF-36: physical functioning	Six months after the intervention, patients were sent a letter with the questionnaires and additional questions on the clinical aspects of their disease and satisfaction with the intervention. The satisfaction question was dichotomized as being satisfied or not. At this time, patients answered a transitional question about their joint improvement after the intervention. The possible responses included "a great deal better," "somewhat better," "equal," "somewhat worse," or "a great deal worse."	The MCID for physical functioning of SF-36 was at 10.04
Quintana, 2006 ³³⁹ Method: Anchor Worst to best: 0-100 SF-36: role emotional	Six months after the intervention, patients were sent a letter with the questionnaires and additional questions on the clinical aspects of their disease and satisfaction with the intervention. The satisfaction question was dichotomized as being satisfied or not. At this time, patients answered a transitional question about their joint improvement after the intervention. The possible responses included "a great deal better," "somewhat better," "equal," "somewhat worse," or "a great deal worse."	The MCID for role-emotional of SF-36 was at 2.43
Quintana, 2006 ³³⁹ Method: Anchor Worst to best: 0-100 SF-36: role physical	Six months after the intervention, patients were sent a letter with the questionnaires and additional questions on the clinical aspects of their disease and satisfaction with the intervention. The satisfaction question was dichotomized as being satisfied or not. At this time, patients answered a transitional question about their joint improvement after the intervention. The possible responses included "a great deal better," "somewhat better," "equal," "somewhat worse," or "a great deal worse."	The MCID for role- physical of SF-36 was at 7.81
Quintana, 2006 ³³⁹ Method: Anchor Worst to best: 0-100 SF-36: social functioning	Six months after the intervention, patients were sent a letter with the questionnaires and additional questions on the clinical aspects of their disease and satisfaction with the intervention. The satisfaction question was dichotomized as being satisfied or not. At this time, patients answered a transitional question about their joint improvement after the	The MCID for social functioning of SF-36 was at 8.77

Appendix Table F57. Minimum clinically important differences in the Short-Form Questionnaire-36 (SF-36) (continued)

Author, year; Method; Worst to best; Scale	Reference	Definition of minimum clinically important differences
	intervention. The possible responses included "a great deal better," "somewhat better," "equal," "somewhat worse," or "a great deal worse."	
Quintana, 2006 ³³⁹ Method: Anchor Worst to best: 0-100 SF-36: vitality	Six months after the intervention, patients were sent a letter with the questionnaires and additional questions on the clinical aspects of their disease and satisfaction with the intervention. The satisfaction question was dichotomized as being satisfied or not. At this time, patients answered a transitional question about their joint improvement after the intervention. The possible responses included "a great deal better," "somewhat better," "equal," "somewhat worse," or "a great deal worse."	The MCID for vitality of SF-36 was at 5.42
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 0 to 100 SF-36 :bodily pain	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month followup, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories "much worse," "slightly worse," "equal," "slightly better," and "much better."	The mean score difference between the "equal" group and the "slightly better" group =7.2 that was the MCID for worsening
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 0 to 100 SF-36 :bodily pain	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month followup, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories "much worse," "slightly worse," "equal," "slightly better," and "much better."	The mean score difference between the "equal" group and the "slightly better" group =7.8 that was the MCID for improvement
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:bodily pain	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 bodily pain score of 16.86(31.83) was equivalent to patient reporting "somewhat better". This was considered the MCID.
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:bodily pain	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 bodily pain score of 22.17(34.44) was equivalent to patient reporting "A great deal better".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:bodily pain	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 bodily pain score of 7.53(26.00) was equivalent to patient reporting "equal".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:bodily pain	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 bodily pain score of -8.47(21.46) was equivalent to patient reporting "worse".
Escobar, 2007 ⁴³⁴ Method: Distribution Worst to best: 0 to 100 SF-36:bodily pain	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: The MDC for the SF-36 bodily pain subscale that expresses the minimal magnitude of change in scores above or below which the observed changes is likely to be real at 95% level of confidence and not just measurement error was 37.91

Appendix Table F57. Minimum clinically important differences in the Short-Form Questionnaire-36 (SF-36) (continued)

Author, year; Method; Worst to best; Scale	Reference	Definition of minimum clinically important differences
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:general health	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 general health score of 0.85(18.05) was equivalent to patient reporting "somewhat better". This was considered the MCID.
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:general health	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 general health score of -0.88(23.29) was equivalent to patient reporting "equal"
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-3:general health 6	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 general health score of -10.82(19.86) was equivalent to patient reporting "worse"
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:general health	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 general health score of 4.52(17.80) was equivalent to patient reporting "A great deal better"
Escobar, 2007 ⁴³⁴ Method: Distribution Worst to best: 0 to 100 SF-36:general health	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: The MDC for the SF-36 general health subscale that expresses the minimal magnitude of change in scores above or below which the observed changes is likely to be real at 95% level of confidence and not just measurement error was 27.40
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:mental health	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 mental health score of -0.32(23.20) was equivalent to patient reporting "somewhat better". This was considered the MCID.
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:mental health	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 mental health score of -0.44(19.16) was equivalent to patient reporting "equal".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:mental health	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 mental health score of 11.88(22.38) was equivalent to patient reporting "A great deal better"
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:mental health	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 mental health score of -16.82(26.41) was equivalent to patient reporting "worse".

Appendix Table F57. Minimum clinically important differences in the Short-Form Questionnaire-36 (SF-36) (continued)

Author, year; Method; Worst to best; Scale	Reference	Definition of minimum clinically important differences
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 0 to 100 SF-36 :physical component summary	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month followup, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories "much worse," "slightly worse," "equal," "slightly better," and "much better."	The mean score difference between the "equal" group and the "slightly better" group =2.0 that was the MCID for improvement
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 0 to 100 SF-36 :physical component summary	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month followup, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories "much worse," "slightly worse," "equal," "slightly better," and "much better."	The mean score difference between the "equal" group and the "slightly better" group =2.0 that was the MCID for worsening
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 0 to 100 SF-36 :physical function	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month followup, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories "much worse," "slightly worse," "equal," "slightly better," and "much better."	The mean score difference between the "equal" group and the "slightly better" group =3.3 that was the MCID for improvement
Angst, 2001 ⁴²⁴ Method: Anchor Worst to best: 0 to 100 SF-36 :physical function	The transition questionnaire was used to gather data from the patients about their current subjective health status in relation to the OA joint in terms of their general health. At the 3-month followup, patients had to compare their general health status with that of 3 months earlier, i.e., with that at baseline examination, using the assessment categories "much worse," "slightly worse," "equal," "slightly better," and "much better."	The mean score difference between the "equal" group and the "slightly better" group =5.3 that was the MCID for worsening
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:physical functioning	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 physical functioning score of 11.57(22.60) was equivalent to patient reporting "somewhat better". This was considered the MCID.
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:physical functioning	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 physical functioning score of 3.64(30.75) was equivalent to patient reporting "equal".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:physical functioning	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 physical functioning score of 30.38(26.54) was equivalent to patient reporting "A great deal better"
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:physical functioning	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 physical functioning score of - 5.22(23.52) was equivalent to patient reporting "worse".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:role emotional	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 role emotional score of 1.11(45.89) was equivalent to patient reporting "equal".

Appendix Table F57. Minimum clinically important differences in the Short-Form Questionnaire-36 (SF-36) (continued)

Author, year; Method; Worst to best; Scale	Reference	Definition of minimum clinically important differences
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:role emotional	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 role emotional score of 14.23(46.86) was equivalent to patient reporting "A great deal better".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-3:role emotional 6	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 role emotional score of 30.95(68.52) was equivalent to patient reporting "worse".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-3:role emotional 6	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 role emotional score of 7.65(54.23) was equivalent to patient reporting "somewhat better". This was considered the MCID. minimum
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:role physical	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 role physical of 11.69(35.27) was equivalent to patient reporting "somewhat better". This was considered the MCID.
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:role physical	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 role physical of 2.30(41.06) was equivalent to patient reporting "equal".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36:role physical	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 role physical of 37.81(46.42) was equivalent to patient reporting "a great deal better".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-3:role physical 6	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 role physical of -9.62(29.82) was equivalent to patient reporting "worse".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36: social functioning	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 social functioning score of 0.00(27.20) was equivalent to patient reporting "equal".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36: social functioning	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 social functioning score of 11.66(35.37) was equivalent to patient reporting "somewhat better". This was considered the MCID.

Appendix Table F57. Minimum clinically important differences in the Short-Form Questionnaire-36 (SF-36) (continued)

Author, year; Method; Worst to best; Scale	Reference	Definition of minimum clinically important differences
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36: social functioning	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 social functioning score of -12.50(33.85) was equivalent to patient reporting "worse".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36: social functioning	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 social functioning score of 22.58(31.67) was equivalent to patient reporting "A great deal better"
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36: utility SF-6D	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 utility SF-6D score of -0.04(0.12) was equivalent to patient reporting "worse".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36: utility SF-6D	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 utility SF-6D score of 0.04(0.15) was equivalent to patient reporting "somewhat better". This was considered the MCID.
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36: utility SF-6D	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 utility SF-6D score of 0.05(0.12) was equivalent to patient reporting "equal".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36: utility SF-6D	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 utility SF-6D score of 0.14(0.15) was equivalent to patient reporting "a great deal better".
Escobar, 2007 ⁴³⁴ Method: Distribution Worst to best: 0 to 100 SF-36: utility SF-6D	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: The MDC for the SF-36 utility SF-6D subscale that expresses the minimal magnitude of change in scores above or below which the observed changes is likely to be real at 95% level of confidence and not just measurement error was 0.17
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36: vitality	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 vitality score of -1.49(18.13) was equivalent to patient reporting "equal".
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36: vitality	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 vitality score of -12.40(16.18) was equivalent to patient reporting "worse".
Escobar, 2007 ⁴³⁴ Method: Anchor	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better",	At 6 months: Mean change in SF-36 vitality score of 16.62(24.54) was

Appendix Table F57. Minimum clinically important differences in the Short-Form Questionnaire-36 (SF-36) (continued)

Author, year; Method; Worst to best; Scale	Reference	Definition of minimum clinically important differences
Worst to best: 0 to 100 SF-36: vitality	somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	equivalent to patient reporting "a great deal better"
Escobar, 2007 ⁴³⁴ Method: Anchor Worst to best: 0 to 100 SF-36: vitality	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: Mean change in SF-36 vitality score of 3.86(24.75) was equivalent to patient reporting "somewhat better". This was considered the MCID.
Escobar, 2007 ⁴³⁴ Method: Distribution Worst to best: 0 to 100 SF-36	All patients had to answer a question about its improvement in their knee at 6 months and 2 years after the intervention. The possible responses were "a great deal better", "somewhat better", "equal", "somewhat worse" and "a great deal worse". The answer "somewhat better" was used to establish the MCID for improvement.	At 6 months: The MDC for the SF-36 vitality subscale that expresses the minimal magnitude of change in scores above or below which the observed changes is likely to be real at 95% level of confidence and not just measurement error was 29.84

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Tanner, 2007 ³⁴⁹ Test: American Academy of Orthopedic Surgeons (AAOS) Sports Knee Rating Scale Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	11 questions had a mean importance ranking of 1 or less
Tanner, 2007 ³⁴⁹ Test: American Academy of Orthopedic Surgeons Sports Knee Rating Scale Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	3 of the AAOS questions had a mean importance ranking of at least 3 (score on a Likert scale of 0 to 5, with 0 being not experienced and 5 being experienced and very important)
Tanner, 2007 ³⁴⁹ Test: American Academy of Orthopedic Surgeons Sports Knee Rating Scale Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	3 questions had a top-20 FIP scores (FIP=frequency*mean importance; the greater the FIP, the more important a symptom or disability is to patients. A high FIP indicates that a symptom or disability is both frequently experienced and most important to patients)
Tanner, 2007 ³⁴⁹ Test: American Academy of Orthopedic Surgeons Sports Knee Rating Scale Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	At least 51% of the patients with mild to moderate OA endorsed 11 (55%) of the AAOS questions.

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Tanner, 2007 ³⁴⁹ Test: The Activities of Daily Living Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	5/17 of the ADL questions had a mean importance ranking of at least 3 (score on a Likert scale of 0 to 5, with 0 being not experienced and 5 being experienced and very important)
Tanner, 2007 ³⁴⁹ Test: The Activities of Daily Living Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	8 questions had a top-20 FIP scores (FIP=frequency*mean importance; the greater the FIP, the more important a symptom or disability is to patients. A high FIP indicates that a symptom or disability is both frequently experienced and most important to patients)
Tanner, 2007 ³⁴⁹ Test: The Activities of Daily Living Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	At least 51% of the patients with mild to moderate OA endorsed 16/17 (94%) of the ADL questions
Tanner, 2007 ³⁴⁹ Test: The Activities of Daily Living Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	No question had a mean importance ranking of 1 or less

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Bellamy, 2007 ³⁴¹ Test: Bellamy et al. Low Intensity Symptom State-attainment Index Worse to best: 100 to 0 Method: Anchor	WOMAC Likert 3.0: pain subscale	5 threshold levels of BLISS response were performed using the WOMAC Pain Scale (WOMAC-P), from a very low level of pain to higher levels of pain. The WOMAC-P varies from 0 to 20 and in the analysis data were transformed to normalized units (NU) on a 0-100 scale. The threshold levels included: WOMAC pain score ≤ 5 , ≤ 10 , ≤ 15 , ≤ 20 , and ≤ 25 (0=no pain, 100=extreme pain). The minimal pain intensity requirement at baseline for inclusion in this study was 35 NU, a value just above the MCAS (Maximally Clinically Acceptable Status) and PASS (Patient Acceptable Symptom State) thresholds for patient acceptable pain intensity of 33 and 32mm, respectively, for patient acceptable pain intensity.. A WOMAC-based BLISS-10, is a potentially symptom intensity state because it is a cut point at which a clinically important between-group difference (24 percentage points) is discernible.
Thomas, 2008 ³⁴² Test: Chronic Pain Grade Method: Anchor	Numerical Rating Scale (NRS)	At 18 month follow-up: the mean for the predicted probability of Chronic Pain Grade II-IV knee pain for patients who belonged to the baseline risk score group (approach proposed by Von Korff and Miglioretti) intermediate risk (5-11) was 0.341 (range: 0.218, 0.499)
Thomas, 2008 ³⁴² Test: Chronic Pain Grade Method: Anchor	Numerical Rating Scale	At 18 month follow-up: the mean for the predicted probability of Chronic Pain Grade II-IV knee pain for patients who belonged to the baseline risk score group (approach proposed by Von Korff and Miglioretti) low risk (0-4) was 0.153 (range: 0.106, 0.184)
Thomas, 2008 ³⁴²	Numerical Rating Scale	At 18 month follow-up: the mean for

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Test: Chronic Pain Grade Method: Anchor		the predicted probability of Chronic Pain Grade II-IV knee pain for patients who belonged to the baseline risk score group (approach proposed by Von Korff and Miglioretti) possible chronic pain (12-17) was 0.656 (range: 0.552-0.781)
Thomas, 2008 ³⁴² Test: Chronic Pain Grade Method: Anchor	Numerical Rating Scale	At 18 month follow-up: the mean for the predicted probability of Chronic Pain Grade II-IV knee pain for patients who belonged to the baseline risk score group (approach proposed by Von Korff and Miglioretti) probable chronic pain (18+) was 0.888 (range: 0.815-0.974)
Thomas, 2008 ³⁴² Test: Chronic Pain Grade Method: Anchor	Numerical Rating Scale	At 3-year follow-up: the mean for the predicted probability of Chronic Pain Grade II-IV knee pain for patients who belonged to the 18-month risk -score group (approach proposed by Von Korff and Miglioretti) intermediate risk (5-10) was 0.341 (range: 0.229, 0.479)
Thomas, 2008 ³⁴² Test: Chronic Pain Grade Method: Anchor	Numerical Rating Scale	At 3-year follow-up: the mean for the predicted probability of Chronic Pain Grade II-IV knee pain for patients who belonged to the 18-month risk- score group (approach proposed by Von Korff and Miglioretti) low risk (0-4) was 0.156 (range: 0.108, 0.192)
Thomas, 2008 ³⁴² Test: Chronic Pain Grade Method: Anchor	Numerical Rating Scale	At 3-year follow-up: the mean for the predicted probability of Chronic Pain Grade II-IV knee pain for patients who belonged to the 18-month risk- score group (approach proposed by Von Korff and Miglioretti) possible chronic pain (12-17) was 0.662 (range: 0.536, 0.781)
Thomas, 2008 ³⁴² Test: Chronic Pain Grade Method: Anchor	Numerical Rating Scale	At 3-year follow-up: the mean for the predicted probability of Chronic Pain Grade II-IV knee pain for patients who belonged to the 18-month risk- score

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Thomas, 2008 ³⁴² Test: Chronic Pain Grade Method: Anchor	Numerical Rating Scale	group (approach proposed by Von Korff and Miglioretti) probable chronic pain (18+) was 0.891 (range: 0.817, 0.982)
Thomas, 2008 ³⁴² Test: Chronic Pain Grade Method: Anchor	Numerical Rating Scale	At 3-year follow-up: the mean for the predicted probability of Chronic Pain Grade II-IV knee pain for patients who belonged to the baseline risk score group (approach proposed by Von Korff and Miglioretti) intermediate risk (4-10) was 0.329 (range: 0.214, 0.466)
Thomas, 2008 ³⁴² Test: Chronic Pain Grade Method: Anchor	Numerical Rating Scale	At 3-year follow-up: the mean for the predicted probability of Chronic Pain Grade II-IV knee pain for patients who belonged to the baseline risk score group (approach proposed by Von Korff and Miglioretti) low risk (0-3) was 0.165 (range: 0.132, 0.182)
Thomas, 2008 ³⁴² Test: Chronic Pain Grade Method: Anchor	Numerical Rating Scale	At 3-year follow-up: the mean for the predicted probability of Chronic Pain Grade II-IV knee pain for patients who belonged to the baseline risk score group (approach proposed by Von Korff and Miglioretti) possible chronic pain (11-17) was 0.637 (range: 0.514, 0.773)
Thomas, 2008 ³⁴² Test: Chronic Pain Grade Method: Anchor	Numerical Rating Scale	At 3-year follow-up: the mean for the predicted probability of Chronic Pain Grade II-IV knee pain for patients who belonged to the baseline risk score group (approach proposed by Von Korff and Miglioretti) probable chronic pain (18+) was 0.878 (range: 0.806, 0.967)
Belo, 2009 ⁴³⁶ Test: American College of Rheumatology (ACR) Method: Anchor	Baseline and 12-month follow-up values of WOMAC ; SF-36; KSS (Knee Society Score); Lysholm Knee Scoring Scale; and baseline values of Tampa Scale for Kinesiophobia	The clinical ACR classification criteria of knee OA have no prognostic value for predicting persisting knee complaints or an increase of disability at 1-year of follow-up in adult patients with non-traumatic knee complaints in GP.

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Bellamy, 2001 ⁴³⁵ Test: Dictionary of the Rheumatic Diseases Method Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for grip strength (Dictionary of the Rheumatic Diseases Method) =37.5
Bellamy, 2001 ⁴³⁵ Test: Investigators subject opinion of patients general condition Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for investigator's opinion of patient's general condition =0.90
Bellamy, 2001 ⁴³⁵ Test: Physicians' estimate of disease activity Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for physician's estimate of disease activity =0.78
Bellamy, 2001 ⁴³⁵ Test: Subjective pain evaluation by patient Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for subjective pain evaluation by patient=0.78
Bellamy, 2001 ⁴³⁵ Test: Patient estimate of disease activity Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for patient estimate of disease activity =1
Bellamy, 2001 ⁴³⁵ Test: Patient's opinion of general condition Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for patient's opinion of general condition =0.9
Redelmeier, 1993 ³⁴⁷ Test: Health Assessment Questionnaire (HAQ) Method: Anchor	After completing the initial questionnaires, participants were asked to talk to each other in one-on-one conversations. At the end of each dialogue, participants were told to rate their disability relative to their conversational partner. The rating question was, "Compared with this person, my physical ability to function during the past week was ..." The response categories were as follows: "much better," "somewhat better," "about the same," "somewhat worse," and "much worse".	HAQ scores needed to improve by 0.17 units for respondents on an average to stop rating themselves as about the same and start rating themselves as somewhat better (0.15 to -0.02)
Redelmeier, 1993 ³⁴⁷ Test: Health Assessment Questionnaire Method: Anchor	After completing the initial questionnaires, participants were asked to talk to each other in one-on-one conversations. At the end of each dialogue, participants were told to rate their disability relative to their conversational partner. The rating question was, "Compared with this person, my physical ability to function during the past week was ..." The response categories were as follows: "much better," "somewhat better," "about the same," "somewhat	HAQ scores needed to differ by 0.22 units for average respondents to stop rating themselves as about the same and start rating themselves as somewhat worse (0.37 to 0.15)

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Redelmeier, 1993 ³⁴⁷ Test: Health Assessment Questionnaire Method: Anchor	worse," and "much worse". After completing the initial questionnaires, participants were asked to talk to each other in one-on-one conversations. At the end of each dialogue, participants were told to rate their disability relative to their conversational partner. The rating question was, "Compared with this person, my physical ability to function during the past week was ...". The response categories were as follows: "much better," "somewhat better," "about the same," "somewhat worse," and "much worse".	The threshold of symptomatic clinical importance for OA =0.20
Redelmeier, 1993 ³⁴⁷ Test: Health Assessment Questionnaire Method: Anchor	After completing the initial questionnaires, participants were asked to talk to each other in one-on-one conversations. At the end of each dialogue, participants were told to rate their disability relative to their conversational partner. The rating question was, "Compared with this person, my physical ability to function during the past week was ...". The response categories were as follows: "much better," "somewhat better," "about the same," "somewhat worse," and "much worse".	The threshold of symptomatic clinical importance for less disabled participants was significantly lower than the threshold for more disabled participants (0.08 vs. 0.29 HAQ units; p<0.05)
Redelmeier, 1993 ³⁴⁷ Test: Health Assessment Questionnaire Method: Anchor	After completing the initial questionnaires, participants were asked to talk to each other in one-on-one conversations. At the end of each dialogue, participants were told to rate their disability relative to their conversational partner. The rating question was, "Compared with this person, my physical ability to function during the past week was ...". The response categories were as follows: "much better," "somewhat better," "about the same," "somewhat worse," and "much worse".	The average patient would find an HAQ score difference on the order of 0.2 units to be an important symptomatic difference
Tanner, 2007 ³⁴⁹ Test: International Knee Documentation Committee Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	3 questions had a top-20 FIP scores (FIP=frequency*mean importance; the greater the FIP, the more important a symptom or disability is to patients. A high FIP indicates that a symptom or disability is both frequently experienced and most important to patients)
Tanner, 2007 ³⁴⁹ Test: International Knee Documentation Committee Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	4 of the IKDC questions had a mean importance ranking of at least 3 (score on a Likert scale of 0 to 5, with 0 being not experienced and 5 being experienced and very important)
Tanner, 2007 ³⁴⁹	A questionnaire of 111 items was developed by combining 222 patient-	At least 51% of the patients with mild

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Test: International Knee Documentation Committee Method: Anchor	directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	to moderate OA endorsed 18 (100%) of the IKDC questions
Tanner, 2007 ³⁴⁹ Test: International Knee Documentation Committee Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	Two questions had a mean importance ranking of 1 or less
Ehrich, 2000 ⁴³⁷ Test: WOMAC VA 3.1: (pain, stiffness, and physical function scales); VAS (patient walking on a flat surface score); Patient global assessment of disease status; Investigator global assessment of disease status Method: Anchor	Patient global response to therapy measure	For patient global response to therapy measure: The minimum perceptible clinical improvement (defined as the difference in mean change scores between patients with a "none" response and those with a "poor" response on the patient global response to therapy measure) was 0.43 (on a 0-4 Likert scale) for the investigator global disease status measure, 11.1 (on a 100mm VAS) for the WOMAC pain walking on a flat surface item; 11.7 for the patient global disease status, 9.7 on WOMAC pain, 9.3 on WOMAC physical functioning, and 10.0 on WOMAC stiffness
Ehrich, 2000 ⁴³⁷ Test: WOMAC VA 3.1: (pain, stiffness, and physical function scales); VAS (patient walking on a flat surface score); Patient global assessment of disease status; Investigator global assessment of disease status Method:	Investigator global response to therapy measure	For investigator global response to therapy measure: The minimum perceptible clinical improvement (defined as the difference in mean change scores between patients with a "none" response and those with a "poor" response on the investigator global response to therapy measure)

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Anchor		was 0.49 (on a 0-4 Likert scale) for the investigator global disease status measure, 12.2 (on a 100mm VAS) for the WOMAC pain walking on a flat surface item; 11.1 for the patient global disease status, 10.8 on WOMAC pain, 7.6 on WOMAC physical functioning, and 10.4 on WOMAC stiffness
Ehrich, 2000 ⁴³⁷ Test: WOMAC: pain walking on a flat surface Method: Anchor	Patient global response to therapy measure and investigator global response to therapy measure	The minimum perceptible clinical improvement of roughly 10mm is seen as the difference between the median change scores for the "none" and the "poor" groups.
Fransen, 2003 ³⁵¹ Test: Knee extensor force in Newtons Method: Anchor	Knee extensor force evaluated on 2 occasions; WOMAC:VAS version	Female (50-59 years) with knee OA would need to show a change of 16.2N in knee extensor force for the clinician to be moderately confident that an actual change had occurred.
Fransen, 2003 ³⁵¹ Test: Knee extensor force in Newtons Method: Anchor	Knee extensor force evaluated on 2 occasions; WOMAC:VAS version	Female (60-69 years) with knee OA would need to show a change of 21.6N in knee extensor force for the clinician to be moderately confident that an actual change had occurred.
Fransen, 2003 ³⁵¹ Test: Knee extensor force in Newtons Method: Anchor	Knee extensor force evaluated on 2 occasions; WOMAC:VAS version	Female (70-79 years) with knee OA would need to show a change of 18.5N in knee extensor force for the clinician to be moderately confident that an actual change had occurred.
Fransen, 2003 ³⁵¹ Test: Knee extensor force in Newtons Method: Anchor	Knee extensor force evaluated on 2 occasions; WOMAC:VAS version	Male (60-69 years) with knee OA would need to show a change of 6N in knee extensor force for the clinician to be moderately confident that an actual change had occurred.
Fransen, 2003 ³⁵¹ Test: Knee extensor force in Newtons Method: Anchor	Knee extensor force evaluated on 2 occasions; WOMAC:VAS version	Male (70-79 years) with knee OA would need to show a change of 17N in knee extensor force for the clinician to be moderately confident that an actual change had occurred.
Fransen, 2003 ³⁵¹ Test: Knee flexor force in Newtons Method:	Knee flexor force evaluated on 2 occasions; WOMAC:VAS version	Female (50-59 years) with knee OA would need to show a change of 14N in knee flexor force for the clinician to

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Anchor		be moderately confident that an actual change had occurred.
Fransen, 2003 ³⁵¹ Test: Knee flexor force in Newtons Method: Anchor	Knee flexor force evaluated on 2 occasions; WOMAC:VAS version	Female (60-69 years) with knee OA would need to show a change of 7.2N in knee flexor force for the clinician to be moderately confident that an actual change had occurred.
Fransen, 2003 ³⁵¹ Test: Knee flexor force in Newtons Method: Anchor	Knee flexor force evaluated on 2 occasions; WOMAC:VAS version	Female (70-79 years) with knee OA would need to show a change of 5.5N in knee flexor force for the clinician to be moderately confident that an actual change had occurred.
Fransen, 2003 ³⁵¹ Test: Knee flexor force in Newtons Method: Anchor	Knee flexor force evaluated on 2 occasions; WOMAC:VAS version	Male (60-69 years) with knee OA would need to show a change of 15.66N in knee flexor force for the clinician to be moderately confident that an actual change had occurred.
Fransen, 2003 ³⁵¹ Test: Knee flexor force in Newtons Method: Anchor	Knee flexor force evaluated on 2 occasions; WOMAC:VAS version	Male (70-79 years) with knee OA would need to show a change of 12.3N in knee flexor force for the clinician to be moderately confident that an actual change had occurred.
Tanner, 2007 ³⁴⁹ Test: Knee, Injury and Osteoarthritis Outcome Score Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	14 of the KOOS questions had a mean importance ranking of at least 3 (score on a Likert scale of 0 to 5, with 0 being not experienced and 5 being experienced and very important)
Tanner, 2007 ³⁴⁹ Test: Knee, Injury and Osteoarthritis Outcome Score Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a	9 questions had a top-20 FIP scores (FIP=frequency*mean importance; the greater the FIP, the more important a symptom or disability is to patients. A high FIP indicates that a symptom or disability is both frequently experienced and most important to patients)

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Tanner, 2007 ³⁴⁹ Test: Knee, Injury and Osteoarthritis Outcome Score Method: Anchor	national or international elite level.” A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from “on sick leave/disability” to “participation in competitive sports such as soccer at a national or international elite level.”	At least 51% of the patients with mild to moderate OA endorsed 38(90%) of the KOOS questions
Tanner, 2007 ³⁴⁹ Test: Knee, Injury and Osteoarthritis Outcome Score Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from “on sick leave/disability” to “participation in competitive sports such as soccer at a national or international elite level.”	Three questions had a mean importance ranking of 1 or less
Bellamy, 2001 ⁴³⁵ Test: Lequesne Knee Index Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for Lequesne Knee Index =3
Bellamy, 2001 ⁴³⁵ Test: Likert scale (Physician assessment of physical disability) Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for physicians overall assessment of physical disability on Likert scale =0.68
Bellamy, 2001 ⁴³⁵ Test: Likert scale (Physician assessment of disease activity) Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for physician's global assessment of disease activity on Likert scale =0.78
Bellamy, 2001 ⁴³⁵ Test: Likert scale(patient overall assessment of pain) Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for patient overall assessment of pain on the Likert scale =0.78
Bellamy, 2001 ⁴³⁵	Delphi exercise to define minimum clinically important differences	The MCID for patient overall

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Test: Likert scale (patient overall assessment of morning stiffness) Method: Anchor		assessment of morning stiffness on the Likert scale =0.80
Bellamy, 2001 ⁴³⁵ Test: Likert scale (patient's overall assessment of physical disability) Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for patient's overall assessment of physical disability on Likert scale =0.8
Bellamy, 2001 ⁴³⁵ Test: Likert scale (patient's global assessment of disease activity) Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for patient's global assessment of disease activity on the Likert scale =1
Bellamy, 2001 ⁴³⁵ Test: Likert Scale for pain (physician assessment) Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for physicians overall assessment of pain =0.78 on a Likert scale
Bellamy, 2001 ⁴³⁵ Test: Likert Scale for stiffness (physician assessment) Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for physicians overall assessment of stiffness =0.75 on a Likert scale
Tanner, 2007 ³⁴⁹ Test: Modified Lysholm Knee Scoring Scale Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from "on sick leave/disability" to "participation in competitive sports such as soccer at a national or international elite level."	2 of the Lysholm questions had a mean importance ranking of at least 3 (score on a Likert scale of 0 to 5, with 0 being not experienced and 5 being experienced and very important)
Tanner, 2007 ³⁴⁹ Test: Modified Lysholm Knee Scoring Scale Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was	7 questions had a top-20 FIP scores (FIP=frequency*mean importance; the greater the FIP, the more important a symptom or disability is to patients. A high FIP indicates that a symptom or disability is both frequently experienced and most important to

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
	assigned, with corresponding definitions ranging from “on sick leave/disability” to “participation in competitive sports such as soccer at a national or international elite level.”	patients)
Tanner, 2007 ³⁴⁹ Test: Modified Lysholm Knee Scoring Scale Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from “on sick leave/disability” to “participation in competitive sports such as soccer at a national or international elite level.”	At least 51% of the patients with mild to moderate OA endorsed 2 (25%) of the Lysholm questions
Tanner, 2007 ³⁴⁹ Test: Modified Lysholm Knee Scoring Scale Method: Anchor	A questionnaire of 111 items was developed by combining 222 patient-directed questions from the 11 knee-specific quality-of-life instruments. Patients were asked to rate the importance of the described symptom or disability using a 6-point Likert scale. The Tegner Activity Scale was administered as a separate tool to determine the activity level of the participating patients at the time the study questionnaire was administered. A patient's activity score from 0 to 10 was assigned, with corresponding definitions ranging from “on sick leave/disability” to “participation in competitive sports such as soccer at a national or international elite level.”	Four questions had a mean importance ranking of 1 or less
Salaffi, 2004 ³³⁶ Test: Numerical Rating Scale Method: Anchor	Patients were instructed to draw a single mark on a horizontally oriented, graduated 10-cm NRS bounded by the descriptors “no pain” at the far left and “worst possible pain” at the far right. At a 3 months follow-up, patients were asked by the same data collector to repeat the measurement on an NRS, without access to any previous NRS ratings. The NRS score at the end of follow-up minus the score at baseline examination prior to the intervention defined the effect measured by NRS.	A raw change of -1.0 (AUC 0.889 +- 0.008) and percent change of -15% (AUC 0.881 +- 0.011) were optimal cut-off point associated with the PGIC (patients global assessment of change) category of “slightly better”. When using NRS changes best associated with “much better”, a raw change of -2.0 (AUC 0.909 +- 0.010) and percent change of -33% (AUC 0.956 +- 0.008) were shown.
Salaffi, 2004 ³³⁶ Test: Numerical Rating Scale Method: Anchor	Patients were instructed to draw a single mark on a horizontally oriented, graduated 10-cm NRS bounded by the descriptors “no pain” at the far left and “worst possible pain” at the far right. At a 3 months follow-up, patients were asked by the same data collector to repeat the measurement on an NRS, without access to any previous NRS ratings. The NRS score at the end of follow-up minus the score at baseline examination prior to the intervention defined the effect measured by NRS.	For NRS baseline score >7 to 10, a raw change of -2.8 (AUC 0.916+- 0.011) and percent change of -40% (AUC 0.904 +- 0.012) were optimal cut-off point associated with the PGIC (patients' global assessment of change) category of “much better”.

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Salaffi, 2004 ³³⁶ Test: Numerical Rating Scale Method: Anchor	Patients were instructed to draw a single mark on a horizontally oriented, graduated 10-cm NRS bounded by the descriptors “no pain” at the far left and “worst possible pain” at the far right. At a 3 months follow-up, patients were asked by the same data collector to repeat the measurement on an NRS, without access to any previous NRS ratings. The NRS score at the end of follow-up minus the score at baseline examination prior to the intervention defined the effect measured by NRS.	When using NRS changes best associated with “slightly better”, if the baseline NRS score is >7 to 10, a raw change of -1.6 (AUC 0.838 +- 0.009) and percent change of -21% (AUC 0.846 +- 0.009) were shown. If the NRS baseline score is ≤4, a raw change of -0.7 (AUC 0.968+- 0.013) and percent change of -17% (AUC 0.971 +- 0.013) were optimal cut-off point associated with the PGIC (patients' global assessment of change) category of “much better”. When using NRS changes best associated with “slightly better”, if the baseline NRS score is ≤4, a raw change of -0.6 (AUC 0.795 +- 0.008) and percent change of -10.5% (AUC 0.804 +- 0.011) were shown.
Salaffi, 2004 ³³⁶ Test: Numerical Rating Scale Method: Anchor	Patients were instructed to draw a single mark on a horizontally oriented, graduated 10-cm NRS bounded by the descriptors “no pain” at the far left and “worst possible pain” at the far right. At a 3 months follow-up, patients were asked by the same data collector to repeat the measurement on an NRS, without access to any previous NRS ratings. The NRS score at the end of follow-up minus the score at baseline examination prior to the intervention defined the effect measured by NRS.	If the NRS baseline score is >4 to ≤7, a raw change of -2.1 (AUC 0.941+- 0.012) and percent change of -32.7% (AUC 0.883+-0.931) were optimal cut-off point associated with the PGIC (patients' global assessment of change) category of “much better”. When using NRS changes best associated with “slightly better”, if the baseline NRS score is >4 and ≤7, a raw change of -1 (AUC 0.878 +- 0.904) and percent change of -16.9% (AUC 0.844 +- 0.014) were shown.
Salaffi, 2004 ³³⁶ Test: Numerical Rating Scale Method: Anchor	Patients were instructed to draw a single mark on a horizontally oriented, graduated 10-cm NRS bounded by the descriptors “no pain” at the far left and “worst possible pain” at the far right. At a 3 months follow-up, patients were asked by the same data collector to repeat the measurement on an NRS, without access to any previous NRS ratings. The NRS score at the end of follow-up minus the score at baseline examination prior to the intervention defined the effect measured by NRS.	MCID is defined as the difference in mean change from baseline in NRS between patients with no response therapy (“no change”, “slightly worse” and “much worse”) and patients with next higher level of response (slightly better).
Salaffi, 2004 ³³⁶ Test: Patient's Global Assessment of	The “transition questionnaire” investigated the current pain intensity, related to the rheumatic disease at the 3 month follow-up compared to the pain	A one unit difference at the lowest end of the PGIC (“slightly better”) was used

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Change Method: Anchor	intensity 3 months earlier (at baseline examination) by the question: Please imagine how you would have described your pain intensity three months ago. How do you feel today as compared to three months earlier as far as your musculoskeletal pain is concerned? The possible replies were “much better”, “slightly better”, “no change”, “slightly worse”, or “much worse” (Jaeschke et al., 1989). This five-point categorical questionnaire was proposed to the patient at the 3 months follow-up and assessed the change of pain in written format	to define MCID as it reflects the minimum and lowest degree of improvement that could be detected.
Bellamy, 2001 ⁴³⁵ Test: ROM (Range of Motion) Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for range of movement =15
Kennedy, 2005 ³⁴⁶ Test: Six Minute Walk Test Distance Method: Distribution	At 3 points, during the performance of the 6MWT, patients were instructed to cover as much distance as possible during the 6 minute time frame with opportunity to stop and rest if required.	The MDC ₉₀ was at 61.34m
Mangione, 2010 ⁴³⁸ Test: Six-Minute Walk Test Method: Distribution	At 2 times patients were tested: Each participant was instructed to cover as much distance as possible in 6 minutes.	The MDC ₉₀ was 65m
Mangione, 2010 ⁴³⁸ Test: Short Physical Performance Battery Method: Distribution	At 2 times patients were tested for 3 timed tests: chair rise for 5 repetitions, without the use of arms; standing balance in positions of side-by side stance, semi-tandem stance, and full tandem stance; and walking speed over a 2,44-m (8-ft) course.	The MDC ₉₀ was 2.9 points
Kennedy, 2005 ³⁴⁶ Test: Stair Time Method: Distribution	At 3 points, patients had to ascend and descend 9 stairs (step height, 20 cm) in their usual manner, and at a safe and comfortable pace.	The MDC ₉₀ was at 5.49s
Bellamy, 2001 ⁴³⁵ Test: Time between arising and improvement in stiffness Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for duration of morning stiffness (measured from the time between arising and improvement in stiffness) =0.23
Bellamy, 2001 ⁴³⁵ Test: Clock time from awaking to when stiffness begins to wear off Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for duration of morning stiffness (measured from the clock time from awaking to when stiffness begins to wear off) =20
Bellamy, 2001 ⁴³⁵ Test: Time between arising and when patient is limber	Delphi exercise to define minimum clinically important differences	The MCID for duration of morning stiffness (measured from the time between awakening and when patient

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
Method: Anchor		is limber) =0.3
Bellamy, 2001 ⁴³⁵ Test: Soft tissue swelling Method: Anchor	Delphi exercise to define minimum clinically important differences	The MCID for soft tissue swelling =1.50
Kennedy, 2005 ³⁴⁶ Test: Timed Up and Go Time (TUG) Method: Anchor	At 3 points, for the TUG test, patients were required to rise from a standard arm chair, walk at a safe and comfortable pace to a tape mark 3-m away, then return to a sitting position in the chair	The MDC ₉₀ was at 2.49s
Ren, 1999 ³⁵⁴ Test: Short form Arthritis Impact Measurement Scale 2 (AIMS2-SF) Method: Distribution	One generic and one disease -specific health measure. Generic health is measured by a global health question, i.e. patients were asked "In general would you say that your health now is excellent, good, fair, or poor?" Disease-specific health was measured by asking the patient how much of their health problems were due to arthritis, due partly to arthritis, or due to other diseases.	Patients who had mild symptom severity score on AIMS2-SF (score >=68) had a mean core of 8.2 on the upper body limitations domain; 8.2 on the lower body limitations domain; 6.5 on the affect domain; and 6.1 on the social function domain
Ren, 1999 ³⁵⁴ Test: Short form Arthritis Impact Measurement Scale 2 Method: Distribution	One generic and one disease -specific health measure. Generic health is measured by a global health question, i.e. patients were asked "In general would you say that your health now is excellent, good, fair, or poor?" Disease-specific health was measured by asking the patient how much of their health problems were due to arthritis, due partly to arthritis, or due to other diseases.	Patients who had moderate symptom severity score on AIMS2-SF (score 43-67) had a mean score of 7.7 on the upper body limitations domain; 7.7 on the lower body limitations domain; 5.8 on the affect domain; and 5.5 on the social function domain
Ren, 1999 ³⁵⁴ Test: Short form Arthritis Impact Measurement Scale 2 Method: Distribution	One generic and one disease -specific health measure. Generic health is measured by a global health question, i.e. patients were asked "In general would you say that your health now is excellent, good, fair, or poor?" Disease-specific health was measured by asking the patient how much of their health problems were due to arthritis, due partly to arthritis, or due to other diseases.	Patients who had severe symptom severity score on AIMS2-SF (score <=42) had a mean score of 6.6 on the upper body limitations domain; 6.0 on the lower body limitations domain; 4.3 on the affect domain; and 4.4 on the social function domain
Lequesne, 1997 ⁴³⁹ Test: Algofunctional index for osteoarthritis Method: Anchor	Different scores of the index	1-4 points in the scores for the algofunctional index corresponds to minor handicap; 5-7 points =moderate handicap; 8-10 points =severe handicap; 11-13 points=very severe handicap and 14 points indicate extremely severe handicap
Ornetti, 2011 ⁴¹⁰ Test: Patient NRS: "What is the degree of difficulty you have experienced for the	All patients had to assess their current global state (global PASS) by answering 'Yes' or 'No' in answer to the question 'Taking into account all the activities you have during your daily life, your level of pain, and also your	Patients considered their global state as satisfactory if the patient NRS was >3.33 (95% CI: 3.17 to 3.48). Global

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
daily activities during the last 48 hours due to your (knee or hip) OA" Method: Anchor Worst to best: 10 to 0	functional impairment, do you consider that your current state is satisfactory?'. All patients had to assess their current global state (global PASS) by answering 'Yes' or 'No' in answer to the question 'Taking into account all the activities you have during your daily life, your level of pain, and also your functional impairment, do you consider that your current state is satisfactory?'.	PASS is defined as the value of measurement beyond which patients consider their global state as satisfactory.
Ornetti, 2011 ⁴¹⁰ Test: Physician NRS: Physician's Estimate of functional impairment of each patient Method: Anchor Worst to best: 10 to 0	PASS for functional state :The PASS of each function scale was defined as the 75th centile of the absolute score among patients who considered their final state as satisfactory	Patients considered their global state as satisfactory if the physician NRS was >3.07 (95% CI: 2.94 to 3.21).Global PASS is defined as the value of measurement beyond which patients consider their global state as satisfactory.
Ornetti, 2011 ⁴¹⁰ Test: Patient NRS: "What is the degree of difficulty you have experienced for the daily activities during the last 48 hours due to your (knee or hip) OA" Method: Anchor Worst to best: 10 to 0	PASS for functional state :The PASS of each function scale was defined as the 75th centile of the absolute score among patients who considered their final state as satisfactory	Patients considered their functional state as satisfactory if the patient NRS was >3.3 (95% CI: 3.16 to 3.45).Function PASS is defined as the value of measurement beyond which patients consider their functional state as satisfactory.
Ornetti, 2011 ⁴¹⁰ Test: Physician NRS: Physician's Estimate of functional impairment of each patient Method: Anchor Worst to best: 10 to 0	All patients had to assess their degree of improvement of global state (global MCII), on a three-point Likert scale (worsened function, no change, improved function). Among patients who improved, the degree of improvement was scored on a four-point Likert scale (poor, fair, good, excellent)	Patients considered their functional state as satisfactory if the physician NRS was >3.03 (95% CI: 2.90 to 3.16).Function PASS is defined as the value of measurement beyond which patients consider their functional state as satisfactory.
Ornetti, 2011 ⁴¹⁰ Test: Patient NRS: "What is the degree of difficulty you have experienced for the daily activities during the last 48 hours due to your (knee or hip) OA" Method: Anchor Worst to best: 10 to 0	All patients had to assess their degree of improvement of global state (global MCII), on a three-point Likert scale (worsened function, no change, improved function). Among patients who improved, the degree of improvement was scored on a four-point Likert scale (poor, fair, good, excellent)	Patients considered their global state as improved for a change of patient NRS >-2.72 (95% CI: -2.92 to -2.51). Global MCII is defined as the smallest change in global state that signifies an important improvement in a patient's symptoms.
Ornetti, 2011 ⁴¹⁰ Test: Physician NRS: Physician's Estimate of functional impairment of each patient Method: Anchor Worst to best: 10 to 0	MCII for functional state: The MCII of each function scale was defined as the 75th centile of the absolute change in score among patients whose final	Patients considered their global state as improved for a change of physician NRS >=2.50 (95% CI: -2.68 to -2.32).Global MCII is defined as the smallest change in global state that signifies an important improvement in a patient's symptoms.
Ornetti, 2011 ⁴¹⁰ Test: Patient NRS: "What is the degree of		Patients considered their functional state as improved for a change of

Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

Author, year; Test; Worst to best; Method	Reference	Definition of minimum clinically important differences
difficulty you have experienced for the daily activities during the last 48 hours due to your (knee or hip) OA" Method: Anchor Worst to best: 10 to 0	evaluation of response to NSAID was improved (improvement good or excellent).	patient NRS ≥ 2.79 (95% CI: -3.01 to -2.57). Functional MCII is defined as the smallest change in functional state that signifies an important improvement in a patient's symptoms.
Ornetti, 2011 ⁴¹⁰ Test: Physician NRS: Physician's Estimate of functional impairment of each patient Method: Anchor Worst to best: 10 to 0	MCII for functional state: The MCII of each function scale was defined as the 75th centile of the absolute change in score among patients whose final evaluation of response to NSAID was improved (improvement good or excellent).	Patients considered their functional state as improved for a change of physician NRS ≥ 2.55 (95% CI: -2.73 to -2.38). Functional MCII is defined as the smallest change in functional state that signifies an important improvement in a patient's symptoms.
Mangione, 2010 ⁴³⁸ Test: Timed "Up & Go" test Method: Distribution	At 2 times patients were tested: Each participant was asked to walk at his or her "normal" speed across the mat for 2 trials and then as "fast as possible" for 2 trials. The 2 trials of fast speed were averaged each session.	The MDC ₉₀ was 4.0s

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Appendix Table F58. Minimum clinically important differences in the tools to assess outcomes in patients with knee OA (continued)

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