# Systematic literature review (SLR) report underpinning the EULAR recommendations for the non-pharmacological core management of hip and knee osteoarthritis: 2023 update

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Moseng T, *et al. Ann Rheum Dis* 2024; 83:730–740. doi: 10.1136/ard-2023-225041

# Table of content





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# 1. Research questions and PICO's

The research questions are derived from the management recommendations published by Fernandes et. al in 2013, and updated with additional relevant terms.

(PICO= population + intervention + control + outcome)

**Population (2013+2022)**: "People diagnosed with hip or knee OA or with persisting knee pain, if 45 years or older".

**Interventions (2013+ search terms added in 2022)**:

| |
|---|
| Research question #1:<br>**What are the benefits and harms of a biopsychosocial approach at initial assessment in core management of hip and knee OA?**<br><br>Search strategy terms: Medical History Taking, medical history, Physical examination, examination, assessment$, measurement$, biopsychosocial, psychosocial, Holistic Health, Holistic Nursing, holistic, (comprehensive or thorough or full or complete), "Activities of Daily Living", activit$ of daily living, Disability Evaluation, disabilit$, activit$, physical function).mp., social behavior, social adjustment. social isolation, social environment, social function$, social behavior, social adjustment, social isolation, social environment, participation, Work, work, Education, education, societal participation, Leisure Activities, leisure, recreation, pain, Pain Measurement, Fatigue, Sleep Disorders, sleep, Foot Joints, foot, feet, Range of Motion Articular, range of motion, Muscle Strength, muscular strength, Joint Instability, alignment, Proprioception, joint position sense, Posture, Comorbidity, Body Weight, body mass index, Emotions, Depressive Disorder, emotion$, depression, mood, fear, anxiety, affect or frustration or anger or loneliness or sadness, Motivation, Attitude to Health, Health Behavior, health belief$, attitude to health, health literacy, ehealth literacy, contextual factors |
| Research question #2:<br>**What are the benefits and harms of individualised treatment in core management of hip and knee OA?**<br><br>Search strategy terms: Individualized medicine, individual$, individual$ treatment$, individual therap$, individual prorgram$, individual management$, tailor$ treatment$, tailor therap$, tailor prorgram$, tailor management$, target$ treatment$, target$ therap$, target$ prorgram$, target$ management$, Classification, classif$, stratif$, categor$, shared decision making |
| Research question #3:<br>**What are the benefits and harms of an individualised comprehensive package of care in core management of hip and knee OA?**<br><br>Search strategy terms: health services, patient care, preventive health services, rehabilitation, Patient Care Management, multidisciplinary, rehabilitation, complex intervention, package of care, multifaceted, multimodal, integrated, complex, combined management, education, information, advise, stepped care, osteoarthritis management program |
| Research question #4:<br>**What are the benefits and harms of individualised principles of lifestyle change in core management of hip and knee OA?** |

| |
|---|
| Search strategy terms: Life Style, Health Behavior, Adaptation, psychological, lifestyle$, goals, action plan, evaluation examination, reinforcement, booster, adjustment, adherence, individual$ treatment$, individual therap$, individual program$, individual management$, tailor$ treatment$, tailor therap$, tailor prorgram$, tailor management$, target$ treatment$, target therap$, target program$, target management$, review, follow-up |
| Research question #5:<br>**What are the benefits and harms principles of information and education in core management of hip and knee OA?**<br><br>Search strategy terms: Health Education, Patient Education as Topic, Self Care, health education, patient education, self manage$, information, advice, counsel$, psychological interventions, cognitive behavioural therapy, remote care, remote management, digital intervention, digital information, digital tool, web based, application, app$, |
| Research question #6:<br>**What are the benefits and harms of principles of exercise education in core management of hip and knee OA?**<br><br>Search strategy terms: Exercise Tolerance, Exercise Therapy, exercise, physical activity, pacing, dose, progression, link$,<br>Integrate, adhere$, remote care, remote management, digital intervention, digital information, digital tool, web based, application, app$, aquatic exercise, pool, hydrotherap$<br>+supervised/homebased, group/individual? |
| Research question #7:<br>**What are the benefits and harms of exercise regimen in core management of hip and knee OA?**<br><br>Search strategy terms: Same as #6 + resistance training, strength training, strengthen$, strengthening, aerobics, aerobic exercise, aerobic activity$, neuro-muscular re-education, nemex, neuromuscular training, neuromuscular exercise |
| Research question #8:<br>**What are the benefits and harms of education in weight loss in core management of hip and knee OA?**<br><br>Search strategy terms: Weight Loss$, weight reduction$, reduc$ weight, weight decreas$, decreas$ weight, weight control$, control$ weight, Maintenance, maint$, retention$, preserv$, sustain$, continu$, keep, diet, Health Promotion, nutrition education, meal or activity, individual, patient, plan, goal, eating behavio$, eating trigger$, self monitor$, self record$, self assess$, self weight, portion size, reduc$ fat, reduce sugar, reduce salt, vegetables, relapse prediction, booster<br>session$, support weight |
| Research question #9:<br>**What are the benefits and harms of footwear in core management of hip and knee OA?**<br><br>Search strategy terms: Shoes, insole$, lateral wedge$, shoe$ |
| Research question #10:<br>**What are the benefits and harms of assistive technology and home/work adaptations in core management of hip and knee OA?**<br><br>Search strategy terms: walker$, walking aids, walking stick$, walking frame$, self-help devices, wheelchairs, assistive device$, crutch$, environmental modification$, height bed$, height chair$, height seat$, adaptation$ home, adaptation$ work, adaptation$ environment, cane, canes, rail$ stair$, handrail$, walk$ shower, automatic gear, car, cars, driving, occupational therapy |

Research question #11:
**What are the benefits and harms of vocational rehabilitation and counselling in core management of hip and knee OA?**

Search strategy terms: Rehabilitation, Vocational, vocation$, occupational rehabilitation, Work$, job$, career, Employment, Disability Evaluation, valued activities, unpaid work

**Control:**
Usual care, other intervention (including different dose and/or mode of delivery), or no intervention

**Outcomes**:
2013: Pain, physical function, quality of life
Outcomes added in 2022: patient's global assessment of target joint + adverse effects ("Mandatory" in OMERACT-OARSI core set 2019 *(Smith TO et. al, The OMERACT-OARSI Core Domain Set for Measurement in Clinical Trials of Hip and/or Knee Osteoarthritis. J Rheumatol. 2019*) + cost-effectiveness (from 2014 EULAR SOP)

**Type of studies:**
1. Systematic reviews or meta-analysis
2. If no SR, RCTs
3. If no RCT of good quality, CT or observational studies

## 2. Inclusion and exclusion criteria

Inclusion criteria

- Studies relevant to the defined PICO
- Systematic reviews of RCTs with meta-analysis
- Randomized controlled trials published later than the newest published systematic review on the similar topic
- Randomized controlled trials on research questions for which no relevant SRs were identified.
- English or Scandinavian language

Exclusion criteria

- Systematic reviews without meta-analysis
- Scoping reviews, or reviews with other non-systematic reviews
- Randomized controlled trials included in a systematic review



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# 3. Search strategy

With assistance from an experienced librarian, systematic literature searches have been conducted in the databases Medline (Ovid), Embase (Ovid), Cochrane Library (Cochrane reviews), Cinahl (Ebsco), AMED (Ovid) and Epistemonikos.

The primary search was conducted aiming to identify systematic reviews (SRs) relevant to inform the 11 research questions. This first search was conducted from 2012 until February 17th 2022. The search was updated May 31th 2022.

Secondly, systematic searches were conducted to identify randomized controlled trials (RCTs) relevant to inform the individual recommendations from the latest identified relevant SR and forward. To identify a broad spectrum of potentially relevant RCTs, search terms relevant for all the recommendations were included in a systematic search from January 1st 2018 up until May 27th 2022.

Thirdly, systematic searched were conducted for the timeframe 2012-2017, aiming to identify relevant RCTs specific for the research questions were none or very little evidence was identified after the first two searches.

## Documentation of literature search

**Search 1 for systematic reviews:**

The following databases were searched:

| **Database** | **Number of retrieved references** |
|---|---|
| Medline (Ovid): | 1605 |
| Embase (Ovid): | 2058 |
| Cochrane Library: (Cochrane reviews) | 31 |
| CINAHL (Ebsco): | 751 |
| AMED (Ovid) | 132 |
| Epistemonikos | 1865 |
| Number of references before deduplication: | 6442 |
| Number of references after deduplication: | 3270 |

**Database: Ovid MEDLINE(R) ALL 1946 to February 17, 2022**
Date searched: 18th Febr 2022
Number of hits: 1605

1 osteoarthritis, hip/ or osteoarthritis, knee/ or (Osteoarthritis/ and (Hip/ or Hip Joint/ or Knee/ or exp Knee joint/)) or (coxitis or gonarthr* or coxarthr* or ((knee* or hip*) adj4 (osteoarthr* or arthrosis or arthroses or arthritis or arthritides))).tw,kf.
2 (Chronic Pain/ and (Hip/ or Hip Joint/ or Knee/ or exp Knee joint/)) or (((persistent adj3 pain*) or (chronic adj3 pain*)) adj4 (knee* or hip*)).tw,kf.

3 ((oa adj1 knee) or (oa adj1 hip)).tw,kf.
4 or/1-3
5 exp *arthroplasty/ or *arthroplasty, replacement/ or *arthroplasty, replacement, hip/ or *arthroplasty, replacement, knee/ or *hemiarthroplasty/ or *arthroscopy/ or *meniscectomy/ or *Tibial Meniscus Injuries/ or *hip fractures/ or *femoral neck fractures/ or ((arthroplast* or arthroscop* or menisc* or hemiarthroplast* or ((femoral or femur) adj2 fracture*) or ((hip or knee) adj2 (replacement* or surg*))) not (nonsurg* or non surg* or nonpharma* or non pharma* or conservative)).ti. or ((Animal Experimentation/ or exp Animals/ or exp Models, Animal/) not Humans/) or ((veterinar* or animal or animals or rabbit or rabbits or rodent or rodents or rat or rats or mouse or mice or hamster or hamsters or pig or pigs or piglet or piglets or porcine or pigeon* or horse* or equine or cow or cows or bovine or goat or goats or sheep or lamb or lambs or monkey or monkeys or murine or ovine or dog or dogs or canine or cat or cats or feline or dolphin*) not (patient or patients or human or humans)).ti.
6 4 not 5
7 (systematic review or meta-analysis).pt.
8 meta-analysis/
9 systematic review/
10 systematic reviews as topic/
11 meta-analysis as topic/
12 Technology Assessment, Biomedical/
13 meta-analysis as topic/ or network meta-analysis/
14 ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*))).tw,kf.
15 ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).tw,kf.
16 ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).tw,kf.
17 (data synthes* or data extraction* or data abstraction*).tw,kf.
18 (handsearch* or hand search*).tw,kf.

19 (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).tw,kf.
20 (meta analy* or metanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).tw,kf.
21 (meta regression* or metaregression*).tw,kf.
22 (meta-analy* or metaanaly* or systematic review* or biomedical technology assessment* or bio-medical technology assessment*).tw,kf.
23 (medline or cochrane or pubmed or medlars or embase or cinahl).tw,kf.
24 (cochrane or (health adj2 technology assessment) or evidence report).jw.
25 (comparative adj3 (efficacy or effectiveness)).tw,kf.
26 (outcomes research or relative effectiveness).tw,kf.
27 ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).tw,kf.
28 (multi* adj3 treatment adj3 comparison*).tw,kf.
29 (mixed adj3 treatment adj3 (meta-analy* or metaanaly*)).tw,kf.
30 umbrella review*.tw,kf.
31 (multi* adj2 paramet* adj2 evidence adj2 synthesis).tw,kf.
32 (multiparamet* adj2 evidence adj2 synthesis).tw,kf.
33 (multi-paramet* adj2 evidence adj2 synthesis).tw,kf.
34 or/7-33
35 6 and 34
36 limit 35 to (english language and yr="2012 -Current")
37 (protocol for systematic review or protocol for a systematic review).ti.
38 limit 36 to (clinical trial protocol or clinical trial protocols as topic or comment or editorial or letter)
39 36 not (37 or 38)

CADTH's filter for systematc review (Canadian Agency for Drugs and Technologies in Health)

Systematic Reviews/Meta-Analysis/Health Technology Assessment – PubMed

Strings Attached: CADTH's Database Search Filters | CADTH

line number: 7-26

**Database: Embase Classic+Embase (1947 to 2022 February 17)**
Date searched: 18th Febr 2022
Number of hits: 2058

1 hip osteoarthritis/ or knee osteoarthritis/ or (osteoarthritis/ and (hip/ or knee/)) or (coxitis or gonarthr* or coxarthr* or ((knee* or hip*) adj4 (osteoarthr* or arthrosis or arthroses or arthritis or arthritides))).tw,kf.
2 (chronic pain/ and (hip/ or knee/)) or (((persistent adj3 pain*) or (chronic adj3 pain*)) adj4 (knee* or hip*)).tw,kf.
3 ((oa adj1 knee) or (oa adj1 hip)).tw,kf.
4 or/1-3
5 *arthroscopy/ or *hip arthroscopy/ or *knee arthroscopy/ or *arthroplasty/ or *hip arthroplasty/ or *knee arthroplasty/ or *total arthroplasty/ or *total knee arthroplasty/ or *replacement arthroplasty/ or *hip replacement/ or *knee replacement/ or *knee meniscus rupture/ or ((arthroplast* or arthroscop* or menisc* or hemiarthroplast* or ((femoral or femur) adj2 fracture*) or ((hip or knee) adj2 (replacement* or surg*))) not (nonsurg* or non surg* or nonpharma* or non pharma* or conservative)).ti. or ((exp animal/ or exp animal model/ or nonhuman/) not exp human/) or ((veterinar* or animal or animals or rabbit or rabbits or rodent or rodents or rat or rats or mouse or mice or hamster or hamsters or pig or pigs or piglet or piglets or porcine or porcines or pigeon or pigeons or horse or horses or equine or cow or cows or bovine og goat or goats or sheep or lamb or lambs or monkey or monkeys or murine or murines or ovine or dog or dogs or canine or canines or cat or cats or feline or felines or doplhine or dolphines) not (patient or patients or human or humans)).ti.
6 4 not 5
7 meta analysis/ or network meta-analysis/ or "systematic review"/ or "systematic review (topic)"/ or "meta analysis (topic)"/ or biomedical technology assessment/ or high-cost technology/
8 (umbrella review* or ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*)))).tw,kf.
9 ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).tw,kf.
10 ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).tw,kf.
11 (data synthes* or data extraction* or data abstraction*).tw,kf.
12 (handsearch* or hand search*).tw,kf.
13 (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).tw,kf.
14 (meta analy* or metanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).tw,kf.
15 (meta regression* or metaregression*).tw,kf.
16 (meta-analy* or metaanaly* or systematic review* or biomedical technology assessment* or bio-medical technology assessment*).tw,kf.

17 (medline or cochrane or pubmed or medlars or embase or cinahl).tw,kf.
18 (cochrane or (health adj2 technology assessment) or evidence report).jw.
19 (comparative adj3 (efficacy or effectiveness)).tw,kf.
20 (outcomes research or relative effectiveness).tw,kf.
21 ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).tw,kf.
22 (multi* adj3 treatment adj3 comparison*).tw,kf.
23 (mixed adj3 treatment adj3 (meta-analy* or metaanaly*)).tw,kf.
24 (multi* adj2 paramet* adj2 evidence adj2 synthesis).tw,kf.
25 (multiparamet* adj2 evidence adj2 synthesis).tw,kf.
26 (multi-paramet* adj2 evidence adj2 synthesis).tw,kf.
27 or/7-26
28 6 and 27
29 limit 28 to (english language and yr="2012 -Current")
30 limit 29 to (conference abstracts or "preprints (unpublished, non-peer reviewed)")
31 limit 29 to (book or book series or "preprint archive (unpublished, non-peer reviewed)")
32 limit 29 to (editorial or letter)
33 (protocol for systematic review or protocol for a systematic review).ti.
33 29 not (30 or 31 or 32)

CADTH's filter for systematc review (Canadian Agency for Drugs and Technologies in Health)
Systematic Reviews/Meta-Analysis/Health Technology Assessment – PubMed
Strings Attached: CADTH's Database Search Filters | CADTH
line number: 7-26

**Database: AMED (Allied and Complementary Medicine) (1985 to February 2022)**
Date searched: 18th Febr 2022
Number of hits: 132

1 (coxitis or gonarthr* or coxarthr* or ((knee* or hip*) adj4 (osteoarthr* or arthrosis or arthroses or arthritis or arthritides))).mp.
2 (((persistent adj3 pain*) or (chronic adj3 pain*)) adj4 (knee* or hip*)).mp.
3 ((oa adj1 knee) or (oa adj1 hip)).mp.
4 or/1-3
5 (exp animals/ not humans/) or ((arthroplast* or arthroscop* or menisc* or hemiarthroplast* or ((femoral or femur) adj2 fracture*) or ((hip or knee) adj2 (replacement* or surg*))) not (nonsurg* or non surg* or nonpharma* or non pharma* or conservative)).ti.
6 4 not 5
7 meta analysis/ or (umbrella review* or ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*)))).mp.
8 ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).mp.
9 ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).mp.
10 (data synthes* or data extraction* or data abstraction* or (evidence adj2 synthesis)).mp.
11 (handsearch* or hand search* or meta regression* or metaregression).mp.
12 (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).mp.
13 (meta-analy* or metaanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).mp.
14 (medline or cochrane or pubmed or medlars or embase or cinahl).mp.
15 (cochrane or (health adj2 technology assessment) or evidence report).jw.
16 (comparative adj3 (efficacy or effectiveness)).mp.
17 (outcomes research or relative effectiveness).mp.
18 ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).mp.
19 (multi* adj3 treatment adj3 comparison*).mp.
20 or/7-19
21 6 and 20
22 limit 21 to (english language and yr="2012 -Current")
23 limit 22 to (clinical note or commentary or editorial or lecture or letter)
24 (protocol for systematic review or protocol for a systematic review).ti. 11
25 22 not (23 or 24)

**Database: Cochrane systematic reviews**
Date searched: 18th Febr 2022
Number of hits: 31

#1 MeSH descriptor: [Osteoarthritis, Hip] this term only
#2 MeSH descriptor: [Osteoarthritis, Knee] this term only
#3 MeSH descriptor: [Osteoarthritis] this term only
#4 MeSH descriptor: [Hip Joint] this term only
#5 MeSH descriptor: [Hip] this term only
#6 MeSH descriptor: [Knee Joint] this term only
#7 MeSH descriptor: [Knee] this term only
#8 {OR #4-#7}
#9 #3 AND #8
#10 (coxitis OR gonarthr* OR coxarthr* OR ((knee* OR hip*) NEAR/4 (osteoarthr* OR arthrosis OR arthroses OR arthritis OR arthritides))):ti,ab,kw
#11 ((oa NEAR/1 knee) OR (oa NEAR/1 hip)):ti,ab,kw
#12 MeSH descriptor: [Chronic Pain] this term only
#13 #8 AND #12
#14 ((((persistent NEAR/3 pain*) or (chronic NEAR/3 pain*)) NEAR/4 (knee* or hip*))):ti,ab,kw
#15 #1 OR #2 OR #9 OR #10 OR #11 OR #13 OR #14
#16 ((arthroplast* OR arthroscop* OR menisc* OR hemiarthroplast* OR ((femoral OR femur) NEAR/2 fracture*) OR ((hip OR knee) NEAR/2 (replacement* OR surg*))) NOT (nonsurg* OR non surg* OR nonpharma* OR non pharma* OR conservative)):ti
#17 #15 NOT #16 with Cochrane Library publication date Between Jan 2012 and Mar 2022, in Cochrane Reviews

**Database: CINAHL**
Date searched: 18th Febr 2022
Number of hits: 751

S1 (MH "Osteoarthritis, Hip") OR (MH "Osteoarthritis, Knee")
S2 coxitis OR gonarthr* OR coxarthr* OR ((knee* OR hip*) N3 (osteoarthr* OR arthrosis OR arthroses OR arthritis OR arthritides)) OR (oa N0 knee) OR (oa N0 hip)
S3 (MH "Osteoarthritis") AND ((MH "Hip") OR (MH "Knee") OR (MH "Hip Joint") OR (MH "Knee Joint"))
S4 (MH "Chronic Pain") AND ((MH "Hip") OR (MH "Knee") OR (MH "Hip Joint") OR (MH "Knee Joint"))
S5 ((persistent OR chronic) N2 pain*) N3 (knee* or hip*)

S6 S1 OR S2 OR S3 OR S4 OR S5
S7 (MM "Hemiarthroplasty") OR (MM "Arthroplasty, Replacement, Knee+") OR (MM "Arthroplasty, Replacement, Hip") OR (MM "Arthroplasty") OR (MM "Arthroplasty, Replacement") OR (MM "Arthroscopy") OR (MM "Meniscectomy") OR (MM "Meniscal Injuries") OR (MM "Hip Fractures") OR (MM "Femoral Fractures") OR ((arthroplast* OR arthroscop* OR menisc* OR hemiarthroplast* OR ((femoral OR femur OR hip* OR knee*) N1 fracture*) OR ((hip OR knee) N1 (replacement* OR surg*))) NOT (nonsurg* OR "non surg*" OR nonpharma* OR "non pharma*" OR conservative))
S8 (MH "Animals+") NOT (MH "Human") OR TI ((veterinar* or animal or animals or rabbit or rabbits or rodent or rodents or rat or rats or mouse or mice or hamster or hamsters or pig or pigs or piglet or piglets or porcine or pigeon* or horse* or equine or cow or cows or bovine or goat or goats or sheep or lamb or lambs or monkey or monkeys or murine or ovine or dog or dogs or canine or cat or cats or feline or dolphin*) not (patient or patients or human or humans))
S9 S7 OR S8
S10 S6 NOT S9
S11 TI (protocol for systematic review) OR TI (protocol for a systematic review)
S12 S10 NOT S11
S13 TI systematic review OR metaanaly* OR meta analy*
S14 S12 AND S13 Limiters - Published Date: 20120101-20220331; Language: Danish, English, Norwegian, Swedish
S15 S10 NOT S11 Limiters - Published Date: 20120101-20220331; Clinical Queries: Review - High Specificity; Language: English
S16 S14 OR S15

**Database: Epistemonikos**
Date searched: 18th Febr 2022
Number of hits: 1865

(advanced_title_en:((((osteoarthr* OR arthrosis OR arthroses OR arthritis OR arthritides OR coxitis OR gonarthr* OR coxarthr* OR chronic pain OR persistent pain* OR chronic pain*) AND (knee* OR hip*)) OR "oa knee" OR "oa hip" OR "hip OA" OR "knee OA")) OR advanced_abstract_en:((((osteoarthr* OR arthrosis OR arthroses OR arthritis OR arthritides OR coxitis OR gonarthr* OR coxarthr* OR chronic pain OR persistent pain* OR chronic pain*) AND (knee* OR hip*)) OR "oa knee" OR "oa hip" OR "hip OA" OR "knee OA")))

NOT advanced_title_en:((arthroplast* OR arthroscop* OR menisc* OR hemiarthroplast* OR ((femoral OR femur) AND fracture*) OR ((hip OR knee) AND (replacement* OR surg*))) NOT (nonsurg* OR non surg* OR nonpharma* OR non pharma* OR conservative))
avgrenset til: systematic-review or broad synthesis or structured summary
min_year=2012, max_year=2022]

## Search 2 for systematic reviews - update:

The following databases were searched:

| **Database** | **Number of retrieved references** |
|---|---|
| Medline (Ovid): | 1527 |
| Embase (Ovid): | 1944 |
| Cochrane Library: (Cochrane reviews) | 31 |
| CINAHL (Ebsco): | 839 |
| AMED (Ovid) | 130 |
| Epistemonikos | 1905 |
| Number of references before deduplication: | 6376 |
| Number of references after deduplication: | 3449 |

**Database: Ovid MEDLINE(R) ALL (1946 to May 27, 2022)**

Date searched: May 31st 2022
Number of hits: 1527

1 osteoarthritis, hip/ or osteoarthritis, knee/ or (Osteoarthritis/ and (Hip/ or Hip Joint/ or Knee/ or exp Knee joint/)) or (coxitis or gonarthr* or coxarthr* or ((knee* or hip*) adj4 (osteoarthr* or arthrosis or arthroses or arthritis or arthritides))).tw,kf.
2 (Chronic Pain/ and (Hip/ or Hip Joint/ or Knee/ or exp Knee joint/)) or (((persistent adj3 pain*) or (chronic adj3 pain*)) adj4 (knee* or hip*)).tw,kf.

3 ((oa adj1 knee) or (oa adj1 hip)).tw,kf.
4 or/1-3
5 exp *arthroplasty/ or *arthroplasty, replacement/ or *arthroplasty, replacement, hip/ or *arthroplasty, replacement, knee/ or *hemiarthroplasty/ or *arthroscopy/ or *meniscectomy/ or *Tibial Meniscus Injuries/ or *hip fractures/ or *femoral neck fractures/ or *Injections,Intra-Articular/ or *Anterior Cruciate Ligament/su
6 ((arthroplast* or arthroscop* or menisc* or hemiarthroplast* or ((femoral or femur) adj2 fracture*) or ((anterior cruciate ligament* or ACL) and (reconstruct* or surg*)) or ((intra articular or intra-articular or intraarticular) and injection*) or ((hip or knee) adj2 (replacement* or surg*))) not (nonsurg* or non surg* or nonpharma* or non pharma* or conservative)).ti,kf.

7 ((Animal Experimentation/ or exp Animals/ or exp Models, Animal/) not Humans/) or ((veterinar* or animal or animals or rabbit or rabbits or rodent or rodents or rat or rats or mouse or mice or hamster or hamsters or pig or pigs or piglet or piglets or porcine or pigeon* or horse* or equine or cow or cows or bovine or goat or goats or sheep or lamb or lambs or monkey or monkeys or murine or ovine or dog or dogs or canine or cat or cats or feline or dolphin*) not (patient or patients or human or humans)).ti.
8 or/5-7
9 4 not 8
10 (systematic review or meta-analysis).pt.
11 meta-analysis/
12 systematic review/
13 systematic reviews as topic/
14 meta-analysis as topic/
15 Technology Assessment, Biomedical/
16 meta-analysis as topic/ or network meta-analysis/
17 ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*))).tw,kf.
18 ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).tw,kf.
19 ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).tw,kf.
20 (data synthes* or data extraction* or data abstraction*).tw,kf.
21 (handsearch* or hand search*).tw,kf.
22 (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).tw,kf.
23 (meta analy* or metanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).tw,kf.
24 (meta regression* or metaregression*).tw,kf.
25 (meta-analy* or metaanaly* or systematic review* or biomedical technology assessment* or bio-medical technology assessment*).tw,kf.
26 (medline or cochrane or pubmed or medlars or embase or cinahl).tw,kf.
27 (cochrane or (health adj2 technology assessment) or evidence report).jw.
28 (comparative adj3 (efficacy or effectiveness)).tw,kf.
29 (outcomes research or relative effectiveness).tw,kf.
30 ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).tw,kf.
31 (multi* adj3 treatment adj3 comparison*).tw,kf.
32 (mixed adj3 treatment adj3 (meta-analy* or metaanaly*)).tw,kf.
33 umbrella review*.tw,kf.
34 (multi* adj2 paramet* adj2 evidence adj2 synthesis).tw,kf.

35 (multiparamet* adj2 evidence adj2 synthesis).tw,kf.
36 (multi-paramet* adj2 evidence adj2 synthesis).tw,kf.
37 or/10-36
38 9 and 37
39 limit 38 to (english language and yr="2012 -Current")
40 (protocol for systematic review or protocol for a systematic review).ti.
41 limit 39 to (clinical trial protocol or comment or directory or editorial or letter)
42 39 not (40 or 41)

CADTH's filter for systematc review (Canadian Agency for Drugs and Technologies in Health)
Systematic Reviews/Meta-Analysis/Health Technology Assessment – PubMed
Strings Attached: CADTH's Database Search Filters | CADTH
line number: 7-26

**Database: Embase Classic+Embase (1947 to 2022 May 27)**
Date searched: May 31st 2022
Number of hits: 1944

1 hip osteoarthritis/ or knee osteoarthritis/ or (osteoarthritis/ and (hip/ or knee/)) or (coxitis or gonarthr* or coxarthr* or ((knee* or hip*) adj4 (osteoarthr* or arthrosis or arthroses or arthritis or arthritides))).tw,kf.
2 (chronic pain/ and (hip/ or knee/)) or (((persistent adj3 pain*) or (chronic adj3 pain*)) adj4 (knee* or hip*)).tw,kf.
3 ((oa adj1 knee) or (oa adj1 hip)).tw,kf.
4 or/1-3
5 *arthroscopy/ or *hip arthroscopy/ or *knee arthroscopy/ or *arthroplasty/ or *hip arthroplasty/ or *knee arthroplasty/ or *total arthroplasty/ or *total knee arthroplasty/ or *replacement arthroplasty/ or *hip replacement/ or *knee replacement/ or *knee meniscus rupture/ or *intraarticular drug administration/ or *anterior cruciate ligament/su
6 ((arthroplast* or arthroscop* or menisc* or hemiarthroplast* or ((femoral or femur) adj2 fracture*) or ((anterior cruciate ligament* or ACL) and (reconstruct* or surg*)) or ((intra articular or intra-articular or intraarticular) and injection*) or ((hip or knee) adj2 (replacement* or surg*))) not (nonsurg* or non surg* or nonpharma* or non pharma* or conservative)).ti,kf.
7 ((exp animal/ or exp animal model/ or nonhuman/) not exp human/) or ((veterinar* or animal or animals or rabbit or rabbits or rodent or rodents or

rat or rats or mouse or mice or hamster or hamsters or pig or pigs or piglet or piglets or porcine or porcines or pigeon or pigeons or horse or horses or equine or cow or cows or bovine og goat or goats or sheep or lamb or lambs or monkey or monkeys or murine or murines or ovine or dog or dogs or canine or canines or cat or cats or feline or felines or doplhine or dolphines) not (patient or patients or human or humans)).ti.
8 or/5-7
9 4 not 8
10 meta analysis/ or network meta-analysis/ or "systematic review"/ or "systematic review (topic)"/ or "meta analysis (topic)"/ or biomedical technology assessment/ or high-cost technology/
11 (umbrella review* or ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*)))).tw,kf.
12 ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).tw,kf.
13 ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).tw,kf.
14 (data synthes* or data extraction* or data abstraction*).tw,kf.
15 (handsearch* or hand search*).tw,kf.
16 (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).tw,kf.
17 (meta analy* or metanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).tw,kf.
18 (meta regression* or metaregression*).tw,kf.
19 (meta-analy* or metaanaly* or systematic review* or biomedical technology assessment* or bio-medical technology assessment*).tw,kf.
20 (medline or cochrane or pubmed or medlars or embase or cinahl).tw,kf.
21 (cochrane or (health adj2 technology assessment) or evidence report).jw.
22 (comparative adj3 (efficacy or effectiveness)).tw,kf.
23 (outcomes research or relative effectiveness).tw,kf.
24 ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).tw,kf.
25 (multi* adj3 treatment adj3 comparison*).tw,kf.
26 (mixed adj3 treatment adj3 (meta-analy* or metaanaly*)).tw,kf.
27 (multi* adj2 paramet* adj2 evidence adj2 synthesis).tw,kf.
28 (multiparamet* adj2 evidence adj2 synthesis).tw,kf.
29 (multi-paramet* adj2 evidence adj2 synthesis).tw,kf.
30 or/10-29
31 9 and 30
32 limit 31 to (english language and yr="2012 -Current")
33 limit 32 to (conference abstracts or "preprints (unpublished, non-peer reviewed)")
34 limit 32 to (book or book series or "preprint archive (unpublished, non-peer reviewed)")

35 limit 32 to (editorial or letter)
36 (protocol for systematic review or protocol for a systematic review).ti.
37 32 not (33 or 34 or 35 or 36)

CADTH's filter for systematc review (Canadian Agency for Drugs and Technologies in Health)
Systematic Reviews/Meta-Analysis/Health Technology Assessment – PubMed
Strings Attached: CADTH's Database Search Filters | CADTH
line number: 7-26

**Database: AMED (Allied and Complementary Medicine) (1985 to May 2022)**

Date searched: May 31 st
Number of hits: 130

1 (coxitis or gonarthr* or coxarthr* or ((knee* or hip*) adj4 (osteoarthr* or arthrosis or arthroses or arthritis or arthritides))).mp.
2 (((persistent adj3 pain*) or (chronic adj3 pain*)) adj4 (knee* or hip*)).mp.
3 ((oa adj1 knee) or (oa adj1 hip)).mp.
4 or/1-3
5 (exp animals/ not humans/) or ((arthroplast* or arthroscop* or menisc* or hemiarthroplast* or ((femoral or femur) adj2 fracture*) or ((anterior cruciate ligament* or ACL) and (reconstruct* or surg*)) or ((intra articular or intra-articular or intraarticular) and injection*) or ((hip or knee) adj2 (replacement* or surg*))) not (nonsurg* or non surg* or nonpharma* or non pharma* or conservative)).ti.
6 4 not 5
7 meta analysis/ or (umbrella review* or ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*)))).mp.
8 ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).mp.
9 ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).mp.
10 (data synthes* or data extraction* or data abstraction* or (evidence adj2 synthesis)).mp.
11 (handsearch* or hand search* or meta regression* or metaregression).mp.
12 (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).mp.
13 (meta-analy* or metaanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).mp.
14 (medline or cochrane or pubmed or medlars or embase or cinahl).mp.
15 (cochrane or (health adj2 technology assessment) or evidence report).jw.
16 (comparative adj3 (efficacy or effectiveness)).mp.

17 (outcomes research or relative effectiveness).mp.
18 ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).mp.
19 (multi* adj3 treatment adj3 comparison*).mp.
20 or/7-19
21 6 and 20
22 limit 21 to (english language and yr="2012 -Current")
23 limit 22 to (clinical note or commentary or editorial or lecture or letter)
24 (protocol for systematic review or protocol for a systematic review).ti.
25 22 not (23 or 24)

**Database: Cochrane systematic reviews**
Date searched: May 31st 2022
Number of hits: 31

#1 MeSH descriptor: [Osteoarthritis, Hip] this term only
#2 MeSH descriptor: [Osteoarthritis, Knee] this term only
#3 MeSH descriptor: [Osteoarthritis] this term only
#4 MeSH descriptor: [Hip Joint] this term only
#5 MeSH descriptor: [Hip] this term only
#6 MeSH descriptor: [Knee Joint] this term only
#7 MeSH descriptor: [Knee] this term only
#8 {OR #4-#7}
#9 #3 AND #8
#10 (coxitis OR gonarthr* OR coxarthr* OR ((knee* OR hip*) NEAR/4 (osteoarthr* OR arthrosis OR arthroses OR arthritis OR arthritides))):ti,ab,kw
#11 ((oa NEAR/1 knee) OR (oa NEAR/1 hip)):ti,ab,kw
#12 MeSH descriptor: [Chronic Pain] this term only
#13 #8 AND #12
#14 ((((persistent NEAR/3 pain*) or (chronic NEAR/3 pain*)) NEAR/4 (knee* or hip*))):ti,ab,kw
#15 #1 OR #2 OR #9 OR #10 OR #11 OR #13 OR #14
#16 ((arthroplast* OR arthroscop* OR menisc* OR hemiarthroplast* OR ((femoral OR femur) NEAR/2 fracture*) OR ((hip OR knee) NEAR/2

(replacement* OR surg*))) NOT (nonsurg* OR non surg* OR nonpharma* OR non pharma* OR conservative)):ti
#17 #15 NOT #16 with Cochrane Library publication date Between Jan 2012 and Mar 2022, in Cochrane Reviews
Kommentar: ingen endring i søket siden 18 februar, ingen endring i antall treff

**Database: CINAHL**
Date searched: 31 st May
Number of hits: 839

S1 (MH "Osteoarthritis, Hip") OR (MH "Osteoarthritis, Knee")
S2 coxitis OR gonarthr* OR coxarthr* OR ((knee* OR hip*) N3 (osteoarthr* OR arthrosis OR arthroses OR arthritis OR arthritides)) OR (oa N0 knee) OR (oa N0 hip)
S3 (MH "Osteoarthritis") AND ((MH "Hip") OR (MH "Knee") OR (MH "Hip Joint") OR (MH "Knee Joint"))
S4 (MH "Chronic Pain") AND ((MH "Hip") OR (MH "Knee") OR (MH "Hip Joint") OR (MH "Knee Joint"))
S5 ((persistent OR chronic) N2 pain*) N3 (knee* or hip*)
S6 S1 OR S2 OR S3 OR S4 OR S5
S7 (MM "Hemiarthroplasty") OR (MM "Arthroplasty, Replacement, Knee+") OR (MM "Arthroplasty, Replacement, Hip") OR (MM "Arthroplasty") OR (MM "Arthroplasty, Replacement") OR (MM "Arthroscopy") OR (MM "Meniscectomy") OR (MM "Meniscal Injuries") OR (MM "Hip Fractures") OR (MM "Femoral Fractures") OR (MM "Injections, Intraarticular") OR (MM "Anterior Cruciate Ligament/SU") OR (MM "Anterior Cruciate Ligament Reconstruction") OR TI ((arthroplast* OR arthroscop* OR menisc* OR (("intra articular" OR intraarticular) AND injection*) OR hemiarthroplast* OR (("anterior cruciate ligament*" OR ACL) AND (reconstruct* or surg*)) OR ((femoral OR femur OR hip* OR knee*) N1 fracture*) OR ((hip OR knee) N1 (replacement* OR surg*))) NOT(nonsurg* OR "non surg*" OR nonpharma* OR "non pharma*" OR conservative))
S8 (MH "Animals+") NOT (MH "Human") OR TI ((veterinar* or animal or animals or rabbit or rabbits or rodent or rodents or rat or rats or mouse or mice or hamster or hamsters or pig or pigs or piglet or piglets or porcine or pigeon* or horse* or equine or cow or cows or bovine or goat or goats or sheep or lamb or lambs or monkey or monkeys or murine or ovine or dog or dogs or canine or cat or cats or feline or dolphin*) not (patient or patients or human or humans))
S9 S7 OR S8
S10 S6 NOT S9
S11 TI (protocol for systematic review) OR TI (protocol for a systematic review)
S12 S10 NOT S11
S13 TI systematic review OR metaanaly* OR meta analy*
S14 S12 AND S13 Limiters - Published Date: 20120101-20220631; Language: Danish, English, Norwegian, Swedish

S15 S10 NOT S11 Limiters - Published Date: 20120101-20220631; Clinical Queries: Review - High Specificity; Language: Danish, English, Norwegian, Swedish
S16 S14 OR S15

**Database: Epistemonikos**
Date searched: May 31st 2022

Number of hits: 1905

(advanced_title_en:((((osteoarthr* OR arthrosis OR arthroses OR arthritis OR arthritides OR coxitis OR gonarthr* OR coxarthr* OR chronic pain OR persistent pain* OR chronic pain*) AND (knee* OR hip*)) OR "oa knee" OR "oa hip" OR "hip OA" OR "knee OA")) OR advanced_abstract_en:((((osteoarthr* OR arthrosis OR arthroses OR arthritis OR arthritides OR coxitis OR gonarthr* OR coxarthr* OR chronic pain OR persistent pain* OR chronic pain*) AND (knee* OR hip*)) OR "oa knee" OR "oa hip" OR "hip OA" OR "knee OA")))

NOT advanced_title_en:((arthroplast* OR arthroscop* OR menisc* OR hemiarthroplast* OR ((anterior cruciate ligament* OR ACL) AND (reconstruct* OR surg*)) OR ((intra articular OR intra-articular OR intraarticular) AND injection*) OR ((femoral OR femur) AND fracture*) OR ((hip OR knee) AND (replacement* OR surg*))) NOT (nonsurg* OR non surg* OR nonpharma* OR non pharma* OR conservative))
avgrenset til: systematic-review or broad synthesis or structured summary
min_year=2012, max_year=2022]

## Search 3 for randomized controlled trials:

The following databases were searched:

| **Database** | **Number of retrieved references** |
|---|---|
| Medline (Ovid): | 1017 |
| Embase (Ovid): | 1434 |
| AMED (Ovid) | 107 |
| Cochrane Library: (Cochrane TRIALS) | 2496 |
| CINAHL (Ebsco): | 717 |
| Number of references before deduplication: | 5771 |
| **Number of references after deduplication:** | **2473** |

**Database: Ovid MEDLINE(R) ALL (1946 to May 27, 2022)**

Number of hits: 1017

1 osteoarthritis, hip/ or osteoarthritis, knee/ or (Osteoarthritis/ and (Hip/ or Hip Joint/ or Knee/ or exp Knee joint/)) or (coxitis or gonarthr* or coxarthr* or ((knee* or hip*) adj4 (osteoarthr* or arthrosis or arthroses or arthritis or arthritides))).tw,kf.
2 (Chronic Pain/ and (Hip/ or Hip Joint/ or Knee/ or exp Knee joint/)) or (((persistent adj3 pain*) or (chronic adj3 pain*)) adj4 (knee* or hip*)).tw,kf.
3 ((oa adj1 knee) or (oa adj1 hip)).tw,kf.
4 or/1-3
5 exp *arthroplasty/ or *arthroplasty, replacement/ or *arthroplasty, replacement, hip/ or *arthroplasty, replacement, knee/ or *hemiarthroplasty/ or *arthroscopy/ or *meniscectomy/ or *Tibial Meniscus Injuries/ or *hip fractures/ or *femoral neck fractures/ or *Injections,Intra-Articular/ or *Anterior Cruciate Ligament/su
6 ((arthroplast* or arthroscop* or menisc* or hemiarthroplast* or ((femoral or femur) adj2 fracture*) or ((anterior cruciate ligament* or ACL) and (reconstruct* or surg*)) or ((intra articular or intra-articular or intraarticular) and injection*) or ((hip or knee) adj2 (replacement* or surg*))) not (nonsurg* or non surg* or nonpharma* or non pharma* or conservative)).ti,kf.
7 ((Animal Experimentation/ or exp Animals/ or exp Models, Animal/) not Humans/) or ((veterinar* or animal or animals or rabbit or rabbits or rodent or rodents or rat or rats or mouse or mice or hamster or hamsters or pig or pigs or piglet or piglets or porcine or pigeon* or horse* or equine or cow or cows or bovine or goat or goats or sheep or lamb or lambs or monkey or monkeys or murine or ovine or dog or dogs or canine or cat or cats or feline or dolphin*) not (patient or patients or human or humans)).ti.
8 or/5-7
9 4 not 8
*10 (systematic review or meta-analysis).pt.*
*11 meta-analysis/*
*12 systematic review/*
*13 systematic reviews as topic/*
*14 meta-analysis as topic/ 2*
*15 Technology Assessment, Biomedical/*
*16 meta-analysis as topic/ or network meta-analysis/*
*17 ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*))).tw,kf.*
*18 ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).tw,kf.*
*19 ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).tw,kf.*

*20 (data synthes* or data extraction* or data abstraction*).tw,kf.*
*21 (handsearch* or hand search*).tw,kf.*
*22 (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).tw,kf.*
*23 (meta analy* or metanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).tw,kf.*
*24 (meta regression* or metaregression*).tw,kf.*
*25 (meta-analy* or metaanaly* or systematic review* or biomedical technology assessment* or bio-medical technology assessment*).tw,kf.*
*26 (medline or cochrane or pubmed or medlars or embase or cinahl).tw,kf.*
*27 (cochrane or (health adj2 technology assessment) or evidence report).jw.*
*28 (comparative adj3 (efficacy or effectiveness)).tw,kf.*
*29 (outcomes research or relative effectiveness).tw,kf.*
*30 ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).tw,kf.*
*31 (multi* adj3 treatment adj3 comparison*).tw,kf.*
*32 (mixed adj3 treatment adj3 (meta-analy* or metaanaly*)).tw,kf.*
*33 umbrella review*.tw,kf.*
*34 (multi* adj2 paramet* adj2 evidence adj2 synthesis).tw,kf.*
*35 (multiparamet* adj2 evidence adj2 synthesis).tw,kf.*
*36 (multi-paramet* adj2 evidence adj2 synthesis).tw,kf.*
*37 or/10-36*
*38 9 and 37*
*39 limit 38 to (english language and yr="2012 -Current")*
40 randomized controlled trial.pt. or randomised.ti,ab,kf. or randomized.ti,ab,kf. or Random Allocation/ or randomly.ab. or random allocation.ab.
41 9 and 40
42 limit 41 to (english language and yr="2018 -Current")
43 42 not 38
44 (protocol or review).ti.
45 43 not 44
46 limit 45 to (comment or editorial or letter)
47 45 not 46

**Database: Embase Classic+Embase (1947 to 2022 May 27)**
Date searched: 30th May
Number of hits: 1434

1 hip osteoarthritis/ or knee osteoarthritis/ or (osteoarthritis/ and (hip/ or knee/)) or (coxitis or gonarthr* or coxarthr* or ((knee* or hip*) adj4 (osteoarthr* or arthrosis or arthroses or arthritis or arthritides))).tw,kf.
2 (chronic pain/ and (hip/ or knee/)) or (((persistent adj3 pain*) or (chronic adj3 pain*)) adj4 (knee* or hip*)).tw,kf.
3 ((oa adj1 knee) or (oa adj1 hip)).tw,kf.
4 or/1-3
5 *arthroscopy/ or *hip arthroscopy/ or *knee arthroscopy/ or *arthroplasty/ or *hip arthroplasty/ or *knee arthroplasty/ or *total arthroplasty/ or *total knee arthroplasty/ or *replacement arthroplasty/ or *hip replacement/ or *knee replacement/ or *knee meniscus rupture/ or *intraarticular drug administration/ or *anterior cruciate ligament/su
6 ((arthroplast* or arthroscop* or menisc* or hemiarthroplast* or ((femoral or femur) adj2 fracture*) or ((anterior cruciate ligament* or ACL) and (reconstruct* or surg*)) or ((intra articular or intra-articular or intraarticular) and injection*) or ((hip or knee) adj2 (replacement* or surg*))) not (nonsurg* or non surg* or nonpharma* or non pharma* or conservative)).ti,kf.
7 ((exp animal/ or exp animal model/ or nonhuman/) not exp human/) or ((veterinar* or animal or animals or rabbit or rabbits or rodent or rodents or rat or rats or mouse or mice or hamster or hamsters or pig or pigs or piglet or piglets or porcine or porcines or pigeon or pigeons or horse or horses or equine or cow or cows or bovine og goat or goats or sheep or lamb or lambs or monkey or monkeys or murine or murines or ovine or dog or dogs or canine or canines or cat or cats or feline or felines or doplhine or dolphines) not (patient or patients or human or humans)).ti.
8 4 not (5 or 6 or 7)
*9 meta analysis/ or network meta-analysis/ or "systematic review"/ or "systematic review (topic)"/ or "meta analysis (topic)"/ or biomedical technology assessment/ or high-cost technology/*
*10 (umbrella review* or ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*)))).tw,kf.*
*11 ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).tw,kf.*
*12 ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).tw,kf.*
*13 (data synthes* or data extraction* or data abstraction*).tw,kf.*
*14 (handsearch* or hand search*).tw,kf.*
*15 (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).tw,kf.*
*16 (meta analy* or metanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).tw,kf.*

*17 (meta regression* or metaregression*).tw,kf.*
*18 (meta-analy* or metaanaly* or systematic review* or biomedical technology assessment* or bio-medical technology assessment*).tw,kf.*
*19 (medline or cochrane or pubmed or medlars or embase or cinahl).tw,kf.*
*20 (cochrane or (health adj2 technology assessment) or evidence report).jw.*
*21 (comparative adj3 (efficacy or effectiveness)).tw,kf.*
*22 (outcomes research or relative effectiveness).tw,kf.*
*23 ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).tw,kf.*
*24 (multi* adj3 treatment adj3 comparison*).tw,kf.*
*25 (mixed adj3 treatment adj3 (meta-analy* or metaanaly*)).tw,kf.*
*26 (multi* adj2 paramet* adj2 evidence adj2 synthesis).tw,kf.*
*27 (multiparamet* adj2 evidence adj2 synthesis).tw,kf.*
*28 (multi-paramet* adj2 evidence adj2 synthesis).tw,kf.*
*29 or/9-28*
30 8 and 29
31 randomization/ or exp randomized controlled trial/ or exp "randomized controlled trial (topic)"/ or (randomised or randomized).ti,ab,kf. or random allocation.ab. or randomly.ab.
32 8 and 31
33 limit 32 to (english language and yr="2018 -Current")
34 33 not 30
35 limit 34 to (conference abstracts or "preprints (unpublished, non-peer reviewed)")
36 33 not 35
37 (protocol or review).ti.
38 36 not 37
39 limit 38 to (books or chapter or editorial or letter or "review")
40 38 not 39

**Database: AMED (Allied and Complementary Medicine) (1985 to May 2022)**

Date searched: 30th May
Number of hits: 107

1 (coxitis or gonarthr* or coxarthr* or ((knee* or hip*) adj4 (osteoarthr* or arthrosis or arthroses or arthritis or arthritides))).mp.
2 (((persistent adj3 pain*) or (chronic adj3 pain*)) adj4 (knee* or hip*)).mp.
3 ((oa adj1 knee) or (oa adj1 hip)).mp.
4 or/1-3
5 (exp animals/ not humans/) or ((arthroplast* or arthroscop* or menisc* or hemiarthroplast* or ((femoral or femur) adj2 fracture*) or ((anterior cruciate ligament* or ACL) and (reconstruct* or surg*)) or ((intra articular or intra-articular or intraarticular) and injection*) or ((hip or knee) adj2 (replacement* or surg*))) not (nonsurg* or non surg* or nonpharma* or non pharma* or conservative)).ti.
6 4 not 5
*7 meta analysis/ or (umbrella review* or ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*)))).mp.*
*8 ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).mp.*
*9 ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).mp.*
*10 (data synthes* or data extraction* or data abstraction* or (evidence adj2 synthesis)).mp.*
*11 (handsearch* or hand search* or meta regression* or metaregression).mp.*
*12 (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).mp.*
*13 (meta-analy* or metaanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).mp.*
*14 (medline or cochrane or pubmed or medlars or embase or cinahl).mp.*
*15 (cochrane or (health adj2 technology assessment) or evidence report).jw.*
*16 (comparative adj3 (efficacy or effectiveness)).mp.*
*17 (outcomes research or relative effectiveness).mp.*
*18 ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).mp.*
*19 (multi* adj3 treatment adj3 comparison*).mp.*
*20 or/7-19*
*21 6 and 20*
22 limit 21 to (english language and yr="2012 -Current")
23 limit 22 to (clinical note or commentary or editorial or lecture or letter
24 (protocol for systematic review or protocol for a systematic review).ti.
25 22 not (23 or 24)

26 randomized controlled trial/ or (randomised or randomized).mp. or (randomly or random allocation).ab.
27 6 and 26
28 27 not 21
29 limit 28 to (english and yr="2018 -Current")

**Database: Cochrane systematic reviews**
Date searched: 30th May
Number of hits: Embase: 1654, PubMed: 816, Cinahl: 26 (2496)

#1 MeSH descriptor: [Osteoarthritis, Hip] this term only
#2 MeSH descriptor: [Osteoarthritis, Knee] this term only
#3 MeSH descriptor: [Osteoarthritis] this term only
#4 MeSH descriptor: [Hip Joint] this term only
#5 MeSH descriptor: [Hip] this term only
#6 MeSH descriptor: [Knee Joint] this term only
#7 MeSH descriptor: [Knee] this term only
#8 {OR #4-#7}
#9 #3 AND #8
#10 ((coxitis OR gonarthr* OR coxarthr* OR ((knee* OR hip*) NEAR/4 (osteoarthr* OR arthrosis OR arthroses OR arthritis OR arthritides)))):ti,ab,kw
#11 ((oa NEAR/1 knee) OR (oa NEAR/1 hip)):ti,ab,kw
#12 MeSH descriptor: [Chronic Pain] this term only
#13 #8 AND #12
#14 ((((persistent NEAR/3 pain*) or (chronic NEAR/3 pain*)) NEAR/4 (knee* or hip*))):ti,ab,kw
#15 #1 OR #2 OR #9 OR #10 OR #11 OR #13 OR #14
#16 (((arthroplast* OR arthroscop* OR menisc* OR hemiarthroplast* OR ((femoral OR femur) NEAR/2 fracture*) OR ((hip OR knee) NEAR/2 (replacement* OR surg*))) NOT (nonsurg* OR non surg* OR nonpharma* OR non pharma* OR conservative))):ti
#17 (((anterior cruciate ligament* OR ACL) AND (reconstruct* OR surg*)) OR (("intra-articular" OR intraarticular) AND injection*)):ti

#18 (nonsurg* OR non surg* OR nonpharma* OR non pharma* OR conservative):ti
#19 #17 NOT #18
#20 #16 OR #19
#21 #15 NOT #20
#22 MeSH descriptor: [Randomized Controlled Trial] explode all trees
#23 MeSH descriptor: [Random Allocation] this term only
#24 (randomised OR randomized):ti,ab,kw OR (randomly OR "random allocation"):ab
#25 #22 OR #23 OR #24
#26 #21 AND #25 with Publication Year from 2018 to 2022, in Trials
#27 MeSH descriptor: [Arthroscopy] this term only
#28 MeSH descriptor: [Arthroplasty] explode all trees
#29 MeSH descriptor: [Meniscectomy] this term only
#30 MeSH descriptor: [Tibial Meniscus Injuries] this term only
#31 MeSH descriptor: [Hip Fractures] explode all trees
#32 MeSH descriptor: [Injections, Intra-Articular] this term only
#33 MeSH descriptor: [Anterior Cruciate Ligament] this term only
#34 {OR #27-#33}
#35 #26 NOT #34

**Database: CINAHL**

Date searched: 30th may
Number of hits: 717

S1 (MH "Osteoarthritis, Hip") OR (MH "Osteoarthritis, Knee")
S2 coxitis OR gonarthr* OR coxarthr* OR ((knee* OR hip*) N3 (osteoarthr* OR arthrosis OR arthroses OR arthritis OR arthritides)) OR (oa N0 knee) OR (oa N0 hip)
S3 (MH "Osteoarthritis") AND ((MH "Hip") OR (MH "Knee") OR (MH "Hip Joint") OR (MH "Knee Joint"))

S4 (MH "Chronic Pain") AND ((MH "Hip") OR (MH "Knee") OR (MH "Hip Joint") OR (MH "Knee Joint"))
S5 ((persistent OR chronic) N2 pain*) N3 (knee* or hip*)
S6 S1 OR S2 OR S3 OR S4 OR S5
S7 (MM "Hemiarthroplasty") OR (MM "Arthroplasty, Replacement, Knee+") OR (MM "Arthroplasty, Replacement, Hip") OR (MM "Arthroplasty") OR (MM "Arthroplasty, Replacement") OR (MM "Arthroscopy") OR (MM "Meniscectomy") OR (MM "Meniscal Injuries") OR (MM "Hip Fractures") OR (MM "Femoral Fractures") OR (MM "Injections, Intraarticular") OR (MM "Anterior Cruciate Ligament/SU") OR (MM "Anterior Cruciate Ligament Reconstruction")

S8 TI ((arthroplast* OR arthroscop* OR menisc* OR (("intra articular" OR intraarticular) AND injection*) OR hemiarthroplast* OR (("anterior cruciate ligament*" OR ACL) AND (reconstruct* or surg*)) OR ((femoral OR femur OR hip* OR knee*) N1 fracture*) OR ((hip OR knee) N1 (replacement* OR surg*))) NOT(nonsurg* OR "non surg*" OR nonpharma* OR "non pharma*" OR conservative))
S9 (MH "Animals+") NOT (MH "Human") OR TI ((veterinar* or animal or animals or rabbit or rabbits or rodent or rodents or rat or rats or mouse or mice or hamster or hamsters or pig or pigs or piglet or piglets or porcine or pigeon* or horse* or equine or cow or cows or bovine or goat or goats or sheep or lamb or lambs or monkey or monkeys or murine or ovine or dog or dogs or canine or cat or cats or feline or dolphin*) not (patient or patients or human or humans))
S10 S7 OR S8 OR S9
S11 S6 NOT S10
*S12 TI (protocol for systematic review) OR TI (protocol for a systematic review)*
*S13 S11 NOT S12*
*S14 TI (systematic review OR metaanaly* OR meta analy*)*
*S15 S13 AND S14 Limiters - Published Date: 20120101-20220631; English Language*
*S16 S11 NOT S12 Limiters - Published Date: 20120101-20220631; English Language; Clinical Queries: Review - High Specificity*
*S17 S15 OR S16*
S18 (MH "Randomized Controlled Trials+") OR (randomised OR randomized) OR AB (randomly OR "random allocation")
S19 S11 AND S18
S20 S19 NOT S17 Limiters - Published Date: 20180101-20220631; English Language
S21 TI protocol Limiters - Published Date: 20180101-20220631; English Language
S22 S20 NOT S21 Limiters - Published Date: 20180101-20220631; English Language

## Search 4 for randomized controlled trials (2012-2017):

Research questions:

What are the benefits and harms of a biopsychosocial approach at initial assessment in core management of hip and knee OA?

What are the benefits and harms of individualised treatment in core management of hip and knee OA?

What are the benefits and harms of individualised principles of lifestyle change in core management of hip and knee OA?

What are the benefits and harms of assistive technology and home/work adaptations in core management of hip and knee OA?

What are the benefits and harms of vocational rehabilitation and counselling in core management of hip and knee OA?

The following databases were searched:

| **Database** | **Number of retrieved references** |
|---|---|
| Medline (Ovid): | 364 |
| Embase (Ovid): | 458 |
| AMED (Ovid) | 39 |
| Cochrane Library: (Cochrane TRIALS) | 818 |
| CINAHL (Ebsco): | 269 |
| Number of references before deduplication: | 1948 |
| **Number of references after deduplication:** | 916 |

**Database: Ovid MEDLINE(R) ALL (1946 to September 08, 2022)**

Number of hits: 364
Date searched: 2022 9th sept

1 osteoarthritis, hip/ or osteoarthritis, knee/ or (Osteoarthritis/ and (Hip/ or Hip Joint/ or Knee/ or exp Knee joint/)) or (coxitis or gonarthr* or coxarthr* or ((knee* or hip*) adj4 (osteoarthr* or arthrosis or arthroses or arthritis or arthritides))).tw,kf.

2 (Chronic Pain/ and (Hip/ or Hip Joint/ or Knee/ or exp Knee joint/)) or (((persistent adj3 pain*) or (chronic adj3 pain*)) adj4 (knee* or hip*)).tw,kf.

3 ((oa adj1 knee) or (oa adj1 hip)).tw,kf.
4 or/1-3
5 exp *arthroplasty/ or *arthroplasty, replacement/ or *arthroplasty, replacement, hip/ or *arthroplasty, replacement, knee/ or *hemiarthroplasty/ or *arthroscopy/ or *meniscectomy/ or *Tibial Meniscus Injuries/ or *hip fractures/ or *femoral neck fractures/ or *Injections,Intra-Articular/ or *Anterior Cruciate Ligament/su
6 ((arthroplast* or arthroscop* or menisc* or hemiarthroplast* or ((femoral or femur) adj2 fracture*) or ((anterior cruciate ligament* or ACL) and (reconstruct* or surg*)) or ((intra articular or intra-articular or intraarticular) and injection*) or ((hip or knee) adj2 (replacement* or surg*))) not (nonsurg* or non surg* or nonpharma* or non pharma* or conservative)).ti,kf.
7 ((Animal Experimentation/ or exp Animals/ or exp Models, Animal/) not Humans/) or ((veterinar* or animal or animals or rabbit or rabbits or rodent or rodents or rat or rats or mouse or mice or hamster or hamsters or pig or pigs or piglet or piglets or porcine or pigeon* or horse* or equine or cow or cows or bovine or goat or goats or sheep or lamb or lambs or monkey or monkeys or murine or ovine or dog or dogs or canine or cat or cats or feline or dolphin*) not (patient or patients or human or humans)).ti.
8 or/5-7
9 4 not 8
10 randomized controlled trial.pt. or randomised.ti,ab,kf. or randomized.ti,ab,kf. or Random Allocation/ or randomly.ab. or random allocation.ab.
11 9 and 10
*12 (systematic review or meta-analysis).pt.*
*13 meta-analysis/*
*14 systematic review/*
*15 systematic reviews as topic/*
*16 meta-analysis as topic/*
*17 Technology Assessment, Biomedical/*
*18 meta-analysis as topic/ or network meta-analysis/*
*19 ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*))).tw,kf.*
*20 ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).tw,kf.*
*21 ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).tw,kf.*
*22 (data synthes* or data extraction* or data abstraction*).tw,kf.*
*23 (handsearch* or hand search*).tw,kf.*
*24 (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).tw,kf.*

*25 (meta analy* or metanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).tw,kf.*
*26 (meta regression* or metaregression*).tw,kf.*
*27 (meta-analy* or metaanaly* or systematic review* or biomedical technology assessment* or bio-medical technology assessment*).tw,kf.*
*28 (medline or cochrane or pubmed or medlars or embase or cinahl).tw,kf.*
*29 (cochrane or (health adj2 technology assessment) or evidence report).jw.*
*30 (comparative adj3 (efficacy or effectiveness)).tw,kf.*
*31 (outcomes research or relative effectiveness).tw,kf.*
*32 ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).tw,kf.*
*33 (multi* adj3 treatment adj3 comparison*).tw,kf.*
*34 (mixed adj3 treatment adj3 (meta-analy* or metaanaly*)).tw,kf.*
*35 umbrella review*.tw,kf.*
*36 (multi* adj2 paramet* adj2 evidence adj2 synthesis).tw,kf.*
*37 (multiparamet* adj2 evidence adj2 synthesis).tw,kf.*
*38 (multi-paramet* adj2 evidence adj2 synthesis).tw,kf.*
*39 or/12-38*
*40 9 and 39*

41 exp Social Behavior/ or (social* or societal or biopsycho* or bio psycho* or psychosocial* or psycho social*).tw,kf.
42 health records, personal/ or (history taking or medical history or medical interview* or family history or reproductive histor* or anamnes* or trajector* or diaries or diary or personal health information* or health record*).tw,kf.
43 Holistic Health/ or Holistic Nursing/ or Integrative Medicine/ or "Delivery of Health Care, Integrated"/ or (wholistic or holistic or (integrat* adj3 (medicine or health* or approach*))).tw,kf.
44 (Models, Psychological/ or (psychology.fs. or psycholog*.tw,kf.)) and (examin* or test* or instrument* or evaluat* or assess* or measur* or tool* or question* or interview* or monitor*).tw,kf.
45 or/41-44
46 (11 and 45) not 40

47 Precision Medicine/ or (p health or ((personali* or predictive or precise or precision or participatory or preventive) adj2 (health or medicine*))).tw,kf.
48 ((individualis* or individualiz* or personaliz* or personalis* or target* or tailor*) adj5 (treatment* or therap* or program* or manag* or goal* or principle* or care or healthcare or intervention* or approach*)).tw,kf.

49 Decision Making, Shared/ or decision support techniques/ or ((decision* adj2 (aid* or support*)) or (shar* adj3 decision*)).tw,kf.
50 decision making/ or Choice Behavior/ or (choice* or (decision* adj3 mak*)).tw,kf.
51 goals/ or ((patient adj2 specific) or ((personal or patient*) adj2 goal*) or (goal* adj2 setting*)).tw,kf.
52 or/47-51
53 (11 and 52) not 40

54 Health Behavior/ or life style/ or healthy lifestyle/ or healthy aging/ or diet, healthy/ or life change events/ or sedentary behavior/ or smoking cessation*.tw,kf.
55 (life style* or lifestyle* or behaviour* or behavior* or healthy).tw,kf.
56 adaptation, psychological/ or emotional adjustment/ or "sense of coherence"/
57 (coping or cope or adaptation* or emotional adjustment* or sense of coherence).tw,kf.
58 (((physical* or level*) adj2 activ*) and (leisure or recreation*)).tw,kf.
59 ((action* adj2 plan*) or (life adj2 (chang* or adjust*))).tw,kf.
60 ((physical* or level* or leisure or recreation*) adj2 activ*).ti.
61 or/54-60
62 (11 and 61) not 40

63 self-help devices/ or wheelchairs/ or exp Automobile Driving/ or (((self help or assistive) adj2 (device* or aid or aids)) or (assistive adj2 technolog*)).tw,kf.
64 (wheelchair* or walker* or rollator* or walking aid* or walking stick* or walking frame* or crutches or bed or beds or chair* or height seat* or cane or canes or rail or rails or stair* or handrail* or shower* or automatic gear* or car or cars or driving or automobile* or vehicle*).tw,kf.
65 orthopedic equipment/ or canes/ or crutches/ or exp orthotic devices/ or walkers/ or Shoes/ or (shoe* or insole* or footwear* or brace or braces or orthotic or orthos*).tw,kf.
66 Occupational Therapy/ or (ergotherap* or occupational therap* or ergonom*).tw,kf.
67 or/63-66
68 (11 and 67) not 40

69 exp Occupations/ or (vocation* or occupation* or work or workplace* or job* or career* or employ* or unemploy*).tw,kf.
70 exp Counseling/ or rehabilitation/ or rehabilitation.fs. or (rehabilitat* or participat* or evaluat* or engag* or capacit* or perform* or abilit* or disabilit* or productivit* or counsel* or advic* or coach*).tw,kf.
71 69 and 70

72 Rehabilitation, Vocational/ or exp Employment/ or work/ or return to work/ or work engagement/ or work performance/ or work capacity evaluation/ or Retirement/ or ((return* adj3 work) or working age or retire* or (exit* adj2 work*)).tw,kf.
73 ((unpaid adj2 (work or job*)) or (valued adj2 activit*)).tw,kf.
74 or/71-73
75 (11 and 74) not 40
76 46 or 53 or 62 or 68 or 75
77 (comment or editorial or letter).pt. or ((rct or review or study or trial) adj protocol).ti.
78 76 not 77
79 limit 78 to (english language and yr="2012 - 2017")

**Database: Embase Classic+Embase (1947 to 2022 September 08)**
Number of hits: 458
Date searched: 2022 9th sept

1 hip osteoarthritis/ or knee osteoarthritis/ or (osteoarthritis/ and (hip/ or knee/)) or (coxitis or gonarthr* or coxarthr* or ((knee* or hip*) adj4 (osteoarthr* or arthrosis or arthroses or arthritis or arthritides))).tw,kf.
2 (chronic pain/ and (hip/ or knee/)) or (((persistent adj3 pain*) or (chronic adj3 pain*)) adj4 (knee* or hip*)).tw,kf.
3 ((oa adj1 knee) or (oa adj1 hip)).tw,kf.
4 or/1-3
5 *arthroscopy/ or *hip arthroscopy/ or *knee arthroscopy/ or *arthroplasty/ or *hip arthroplasty/ or *knee arthroplasty/ or *total arthroplasty/ or *total knee arthroplasty/ or *replacement arthroplasty/ or *hip replacement/ or *knee replacement/ or *knee meniscus rupture/ or *intraarticular drug administration/ or *anterior cruciate ligament/su
6 ((arthroplast* or arthroscop* or menisc* or hemiarthroplast* or ((femoral or femur) adj2 fracture*) or ((anterior cruciate ligament* or ACL) and (reconstruct* or surg*)) or ((intra articular or intra-articular or intraarticular) and injection*) or ((hip or knee) adj2 (replacement* or surg*))) not (nonsurg* or non surg* or nonpharma* or non pharma* or conservative)).ti,kf.
7 ((exp animal/ or exp animal model/ or nonhuman/) not exp human/) or ((veterinar* or animal or animals or rabbit or rabbits or rodent or rodents or rat or rats or mouse or mice or hamster or hamsters or pig or pigs or piglet or piglets or porcine or porcines or pigeon or pigeons or horse or horses or equine or cow or cows or bovine og goat or goats or sheep or lamb or lambs or monkey or monkeys or murine or murines or ovine or dog or dogs or canine or canines or cat or cats or feline or felines or doplhine or dolphines) not (patient or patients or human or humans)).ti.

8 4 not (5 or 6 or 7)
9 randomization/ or exp randomized controlled trial/ or exp "randomized controlled trial (topic)"/ or (randomised or randomized).ti,ab,kf. or random allocation.ab. or randomly.ab.
10 8 and 9
*11 meta analysis/ or network meta-analysis/ or "systematic review"/ or "systematic review (topic)"/ or "meta analysis (topic)"/ or biomedical technology assessment/ or high-cost technology/*
*12 (umbrella review* or ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*)))).tw,kf.*
*13 ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).tw,kf.*
*14 ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).tw,kf.*
*15 (data synthes* or data extraction* or data abstraction*).tw,kf.*
*16 (handsearch* or hand search*).tw,kf.*
*17 (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).tw,kf.*
*18 (meta analy* or metanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).tw,kf.*
*19 (meta regression* or metaregression*).tw,kf.*
*20 (meta-analy* or metaanaly* or systematic review* or biomedical technology assessment* or bio-medical technology assessment*).tw,kf.*
*21 (medline or cochrane or pubmed or medlars or embase or cinahl).tw,kf.*
*22 (cochrane or (health adj2 technology assessment) or evidence report).jw.*
*23 (comparative adj3 (efficacy or effectiveness)).tw,kf.*
*24 (outcomes research or relative effectiveness).tw,kf.*
*25 ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).tw,kf.*
*26 (multi* adj3 treatment adj3 comparison*).tw,kf.*
*27 (mixed adj3 treatment adj3 (meta-analy* or metaanaly*)).tw,kf.*
*28 (multi* adj2 paramet* adj2 evidence adj2 synthesis).tw,kf.*
*29 (multiparamet* adj2 evidence adj2 synthesis).tw,kf.*
*30 (multi-paramet* adj2 evidence adj2 synthesis).tw,kf.*
*31 or/11-30*
*32 8 and 31*
33 (medical interview* or family history or reproductive history).tw,kf.
34 social behavior/ or social behavior/ or exp social adaptation/ or social attitude/ or social disability/ or social interaction/ or social participation/ or

(social* or societal or biopsycho* or bio psycho* or psychosocial* or psycho social*).tw,kf.
35 anamnesis/ or family history/ or reproductive history/ or (history taking or medical history or anamnes* or trajector* or diaries or diary or personal health information* or health record*).tw,kf.
36 holistic care/ or holistic nursing/ or integrative medicine/ or integrated health care system/ or (wholistic or holistic or (integrat* adj3 (medicine or health* or approach*))).tw,kf.
37 psychological model/ or (psycholog* and (examin* or test* or instrument* or evaluat* or assess* or measur* or tool* or question* or interview* or monitor*)).tw,kf.
38 or/33-37
39 (10 and 38) not 32
40 personalized medicine/ or (p health or ((personali* or predictive or precise or precision or participatory or preventive) adj2 (health or medicine*))).tw,kf.
41 ((individualis* or individualiz* or personaliz* or personalis* or target* or tailor*) adj5 (treatment* or therap* or program* or manag* or goal* or principle* or care or healthcare or intervention* or approach*)).tw,kf.
42 decision making/ or shared decision making/ or patient decision making/ or (choice* or (decision* adj2 (aid* or support*)) or (shar* adj3 decision*) or (decision* adj3 mak*)).tw,kf.
43 ((patient adj2 specific) or ((personal or patient*) adj2 goal*) or (goal* adj2 setting*)).tw,kf.
44 or/40-43
45 (10 and 44) not 32
46 health behavior/ or attitude to health/ or drinking behavior/ or high risk behavior/ or smoking cessation/ or smoking cessation*.tw,kf.
47 lifestyle/ or healthy lifestyle/ or sedentary lifestyle/ or lifestyle modification/ or healthy aging/ or healthy diet/ or job adaptation/ or exp body weight change/
48 (life style* or lifestyle* or behaviour* or behavior* or healthy).tw,kf.
49 psychological adjustment/ or (coping or cope or adaptation* or emotional adjustment* or sense of coherence).tw,kf.
50 (((physical* or level*) adj2 activ*) and (leisure or recreation*)).tw,kf.
51 physical activity/ and (leisure/ or recreation/)
52 ((action* adj2 plan*) or (life adj2 (chang* or adjust*))).tw,kf.
53 ((physical* or level* or leisure or recreation*) adj2 activ*).ti.
54 or/46-53
55 (10 and 54) not 32

56 (wheelchair* or rollator* or walker* or walking aid* or walking stick* or walking frame* or crutches or bed or beds or chair* or height seat* or cane or canes or rail or rails or stair* or handrail* or shower* or automatic gear* or car or cars or driving or automobile* or vehicle*).tw,kf.
57 assistive technology/ or self help device/ or rehabilitation equipment/ or exp wheelchair/ or car driving/
58 (((self help or assistive) adj2 (device* or aid or aids)) or (assistive adj2 technolog*)).tw,kf.
59 exp orthopedic equipment/ or cane/ or walking aid/ or crutch/ or orthosis/ or exp brace/ or knee-ankle-foot orthosis/ or walker/ or rollator/ or shoe/
60 (shoe* or insole* or footwear* or brace or braces or bracing or orthotic or orthos*).tw,kf.
61 occupational Therapy/ or ergonomics/ or (ergotherap* or occupational therap* or ergonom*).tw,kf.
62 or/56-61
63 (10 and 62) not 32
64 occupation/ or career/ or career mobility/ or career planning/ or employment/ or job change/ or retirement/ or vocation/ or (vocation* or occupation* or work or workplace* or job* or career* or employ* or unemploy*).tw,kf.
65 counseling/ or motivational interviewing/ or patient counseling/ or patient guidance/ or psychological counseling/ or rehabilitation/ or psychosocial rehabilitation/ or rehabilitation care/ or (rehabilitat* or participat* or evaluat* or engag* or capacit* or perform* or abilit* or disabilit* or productivit* or counsel* or advic* or coach*).tw,kf. or rh.fs.
66 64 and 65
67 vocational rehabilitation/ or vocational guidance/ or exp employment/ or exp work/ or ((return* adj3 work) or working age or retire* or (exit* adj2 work*)).tw,kf.
68 ((unpaid adj2 (work or job*)) or (valued adj2 activit*)).tw,kf.
69 or/66-68
70 (10 and 69) not 32
71 39 or 45 or 55 or 63 or 70
72 limit 71 to (english language and yr="2012 - 2017")
73 limit 72 to conference abstracts
74 72 not 73

**Database: AMED (Allied and Complementary Medicine) (1985 to September 2022)**
Date searched: 2022 10th Sept
Number of hits: 39

1 (coxitis or gonarthr* or coxarthr* or ((knee* or hip*) adj4 (osteoarthr* or arthrosis or arthroses or arthritis or arthritides))).mp.
2 (((persistent adj3 pain*) or (chronic adj3 pain*)) adj4 (knee* or hip*)).mp.
3 ((oa adj1 knee) or (oa adj1 hip)).mp.
4 or/1-3
5 (exp animals/ not humans/) or ((arthroplast* or arthroscop* or menisc* or hemiarthroplast* or ((femoral or femur) adj2 fracture*) or ((anterior cruciate ligament* or ACL) and (reconstruct* or surg*)) or ((intra articular or intra-articular or intraarticular) and injection*) or ((hip or knee) adj2 (replacement* or surg*))) not (nonsurg* or non surg* or nonpharma* or non pharma* or conservative)).ti.
6 4 not 5
*7 meta analysis/ or (umbrella review* or ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*)))).mp.*
*8 ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).mp.*
*9 ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).mp.*
*10 (data synthes* or data extraction* or data abstraction* or (evidence adj2 synthesis)).mp.*
*11 (handsearch* or hand search* or meta regression* or metaregression).mp.*
*12 (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).mp.*
*13 (meta-analy* or metaanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).mp.*
*14 (medline or cochrane or pubmed or medlars or embase or cinahl).mp.*
*15 (cochrane or (health adj2 technology assessment) or evidence report).jw.*
*16 (comparative adj3 (efficacy or effectiveness)).mp.*
*17 (outcomes research or relative effectiveness).mp.*
*18 ((indirect or indirect treatment or mixed-treatment or bayesian) adj3 comparison*).mp.*
*19 (multi* adj3 treatment adj3 comparison*).mp.*
*20 or/7-19*
*21 6 and 20*
22 randomized controlled trial/ or (randomised or randomized).mp. or (randomly or random allocation).ab.
23 (6 and 22) not 21
24 (social* or societal or biopsycho* or bio psycho* or psychosocial* or psycho social*).mp.
25 (history taking or medical history or medical interview* or family history or reproductive histor* or anamnes* or trajector* or diaries or diary or personal health information* or health record*).mp.
26 (wholistic or holistic or (integrat* adj3 (medicine or health* or approach*))).mp.
27 (psycholog* and (examin* or test* or instrument* or evaluat* or assess* or measur* or tool* or question* or interview* or monitor*)).ti,ab.

28 (psycholog* and (examin* or test* or instrument* or evaluat* or assess* or measur* or tool* or question* or interview* or monitor*)).mp.
29 or/24-28
30 23 and 29
31 (p health or ((personali* or predictive or precise or precision or participatory or preventive) adj2 (health or medicine*))).mp.
32 ((individualis* or individualiz* or personaliz* or personalis* or target* or tailor*) adj5 (treatment* or therap* or program* or manag* or goal* or principle* or care or healthcare or intervention* or approach*)).mp.
33 ((decision* adj2 (aid* or support*)) or (shar* adj3 decision*)).mp.
34 (choice* or (decision* adj3 mak*)).mp.
35 ((patient adj2 specific) or ((personal or patient*) adj2 goal*) or (goal* adj2 setting*)).mp.
36 or/31-35
37 23 and 36
38 (smoking cessation* or life style* or lifestyle* or behaviour* or behavior* or healthy).mp.
39 (coping or cope or adaptation* or emotional adjustment* or sense of coherence).mp.
40 (((physical* or level*) adj2 activ*) and (leisure or recreation*)).mp.
41 ((action* adj2 plan*) or (life adj2 (chang* or adjust*))).mp.
42 ((physical* or level* or leisure or recreation*) adj2 activ*).ti.
43 or/38-42
44 23 and 43
45 (((self help or assistive) adj2 (device* or aid or aids)) or (assistive adj2 technolog*)).mp.1107
46 (wheelchair* or walker* or rollator* or walking aid* or walking stick* or walking frame* or crutches or bed or beds or chair* or height seat* or cane or canes or rail or rails or stair* or handrail* or shower* or automatic gear* or car or cars or driving or automobile* or vehicle*).mp.
47 (shoe* or insole* or footwear* or brace or braces or orthotic or orthos*).mp.
48 (ergotherap* or occupational therap* or ergonom*).mp.
49 or/45-48
50 23 and 49
51 (vocation* or occupation* or work or workplace* or job* or career* or employ* or unemploy*).mp.
52 (rehabilitat* or participat* or evaluat* or engag* or capacit* or perform* or abilit* or disabilit* or productivit* or counsel* or advic* or coach*).mp.

53 51 and 52
54 ((return* adj3 work) or working age or retire* or (exit* adj2 work*)).mp.
55 ((unpaid adj2 (work or job*)) or (valued adj2 activit*)).mp.

56 or/53-55
57 23 and 56
58 30 or 37 or 44 or 50 or 57
59 limit 58 to yr="2012 - 2017"

**Database: Cochrane systematic reviews**
Date searched: 2022 12th sept
Number of hits: Embase: 486, PubMed: 324, CINAHL: 8 (818)

#1 MeSH descriptor: [Osteoarthritis, Hip] this term only
#2 MeSH descriptor: [Osteoarthritis, Knee] this term only
#3 MeSH descriptor: [Osteoarthritis] this term only
#4 MeSH descriptor: [Hip Joint] this term only
#5 MeSH descriptor: [Hip] this term only
#6 MeSH descriptor: [Knee Joint] this term only
#7 MeSH descriptor: [Knee] this term only
#8 {OR #4-#7}
#9 #3 AND #8
#10 ((coxitis OR gonarthr* OR coxarthr* OR ((knee* OR hip*) NEAR/4 (osteoarthr* OR arthrosis OR arthroses OR arthritis OR arthritides)))):ti,ab,kw
#11 ((oa NEAR/1 knee) OR (oa NEAR/1 hip)):ti,ab,kw
#12 MeSH descriptor: [Chronic Pain] this term only
#13 #8 AND #12
#14 ((((persistent NEAR/3 pain*) or (chronic NEAR/3 pain*)) NEAR/4 (knee* or hip*))):ti,ab,kw
#15 #1 OR #2 OR #9 OR #10 OR #11 OR #13 OR #14
#16 (((arthroplast* OR arthroscop* OR menisc* OR hemiarthroplast* OR ((femoral OR femur) NEAR/2 fracture*) OR ((hip OR knee) NEAR/2 (replacement* OR surg*))) NOT (nonsurg* OR non surg* OR nonpharma* OR non pharma* OR conservative))):ti
#17 (((anterior cruciate ligament* OR ACL) AND (reconstruct* OR surg*)) OR (("intra-articular" OR intraarticular) AND injection*)):ti
#18 (nonsurg* OR non surg* OR nonpharma* OR non pharma* OR conservative):ti
#19 #17 NOT #18

#20 #16 OR #19
#21 #15 NOT #20
#22 MeSH descriptor: [Randomized Controlled Trial] explode all trees
#23 MeSH descriptor: [Random Allocation] this term only
#24 (randomised OR randomized):ti,ab,kw OR (randomly OR "random allocation"):ab
#25 #22 OR #23 OR #24
#26 MeSH descriptor: [Social Behavior] explode all trees
#27 (social* OR societal OR biopsycho* OR "bio psychosocial" OR psychosocial* OR "psycho social" OR "bio psychosocially" OR "psycho socially"):ti,a
#28 MeSH descriptor: [Health Records, Personal] this term only
#29 ("history taking" OR "medical history" OR "medical interview" OR "medical interviews" OR "medical interviewing" OR "family history" OR "reproductive history" OR anamnes* OR trajector* OR diaries OR diary OR "personal health information" OR "personal health informations" OR "health record" OR "health records"):ti,ab,kw
#30 MeSH descriptor: [Holistic Health] this term only
#31 MeSH descriptor: [Holistic Nursing] this term only
#32 MeSH descriptor: [Integrative Medicine] this term only
#33 MeSH descriptor: [Delivery of Health Care, Integrated] this term only
#34 (wholistic OR holistic OR (integrat* NEAR/2 (medicine OR health* OR approach*))):ti,ab,kw
#35 MeSH descriptor: [Models, Psychological] this term only
#36 ((psycholog* AND (examin* OR test* OR instrument* OR evaluat* OR assess* OR measur* OR tool* OR question* OR interview* OR monitor*))):ti,ab,kw
#37 MeSH descriptor: [] explode all trees and with qualifier(s): [psychology - PX]
#38 examin* OR test* OR instrument* OR evaluat* OR assess* OR measur* OR tool* OR question* OR interview* OR monitor*
#39 #37 AND #38
#40 #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #39
#41 MeSH descriptor: [Precision Medicine] this term only
#42 ("p health" OR ((personali* OR predictive OR precise OR precision OR participatory OR preventive) NEAR/1 (health OR medicine*))):ti,ab,kw
#43 ((individualis* OR individualiz* OR personaliz* OR personalis* OR target* OR tailor*) NEAR/4 (treatment* OR therap* OR program* OR manag* OR goal* OR principle* OR care OR healthcare OR intervention* OR approach*)):ti,ab,kw
#44 MeSH descriptor: [Decision Making, Shared] this term only

#45 MeSH descriptor: [Decision Support Techniques] this term only
#46 (decision* NEAR/1 (aid* or support*)):ti,ab,kw OR (shar* NEAR/2 decision*):ti,ab,kw
#47 MeSH descriptor: [Decision Making] this term only
#48 MeSH descriptor: [Choice Behavior] this term only
#49 (choice* OR (decision* NEAR/2 mak*)):ti,ab,kw OR ((patient NEAR/1 specific) OR ((personal OR patient*) NEAR/1 goal*) OR (goal* NEAR/1 setting*)):ti,ab,kw
#50 MeSH descriptor: [Goals] this term only
#51 {OR #41-#50}
#52 MeSH descriptor: [Health Behavior] this term only
#53 MeSH descriptor: [Life Style] this term only
#54 MeSH descriptor: [Healthy Lifestyle] this term only
#55 MeSH descriptor: [Healthy Aging] this term only
#56 MeSH descriptor: [Diet, Healthy] this term only
#57 MeSH descriptor: [Life Change Events] this term only
#58 MeSH descriptor: [Sedentary Behavior] this term only
#59 MeSH descriptor: [Smoking Cessation] this term only
#60 (life style* OR lifestyle* OR behaviour* OR behavior* OR healthy OR "smoking cessation" OR "smoking cessations"):ti,ab,kw
#61 MeSH descriptor: [Adaptation, Psychological] this term only
#62 MeSH descriptor: [Emotional Adjustment] this term only
#63 MeSH descriptor: [Sense of Coherence] this term only
#64 (coping OR cope OR adaptation* OR "emotional adjustment" OR "emotional adjustments" OR "sense of coherence"):ti,ab,kw
#65 (((physical* OR level*) NEAR/1 activ*) AND (leisure OR recreation*)):ti,ab,kw
#66 (action* NEAR/1 plan*):ti,ab,kw OR (life NEAR/1 (chang* OR adjust*)):ti,ab,kw
#67 ((physical* OR level* OR leisure OR recreation*) NEAR/1 activ*):ti
#68 {OR #52-#67}
#69 MeSH descriptor: [Self-Help Devices] this term only
#70 MeSH descriptor: [Wheelchairs] this term only
#71 MeSH descriptor: [Automobile Driving] this term only
#72 (("self help" OR assistive) NEAR/1 (device* OR aid OR aids)):ti,ab,kw OR (assistive NEAR/1 technolog*):ti,ab,kw OR (wheelchair* OR walker* OR

rollator* OR "walking aid" OR "walking aids" OR "walking stick" OR "walking sticks" OR "walking frame" OR "walking frames" OR crutches OR bed OR beds OR chair* OR "height seat" OR "height seats" OR cane OR canes OR rail OR rails OR stair* OR handrail* OR shower* OR "automatic gear" OR "automatic gears" OR car OR cars OR driving OR automobile* OR vehicle*):ti,ab,kw
#73 MeSH descriptor: [Orthopedic Equipment] this term only
#74 MeSH descriptor: [Canes] this term only
#75 MeSH descriptor: [Crutches] this term only
#76 MeSH descriptor: [Orthotic Devices] explode all trees
#77 MeSH descriptor: [Walkers] this term only
#78 MeSH descriptor: [Shoes] this term only
#79 (shoe* OR insole* OR footwear* OR brace OR braces OR orthotic OR orthos*):ti,ab,kw
#80 MeSH descriptor: [Occupational Therapy] this term only
#81 (ergotherap* OR occupational therap* OR ergonom*):ti,ab,kw
#82 {OR #69-#81}
#83 MeSH descriptor: [Occupations] explode all trees
#84 (vocation* OR occupation* OR work OR workplace* OR job* OR career* OR employ* OR unemploy*):ti,ab,kw
#85 MeSH descriptor: [Counseling] explode all trees
#86 MeSH descriptor: [Rehabilitation] this term only
#87 MeSH descriptor: [] explode all trees and with qualifier(s): [rehabilitation - RH]
#88 (rehabilitat* OR participat* OR evaluat* OR engag* OR capacit* OR perform* OR abilit* OR disabilit* OR productivit* OR counsel* OR advic* OR coach*):ti,ab,kw
#89 #83 OR #84

#90 #85 OR #86 OR #87 OR #88
#91 #89 AND #90
#92 MeSH descriptor: [Rehabilitation, Vocational] this term only
#93 MeSH descriptor: [Employment] explode all trees
#94 MeSH descriptor: [Work] this term only
#95 MeSH descriptor: [Return to Work] this term only
#96 MeSH descriptor: [Work Engagement] this term only

#97 MeSH descriptor: [Work Performance] this term only
#98 MeSH descriptor: [Work Capacity Evaluation] this term only
#99 MeSH descriptor: [Retirement] this term only
#100 (return* NEAR/2 work):ti,ab,kw OR ("working age" OR retire*):ti,ab,kw OR (exit* NEAR/1 work*):ti,ab,kw OR (unpaid NEAR/1 (work OR job*)):ti,ab,kw OR (valued NEAR/1 activit*):ti,ab,kw
#101 {OR #91-#100}
#102 #40 OR #51 OR #68 OR #82 OR #101
#103 #21 AND #25 AND #102 with Publication Year from 2012 to 2017, in Trials

**Database: CINAHL**
Date searched: 2022 12th sept
Number of hits: 269
S1 (MH "Osteoarthritis, Hip") OR (MH "Osteoarthritis, Knee")
S2 coxitis OR gonarthr* OR coxarthr* OR ((knee* OR hip*) N3 (osteoarthr* OR arthrosis OR arthroses OR arthritis OR arthritides)) OR (oa N0 knee) OR (oa N0 hip)
S3 (MH "Osteoarthritis") AND ((MH "Hip") OR (MH "Knee") OR (MH "Hip Joint") OR (MH "Knee Joint"))
S4 (MH "Chronic Pain") AND ((MH "Hip") OR (MH "Knee") OR (MH "Hip Joint") OR (MH "Knee Joint"))
S5 ((persistent OR chronic) N2 pain*) N3 (knee* or hip*)
S6 S1 OR S2 OR S3 OR S4 OR S5
S7 (MM "Hemiarthroplasty") OR (MM "Arthroplasty, Replacement, Knee+") OR (MM "Arthroplasty, Replacement, Hip") OR (MM "Arthroplasty") OR (MM "Arthroplasty, Replacement") OR (MM "Arthroscopy") OR (MM "Meniscectomy") OR (MM "Meniscal Injuries") OR (MM "Hip Fractures") OR (MM "Femoral Fractures") OR (MM "Injections, Intraarticular") OR (MM "Anterior Cruciate Ligament/SU") OR (MM "Anterior Cruciate Ligament Reconstruction")

S8 TI ((arthroplast* OR arthroscop* OR menisc* OR (("intra articular" OR intraarticular) AND injection*) OR hemiarthroplast* OR (("anterior cruciate ligament*" OR ACL) AND (reconstruct* or surg*)) OR ((femoral OR femur OR hip* OR knee*) N1 fracture*) OR ((hip OR knee) N1 (replacement* OR surg*))) NOT(nonsurg* OR "non surg*" OR nonpharma* OR "non pharma*" OR conservative))

S9 (MH "Animals+") NOT (MH "Human") OR TI ((veterinar* or animal or animals or rabbit or rabbits or rodent or rodents or rat or rats or mouse or mice or hamster or hamsters or pig or pigs or piglet or piglets or porcine or pigeon* or horse* or equine or cow or cows or bovine or goat or goats or sheep or lamb or lambs or monkey or monkeys or murine or ovine or dog or dogs or canine or cat or cats or feline or dolphin*) not (patient or patients or human or humans))

S10 S7 OR S8 OR S9
S11 S6 NOT S10
S12 TI (protocol for systematic review) OR TI (protocol for a systematic review)
S13 S11 NOT S12
S14 TI (systematic review OR metaanaly* OR meta analy*)
S15 S13 AND S14 Limiters - Published Date: 20120101-20220631; English Language
S16 S11 NOT S12 Limiters - Published Date: 20120101-20220631; English Language; Clinical Queries: Review - High Specificity
S17 S15 OR S16
S18 (MH "Randomized Controlled Trials+") OR (randomised OR randomized) OR AB (randomly OR "random allocation")
S19 S11 AND S18
S20 S19 NOT S17
S21 S20 NOT (TI protocol)
S22 (MH "Social Behavior+") OR social* or societal or biopsycho* or "bio psycho*" or psychosocial* or "psycho social*"
S23 (MH "Medical Records+") OR "history taking" OR "medical history" OR "medical interview*" OR "family history" OR "reproductive histor*" OR anamnes* OR trajector* OR diaries OR diary OR "personal health information*" OR "health record*"
S24 "history taking" OR "medical history" OR "medical interview*" OR "family history" OR "reproductive histor*" OR anamnes* OR trajector* OR diaries OR diary OR "personal health information*" OR "health record*"
S25 (MH "Holistic Nursing") OR (MH "Holistic Care") OR (MH "Holistic Health") OR (MH "Integrative Medicine") OR (MH "Health Care Delivery, Integrated")
S26 wholistic OR holistic OR (integrat* N2 (medicine OR health* OR approach*))
S27 (MH "Models, Psychological+") OR (psycholog* AND (examin* OR test* OR instrument* OR evaluat* OR assess* OR measur* OR tool* OR question* OR interview* OR monitor*))
S28 S22 OR S23 OR S24 OR S25 OR S26 OR S27
S29 (MH "Individualized Medicine") OR ("p health" OR ((personali* OR predictive OR precise OR precision OR participatory OR preventive) N1 (health OR medicine*)))
S30 (individualis* OR individualiz* OR personaliz* OR personalis* OR target* OR tailor*) N4 (treatment* OR therap* OR program* OR manag* OR goal* OR principle* OR care OR healthcare OR intervention* OR approach*)
S31 (MH "Decision Making, Shared") OR (MH "Decision Support Techniques+") OR (decision* N1 (aid* OR support*)) OR (shar* N2 decision*)
S32 (MH "Decision Making+") OR (MH "Decision Making, Patient+")
S33 ( choice* OR (decision* N2 mak*) ) OR patient N1 specific OR ( (personal OR patient*) N1 goal* ) OR goal* N1 setting*
S34 (MH "Goal-Setting") OR (MH "Goal Attainment") OR (MH "Behavioral Objectives") OR (MH "Goals and Objectives")

S35 S29 OR S30 OR S31 OR S32 OR S33 OR S34
S36 (MH "Health Behavior") OR (MH "Life Style Changes") OR (MH "Life Style+") OR (MH "Life Change Events") OR (MH "Life Style, Sedentary") OR (MH "Healthy Aging") OR (MH "Smoking Cessation Programs") OR (MH "Smoking Cessation") OR (MH "Behavioral Changes")
S37 "life style*" OR lifestyle* OR behaviour* OR behavior* OR healthy
S38 (MH "Adaptation, Psychological") OR ( coping OR cope OR adaptation* OR "emotional adjustment*" OR "sense of coherence" ) OR ( ((physical* OR level*) N1 activ*) AND (leisure OR recreation*) ) OR ( (action* N1 plan*) OR (life N1 (chang* OR adjust*)) )
S39 TI (physical* OR level* OR leisure OR recreation*) N1 activ*
S40 S36 OR S37 OR S38 OR S39
S41 (MH "Assistive Technology Devices+") OR (MH "Automobile Driving")
S42 ( ((self help OR assistive) N1 (device* OR aid OR aids)) OR (assistive N1 technolog*) ) OR ( wheelchair* OR walker* OR rollator* OR walking aid* OR walking stick* OR walking frame* OR crutches OR bed OR beds OR chair* OR "height seat*" OR cane OR canes OR rail OR rails OR stair* OR handrail* OR shower* OR "automatic gear*" OR car OR cars OR driving OR automobile* OR vehicle* )
S43 (MH "Orthopedic Equipment and Supplies") OR (MH "Ambulation Aids+") OR (MH "Orthopedic Footwear") OR (MH "Orthoses+") OR (MH "Shoes")

S44 shoe* OR insole* OR footwear* OR brace OR braces OR orthotic OR orthos*
S45 (MH "Occupational Therapy") OR (MH "Home Occupational Therapy") OR (MH "Adaptation, Occupational")
S46 (MH "Ergonomics+") OR ergotherap* OR "occupational therap*" OR ergonom*
S47 S41 OR S42 OR S43 OR S44 OR S45 OR S46
S48 (MH "Occupations and Professions+") OR vocation* OR occupation* OR work OR workplace* OR job* OR career* OR employ* OR unemploy*
S49 (MH "Counseling+") OR (MH "Rehabilitation") OR rehabilitat* OR participat* OR evaluat* OR engag* OR capacit* OR perform* OR abilit* OR disabilit* OR productivit* OR counsel* OR advic* OR coach*
S50 S48 AND S49
S51 (MH "Rehabilitation, Vocational") OR (MH "Employment+") OR (MH "Work+") OR (MH "Work Environment") OR (MH "Work Capacity Evaluation") OR (MH "Job Re-Entry") OR (MH "Job Performance") OR (MH "Retirement")
S52 ( (return* N2 work) OR "working age" OR retire* OR (exit* N1 work*) ) OR ( (unpaid N1 (work OR job*)) OR (valued N1 activit*) )
S53 S50 OR S51 OR S52
S54 S28 OR S35 OR S40 OR S47 OR S53
S55 S21 AND S54 Limiters - Published Date: 20120101-20171231; English Language

Except from Cochrane, the searches combines the result from the rct search and result from systematic reviews with the Boolean operator: NOT.

# 4. PRISMA flow diagram

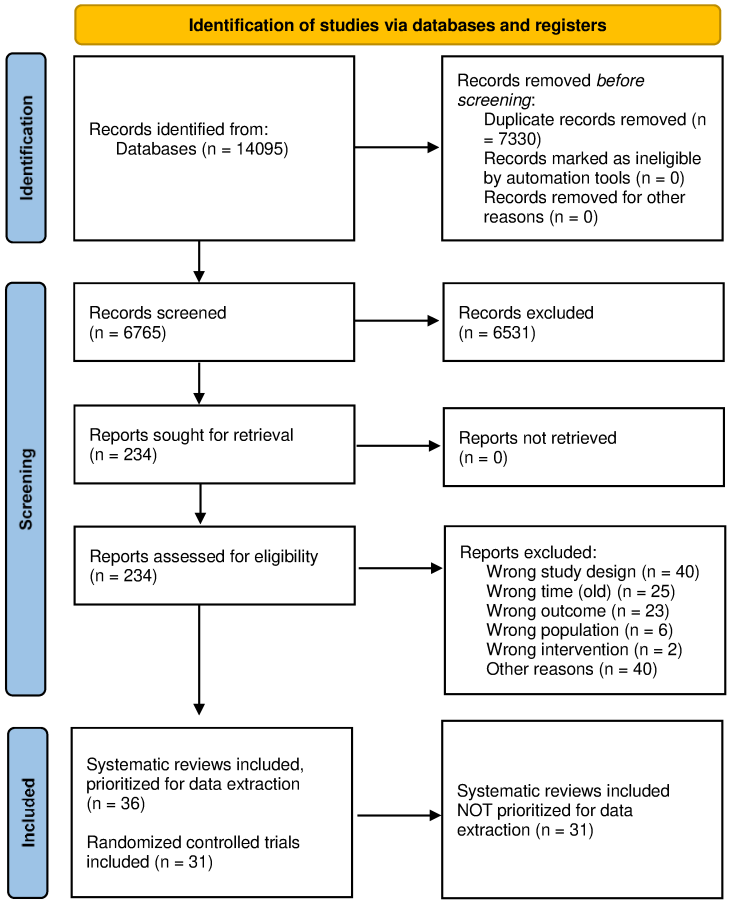



Figure 1. PRISMA flow diagram

**Table 1. Reason for not extracting data from identified systematic reviews (SRs)**

| |
|---|
| Topic covered by newer SR, n=7 |
| Insufficient data analysis, n=5 |
| Not prioritized outcome, n= 1 |
| Included only RCTs published year 2012* or earlier, n= 3 |
| Not relevant intervention, n=15 |

RCT=Randomized controlled trial, *End of previous systematic literature search

# 5. Summary fact sheets for all included studies

## PICO 1: BIOPSYCOSOCIAL APPROACH

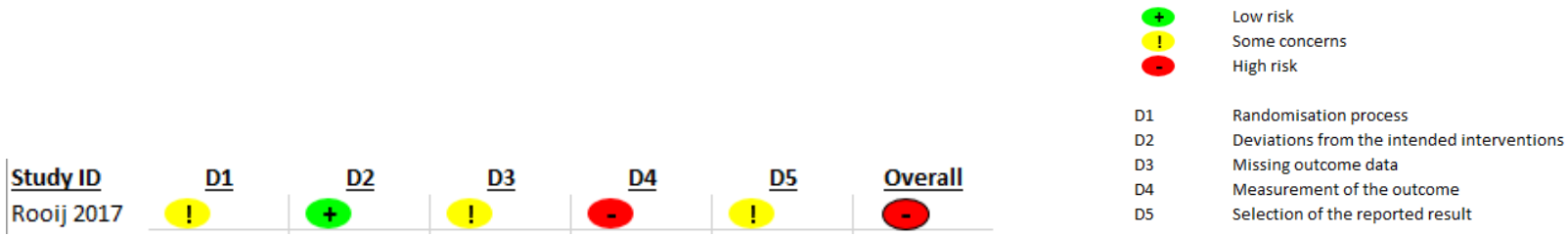
No relevant systematic reviews or RCTs identified

## PICO 2: INDIVIDUALISED TREATMENT

1 relevant RCT identified

| Reference | Hip Knee | Intervention | Control | Follow-up | Outcomes pain | Outcomes function | Other outcomes |
|---|---|---|---|---|---|---|---|
| De Rooij et al. 2017 | K | Individualized, tailored exercise (n= 63) | Usual care (n=63) | 10 weeks<br>20 weeks<br>32 weeks | WOMAC-p (0-17): Difference over time, B (95% CI) -1.78 (-2.65, -0.91)<br><br>NRS (0-10): Difference over time, B (95% CI) -1.41 (-1.87, -0.95) | WOMAC-pf (0-68): Difference over time, B (95% CI) -7.43 (-9.99, -4.87)<br><br>6MWT (meters): Difference over time, B (95% CI) -1.41 (-1.87, -0.95) | Get-up and go<br>Stair climbing up<br>Stair climbing down<br>Sf-36 pf subscale<br>Patient-specific functioning list (PSFL)<br>Walking questionnaire (WQ-35)<br>Climbing stairs questionnaire (CSQ 15)<br>Rising and sitting down questionnaire (R&SDQ39) |

**Appraisal of the methodological quality – Rob 2**




## PICO 3: PACKAGE OF CARE

**Overview of relevant studies:**

| No. | SR /RCT | Hip/ Knee | Study | Topic | Comment |
|---|---|---|---|---|---|
| 1 | SR | K | **Alrushud et al. 2017** Effect of physical activity and dietary restriction interventions on weight loss and the musculoskeletal function of overweight and obese older adults with knee osteoarthritis: a systematic review and mixed method data synthesis | Physical activity and dietary restriction | • Data extracted |
| 2 | SR | K | **Goff et al. 2021** Patient education improves pain and function in people with knee osteoarthritis with better effects when combined with exercise therapy: a systematic review | Patient education and exercise | • Data extracted on patient education + exercise vs control<br>• This SR will also inform rec. 5 - education |
| 3 | SR | K | **Hall et al. 2019** Diet-induced weight loss alone or combined with exercise in overweight or obese people with knee osteoarthritis: A systematic review and meta-analysis | Weight loss and exercise | • Data extracted on diet and exercise vs. control<br>• This SR will also inform rec. 8 – weight management |

| | | | | | |
|---|---|---|---|---|---|
| 4 | SR | K | **Pitsillides et al. 2021**<br>The effects of cognitive behavioural therapy delivered by physical therapists in knee osteoarthritis pain: A systematic review and meta-analysis of randomized controlled trials | Cognitive behavioural therapy and exercise | • Data extracted |
| 5 | SR | K | **Xie et al. 2021**<br>Effect of Internet-Based Rehabilitation Programs on Improvement of Pain and Physical Function in Patients with Knee Osteoarthritis: Systematic Review and Meta-analysis of Randomized Controlled Trials | Internet-based rehabilitation | • Data extracted |
| 9 | RCT | K | **Bennell et al. 2016**<br>Physical Therapist-Delivered Pain Coping Skills Training and Exercise for Knee Osteoarthritis: Randomized Controlled Trial | Pain coping skills training and exercise | • Data extracted |
| 10 | RCT | K | **Bennell et al. 2022**<br>Comparing Video-Based, Telehealth-Delivered Exercise and Weight Loss Programs With Online Education on Outcomes of Knee Osteoarthritis: A Randomized Trial | Weight loss, exercise and education delivered with telehealth | • Data extracted |
| 11 | RCT | K | **Robbins et al. 2021**<br>Effectiveness of Stepped-Care Intervention in Overweight and Obese Patients With Medial Tibiofemoral Osteoarthritis: A Randomized Controlled Trial | Stepped care involving diet and exercise, cognitive behavioural therapy and unloader knee brace | • Data extracted |
| 12 | RCT | K | **Skou et al. 2020**<br>Cost-effectiveness of 12 weeks of supervised treatment compared to written advice in patients with knee osteoarthritis: a secondary analysis of the 2-year outcome from a randomized trial | Patient education, neuromuscular exercise, insoles, diet and pain medication | • Data extracted |
| | | | | | |
| 6 | SR | H/K | **Kechichian et al. 2022**<br>Multimodal Interventions Including Rehabilitation Exercise for Older Adults With Chronic Musculoskeletal Pain: A Systematic Review and Meta-analyses of Randomized Controlled Trials | Exercise and at least one other medical, educational or biopsychosocial intervention | • Data extracted |
| 7 | SR | H/K | **Mazzei et al. 2021** | Education, exercise and diet | • Data extracted<br>• Cost-effectivness analyses |

| | | | | | |
|---|---|---|---|---|---|
| | | | Are education, exercise and diet interventions a cost-effective treatment to manage hip and knee osteoarthritis? A systematic review | | |
| 8 | SR | H/K | **Manoharan et al. 2018**<br>Structured education and neuromuscular exercise program for hip and/or knee osteoarthritis: A health technology assessment | Education and exercise | • Data not extracted<br>• Covered by Mazzei et al. 2021 |

**SUMMARY OF FINDINGS**

- **Effect estimates higligted in green: statistically significant in favour of intervention group**
- **Effet estimates highligtes in red: statistically significant in favour of control / comparison group**

**Patient education + Exercise (1 SR, 1 RCT)**

- Patient education + exercise vs. Information (Bennell 2022 RCT; Goff 2021 SR)
  *Pain, NRS 0-10 (95% CI)*
  - 6 months: -0.8 (-1.5 to -0.2)
  - 12 months: -0.7 (-1.4 to -0.1)

  *Pain, SMD (95 % CI)*
  - Short-term 0.44 (0.19, 0.69)
  - Medium-term: 0.14 (-0.04, 0.32)
  - Long-term: 0.13 (-0.08, 0.33)

  *Function, WOMAC 0-68 (95% CI)*
  - 6 months: -7.0 (-9.7 to -4.2)
  - 12 months: -4.4 (-7.4 to -1.4

  *Function, SMD (95% CI)*
  - Short-term: 0.81 (0.54, 1.08)
  - Medium-term: 0.39 (0.15, 0.62)
  - Long-term: 0.24 (-0.06, 0.54)

- Exercise vs. patient education + exercise (Goff 2021 SR)

  *Pain, SMD (95 % CI)*
  - Short-term: 0.61 (-0.40, 1.62)
  - Medium-term: 0.10 (-0.30, 0.50)

  *Function, SMD (95% CI)*
  - Short-term: 1.32 (-0.57, 3.20)

**Exercise + Diet (2 SRs)**

- Exercise + diet vs. Exercise (Alrushud 2017 SR)

  *Function (6MWT), MD (95% CI)*
  - 15.05 (-11.77, 41.87)

- Exercise + diet vs. Non-diet treatment or no treatment (Hall 2019 SR)

  *Pain, SMD (95% CI)*
  - <12 months -0.78 (-1.25, -0.31)
  - ≥12 months -0.22 (-0.46, 0.03)

  *Function, SMD (95% CI)*
  - <12 months -0.63 (-1.01, -0.25)
  - ≥12 months -0.17 (-0.41, 0.07)

**Education + exercise + diet (1 RCT, 1 SR)**

- Education + exercise + diet vs. information (Bennell 2022 RCT)

  *Pain, NRS 0-10 (95% CI)*
  - 6 months -1.5 (-2.1, -0.8)

- 12 months -1.3 (-2.0, -0.7)

*Function, WOMAC 0-68 (95% CI)*
- 6 months -9.8 (-12.5 to -7.0)
- 12 months -7.5 (-10.4 to -4.5)

- Education + exercise + diet vs. Education + exercise (Bennell 2022 RCT)
*Pain, NRS 0-10 (95% CI)*
  - 6 months -0.6 (-1.1, -0.2)
  - 12 months -0.6 (-1.0, -0.1)

  *Function, WOMAC 0-68 (95% CI)*
  - 6 months -2.8 (-4.7, -0.8)
  - 12 months -3.1 (-5.1, -1.7)

- Cost-effectiveness of Education, exercise and dietary weight management compared to any control (Mazzei 2021 SR)
  - Authors conclusion: *Structured core treatment programs were clinically effective and cost-effective, compared to physician-delivered usual care, in five health care systems.*

**Cognitive behavioral therapy / pain coping skills training + Exercise (1 SR, 1 RCT)**

- Centre-based CBT + exercise vs. Any control (Pitsillides 2021 SR) (post-intervention)
*Pain, SMD (95% CI)*
  - -1.62 (-1.97, -1.27)

- Distance-delivered CBT + exercise vs. Any control (Pitsillides 2021 SR)
*Pain, SMD (95% CI)*
  - -1.28 (-1.75, -0.81)

- Pain coping skills training + exercise vs. Exercise (Bennell 2016 RCT)
*Pain, VAS 0-100 (95% CI)*
  - 0-12wk: 5.8 (-1.4, 13.0)

- 0-32wk: 9.4 (1.0,17.9)
- 0-52wk: 2.8 (-5.2, 10.7)

*Function, WOMAC 0-68 (95% CI)*

- 0-12wk: 3.7 (0.4, 7.0)
- 0-32wk: 4.4 (0.2, 8.7)
- 0-52wk: 2.8 (-1.0, 6.6)

- Pain coping skills training + exercise vs. Pain coping skills training (Bennell 2016 RCT)

*Pain, VAS 0-100 (95% CI)*

- 0-12wk: 6.7 (-0.6, 14.1)
- 0-32wk: 8.4 (0.3,16.6)
- 0-52wk: 2.6 (-5.2, 10.4)

*Function, WOMAC 0-68 (95% CI)*

- 0-12wk: 7.9 (4.7, 11.2)
- 0-32wk: 6.6 (2.3, 10.8)
- 0-52wk: 5.5 (1.6, 9.3)

**Mix of interventions incl. exercise, diet, knee brace, CBT, insoles medical interventions, biopsychosocial interventions (1 SR, 2 RCTs)**

- Multimodal interventions vs educational leaflets (Robbins 2021 RCT)

*Pain, VAS 0-100 (95% CI)*

- 20 weeks: Between group Δ: 10.7 (3.9-17.4)
- 32 weeks: Between group Δ: 3.3 (-3.6, 10.2)
-

*Function, WOMAC 0-68 (95% CI)*

- 20 weeks: Between group Δ: 9.9 (5.0-14.8)
- 32 weeks: Between group Δ: 6.0 (1.0-11.0)

- Multimodal intervention vs. usual care or no intervention (Kechichian 2022 SR)

*Pain, MD NRS/VAS (0-10 ) (95 % CI)*

  - 6-12 weeks: -0.70 (-0.98, -0.42)
  - 3-6 months: -0.53 (-0.87, -0.18)
  - 1 year: -0.49 (-0.89, -0.09)

- Cost effectiveness of multimodal interventions compared to written advice (Skou 2020 RCT)
  - Authors conclusion: *"Individualized, supervised treatment was cost-effective compared to written advice in a 24-month limited societal perspective in patients with moderate to severe OA not eligible for TKR."*

Internet-based rehabilitation vs. conventional therapy (Xie 2022, SR)

Pain, SMD (95 % CI):

- -0.21 (-0.40, -0.01)

Function, SMD (95 % CI):

- -0.08 (-0.27, 0.12)

**Analysis**

*Patient education + Exercise*

- 1 SR and 1 RCT have compared patient education and exercise to information alone or exercise alone. Both studies favor the combination patient education and exercise over information alone. The effect sizes were small to moderate. The SR found no superior results of education + exercise over exercise alone (Goff 2021, Bennell 2022)

*Exercise + Diet*

- 2 SRs have compared exercise + diet to exercise alone or other non-diet treatments or no treatment in people with overweight or obesity. Exercise + diet was found superior to no-diet treatment or no treatment with moderate effect sized and large confidence intervals, but not to exercise alone (Alrushud 2017, Hall 2019)

*Education + Exercise + Diet*

- 1 RCT have compared education + exercise + diet in people with overweigh or obesity to information alone or education + exercise alone (Bennell 2022). The combined intervention, delivered with telehealth was superior to both controls for all comparisons, and the effects may be interpreted as clinically relevant. The combination of education + exercise + diet was also found cost-effective in one SR (Mazzei 2021)

*Cognitive behavioral therapy / pain coping skills training + Exercise*

- 1 SR and 1 RCT found that CBT or pain coping skills training + exercise was superior compared to any control, exercise alone or pain coping skills training alone. (Bennell 2016, Pitsillides 2021). The reported effect sizes were large when or pain coping skills training + exercise was compared to any control (SR), but smaller when the combined intervention was compared to exercise alone or pain coping skills training alone (RCT). The SR reported comparable results from distance delivered and center-based interventions in comparison to any control.

*Mix of interventions incl. exercise, diet, knee brace, CBT, insoles medical interventions, biopsychosocial interventions*

- 1 SR and 1 RCT found evidence that multimodal intervention including a mix of exercise, diet, knee brace, CBT, insoles medical interventions, biopsychosocial interventions was superior to educational leaflets, usual care or no intervention (Robbins 2021, Kechichian 2022). Effectsizes were moderate in the short-term and declining over time (1 year). 1 RCT on cost-effectiveness of multimodal interventions compared to written advice concluded that *"Individualized, supervised treatment was cost-effective compared to written advice in a 24-month limited societal perspective in patients with moderate to severe OA not eligible for TKR."* (Skou 2020)

*Internet-based rehabilitation vs. conventional therapy*

- 1 SR found evidence that internet -based rehabilitation was superior to conventional therapy for pain, but not for function. The effect size was small.

**Conclusion:**

The new evidence was in line with the original recommendation, but with added information on cost-effectiveness, CBT and pain coping skills training as part of a package of care / management plan. All SRs were of low or critically low quality as evaluated by AMSTAR 2. One RCT included one SR (Alrsuhud) reported no adverse events of exercise + diet, otherwise adverse events were not reported in any of the SRs.

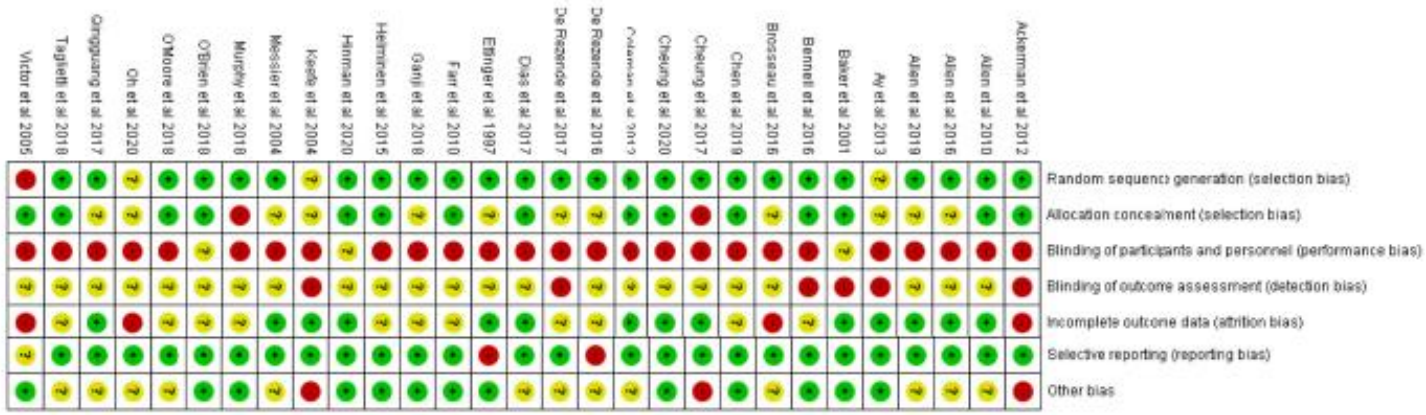
**DATA EXTRACTION SYSTEMATIC REVIEWS**

| **1: Alrushud et al 2017** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Alrushud, A.S., Rushton, A. B., Kanavaki, A. M., Greig, C. A. |
| **Year of publication** | 2017 |
| **Title** | Effect of physical activity and dietary restriction interventions on weight loss and the musculoskeletal function of overweight and obese older adults with knee osteoarthritis: a systematic review and mixed method data synthesis |
| **Inclusion period** | From ? until 15 January 2017 |
| **Inclusion criteria** | • Older adults (aged ≥55 years, men and women).<br>• Overweight or obese with BMI ≥25kg/m2<br>• Radiographic evidence of tibiofemoral OA (unilateral or bilateral), grade I–III (mild to moderate) according to the Kellgren and Lawrence system for knee OA classification.<br>• Randomised controlled trials.<br>• Interventions: Combined physical activity and dietary restriction programmes.<br>• Comparators Usual care (including advice or physical activity alone or dietary restriction alone) or exercise (participants received an exercise programme similar to the intervention group).<br>• Exclusion criteria: Full article not written in English. |
| **Outcomes** | 6 min walk test (metres) |
| **Comparisons** | In meta-analysis: the effect of the combined dietary and exercise intervention programme compared with exercise |
| **Results** | |
| **Number of RCTs** | 5 in total. 2 in meta-analysis. Results extracted only from meta-analysis |
| **Range no. of participants** | 21-255 |
| **Ranges of duration of follow-up** | 6 months |
| **Results per outcome measure** | **FUNCTION (6MWT)**<br>Combined diet and exercise vs. exercise (MD (95% CI))<br>15.05 (-11.77, 41.87) |
| **Adverse events** | Report of no adverse events in one included RCT (Messier 2013) |

<table>
<tr><td>Risk of bias</td><td>Risk of bias across trials was evaluated as unclear, only component 5 (selective outcome reporting) was evaluated as low risk of bias for all studies. For the ‘blinding of participants, personnel and outcome assessor’ component, all trials were evaluated as having unclear risk of bias as no strategies were reported to address the issue of outcome assessor unblinding. Also, for the ‘other sources of bias’ components, all trials were evaluated with unclear risk of bias due to unclear reporting.</td></tr>
<tr><td>AMSTAR 2</td><td>
<table>
<tr><th>Study</th><th>1</th><th>2*</th><th>3</th><th>4*</th><th>5</th><th>6</th><th>7*</th><th>8</th><th>9*</th><th>10</th><th>11*</th><th>12</th><th>13*</th><th>14</th><th>15</th><th>16</th><th>Overall quality</th></tr>
<tr><td>Alrushud 2017</td><td>Y</td><td>N</td><td>Y</td><td>P</td><td>Y</td><td>Y</td><td>N</td><td>P</td><td>Y</td><td>N</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Critically low</td></tr>
</table>
*Critical items, Y=yes, N=No, P=partial yes<br>See attached AMSTAR 2 checklist for details on the content of the specific items
</td></tr>
</table>

| **2: Goff et al. 2021** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Goff, A. J.; De Oliveira Silva, D.; Merolli, M.; Bell, E. C.; Crossley, K. M.; Barton, C. J. |
| **Year of publication** | 2021 |
| **Title** | Patient education improves pain and function in people with knee osteoarthritis with better effects when combined with exercise therapy: a systematic review |
| **Inclusion period** | Inception to April 2020 |
| **Inclusion criteria** | • Randomised controlled trials, including cluster randomised trials<br>• Any form of patient education<br>• Clinical or radiographically confirmed knee OA<br>• Control: any non-pharmacological intervention, even if the patient educational intervention was the control intervention. |
| **Comparisons** | • Exercise vs. patient education + exercise<br>• Patient education versus patient education + exercise |
| **Outcomes** | Pain and function |
| **Results** | |
| **Number of RCTs** | 29 in total |
| **Range no. of participants** | 35-300 |
| **Ranges of duration of follow-up** | Due to large variation in when outcome measures were assessed, subgrouping of short-term (< 6 months), medium term (6 to 12 months) and long-term (> 12 months) results was introduced |

| | |
|---|---|
| **Results per outcome measure** | **PAIN**<br>Exercise vs. patient education + exercise (SMD (95% CI))<br>• Short-term (based on 3 studies): 0.61 (-0.40, 1.62)<br>• Medium-term (based on 2 studies): 0.10 (-0.30, 0.50)<br><br>Patient education vs. patient education + exercise (SMD (95% CI))<br>• Short-term (based on 5 studies): 0.44 (0.19, 0.69)*<br>• Medium-term (based on 4 studies): 0.14 (-0.04, 0.32)<br>• Long-term (based on 3 studies): 0.13 (-0.08, 0.33)<br><br>**FUNCTION**<br>Exercise vs. patient education + exercise (SMD (95% CI))<br>• Short-term (based on two studies): 1.32 (-0.57, 3.20)<br><br>Patient education vs. patient education + exercise (SMD (95% CI))<br>• Short-term (based on 3 studies): 0.81 (0.54, 1.08)*<br>• Medium-term (based on 2 studies): 0.39 (0.15, 0.62)*<br>• Long-term (based on 3 studies): 0.24 (-0.06, 0.54)<br><br>*Statistically significant in favor of patient education + exercise |
| **Adverse events** | Not reported |
| **Risk of bias** | |




Risk of bias of the studies included in the meta-analysis, Cohrane risk of bias tool

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**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goff 2021 | Y | P | N | P | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | N | Y | Low |

*Critical items, Y=yes, N=No, P=partial yes
See attached AMSTAR 2 checklist for details on the content of the specific items

| **3: Hall et al. 2019** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Hall, M.; Castelein, B.; Wittoek, R.; Calders, P.; Van Ginckel, A. |
| **Year of publication** | 2019 |
| **Title** | Diet-induced weight loss alone or combined with exercise in overweight or obese people with knee osteoarthritis: A systematic review and meta-analysis |
| **Inclusion period** | From inception up to March 1st 2017 |
| **Inclusion criteria** | • Full reports of RCTs<br>• Knee OA as defined by the study investigators. This involved self-reported, clinical and or/radiographic diagnoses<br>• ≥45 years<br>• Body mass index >25 kg/m2<br>• Any non-surgical non-pharmacological weight loss treatment, with or without any exercise treatment designed for people with knee OA.<br>• Experimental groups that consisted of multi-modal therapy programs where the effects of weight loss could not be discerned in isolation were excluded from analysis.<br>• The comparator (control) group could be an active (given any non-diet treatment) or no treatment (including placebo or waiting list) group.<br>• If studies involved mixed patient populations, at least 80% of the sample had to have knee OA.<br>• Reports in languages other than English, German, French or Dutch were also excluded.64 |
| **Comparisons** | Diet + exercise vs. control |
| **Outcomes** | self-reported clinical symptoms (pain and/or physical dysfunction) |
| **Results** | |
| **Number of RCTs** | 16 (in total) |
| **Range no. of participants** | NR |
| **Ranges of duration of follow-up** | NR. Analysis on <12 months and ≥12 months |
| **Results per outcome measure** | PAIN<br>Diet + Exercise vs. control (active (given any non-diet treatment) or no treatment).<br>(based on 3 studies), SMD (95% CI) |

<table>
<tr><td></td><td>
<ul>
<li><12 months -0.78 (-1.25, -0.31) 0.001*</li>
<li>≥12 months -0.22 (-0.46, 0.03) 0.08</li>
<li>Total -0.37 (-0.69, -0.04) 0.029*</li>
</ul>
FUNCTION<br>
Diet + Exercise vs. control (active (given any non-diet treatment) or no treatment), (based on 4 studies) SMD (95% CI)
<ul>
<li><12 months -0.63 (-1.01, -0.25) 0.001*</li>
<li>≥12 months -0.17 (-0.41, 0.07) 0.17</li>
<li>Total -0.32 (-0.56, -0.08) 0.010*</li>
</ul>
*Statistically significant in favour of intervention
</td></tr>
<tr><td>Adverse events</td><td>Not reported</td></tr>
<tr><td>Risk of bias</td><td>
Appendix C. Within-study risk of bias of eligible studies (n = 19) using the Cochrane Risk of Bias Tool
<table>
<tr><th>Authors, Year</th><th>Random sequence Generation</th><th>Allocation</th><th>Blinding patients/staff</th><th>Blinding outcome</th><th>Incomplete outcome data</th><th>Selective reporting</th><th>Overall risk of bias[a]</th></tr>
<tr><td>Beavers, 2015</td><td>U</td><td>U</td><td>L</td><td>L</td><td>L</td><td>L</td><td>L</td></tr>
<tr><td>Bliddal, 2011</td><td>L</td><td>L</td><td>H</td><td>L</td><td>L</td><td>U</td><td>L</td></tr>
<tr><td>Budiman-Mak, 2014</td><td>U</td><td>U</td><td>H</td><td>L</td><td>U</td><td>L</td><td>L</td></tr>
<tr><td>Christensen, 2005</td><td>U</td><td>U</td><td>H</td><td>U</td><td>L</td><td>U</td><td>L</td></tr>
<tr><td>Christensen, 2015</td><td>L</td><td>L</td><td>H</td><td>L</td><td>L</td><td>L</td><td>L</td></tr>
<tr><td>Chua, 2008</td><td>U</td><td>U</td><td>L</td><td>L</td><td>L</td><td>U</td><td>L</td></tr>
<tr><td>Gudbersen, 2011</td><td>L</td><td>L</td><td>H</td><td>L</td><td>L</td><td>U</td><td>L</td></tr>
<tr><td>Huang, 2000</td><td>H</td><td>U</td><td>H</td><td>U</td><td>H</td><td>U</td><td>H</td></tr>
<tr><td>Huebner, 2016</td><td>U</td><td>U</td><td>L</td><td>L</td><td>L</td><td>U</td><td>L</td></tr>
<tr><td>Messier, 2000</td><td>U</td><td>U</td><td>H</td><td>L</td><td>L</td><td>U</td><td>L</td></tr>
<tr><td>Messier, 2004</td><td>L</td><td>U</td><td>H</td><td>L</td><td>L</td><td>U</td><td>L</td></tr>
<tr><td>Messier, 2013</td><td>L</td><td>U</td><td>H</td><td>L</td><td>L</td><td>L</td><td>L</td></tr>
<tr><td>Miller, 2004</td><td>U</td><td>U</td><td>L</td><td>U</td><td>U</td><td>U</td><td>L</td></tr>
<tr><td>Miller, 2006</td><td>U</td><td>U</td><td>H</td><td>U</td><td>L</td><td>U</td><td>L</td></tr>
<tr><td>Miller, 2008</td><td>U</td><td>U</td><td>L</td><td>U</td><td>U</td><td>U</td><td>L</td></tr>
<tr><td>Miller, 2012</td><td>U</td><td>U</td><td>L</td><td>U</td><td>L</td><td>U</td><td>L</td></tr>
<tr><td>Nicklas, 2004</td><td>L</td><td>U</td><td>L</td><td>L</td><td>L</td><td>U</td><td>L</td></tr>
<tr><td>Rejeski, 2002</td><td>U</td><td>U</td><td>H</td><td>L</td><td>L</td><td>U</td><td>L</td></tr>
<tr><td>Somers, 2012</td><td>L</td><td>L</td><td>H</td><td>L</td><td>L</td><td>U</td><td>L</td></tr>
</table>
U: unclear risk of bias; L: low risk of bias; H: high risk of bias.<br>
[a]Judged as "Low" when the three domains of random sequence generation, allocation concealment and incomplete outcome data were adequately met in a study, that is when low or unclear risks were reported for these particular items.<br>
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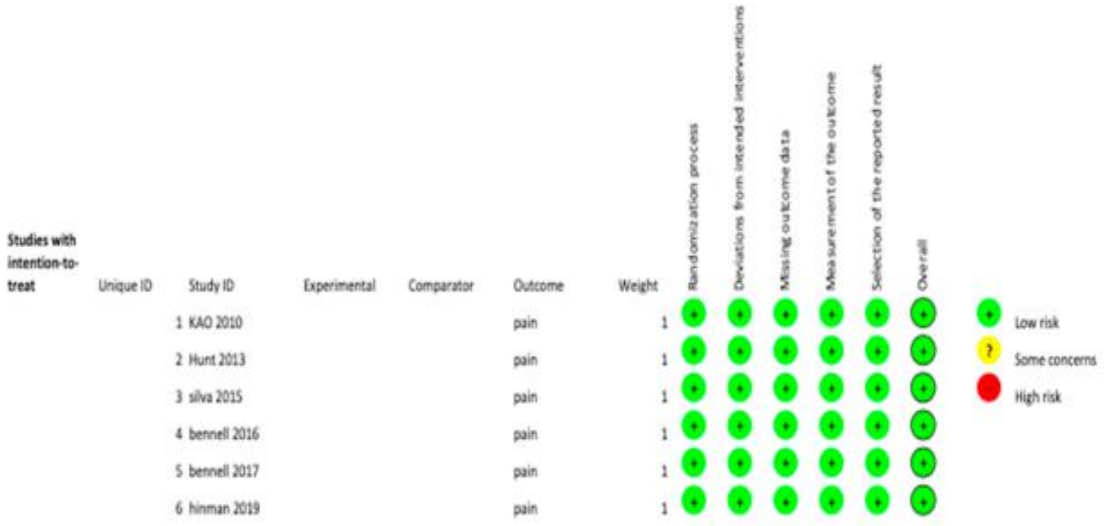
</td></tr>
<tr><td>AMSTAR 2</td><td>
<table>
<tr><th>Study</th><th>1</th><th>2*</th><th>3</th><th>4*</th><th>5</th><th>6</th><th>7*</th><th>8</th><th>9*</th><th>10</th><th>11*</th><th>12</th><th>13*</th><th>14</th><th>15</th><th>16</th><th>Overall quality</th></tr>
<tr><td>Hall 2019</td><td>Y</td><td>Y</td><td>Y</td><td>P</td><td>Y</td><td>Y</td><td>N</td><td>Y</td><td>Y</td><td>N</td><td>Y</td><td>Y</td><td>y</td><td>Y</td><td>Y</td><td>Y</td><td>Low</td></tr>
</table>
*Critical items, Y=yes, N=No, P=partial yes<br>
See attached AMSTAR 2 checklist for details on the content of the specific items
</td></tr>
</table>

| **4: Pitsillides 2021** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Pitsillides, A; Stasinopoulos, D; Giannakou, K |
| **Year of publication** | 2021 |
| **Title** | The effects of cognitive behavioural therapy delivered by physical therapists in knee osteoarthritis pain: A systematic review and meta-analysis of randomized controlled trials |
| **Inclusion period** | Inception to March 2020 |
| **Inclusion criteria** | • Patients with knee osteoarthritis.<br>• Intervention: studies of CBT and exercise delivered by physical therapists, no co-interventions were allowed.<br>• Control: Any control group<br>• Randomized controlled clinical trial.<br>• English language |
| **Comparisons** | • Centre-based CBT+ exercise vs. control<br>• Distance- delivered CBT+ exercise vs. control<br>• Overall: CBT+ exercise vs. control |
| **Outcomes** | Pain |
| **Results** | |
| **Number of RCTs** | 4 RCTs in quantitative synthesis (meta-analysis) |
| **Range no. of participants** | 20-222 |
| **Ranges of duration of follow-up** | 4 weeks – 12 months |
| **Results per outcome measure** | **PAIN**<br>Centre-based CBT+ exercise vs. control (based on 2 studies) (SMD (95% CI))<br>• -1.62 (-1.97, -1.27)*<br><br>Distance- delivered CBT+ exercise vs. control (based on 2 studies) (SMD (95% CI))<br>• -1.28 (-1.75, -0.81)*<br><br>Overall: CBT+ exercise vs. control (SMD (95% CI))<br>• -1.42 (-1.76, -1.09)*<br><br>*Statistically significant in favor of intervention |

| | |
|---|---|
| | |
| **Adverse events** | Not reported |
| **Risk of bias** |  <br>**Fig. 4.** Methodological quality assessment (RoB2).<br>*Reprinted with permission from Elsevier* |
| **AMSTAR 2** | See table below |

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pitsillides 2021 | Y | N | Y | P | Y | Y | N | P | Y | N | N | Y | Y | Y | Y | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes
See attached AMSTAR 2 checklist for details on the content of the specific items

| **5: Xie 2022** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Xie, S.H., Wang Q., Wang l.Q., Wang L., Song K.P., He C.Q. |
| **Year of publication** | 2021 |
| **Title** | Effect of Internet-Based Rehabilitation Programs on Improvement of Pain and Physical Function in Patients with Knee Osteoarthritis: Systematic Review and Meta-analysis of Randomized Controlled Trials (https://www.jmir.org/2021/1/e21542) |
| **Inclusion period** | January 2000 to April 2020 |
| **Inclusion criteria** | • RCTs<br>• Effect of internet-based rehabilitation programs<br>• Patients with knee OA diagnosed by a physician or self-reported a physician diagnosis along with matching items based on the American College of Rheumatology clinical criteria, and had not undergone knee arthroplasty<br>• English or Chinese language.<br>• Participants above 18 years,<br>• Interventions compared the effects of internet-based rehabilitation programs with conventional rehabilitation (eg, rehabilitation performed in the clinic or hospital) or waiting without any therapy.<br>• Internet-based rehabilitation could be the only intervention or could be combined with another form of physiotherapy.<br>• The internet-based rehabilitation programs were performed through videos or graphic knowledge demonstrations, real-time communication with physicians or therapists, and group discussions to promote the self-rehabilitation for individuals with knee OA.<br>• Rehabilitation methods include exercise, patient education, and self-management.<br>• Interventions used for participants had to be internet-based such as by email, websites, or software systems.<br>• Studies using non-internet technology support or not explicitly stating that internet technology was used to support the intervention were excluded, such as telephone, DVD, and cable television. |
| **Comparisons** | Internet-based rehabilitation vs. conventional therapy |
| **Outcomes** | Pain, function |
| **Results** | |

| | |
|---|---|
| **Number of RCTs** | 4 |
| **Range no. of participants** | 20-350 |
| **Ranges of duration of follow-up** | 10-48 weeks |
| **Results per outcome measure** | PAIN<br>Internet-based rehabilitation vs. conventional therapy, SMD (95 % CI):<br>• -0.21 (-0.40, -0.01)<br><br>FUNCTION<br>Internet-based rehabilitation vs. conventional therapy, SMD (95 % CI):<br>• -0.08 (-0.27, 0.12) |

**Risk of bias**

**Table 2.** Assessment of methodological quality using the PEDro scale.

| Quality metric | Aily et al [52] | Huang et al [34] | O'Moore et al [33] | Allen et al [35] |
|---|---|---|---|---|
| Eligibility criteria | Yes | Yes | Yes | Yes |
| Random allocation | Yes | Yes | Yes | Yes |
| Concealed allocation | Yes | Yes | Yes | Yes |
| Baseline comparability | Yes | Yes | Yes | Yes |
| Blinded subjects | No | No | No | No |
| Blinded therapists | No | No | No | No |
| Blinded assessors | No | Yes | Yes | Yes |
| Adequate follow up | Yes | Yes | Yes | Yes |
| Intention-to-treat analysis | No | No | Yes | Yes |
| Between-group comparisons | Yes | Yes | Yes | Yes |
| Point estimates and variability | Yes | Yes | Yes | Yes |
| Total score[a] | 6 | 7 | 8 | 8 |
| Quality assessment | Good | Good | Good | Good |

[a]Eligibility criteria did not contribute to the total score: 1=yes, 0=no.

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**Adverse events**

**Not reported**

**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Xie 2021 | Y | N | Y | P | Y | Y | N | P | P | N | Y | N | N | Y | N | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

| **6: Kechichian et al. 2022** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Kechichian, A.; Lafrance, S.; Matifat, E.; Dube, F.; Lussier, D.; Benhaim, P.; Perreault, K.; Filiatrault, J.; Rainville, P.; Higgins, J.; Rousseau, J.; Masse, J.; Desmeules, F. |
| **Year of publication** | 2022 |
| **Title** | Multimodal Interventions Including Rehabilitation Exercise for Older Adults With Chronic Musculoskeletal Pain: A Systematic Review and Meta-analyses of Randomized Controlled Trials |
| **Inclusion period** | Inception to January 2019 |
| **Inclusion criteria** | • Participants were adults with a mean age of 65 years or above<br>• Chronic musculoskeletal pain in any body site (for at least 3 months, according to the definition of chronic pain from the International Association for the Study of Pain)<br>• Randomized controlled trials (RCT)<br>• Multimodal interventions including an active exercise rehabilitation program, and at least one other medical, educational or biopsychosocial intervention<br>• Control: usual medical care including medication prescription or to no intervention<br>• English or French language |
| **Comparisons** | • Multimodal intervention vs. control intervention |
| **Outcomes** | Pain and function |
| **Results** | |
| **Number of RCTs** | 16 RCTs (3 non-OA, not included in results) |
| **Range no. of participants** | 46-418 |
| **Ranges of duration of follow-up** | • 6-12 weeks<br>• 3-6 months<br>• 1 year |
| **Results per outcome measure** | **PAIN**<br>Multimodal intervention vs. control (MD (95 % CI))<br>• 6-12 weeks: -0.70 (-0.98, -0.42)*<br>• 3-6 months: -0.53 (-0.87, -0.18)*<br>• 1 year: -0.49 (-0.89, -0.09)*<br>*Statistically significant in favor of multimodal intervention |

| | |
|---|---|
| | **FUNCTION**<br>Control vs. multimodal intervention (SMD (95 % CI))<br>• 6-12 weeks: 0.47 (0.34, 0.61)*<br>• 3-6 months: 0.26 (0.12, 0.39)*<br>• 1 year: 0.29 (0.13, 0.46)*<br>*Statistically significant in favor of multimodal intervention |
| **Adverse events** | Not reported |
| **Risk of bias** |  |

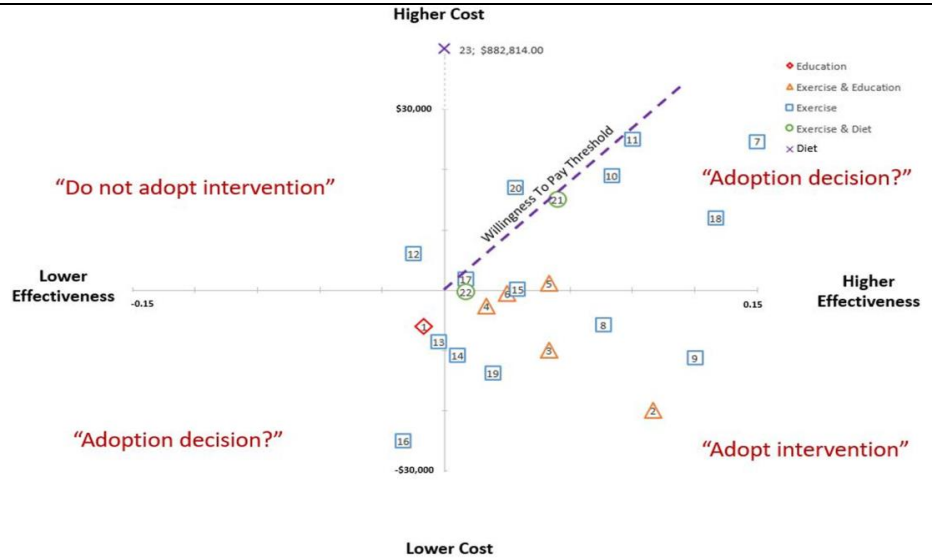


**AMSTAR 2**

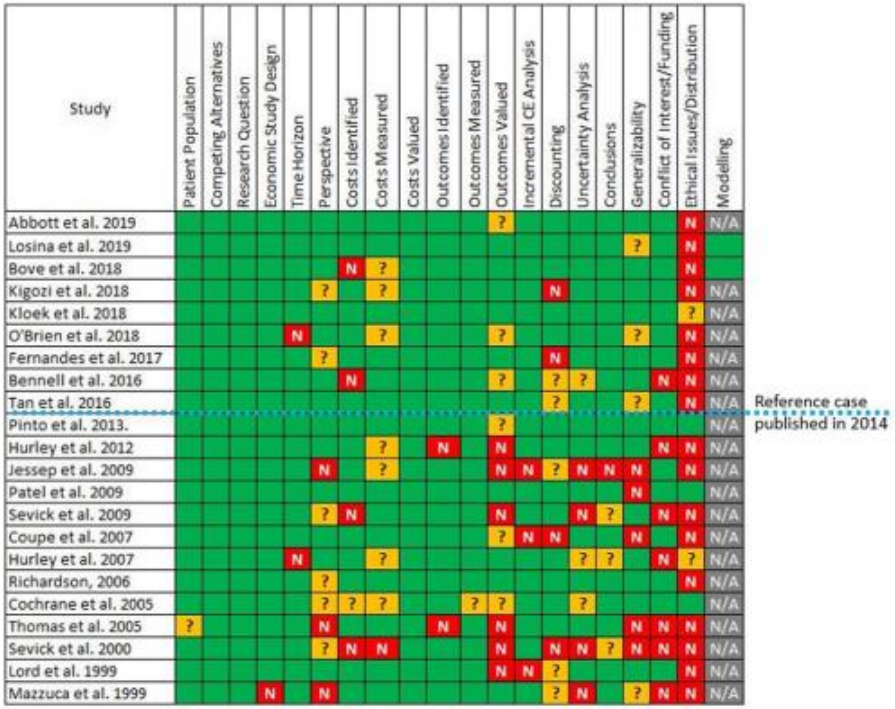
| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kechichian 2022 | Y | Y | Y | P | Y | Y | N | P | Y | N | Y | N | N | Y | Y | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes
See attached AMSTAR 2 checklist for details on the content of the specific items

| **7: Mazzei et al. 2020** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Mazzei, D. R.; Ademola, A.; Abbott, J. H.; Sajobi, T.; Hildebrand, K.; Marshall, D. A. |
| **Year of publication** | 2020 |
| **Title** | Are education, exercise and diet interventions a cost-effective treatment to manage hip and knee osteoarthritis? A systematic review |
| **Inclusion period** | Inception to November 2019 |
| **Inclusion criteria** | • Full economic evaluations conducted alongside randomized or nonrandomized clinical trials<br>• People with hip and/or knee OA<br>• Receiving education, exercise and dietary weight management interventions compared to any control.<br>• Education was defined as any formal instruction about OA and self-management techniques.<br>• Exercise was defined as any prescribed activity requiring muscular contraction.<br>• Dietary weight management was defined as any type of intervention with the goal of caloric restriction.<br>• Full trial-based economic evaluations compare two or more comparators using a cost-utility analysis (CUA), cost-effectiveness analysis (CEA), cost-benefit analysis (CBA) or cost-minimization analysis (CMA).<br>• Publications were excluded if they did not have a comparator or evaluated surgical, pharmaceutical or nutraceutical interventions. |
| **Comparisons** | Education, exercise and dietary weight management interventions compared to any control |
| **Outcomes** | Economic evaluations: cost-minimization (n=2), cost-effectiveness (n=5) and cost-utility (n=16) analyses |
| **Results** | |
| **Number of RCTs** | 22 RCTs (RCTs, cluster RCTs, pragmatic RCTs) 1 non-random clinical study |
| **Range no. of participants** | 64-810 |
| **Ranges of duration of follow-up** | 6 months-5 years |
| **Results per outcome measure** | |

| | |
|---|---|
| |  <br>*Reprinted with permission from Elsevier* |
| **Adverse events** | Not reported |

Risk of bias




Health Economic Criteria (CHEC) list. The CHEC list is a validated risk of bias tool with 19 yes-or-no questions. The CHEC list was designed and is recommended for systematic reviews of trial-based economic evaluations.

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AMSTAR 2

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mazzei 2020 | Y | P | N | P | Y | Y | N | P | N | N | N/M | N/M | N | N | N/M | Y | Low |

*Critical items,

Y=yes, N=No, P=partial yes, N/M= No Meta-analysis
See attached AMSTAR 2 checklist for details on the content of the specific items

**RANDOMIZED CONTROLLED TRIALS**

| Reference | No. | Hip Knee | Intervention | Control | Follow-up | Outcomes pain | Outcomes function | Other outcomes |
|---|---|---|---|---|---|---|---|---|
| Bennell 2016 | 9 | K | Pain coping skills training (PCST) + exercise (n=64) | Pain coping skills training (PCTS)only (n=61)<br><br>Exercise only (n=61) | 12, 32, 53 weeks | VAS pain (0-100)<br>PCST/ex vs. exercise<br>0-12wk: 5.8 (-1.4, 13.0)<br>0-32wk: 9.4 (1.0,17.9)*<br>0-52wk: 2.8 (-5.2, 10.7)<br>*Significantly in favor of PCST/ex<br><br>PCST/ex vs. PCST<br>0-12wk: 6.7 (-0.6, 14.1)<br>0-32wk: 8.4 (0.3,16.6)*<br>0-52wk: 2.6 (-5.2, 10.4)<br>*Significantly in favor of PCST/ex<br><br>PCST vs. exercise<br>0-12wk: -0.9 (-8.1, 6.3)<br>0-32wk: 1.0 (-7.0, 9.0)<br>0-52wk: 0.2 (-8.2, 8.5) | WOMAC function (0-68)<br>PCST/ex vs. exercise<br>0-12wk: 3.7 (0.4, 7.0)*<br>0-32wk: 4.4 (0.2, 8.7)*<br>0-52wk: 2.8 (-1.0, 6.6)<br>*Significantly in favor of PCST/ex<br><br>PCST/ex vs. PCST<br>0-12wk: 7.9 (4.7, 11.2)*<br>0-32wk: 6.6 (2.3, 10.8)*<br>0-52wk: 5.5 (1.6, 9.3)*<br>*Significantly in favor of PCST/ex<br><br>PCST vs. exercise<br>0-12wk: -4.2 (-7.6, -0.9)*<br>0-32wk: -2.1 (-6.4, 2.1)<br>0-52wk: -2.7 (-6.9, 1.5)<br>*Significantly in favor of exercise | VAS walking pain, Self-efficacy (ASES), Pain coping (CSQ) Catastrophizing (PCS) DASS21 depression, DASS21 anxiety, DASS21 stress, AQoL-6D, PASE Quadriceps strength, 30-second sit-to-stand, 20-meter walk, Step test |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Bennell 2022 | 10 | K | Access to electronic osteoarthritis information.<br><br>*Exercise group*: The exercise program comprised 6 physiotherapist consultations via videoconference for exercise, self-management advice, and behavioral counseling, plus exercise equipment and resources. (n=172)<br><br>*Exercise and diet group*: The diet and exercise program included an additional 6 dietitian consultations for a ketogenic very-low-calorie diet (2 formulated meal replacements and a low-carbohydrate meal daily) followed by a transition to healthy eating, as well as nutrition and behavioral resources (n=175) | Access to electronic osteoarthritis information (n=67) | 6 months<br>12 months | NRS (0-10)<br>*Change BL-6 months:*<br>Exercise vs. control<br>-0.8 (-1.5 to -0.2), p = 0.011<br>Diet and exercise vs. control:<br>-1.5 (-2.1 to -0.8), p= <0.001<br>Diet and exercise vs. exercise:<br>-0.6 (-1.1 to -0.2), p= 0.005<br><br>*Change BL-12 months:*<br>Exercise vs. control<br>-0.7 (-1.4 to -0.1), p= 0.028<br>Diet and exercise vs. control:<br>-1.3 (-2.0 to -0.7), p= <0.001<br>Diet and exercise vs. exercise:<br>-0.6 (-1.0 to -0.1), p= 0.010 | WOMAC function (0-68)<br>*Change BL-6 months:*<br>Exercise vs. control<br>-7.0 (-9.7 to -4.2), p= <0.001<br>Diet and exercise vs. control:<br>-9.8 (-12.5 to -7.0), p= <0.001<br>Diet and exercise vs. exercise:<br>-2.8 (-4.7 to -0.8), p= 0.005<br><br>*Change BL-12 months:*<br>Exercise vs. control<br>-4.4 (-7.4 to -1.4), p= 0.004<br>Diet and exercise vs. control:<br>-7.5 (-10.4 to -4.5), p= <0.001<br>Diet and exercise vs. exercise:<br>-3.1 (-5.1 to -1.1), p= 0.003 | Quality of life (AQoL-8D)<br>Scale, -0.04 to 1.00; higher scores indicate better quality of life<br><br>*Change BL-6 months:*<br>Exercise vs. control<br>0.05 (0.00 to 0.09), p= 0.031<br>Diet and exercise vs. control:<br>0.08 (0.04 to 0.12), p= <0.001<br>Diet and exercise vs. exercise:<br>0.03 (0.00 to 0.06), p= 0.019<br><br>*Change BL-12 months:*<br>Exercise vs. control<br>0.03 (-0.01 to 0.07), p= 0.112<br>Diet and exercise vs. control:<br>0.06 (0.01 to 0.10), p= 0.007<br>Diet and exercise vs. exercise:<br>0.02 (-0.00 to 0.05), p= 0.083<br><br>Body weight<br>Physical activity (IPEQ-W)<br>Depression (DASS-21)<br>Anxiety (DASS-21) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Stress (DASS-21) |
| Robbins 2021 | 11 | K | A 2-step intervention. The first step consisted of an 18-week diet and exercise program. The second step consisted of 4 treatment subgroups: 1) diet and exercise maintenance; 2) cognitive–behavioral therapy; 3) unloader knee brace; and 4) muscle strengthening exercises. Allocation into subgroups was based on disease remission state and clinical characteristics. (n = 87) | Educational leaflets (n = 84) | 20 weeks 32 weeks | VAS (0-100) 20 weeks: Between group Δ: 10.7 (3.9-17.4), p = 0.002, favoring intervention<br><br>32 weeks: Between group Δ: 3.3 (-3.6, 10.2), p = 0.35 | WOMAC function 20 weeks: Between group Δ: 9.9 (5.0-14.8), p = <0.001, favoring intervention<br><br>32 weeks: Between group Δ: 6.0 (1.0-11.0), p = 0.02, favoring intervention | BMI<br>Waist-hip ratio<br>Knee flexion<br>Knee extension<br>TUG<br>40m FPWT<br>Knee strength<br>Depression score<br>Baseline 77/6.1 ± 6.2<br>Knee alignment |
| Skou 2020 | 12 | K | A 12-week individualized and supervised treatment program including patient education, neuromuscular exercise, and insoles, with diet and/or pain medication prescribed if indicated. delivered the treatment. (n=50) | Written advice only. (n=50) | 24 months | NA | NA | Cost effectiveness: Authors conclusion: *"Individualized, supervised treatment was cost-effective compared to written advice in a 24-month limited societal perspective in patients with moderate to severe OA not eligible for TKR."* |

**Appraisal of the methodological quality – Rob 2**

| Study ID | D1 | D2 | D3 | D4 | D5 | Overall |
|---|---|---|---|---|---|---|
| Bennell 2020 | + | + | + | + | ! | ! |
| Bennell 2022 | + | + | + | - | + | - |
| Robbins 2021 | + | - | ! | ! | ! | ! |
| Skou 2020 | + | + | + | + | ! | ! |

| | |
|---|---|
| + | Low risk |
| ! | Some concerns |
| - | High risk |

| | |
|---|---|
| D1 | Randomisation process |
| D2 | Deviations from the intended interventions |
| D3 | Missing outcome data |
| D4 | Measurement of the outcome |
| D5 | Selection of the reported result |

## PICO 4: LIFESTYLE CAHANGE

**Overview of relevant studies:**

| No. | Page | SR / RCT | Hip / knee | Publication | Topic | Comment |
|---|---|---|---|---|---|---|
| **1** | **9-11** | **SR** | **H/K** | **Nicolson et al. 2017**<br>Interventions to increase adherence to therapeutic exercise in older adults with low back pain and/or hip/knee osteoarthritis: a systematic review and meta-analysis | Exercise adherence / booster sessions | • Data extracted<br>• Exercise adherence as outcome |
| 2 | 12-15 | RCT | K/H | **Bendrik et al. 2021**<br>Physical activity on prescription in patients with hip or knee osteoarthritis: A randomized controlled trial | Physical activity on prescription incl. goal setting, action planning, self-monitoring, review and graded tasks | • Data extracted |
| 3 | 12-15 | RCT | K/H | **Bossen et al. 2013**<br>Effectiveness of a web-based physical activity intervention in patients with knee and/or hip osteoarthritis: randomized controlled trial | Web-based physical activity | • Data extracted |
| 4 | 12-15 | RCT | H/K | **Pelle et al. 2020**<br>Effect of the dr. Bart application on healthcare use and clinical outcomes in people with osteoarthritis of the knee and/or hip in the Netherlands; a randomized controlled trial | App to enhance healthy lifestyle | • Data extracted |
| 5 | 12-15 | RCT | H/K | **Pelle 2022**<br>Economic Evaluation of the Dr. Bart Application in Individuals With Knee and/or Hip Osteoarthritis | Economic evaluation of app to enhance healthy lifestyle | • Data extracted<br>• Economic evaluation |
| 6 | 12-15 | RCT | K | **Baker et al. 2020**<br>Efficacy of Computer-Based Telephone Counseling on Long-Term Adherence to Strength Training in Elderly Patients With Knee Osteoarthritis: A Randomized Trial | Long-term exercise adherence with telephone-counselling | • Data extracted |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | 12-15 | RCT | K | **Schlenk et al. 2021** Promoting Physical Activity in Older Adults With Knee Osteoarthritis and Hypertension: A Randomized Controlled Trial | Physical activity in OA with comorbidity | • Data extracted |
| 8 | 12-15 | RCT | K | **Somers et al. 2012** Pain coping skills training and lifestyle behavioral weight management in patients with knee osteoarthritis: a randomized controlled study | Pain coping skills training and lifestyle behavioral weight management | • Data extracted |
| 9 | 12-15 | RCT | K | **Wang et al. 2018** Effect of a low-intensity, self-management lifestyle intervention on knee pain in community-based young to middle-aged rural women: a cluster randomised controlled trial | Low-intensity, self-management lifestyle intervention | • Data extracted |

## SUMMARY OF FINDINGS

- **Effect estimates higligted in green: statistically significant in favour of intervention group**
- **Effet estimates highligtes in red: statistically significant in favour of control / comparison group**

### Hip / Knee OA

**Booster sessions (1 SR, Nicolson)**

Exercise with booster sessions vs. exercise without booster sessions

Exercise adherence, NRS (0-10), SMD (95% CI)

- Mid-term to long-term: 0.39 (0.05, 0.72)

**Physical activity on prescription (1 RCT, Bendrik)**

Phsycal activity + education vs. education

Pain, H/KOOS (0-100), mean (95% CI)

- 6 months: 65 (60-69) vs. 65 (60-69)

Function, 6MWT (meters), mean (95% CI)

- 521 (500-542) vs. 518 (498-536)

**Behaviour-graded activity (1 RCT, Bossen)**

Behaviour graded activity vs. Wait-list control

Pain, NRS (0-10), change (95% CI)

- 3 months: −1 (−1.6, −0.38)
- 12 months: −0.36 (−1.1 to 0.38)

Function, H/KOOS (0-100), change (95% CI)

- 3 months: 6.5 (1.8, 11.2)
- 12 months: 5.0 (−1.0 to 11.0)

## Knee OA

**Exercise adherence with telephone-counselling (1 RCT, Baker)**

Telephone-based exercise adherence counselling vs. Monthly automated phone message

Pain, WOMAC (0-20)

- 24 months: -0.38 (-1.80, 1.42)

Function, WOMAC (0-68)

- 24 months: -0.46 (-4.83, 3.93)

Exercise adherence, (0-10)

- 24 months: -0.38 (-1.67, 0.91)

**App to enhance healthy lifestyle (1 RCT, Pelle. Reported in 2 papers)**

Dr. Bart app vs. usual care

Pain, H/KOOS (0-100), Δ overall (3+ 6 months) (95 % CI)

- 3.5 (0.9, 6.0)

Function, H/KOOS function (0-100), Δ overall (3+ 6 months) (95 % CI)

- 2.6 (0.4, 4.9)

Quality of life, H/KOOS (0-100), Δ overall (3+ 6 months) (95 % CI)

- 0.3 (-2.5, 3.1)

Economic evaluation of Dr. Bart app - authors conclusion:
*This economic evaluation showed that costs were lower for the dr. Bart app group compared to the group who received usual care. Given the noninvasive nature of the intervention and the moderate probability of it being cost-effective for the majority of outcomes, the dr. Bart app has the potential to serve as a tool to provide education and goal setting in OA and its treatment options*

**Physical activity with telephone follow-up (1 RCT, Schlenk)**

Physical activity + telephone follow-up vs. attention control

Pain, WOMAC Intervention vs. control (95% CI)

- Baseline: 5.9 (SD 3.9) vs. 4.8 (SD 3.0)
- 6 months: 4.25 (3, 5) vs. 4.54 (4, 5)
- 12 months: 4.09 (3, 5) vs. 4.72 (4, 5)

- Group x Time interaction: F= 4.27, p=0.015

Function, WOMAC Intervention vs. control (95% CI)

- Baseline: 22.5 (SD 13.4) vs. 19.3 (SD 11.9)
- 6 months: 16.68 (14, 20) vs. 18.30 (16, 21)
- 12 months: 17.02 (15, 20) vs. 17.51 (15, 20)
- Group x Time interaction: F= 4.22, p=0.016

**Combined pain coping skills training and lifestyle behavioral weight management (1 RCT, Somers)**

Pain coping skills training (PCST) and lifestyle behavioral weight management (BWM) vs. Standard care control OR interventions alone

Pain, WOMAC pain (0-100) Estimated difference between PCST + BWM and each other intervention, mean (95% CI)

- BWM only: 8.3 (2.5, 14.1)
- PCST only: 7.3 (1.3, 13.3)
- Standard care: 10.8 (4.6, 16.9)

Function, WOMAC activity (0-100) Estimated difference between PCST + BWM and each other condition, mean (95% CI)

- BWM only: 10.8 (5.3, 16.2)
- PCST only: 10.0 (4.4, 15.6)
- Standard care: 12.4 (6.5, 18.2)

**Self-management lifestyle intervention (1 RCT, Wang)**

Self-management lifestyle intervention vs. One group-based education session

Pain, WOMAC-p (0-20), OR (95 % CI)

- Knee pain increase: 0.37 (0.14, 1.01)
- Knee pain improvement: 1.13 (0.53, 2.43)

**Analysis:**

*Booster session (mixed h/k):*

- 1 SR (Nicolson) found a small to moderate effects of booster sessions on mid to long-term adherence to exercise. Adverse events were not reported.

*Physical activity on prescription (mixed h/k):*

- No effect of physical activity on prescription compared to education was observed in 1 RCT (Bendrik).

*Behaviour-graded activity (mixed h/k):*

- Another RCT reported small, short-term significant effects of behaviour-graded activity compared to wait-list control for pain and function. No long-term effects were observed (Bossen).

*Exercise adherence with telephone-counselling (knee):*

- No effects were reported for pain, function or exercise adherence in 1 RCT comparing exercise adherence counselling to monthly automated phone messages (Baker).

*App to enhance healthy lifestyle (knee):*

- 1 RCT (Pelle 2020) found small significant, although unlikely any clinical important improvements in pain and function between participants using an app to improve healthy lifestyle vs. participants receiving usual care. An economic evaluation of the same app (Pelle 2022) found that the cost was lower for the app compared to usual care and that the app had potential to serve as a tool to provide education and goal setting in OA and its treatment options.

*Physical activity with telephone follow-up (knee):*

- 1 RCT that compared physical activity with telephone follow-up to attention control reported a significant time x group effect in favour of the intervention. Due to baseline differences between the groups no between-group differences were reported at the follow-ups (Schlenk).

*Combined pain coping skills training and lifestyle behavioral weight management (knee):*

- Somers investigated in another RCT effects of combined pain coping skills training and lifestyle behavioral weight management against these interventions alone or standard care control. The combined treatment significantly improved pain and function for all the comparisons. The effects were small to moderate.



Moseng T, *et al. Ann Rheum Dis* 2024; 83:730–740. doi: 10.1136/ard-2023-225041

*Self-management lifestyle intervention (knee):*

- Wang investigated in an RCT effects of a self-management lifestyle intervention and found no significant odd ratio for any knee pain increase or improvement compared to one group-based education session.

**Conclusion:**

The new evidence was in line with the original recommendation, but with added information on strategies to improve adherence

**Data extraction:**

**SYSTEMATIC REVIEW**

| **1: Nicolson et al. 2017** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Nicolson, P. J. A.; Bennell, K. L.; Dobson, F. L.; Van Ginckel, A.; Holden, M. A.; Hinman, R. S. |
| **Year of publication** | 2017 |
| **Title** | Interventions to increase adherence to therapeutic exercise in older adults with low back pain and/or hip/knee osteoarthritis: a systematic review and meta-analysis |
| **Inclusion period** | From inception to August 2016 |
| **Inclusion criteria** | • RCTs People 45 years or older<br>• Chronic (>3 months) low back pain and/or hip/knee osteoarthritis. Where mixed populations of participants were reported, only those with 50% or more meeting the above population criteria were included.<br>• Any form of therapeutic exercise was eligible, including aerobic exercise, strengthening exercise, balance exercise and so on.<br>• Studies were required to test an intervention that aimed to improve adherence to therapeutic exercise.<br>• To be eligible, the control arm of included studies was required to receive therapeutic exercise comparable to the intervention arm, such that the only point of difference between control and intervention groups was the specific adherence strategy under investigation.<br>• RCTs that compared the effectiveness of two or more different adherence strategies were eligible, as long as all other treatment elements (including the exercise programmes) remained similar across trial arms. |

| | |
|---|---|
| | • Studies were required to measure exercise adherence. Any quantitative measure of exercise adherence was deemed eligible, including numerical rating scales and logbook/ diary measures. |
| **Comparisons** | Exercise with booster sessions vs. exercise without booster sessions |
| **Outcomes** | Adherence to exercise |
| | |
| **Number of RCTs** | 9 total, 6 on hip/knee OA, 2 OA studies included in meta-analysis. Only data from meta-analysis was extracted |
| **Range no. of participants** | In meta-analysis: 78-200 |
| **Ranges of duration of follow-up** | In meta-analysis: 12 weeks |
| **Results per outcome measure** | Mid-term to long-term effect of booster sessions on self-rated adherence assessed using Numeric Rating Scales<br><br>Exercise without booster sessions vs. exercise with booster sessions (SMD (95% CI))<br>• 0.39 (0.05, 0.72), in favour of intervention |

**Risk of bias**

| Pisters 2010 | Bennel l 2014 | |
|---|---|---|
| + | + | Domain 1: Risk of bias arising from the randomization process |
| + | + | Domain 2: Risk of bias due to deviations from the intend interventions (effect of assignment to intervention) |
| + | - | Domain 3: Missing outcome data |
| + | + | Domain 4: Risk of bias in the measurement of the outcome |
| ? | + | Domain 5: Risk of bias in selection of the reported results |
| + | + | Overall risk of bias |

Risk of bias of the studies included in the meta-analysis, Cohrane risk of bias tool

**Adverse events**

Not reported

**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nicolson 2017 | Y | N | Y | P | Y | Y | N | Y | Y | N | Y | Y | Y | Y | N | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

**RANDOMIZED CONTROLLED TRIALS**

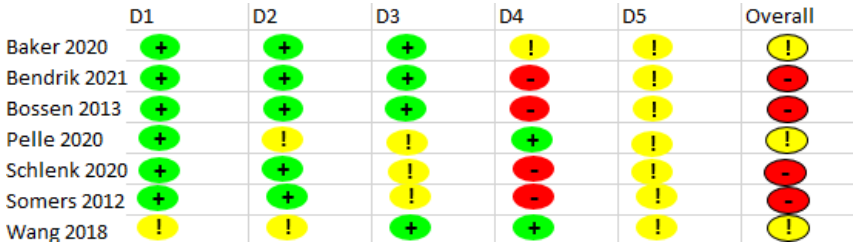
| Reference | Hip Knee | Intervention | Control | Follow-up | Outcomes pain | Outcomes function | Other outcomes |
|---|---|---|---|---|---|---|---|
| Bendrik et al. 2021 | K/H | One-hour educational session. Physical activity on prescription incl. goal setting, action planning, self-monitoring, review and graded tasks | One-hour educational session. Individual tailored advise on physical activity orally and printed (n=69) | 6 months | H/KOOS-pain (0-100) Intervention vs. control, mean (95 % CI), 65 (60-69) vs 65 60-69), p= 0.4 | 6MWT (meters) Intervention vs. control, mean (95% CI) 521 (500-542) vs. 518 (498-536), p=0.1 | Self-reported physical activity<br>Accelerometer assessed physical activity<br>Fitness and pain after 6MWT<br>EQ-VAS<br>EQ-5D |
| Bossen et al. 2013 | K/H | Behaviour graded activity (BGA) program incorporating a baseline test, goal setting, time-contingent PA objectives (ie, on fixed time points), and text messages to promote PA. An essential feature of the BGA program is the positive reinforcement of gradual PA, despite the presence of pain. (n= 100) | Wait-list control (n= 99) | | NRS (0-10)<br>Change score (Intervention-control)<br>3 months: −1 (−1.6 to −0.38), p= 0.002<br><br>12 months: −0.36 (−1.1 to 0.38), p= 0.33 | HOOS/KOOS-function<br>Change score (Intervention-control)<br>3 months: 6.5 (1.8-11.2), p=0.006<br><br>12 months: 5.0 (−1.0 to 11.0), p= 0.17 | Total PA (PASE), Total PA (accelerometer min/day), Self-perceived effect (improved-not improved), Sedentary intensity (accelerometer min/day) Symptoms, Sport/recreation, Self-efficacy pain, Self-efficacy other symptoms, Active pain coping, Passive pain coping, Internal locus of control, Powerful others locus of control, Anxiety, Depression |
| Baker et al. 2020 | K | After participating in a group exercise class, participants received telephone-based, motivational, strength-training exercise adherence counselling | Monthly automated phone message reminder to strength training and complete exercise log. (n=52) | 12, 18, and 24 months. | WOMAC-pain (0-20). Difference in change between groups at 24 months -0.38 (-1.80, 1.42), p=0.81 | WOMAC-function (0-68). Difference in change between groups at 24 months -0.46 (-4.83, 3.93), p=0.84 | Adherence (0-10). Difference in change between groups at 24 months -0.38 (-1.67, 0.91), p=0.57 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | intervention for 24 months (n=52) | | | | | Timed up-and-go test, Repeated chair stand, Stair climb, Hamstring strength, Quadriceps strength |
| Pelle et al. 2020 | H/K | Dr. Bart app; a standalone eHealth application which invites users to select pre-formulated goals (i.e. "tiny habits") and triggers to a healthier lifestyle. The pre-formulated goals are based on four themes that are core elements in the (non-surgical) management of OA: education regarding OA and its treatment modalities and the benefits of a healthy lifestyle, physical activity (both generic and OA specific information), vitality, and nutrition (analysed n=115) | Usual care (analysed n= 181) | 3 and 6 months | H/KOOS pain (0-100)<br>Δ overall (95 % CI)<br>3.5 (0.9, 6.0) | H/KOOS function (0-100)<br>Δ overall (95 % CI)<br>2.6 (0.4, 4.9) | H/KOOS QoL(0-100)<br>Δ overall (95 % CI)<br>0.3 (-2.5, 3.1)<br><br>Number of self-reported consultations in secondary healthcare, health care utilization. Euro Quality of Life (EQ-5D-3L), The Short Questionnaire to Assess Health-enhancing physical activity (SQUASH), Patient Activation Measure (PAM-13) questionnaire. The brief Illness Perception Questionnaire (IPQ), |
| Pelle et al. 2022 | H/K | Dr. Bart app; a standalone eHealth application which invites users to select pre-formulated goals (i.e. "tiny habits") and triggers to a healthier | Usual care (analysed for cost n= 182) | 6 months | NA | NA | Economic evaluation. Authors conclusion: *This economic evaluation showed that costs were lower for the dr. Bart app group compared to the group* |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | lifestyle. The pre-formulated goals are based on four themes that are core elements in the (non-surgical) management of OA: education regarding OA and its treatment modalities and the benefits of a healthy lifestyle, physical activity (both generic and OA specific information), vitality, and nutrition. (Analysed for cost n=115) | | | | | *who received usual care. Given the noninvasive nature of the intervention and the moderate probability of it being cost-effective for the majority of outcomes, the dr. Bart app has the potential to serve as a tool to provide education and goal setting in OA and its treatment options.* |
| Schlenk et al. 2021 | K | Six weekly individual physical therapy sessions for lower-extremity exercise and fitness walking and nine biweekly nurse telephone counselling sessions (n=91). | Attention-control (six weekly and nine biweekly nurse telephone sessions on health topics) (n=91). | 6 months (immediate post-intervention) 12 months | WOMAC-pain. Intervention vs. control. Mean (95% CI) Baseline: 5.9 (3.9) vs. 4.8 (3.0) 6 months: 4.25 (3, 5) vs. 4.54 (4, 5) 12 months: 4.09 (3, 5) vs. 4.72 (4, 5) Group x Time interaction: F= 4.27, p=0.015 | WOMAC-function. Intervention vs. control. Mean (95% CI) Baseline: 22.5 (SD 13.4) vs. 19.3 (SD 11.9) 6 months: 16.68 (14, 20) vs. 18.30 (16, 21) 12 months: 17.02 (15, 20) vs. 17.51 (15, 20) Group x Time interaction: F= 4.22, p=0.016 | Lower extremity exercise, Fitness walking, Blood pressure, Performance based functional status, Self-reported functional status, self-efficacy, outcome expectancy |
| Somers et al. 2012 | K | Long-term efficacy of a combined pain coping skills training (PCST) and lifestyle behavioral weight management (BWM) intervention in overweight and obese OA patients. | Standard care control (n=51) | 24 week, 6 months and 1 year. Effects reported for timepoints combined | WOMAC pain (0-100) Estimated difference between PCST + BWM and each other condition, mean (95% CI) | WOMAC activity (0-100) Estimated difference between PCST + BWM and each other condition, mean (95% CI) | Phycological disability Pain catastrophizing Self-efficacy for arthritis and weight management Weight and BMI |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | PCST + BWM (n=62)<br>PCT only (n=60)<br>BMW only (n=59) | | | BWM only: 8.3 (2.5-14.1), p=0.002<br>PCST only: 7.3 (1.3, 13.3), p=0.01<br>Standard care: 10.8 (4.6- 16.9) p=0.0002 | BWM only: 10.8 (5.3–16.2), p=<0.0001<br>PCST only: 10.0 (4.4–15.6) , p=0.0001<br>Standard care: 12.4 (6.5–18.2) , p=<0.0001 | |
| Wang et al. 2018 | K | 1-year self-management lifestyle intervention incl. community integration, nonprescriptive simple health messages, small changes to behaviour, low participant burden, goal setting, self-monitoring including self-weighing, and delivery including a mix of a single face-to-face group session, one session of phone coaching, and mobile health with SMS text reminders (n=67) | One group-based general educational session based on rec for healthy diet and activity (n=64) | 1 year | WOMAC-p (0-20)<br>Knee pain increase OR (95 % CI) 0.37 (0.14, 1.01)<br><br>Knee pain improvement OR (95 % CI) 1.13 (0.53, 2.43) | - | - |

**Appraisal of the methodological quality – Rob 2**



## PICO 5: INFORMATION AND EDUCATION

**Overview of relevant studies:**

| No. | Page | SR/ RCT | Hip / Knee | Publication | Topic | Comment |
|---|---|---|---|---|---|---|
| **1** | **9-13** | **SR** | **K** | **Goff et al. 2021**<br>Patient education improves pain and function in people with knee osteoarthritis with better effects when combined with exercise therapy: a systematic review | Patient education | Data extracted<br>This SR will also inform rec. 3 – management plan |
| **2** | **14-17** | **SR** | **K** | **Wu et al. 2022**<br>Self-Management for Knee Osteoarthritis: A Systematic Review and Meta-Analysis of Randomized Controlled Trials | Self-management | Data extracted |
| | **29** | **RCT** | **K** | **Helminen et al. 2015**<br>Effectiveness of a cognitive-behavioural group intervention for knee osteoarthritis pain: a randomized controlled trial | Cognitive-behavioural group intervention | Data extracted |
| | | **SR** | **K** | **Ismail et al. 2017**<br>Cognitive behavioural therapy and pain coping skills training for osteoarthritis knee pain management: a systematic review | Cognitive behavioural therapy and pain coping skills training | Data not extracted. Insufficient data analyses |
| | | **SR** | **K** | **Uritani et al. 2021**<br>Effects of self-management education programmes on self-efficacy for osteoarthritis of the knee: a systematic review of randomised controlled trials | Self-management education | Data not extracted.<br>Includes only self-efficacy as outcome. Not a prioritized outcome |
| | | | | | | |
| **3** | **18-21** | **SR** | **H/K** | **O'Brien et al. 2018** | Telephone-based patient education | Data extracted |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Effectiveness of telephone-based interventions for managing osteoarthritis and spinal pain: a systematic review and meta-analysis | | |
| **4** | **22-28** | **SR** | **H/K** | **Safari et al. 2020**<br>Digital Self-Management Interventions for People With Osteoarthritis: Systematic Review With Meta-Analysis | Digital self-management | Data extracted |
| | | **SR** | **H/K** | **Mazzei et al. 2021**<br>Are education, exercise and diet interventions a cost-effective treatment to manage hip and knee osteoarthritis? A systematic review | Patient education. Economic analyses | Data not extracted.<br>Includes 3 RCTS on patient education, all published <2012 |
| | | **SR** | **H/K** | **Sinatti et al. 2022**<br>Effects of Patient Education on Pain and Function and Its Impact on Conservative Treatment in Elderly Patients with Pain Related to Hip and Knee Osteoarthritis: A Systematic Review | Patient Education | Data not extracted. No meta-analysis |

## SUMMARY OF FINDINGS

- **Effect estimates higligted in green: statistically significant in favour of intervention group**
- **Effet estimates highligtes in red: statistically significant in favour of control / comparison group**

**Patient education and telephone-based patient education (2 SRs)**

- Patient education vs. usual care (Goff 2021, SR)
  *Pain, SMD (95% CI)*
  - Short-term: -0.35 (-0.56, -0.14)
  - Medium-term: -0.10 (-0.26, 0.05)
  - Long-term: -0.12 (-0.30, 0.05)

  *Function, SMD (95% CI)*
  - Short-term: -0.31 (-0.62, -0.00)
  - Medium-term: -0.17 (-0.40, 0.07)

- Patient education vs. exercise (Goff 2021, SR)
  *Pain, SMD (95% CI)*
  - Short-term: 0.77 (0.07, 1.47)
  - Medium-term: 0.12 (-0.11, 0.36)
  - Long-term: 0.18 (-0.11, 0.46)

  *Function, SMD (95% CI)*
  - Short-term: 0.33 (-0.02, 0.69)
  - Medium-term: 0.23 (-0.08, 0.54)

- Patient education vs. patient education + exercise (Goff 2021 SR)
  *Pain, SMD (95% CI)*
  - Short-term: 0.44 (0.19, 0.69)
  - Medium-term: 0.14 (-0.04, 0.32
  - Long-term: 0.13 (-0.08, 0.33)

  *Function, SMD (95% CI)*
  - Short-term: 0.81 (0.54, 1.08)
  - Medium-term: 0.39 (0.15, 0.62)
  - Long-term: 0.24 (-0.06, 0.54

- Telephone-based interventions (with educational materials) vs. usual care (O'Brien 2018 SR)
  *Pain, SMD (95% CI)*
  - -0.16 (-0.47, 0.14)

  *Disability, SMD (95% CI)*
  - -0.13 (-0.30, 0.04)

- Telephone plus comprehensive face-to-face interventions vs. face-to-face interventions alone (O'Brien 2018 SR)
  *Pain, SMD (95% CI)*
  - -0.13 (-0.30, 0.04)

*Disability, SMD (95% CI)*
- -0.06 (-0.31, 0.19)

**Self-management and digital self-management (2 SRs)**

- Structured self- management vs. Routine care (Wu 2022 SR)
  *Pain, SMD (95% CI)*
  - -1.51 (-2.41, -0.62)
- *Physical function, SMD (95% CI)*
  - -1.95 (-4.21, 0.30)

- Self-management + routine care vs. Routine care (Wu 2022 SR)
  *Pain, SMD (95% CI)*
  - 0.05 (-0.65, 0.75)

  Knee function, SMD (95% CI)
  - -0.24 (-0.45, 0.04)

- Self-management+ standard treatment vs. standard treatment (Wu 2022 SR)
  *Pain, SMD (95% CI)*
  - -0.76 (-1.78, 0.26)

  *Physical function, SMD (95% CI)*
  - 0.09 (-0.19, 0.37)

- Digital-based structured SMP (telephone + video, mobile app, internet) vs. usual care/no treatment (Safari 2020 SR)
  *Pain, SMD (95% CI)*
  - Post-intervention: -0.28 (-0.38, -0.18)
  - 12 months: -0.20 (-0.35, -0.05)

  *Physical function, SMD (95% CI)*
  - Post intervention: -0.26 (-0.35, -0.16)
  - 12 months: -0.23 (-0.38, 0.08)

- Digital-based structured SMP (telephone + video, mobile app, internet) vs. physical therapy or health education (Safari 2020 SR)
  *Pain, SMD (95% CI)*
  - Post intervention: -0.15 (-0.29, 0.01)
  - 12 months: -0.12 (-0.31, 0.07)

*Physical function, SMD (95% CI)*

  - Post intervention: -0.04 (-0.18, 0.11)
  - 12 months: -0.03 (-0.22, 0.16)

- Web-based SMP vs. wait-list control (Safari 2020 SR)
  *Quality of life, SMD (95% CI)*
  - Post intervention: -0.17 (-0.47, 0.14)
  - 12 months: -0.07 (-0.39, 0.26)

**Cognitive-behavioural group intervention (1 RCT)**

- A cognitive–behavioural training programme for pain management vs. regular GP care (Helminen 2015 RCT)

  *Pain, WOMAC 0-20 (95% CI) Between group change (BL-posttreatment average)*
  - -3.9 (-11.8, 4.0)

  *Physical function, WOMAC 0-68 (95% CI) Between group change (BL-posttreatment average)*
  - -0.3 (-8.3, 7.8)

  *Health-related quality of life, 15D 0-1 (95% CI) Between group change (BL-posttreatment average)*
  - -0.03 (-0.06, 0.00)



Moseng T, *et al. Ann Rheum Dis* 2024; 83:730–740. doi: 10.1136/ard-2023-225041

## Analysis

*Patient education and telephone- based patient education*

2 SRs have evaluated comparisons of any form of patient education and telephone-based patient education against a large range of control interventions. The results suggest short-term small to moderate effects of patient education compared to usual care on pain and function. Control interventions of exercise or patient education + exercise was superior to patient education alone. (Goff 2021, O'Brien 2018)

*Self-management and digital self-management*

2 SRs compared structured self-management programs against a large range of control interventions. Superior results and small effect sizes of self-management delivered face-to-face or digitally was found in some comparison to routine care/usual care or no treatment, but other comparisons did not show any between-group differences. (Wu 2022, Safari 2020)

*Cognitive-behavioural group intervention*

1 RCT that compared a cognitive–behavioural training programme for pain management against regular GP care found no between group differences for pain, function or health-related quality of life (Helminen 2015)

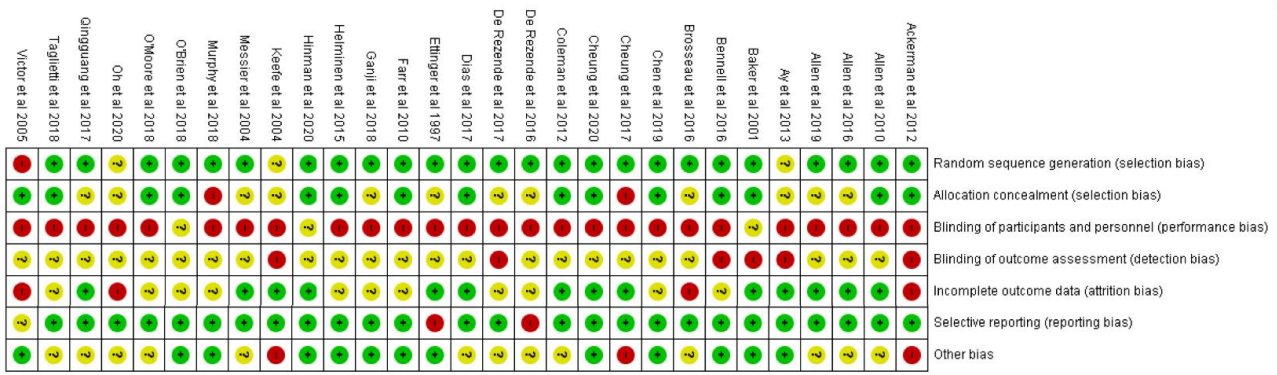
**Conclusion:**

- New evidence shows small effects of patient education as a single intervention in the short term, which is in line with the recommendation
- The new evidence showed conflicting results for self-management as a single intervention
- Digital delivery may be an option for self-management programs
- New evidence underpinning the details (a-f) of the recommendation was not found

| **1: Goff et al. 2021** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Goff, A. J.; De Oliveira Silva, D.; Merolli, M.; Bell, E. C.; Crossley, K. M.; Barton, C. J. |
| **Year of publication** | 2021 |
| **Title** | Patient education improves pain and function in people with knee osteoarthritis with better effects when combined with exercise therapy: a systematic review |
| **Inclusion period** | Inception to April 2020 |
| **Inclusion criteria** | • Randomised controlled trials, including cluster randomised trials<br>• Any form of patient education<br>• Clinical or radiographically confirmed knee OA<br>• Control: any non-pharmacological intervention, even if the patient educational intervention was the control intervention. |
| **Comparisons** | • Patient education vs. usual care<br>• Patient education vs. exercise<br>• Patient education versus patient education + exercise<br>• The comparisons exercise vs. patient education + exercise and patient education versus patient education + exercise is reported with recommendation #3 (management plan/package of care).<br>• The comparison patient education vs. exercise is also reported for recommendation #7 (exercise) |
| **Outcomes** | Pain and function |
| **Results** | |
| **Number of RCTs** | 29 in total |
| **Range no. of participants** | 35-300 |
| **Ranges of duration of follow-up** | Due to large variation in when outcome measures were assessed, subgrouping of short-term (< 6 months), medium term (6 to 12 months) and long-term (> 12 months) results were introduced |
| **Results per outcome measure** | **PAIN**<br>Patient education vs. usual care (SMD (95% CI))<br>• Short-term: -0.35 (-0.56, -0.14)*,[a]<br>• Medium-term: -0.10 (-0.26, 0.05)[c]<br>• Long-term: -0.12 (-0.30, 0.05)[e] |

| | |
|---|---|
| | Patient education vs. exercise (SMD (95% CI))<br>• Short-term: 0.77 (0.07, 1.47) %, b<br>• Medium-term: 0.12 (-0.11, 0.36) c<br>• Long-term: 0.18 (-0.11, 0.46)d<br><br>Patient education versus patient education + exercise (SMD (95% CI))<br>• Short-term: 0.44 (0.19, 0.69) %,b<br>• Medium-term: 0.14 (-0.04, 0.32 c<br>• Long-term: 0.13 (-0.08, 0.33) d<br><br>**FUNCTION**<br>Patient education vs. usual care (SMD (95% CI))<br>• Short-term: -0.31 (-0.62, -0.00)*a<br>• Medium-term: -0.17 (-0.40, 0.07)c<br><br>Patient education vs. exercise (SMD (95% CI))<br>• Short-term: 0.33 (-0.02, 0.69)d<br>• Medium-term: 0.23 (-0.08, 0.54)e<br><br>Patient education versus patient education + exercise (SMD (95% CI))<br>• Short-term: 0.81 (0.54, 1.08) %,d<br>• Medium-term: 0.39 (0.15, 0.62)%, e<br>• Long-term: 0.24 (-0.06, 0.54)d<br><br>*Statistically significant in favour of patient education (alone) over control<br>%Statistically significant in favour of control over patient education (alone)<br>aBased on 6 RCTs, bBased on 5 RCTs, cBased on 4 RCTs, dBased on 3 RCTs, eBased on 2 RCTs |

**Risk of bias**

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**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goff 2021 | Y | P | N | P | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | N | Y | Low |

*Critical items,

Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

| **2: Wu et al. 2022** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Wu, Z.; Zhou, R.; Zhu, Y.; Zeng, Z.; Ye, Z.; Wang, Z.; Liu, W.; Xu, X. |
| **Year of publication** | 2022 |
| **Title** | Self-Management for Knee Osteoarthritis: A Systematic Review and Meta-Analysis of Randomized Controlled Trials |
| **Inclusion period** | Inception until September 2021. |
| **Inclusion criteria** | • Knee OA based on the criteria of the American College of Rheumatology (ACR) [37] or by a physician based on the clinical and radiographic features of the patient.<br>• No restrictions on participants' age, duration of disease, the severity of disease, etc.<br>• Participants who have previously undergone total knee arthroplasty will not be included.<br>• Intervention including structured self-management: main components of self-management may include developing the management skills of osteoarthritis, such as providing patients with osteoarthritis education and knowledge, strengthening the interaction between doctors and patients, and then promoting and stimulating patients' ability to manage osteoarthritis and deal with diseases, and setting relevant goals and formulating action plans. Studies that provided only educational information or focused on psychotherapy interventions were excluded<br>• Any type of control group could be included in this study, such as routine care, standard treatment, and spa therapy.<br>• Only RCTs<br>• The language of literature was restricted to those published in English. |
| **Outcomes** | • Pain, Function |
| **Comparisons** | • Self- management vs. Routine care<br>• Self-management + routine care vs. routine care<br>• Self-management+ standard treatment vs. standard treatment |
| **Results** | |
| **Number of RCTs** | 13 |
| **Range no. of participants** | 40-205 |
| **Ranges of duration of follow-up** | 4 weeks – 48 weeks |
| **Results** | **PAIN**<br>Self- management vs. Routine care (based on 4 studies), SMD (95 % CI)<br>• -1.51 (-2.41, -0.62) |

| | |
|---|---|
| | Self-management + routine care vs. routine care (based on 2 studies), SMD (95 % CI)<br>• 0.05 (-0.65, 0.75)<br><br>Self-management+ standard treatment vs. standard treatment (based on 3 studies), SMD (95 % CI)<br>• -0.76 (-1.78, 0.26)<br><br>**KNEE FUNCTION**<br>Self-management + routine care vs. routine care (based on 2 studies), SMD (95 % CI)<br>• -0.24 (-0.45, 0.04)<br><br>**PHYSICAL FUNCTION**<br>Self-management vs. routine care (based on 3 studies), SMD (95 % CI)<br>• -1.95 (-4.21, 0.30)<br><br>Self-management + standard treatment vs. standard treatment (based on 2 studies), SMD (95 % CI)<br>• 0.09 (-0.19, 0.37) |

**Risk of bias**


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**AMSTAR 2**

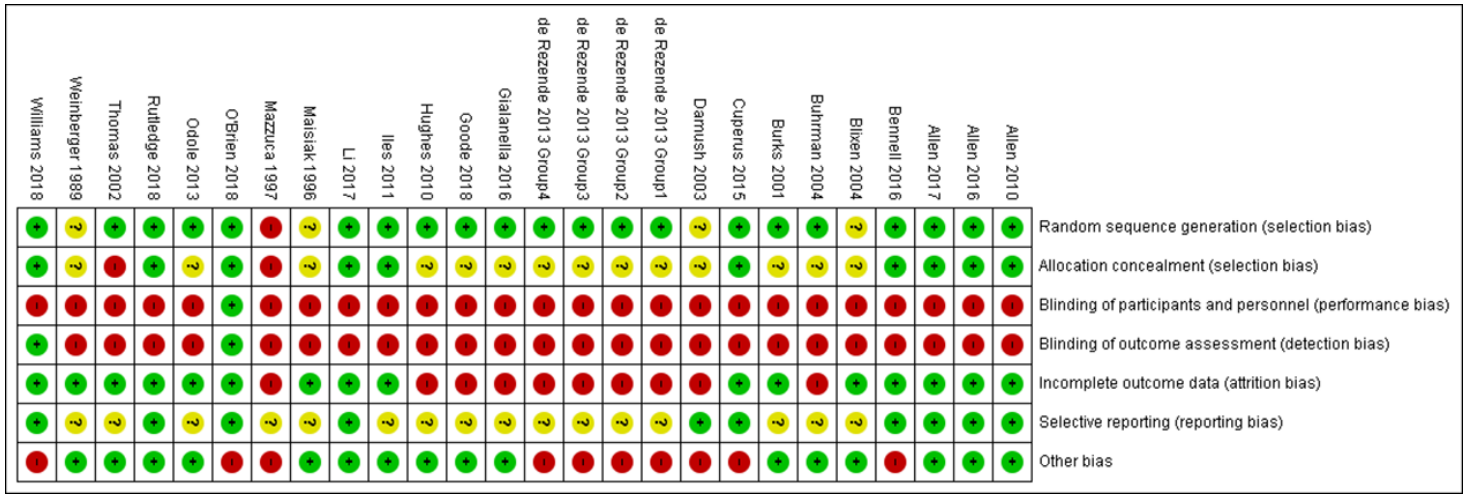
| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wu 2022 | Y | Y | Y | P | Y | Y | N | P | Y | N | Y | Y | Y | Y | Y | Y | Low |

*Critical items, Y=yes, N=No, P=partial yes
See attached AMSTAR 2 checklist for details on the content of the specific items

| **3: O'Brien 2018** | |
|---|---|
| | **Study characteristics** |
| **Study authors** | O'Brien, K. M.; Hodder, R. K.; Wiggers, J.; Williams, A.; Campbell, E.; Wolfenden, L.; Yoong, S. L.; Tzelepis, F.; Kamper, S. J.; Williams, C. M. |
| **Year of publication** | 2018 |
| **Title** | Effectiveness of telephone-based interventions for managing osteoarthritis and spinal pain: a systematic review and meta-analysis |
| **Inclusion period** | Inception to May 2018 |
| **Inclusion criteria** | • Randomised controlled trials (RCTs), cluster RCTs (C-RCTs) and non-randomised controlled trials that had a parallel comparison group as per the a priori trial registration. Trials with non-random assignment of groups were included given Medical Research Council recommendations that non-randomised designs may represent an appropriate evaluation design for some complex health promotion interventions (Craig et al., 2008).<br>• Eligible comparison groups included other interventions, no treatment, usual care, wait-list control or attention control.<br>• Participants with osteoarthritis of the knee or hip, or spinal pain (back or neck pain).<br>• Trials that defined osteoarthritis as confirmed by clinical assessment or medical diagnosis, including patient self-report of such diagnosis, with or without diagnostic imaging. Studies with mixed populations of musculoskeletal conditions were included where separate data were provided for osteoarthritis and spinal pain.<br>• We included trials that did not specify the location of osteoarthritis, as we assumed those studies would be representative of patients with knee or hip osteoarthritis as these are the most prevalent types of osteoarthritis (Vos et al., 2016).<br>• There were no restrictions on intensity or duration of participant symptoms.<br>• Studies that included patients with a serious pathology (e.g. cancer, infection, etc.) or included patients in the postoperative period were excluded.<br>• We included trials that involved service delivery by any person (i.e. therapist, health professional or trained operator) by telephone or videoconferencing in which there was a direct person-to-person verbal exchange of information. The service could be used to provide any aspect of care (e.g. delivery of advice, education, behavior modification treatment, ongoing support).<br>• We included studies that specifically aimed to test the effectiveness of a telephone-based or videoconferencing intervention. Complex interventions with one or more delivery component (e.g. face-to-face sessions or educational materials in addition to telephone or videoconferencing) were included if the telephone or videoconferencing component was the main method of intervention delivery, defined as at least 50% of the total number of intervention contacts conducted via telephone or videoconferencing. |
| **Relevant outcomes** | Pain intensity and disability (including physical function) |

| | |
|---|---|
| **Comparisons** | • Telephone-based interventions (with educational materials) vs. usual care<br>• Telephone plus comprehensive face-to-face interventions vs. face-to face interventions alone |
| **Results** | |
| **Number of RCTs** | 8 trials on knee OA<br>5 trials on patients with hip and/or knee OA<br>3 trials on unspecified OA |
| **Range no. of participants** | 32-786 |
| **Ranges of duration of follow-up** | 1-24 months |
| **Results per outcome measure** | **PAIN INTENSITY**<br>Telephone-based interventions (with educational materials) versus usual care (SMD (95% CI)), based on 3 OA studies<br>-0.16 (-0.47, 0.14)<br><br>Telephone plus comprehensive face-to-face interventions versus face-to-face interventions alone (SMD (95% CI)), based on 3 OA studies<br>-0.13 (-0.30, 0.04)<br><br>**DISABILITY**<br>Telephone-based interventions (with educational materials) versus usual care (SMD (95% CI)), based on 3 OA studies<br>-0.13 (-0.30, 0.04)<br><br>Telephone plus comprehensive face-to-face interventions versus face-to-face interventions alone (SMD (95% CI)), based on 3 OA studies<br>-0.06 (-0.31, 0.19) |

**Risk of bias**

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**AMSTAR 2**

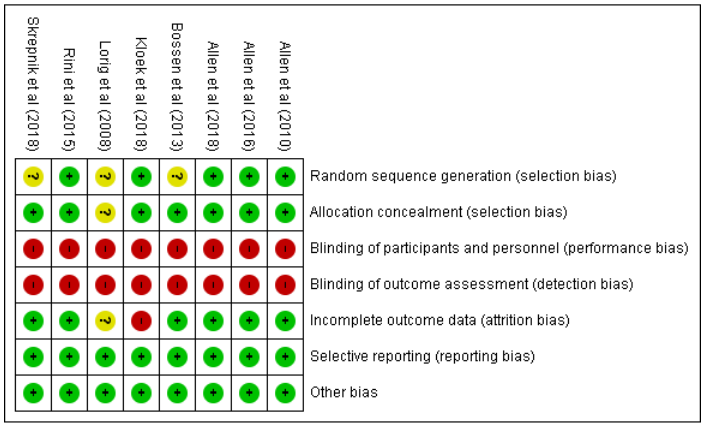
| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| O'Brien 2018 | Y | Y | Y | P | Y | Y | N | Y | Y | N | Y | Y | Y | Y | Y | Y | Low |

*Critical items, Y=yes, N=No, P=partial yes
See attached AMSTAR 2 checklist for details on the content of the specific items

| **4: Safari et al. 2020** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Safari, R.; Jackson, J.; Sheffield, D. |
| **Year of publication** | 2020 |
| **Title** | Digital Self-Management Interventions for People With Osteoarthritis: Systematic Review With Meta-Analysis (https://www.jmir.org/2020/7/e15365/) |
| **Inclusion period** | Inception to May 2018 |
| **Inclusion criteria** | • Randomized controlled trials (RCTs) of any design, including parallel-group, crossover, and cluster RCTs<br>• English language<br>• Adults (≥18 years of age)<br>• Confirmed diagnosis of OA, radiologically or by a health practitioner<br>• All types of OA at any stage of the disease<br>• Studies recruiting patients with OA with other conditions only if outcome data for OA patients were provided.<br>• Intervention: Structured and coordinated Self-Management Programs in isolation or in combination with other interventions delivered fully or partially via digital technologies (eg, websites, mobile apps, social networking tools, web-based games, animation, and telephone).<br>• Self-management was defined as an engagement in activities that promote health and prevent adverse events; interacting with a health care professional; improving self-monitoring; coping with disease; and developing skills in problem-solving, decision making, resource utilization, forming of a patient and health care provider partnership, and taking action.<br>• Any type of control group |
| **Outcomes** | Pain, function, quality of life (QoL) |
| **Comparisons** | • Digital-based structured SMP vs. usual care/no treatment<br>• Digital-based structured SMP vs. physical therapy or health education<br>• Web-based SMP vs. wait-list control |
| **Results** | |
| **Number of RCTs** | 8 in total on hip and/or knee OA |
| **Range no. of participants** | 199 - 855 |

| | |
|---|---|
| **Ranges of duration of follow-up** | Pain: 9-52 weeks<br>Function: 9-52 weeks<br>QoL: 4 and 12 months |
| **Results** | (Forrest plots for all outcomes and comparisons are presented below this table)<br>**PAIN**<br>Digital-based structured SMP (telephone + video, mobile app, internet) vs. usual care/no treatment (SMD (95% CI)):<br>• Post-intervention: -0.28 (-0.38, -0.18)*[,a]<br>• 12 months: -0.20 (-0.35, -0.05)*[,b]<br><br>Digital-based structured SMP (telephone + video, mobile app, internet) vs. physical therapy or health education (SMD (95% CI)):<br>• Post intervention: -0.15 (-0.29, 0.01) [b]<br>• 12 months: -0.12 (-0.31, 0.07)[c]<br><br>**FUNCTION**<br>Digital-based structured SMP (telephone + video, mobile app, internet) vs. usual care/no intervention (SMD (95% CI)):<br>• Post intervention: -0.26 (-0.35, -0.16)*[,a]<br>• 12 months: -0.23 (-0.38, 0.08)[b]<br><br>Digital-based structured SMP (telephone + video, mobile app, internet) vs. physical therapy or health education (SMD (95% CI)):<br>• Post intervention: -0.04 (-0.18, 0.11) [b]<br>• 12 months: -0.03 (-0.22, 0.16) [c]<br><br>**QUALITY OF LIFE**<br>Web-based SMP vs. wait-list control (SMD (95% CI)):<br>• Post intervention: -0.17 (-0.47, 0.14)[d]<br>• 12 months: -0.07 (-0.39, 0.26) [d]<br><br>Negative values favours intervention group, *Statistically significant in favour of intervention (SMP) over control, [a]Based on 7 RCTs, [b]Based on 3 RCTs, [c]Based on 2 RCTs, [d]Based on 1 RCT |

**Risk of bias**

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**AMSTAR 2**

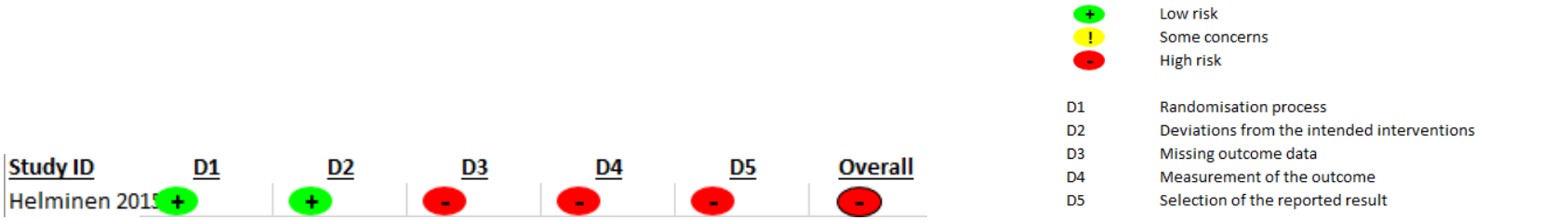
| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Safari 2020 | Y | Y | Y | P | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y | Y | High |

*Critical items, Y=yes, N=No, P=partial yes
See attached AMSTAR 2 checklist for details on the content of the specific items

## RANDOMIZED CONTROLLED TRIALS

| Reference | Hip Knee | Intervention | Control | Follow-up | Outcomes pain | Outcomes function | Other outcomes |
|---|---|---|---|---|---|---|---|
| Helminen 2015 | K | A cognitive–behavioural training programme for pain management with six weekly group sessions supervised by a psychologist and a physiotherapist (n= 53) | Regular GP care (n= 45) | 3 and 12 months | WOMAC pain<br>Between group change (BL-posttreatment average), mean (95 % CI) -3.9 (-11.8, 4.0), p= 0.332 | WOMAC function<br>Between group change (BL-posttreatment average), mean (95 % CI) -0.3 (-8.3, 7.8), 0.951 | HR QoL, 15D<br>Between group change (BL-posttreatment average), mean (95 % CI) -0.03 (-0.06, 0.00), 0.068<br><br>RAND-36,<br>Life satisfaction, Sense of coherence, Pain Self-Efficacy Questionnaire, Tampa Scale of Kinesiophobia, Pain Catastrophizing Scale, Beck Depression Inventory, Beck Anxiety Inventory |

**Appraisal of the methodological quality – Rob 2**



## PICO 6: EXERCISE DELIVERY

### Overview of relevant studies

| No. | Page | SR / RCT | Hip / knee | Publication | Topic | Comment |
|---|---|---|---|---|---|---|
| **1** | **9-11** | **SR** | **K** | **Chen et al. 2021**<br>Effects of technology-supported exercise programs on the knee pain, physical function, and quality of life of individuals with knee osteoarthritis and/or chronic knee pain: A systematic review and meta-analysis of randomized controlled trials | **Technology-supported exercise programs** | • Data extracted |
| **2** | **12-16** | **SR** | **K** | **Dong et al. 2018**<br>Is aquatic exercise more effective than land-based exercise for knee osteoarthritis? | **Aquatic exercise** | • Data extracted |
| **3** | **17-20** | **SR** | **K** | **Yang et al. 2022**<br>Effectiveness of telehealth-based exercise interventions on pain, physical function and quality of life in patients with knee osteoarthritis: A meta-analysis | **Telehealth-based exercise** | • Data extracted |
| **5** | **25-27** | **RCT** | **K** | **Allen et al 2021**<br>Stepped Exercise Program for Patients With Knee Osteoarthritis: A Randomized Controlled Trial | **Stepped-care exercise** | • Data extracted |
| **6** | **25-27** | **RCT** | **K** | **Hinman et al. 2020**<br>Does telephone-delivered exercise advice and support by physiotherapists improve pain and/or function in people with knee osteoarthritis? Telecare randomised controlled trial | **Telecare exercise advise** | • Data extracted |
| **7** | **25-27** | **RCT** | **K** | **Kaufman et al. 2022**<br>Cost and Quality of Life Outcomes of the STepped Exercise Program for Patients With Knee OsteoArthritis Trial | **Cost-effectiveness of stepped-care exercise** | • Data extracted |

| | | | | | | |
|---|---|---|---|---|---|---|
| **8** | **25-27** | **RCT** | **K** | **Nelligan et al. 2021**<br>Effects of a Self-directed Web-Based Strengthening Exercise and Physical Activity Program Supported by Automated Text Messages for People With Knee Osteoarthritis: A Randomized Clinical Trial | **Web-based exercise and automated text messages** | • Data extracted |
| | | | | | | |
| **4** | **21-24** | **SR** | **H/K** | **Duan et al. 2022**<br>Effectiveness of aquatic exercise in lower limb osteoarthritis: a meta-analysis of randomized controlled trials | **Aquatic exercise** | • Data extracted |
| | | | | | | |
| | | **SR** | **H/K** | **Bartels et al. 2016**<br>Aquatic exercise for the treatment of knee and hip osteoarthritis | **Aquatic exercise** | • Data not extracted<br>• Covered by Duan 2022<br>• Includes only studies published pre 2012 |
| | | **SR** | **H/K** | **Corso et al. 2022**<br>Are Nonpharmacologic Interventions Delivered Through Synchronous Telehealth as Effective and Safe as In-Person Interventions for the Management of Patients With Nonacute Musculoskeletal Conditions? A Systematic Rapid Review | **Synchronous Telehealth** | • Data not extracted<br>• No meta-analysis<br>• Rapid review |
| | | **SR** | **K** | **Chen et al. 2019**<br>Are aquatic exercises efficacious in postmenopausal women with knee osteoarthritis? A meta-analysis of randomized controlled trials | **Aquatic exercise** | • Data not extracted<br>• Selected group of postmenopausale women |
| | | **SR** | **K** | **Schafer et al. 2018**<br>The Efficacy of Electronic Health-Supported Home Exercise Interventions for Patients With Osteoarthritis of the Knee: Systematic Review | **Electronic Health-Supported Home Exercise** | • Data not extraced<br>• Overlaps with Chen 2021 |

# SUMMARY OF FINDINGS

- **Effect estimates higligted in green: statistically significant in favour of intervention group**
- **Effet estimates highligtes in red: statistically significant in favour of control / comparison group**

## Knee

### Technology supported exercise (2 SRs, 2 RCTs)

Technology-supported exercise vs. control (non-technological or no care services) (Chen 2021, SR)

*Pain, SMD (95% CI)*

- -0.29 (-0.48, -0.10)

*Physical function, SMD (95% CI)*

- 0.22 (0.00, 0.46)

*Quality of life, SMD (95% CI)*

- 0.25 (0.04, 0.46)

Telehealth-based exercise intervention vs. Non-telehealth control (Yang 2022, SR)

*Pain, SMD (95% CI)*

- -0.28 (-0.49, -0.08)

*Function, SMD (95% CI)*

- -0.17 (-0.42, 0.08)

*Quality of life, SMD (95% CI)*

- 0.00 (-0.25, 0.26)

Education + Strengthening exercise follow-up through telephone calls vs. Education (Hinman 2020, RCT)

*Pain, NRS (0-10)*

Difference in change between groups, Baseline to follow-up, Mean difference (95%CI):

- 6 months: 0.7 (0.0 to 1.4), p= 0.057
- 12 months: 0.3 (–0.4 to 1.0), p= 0.44

*Function, WOMAC (0-68)*

Difference in change between groups, Baseline to follow-up, Mean difference (95% CI):

- 6 months: 4.7 (1.0 to 8.4), p= 0.013
- 12 months: 3.1 (–0.6 to 6.7), p= 0.097

Access to educational website +. Exercise supported automated behavior-change text messages vs. Access to educational website (Nelligan 2021, RCT)

*Pain, NRS (0-10)*

Difference in change between groups, Baseline to 24 weeks, Mean difference (95%CI):

- 1.6 (0.9 to 2.2), p= <.001

*Function, WOMAC (0-68)*

Difference in change between groups, Baseline to 24 weeks, Mean difference (95% CI):

- 5.2 (1.9 to 8.5), p= .002

**Stepped-care exercise (1 RCT)**

Stepped care vs. educational materials (Allen 2021, RCT)

*Pain, WOMAC (0-20)*

Mean Difference, Intervention - control (95% CI)

- 3 months: -0.9 (-1.7 to -0.1)
- 6 months: -0.5 (-1.4 to 0.5)
- 9 months: -1.4 (-2.3 to -0.6)

*Function, WOMAC (0-68)*

Mean Difference, Intervention - control (95% CI)

- 3 months: - 3.6 (-6.0 to -1.3)
- 6 months: -1.1 (-3.8 to 1.7)
- 9 months: -4.6 (-7.4 to -1.9)

Cost effectiveness analyses from the same stepped-care trial. Conclusion*: STEP-KOA intervention improves knee OA-related symptoms, improves QOL, and has a high probability of cost-effectiveness in the short term (Kaufman 2021)*

### Aquatic exercise (1 SR)

Aquatic exercise vs. land-based exercise (short-term) (Dong 2018, SR)

*Pain, SMD (95% CI)*

- VAS: -0.62 (-1.27, 0.03)
- WOMAC pain: -1.66 (-4.90, 1.58)
- KOOS pain: 0.19 (-0.07, 0.45)

*Function, SMD (95% CI)*

- KOOS symptom: 0.19 (-0.32, 0.71)
- KOOS ADL: 0.17 (-0.08, 0.43)
- KOOS sport&rec: 0.24 (-0-19, 0.67)

## Mixed hip / knee

### Aquatic exercise (1 SR)

Aquatic exercise vs. control (no intervention) (Duan 2022 SR)

*Pain, SMD (95 % CI)*

- Short-term: -0.54 (-0.81, -0.28)
- Medium-term: -4.53 (-12.95, 3.90) *(Based on 2 studies with 61 participants)*
- Long-term: -0.59 (-1.24, 0.07)

*Function, SMD (95% CI)*

- Short-term: -0.64 (-1.00, -0.28)
- Medium-term: -7.62 (-9.81, -5.43) *(Based on 1 study with 30 participants)*
- Long-term: -3.98 (-4.87, 3.08)

## Analysis

### Knee OA

*Technology supported exercise*

- 2 SRs have investigated effects of technology and telehealth-based exercise delivery. 1 SR found superior effects of technology supported exercise compared to control with non-technological or no care services for pain, function and quality of life (Chen 2021), whereas the other SR found superior effects of telehealth-based exercise compared to no-telehealth control for pain, but not for function or quality of life (Yang 2022). Effects sizes were small. 1 RCT found a small, significant effect on function at 6 months follow-up of an education + strengthening exercise follow-up through telephone calls compared to education alone, but no other between group differences in pain and function were detected after 6 and 12 months (Hinman 2020). Another RCT comparing access to an educational website + exercise supported automated behavior-change text messages and access to the educational website alone found significant superior effects of the intervention in pain and function after 24 weeks (Nelligan 2021).

*Stepped care exercise*

- 1 RCT on a 3 step, stepped care exercise program compared to educational materials found beneficial, although not clinically relevant effects of the stepped care program on pain and function at 3 and 9 months, but not 6 months (Allen 2021). Kaufman 2021 conducted a cost-effectiveness analysis on the same study. They concluded that "*The VA (veterans affairs) STEP-KOA intervention improves knee OA-related symptoms, improves QOL, and has a high probability of cost-effectiveness in the short term"*

*Aquatic exercise*

- 1 SR compared aquatic exercise to land-based exercise and did not find any of these modes superior to the other (Dong 2018).

### Mixed hip /knee

*Aquatic exercise*

- 1 SR investigated aquatic exercise to no intervention or usual care control. Small beneficial effects for aquatic exercise was reported in a short-term perspective for pain and function.

**Conclusion:**

The new evidence adds information on technology supported delivery of exercise, aquatic exercise and a stepped care strategy for exercise delivery. All SRs were of low or critically low quality as evaluated by AMSTAR 2. Few non-serious adverse events were reported in relation to aquatic exercise including pain, dyspnea and dizziness

| **1: Chen et al. 2021** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Chen, T.; Or, C. K.; Chen, J. |
| **Year of publication** | 2021 |
| **Title** | Effects of technology-supported exercise programs on the knee pain, physical function, and quality of life of individuals with knee osteoarthritis and/or chronic knee pain: A systematic review and meta-analysis of randomized controlled trials |
| **Inclusion period** | Inception to August 2020 |
| **Inclusion criteria** | • RCTs<br>• Adults ≥18 years of age<br>• Diagnosis of knee OA or had chronic knee pain for at least 1 month in the last 12 months prior to the studies<br>• Examined the effects of technology-supported exercise programs on knee pain, physical function, or quality of life<br>• Were written in English<br>• Published in peer-reviewed journals. |
| **Comparisons** | Technology-supported exercise vs. control (non-technological or no care services) |
| **Outcomes** | Pain, physical function, QoL |
| **Results** | |
| **Number of RCTs** | 12 RCTs reported in 13 publications |
| **Range no. of participants** | 34-282 |

| | |
|---|---|
| **Ranges of duration of follow-up** | 4 weeks – 6 months |
| **Results per outcome measure** | KNEE PAIN<br>Technology-supported exercise vs. control (SMD (95% CI))<br>• -0.29 (-0.48, -0.10)*<br><br>PHYSICAL FUNCTION<br>Technology-supported exercise vs. control (SMD (95% CI))<br>• 0.22 (0.00, 0.46)**<br><br>QUALITY OF LIFE<br>Technology-supported exercise vs. control (SMD (95% CI))<br>• 0.25 (0.04, 0.46)**<br><br>*A negative difference favours the intervention group<br>** A positive difference favours the intervention group |
| **Adverse events** | Not reported |

**Risk of bias**

| Wi 2013 | Skrepnik 2017 | Odole 2013 | Mecklenburg 2018 | Lin 2007 | Li 2020 | Li 2018 | Li 2017 | Hinman 2020 | Bennell, Nelligan 2017 | Bennell Campbell 2017 | Allen 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ? | + | + | + | ? | + | + | + | + | + | + | + | Random sequence generation (selection bias) |
| ? | + | ? | + | ? | + | ? | ? | + | + | + | + | Allocation concealment (selection bias) |
| ? | ? | ? | - | ? | - | ? | ? | - | ? | + | ? | Blinding of participants and personnel (performance bias) |
| ? | ? | ? | - | ? | + | ? | ? | + | ? | + | + | Blinding of outcome assessment (detection bias) |
| + | + | + | - | + | + | + | + | + | + | + | + | Incomplete outcome data (attrition bias) |
| + | + | + | + | + | + | + | + | + | + | + | + | Selective reporting (reporting bias) |
| + | + | + | + | + | + | + | + | + | + | + | + | Other bias |

**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chen 2021 | N | P | Y | P | Y | Y | N | P | Y | N | Y | N | N | Y | Y | Y | Critically low |

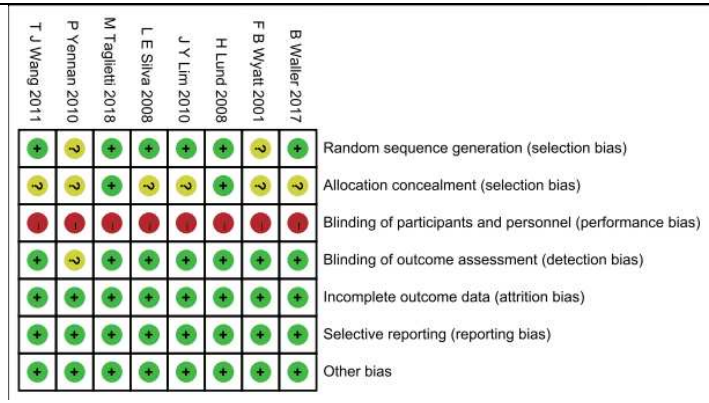
*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

| **2: Dong et al. 2018** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Dong, R.; Wu, Y.; Xu, S.; Zhang, L.; Ying, J.; Jin, H.; Wang, P.; Xiao, L.; Tong, P. |
| **Year of publication** | 2018 |
| **Title** | Is aquatic exercise more effective than land-based exercise for knee osteoarthritis? |
| **Inclusion period** | Inception to September 2018 |
| **Inclusion criteria** | • RCT<br>• Patients diagnosed with knee OA according to symptoms and radiologic findings without any invasive intervention<br>• The RCT compared aquatic exercise (AQE) to land-based exercise (LBE).<br>• All types of exercise developed in a therapeutic/heated indoor/outdoor pool were eligible<br>• The experimental group which received AQE combined with the certain therapy (e.g., nonsteroidal antiinflammatory drugs) and the control group with the same certain therapy were also included. |
| **Outcomes** | Pain, function, QoL |
| **Comparisons** | Data extracted:<br>• Aquatic exercise vs. land-based exercise (short-term)<br><br>*Data not extracted, due to only two studies included in fragmented meta-analysis:*<br>• *Aquatic exercise vs. land-based exercise (long-term)*<br>• *Aquatic exercise vs. no intervention* |
| **Results** | |
| **Number of RCTs** | 8 RCTs |
| **Range no. of participants** | 42-87 |
| **Ranges of duration of follow-up** | 6-18 weeks |
| **Results per outcome measure** | PAIN<br>VAS (based on 5 studies): aquatic exercise versus land-based exercise, SMD (95 % CI)<br>• - 0.62 (-1.27, 0.03) |

| | |
|---|---|
| | WOMAC pain (based on 2 studies): aquatic exercise versus land-based exercise, SMD (95 % CI)<br>• -1.66 (-4.90, 1.58)<br>•<br><br>KOOS pain (based on 4 studies): aquatic exercise versus land-based exercise, SMD (95 % CI)<br>• 0.19 (-0.07, 0.45)<br><br>FUNCTION<br>KOOS symptom (based on 4 studies): aquatic exercise versus land-based exercise, SMD (95 % CI)<br>• 0.19 (-0.32, 0.71)<br><br>KOOS ADL (based on 4 studies): aquatic exercise versus land-based exercise, SMD (95 % CI)<br>• 0.17 (-0.08, 0.43)<br><br>KOOS sport&rec (based on 4 studies): aquatic exercise versus land-based exercise, SMD (95 % CI)<br>• 0.24 (-0-19, 0.67)<br><br>SF-36 physical function (based on 2 studies): aquatic exercise versus land-based exercise, SMD (95 % CI)<br>• -1.68 (-5.38, 2.03)<br>•<br><br>QUALITY OF LIFE<br>KOOS Qol (based on 4 studies): aquatic exercise versus land-based exercise, SMD (95 % CI)<br>• 0.19 (-0.07, 0.44)<br><br>Negative values favour aquatic exercise |
| **Adverse events** | Three of the 8 studies reported mild adverse effects in the aquatic exercise group, including pain, dyspnea and dizziness. However, the adverse effects were more frequent and severe for the Land Based exercise group. One mentioned a 44% incidence of adverse effects in the land-based exercise group, including pain and joint swelling; 3 participants even dropped out, another record reported 2 patients increased pain after exercise. |

**Risk of bias**






**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dong 2018 | Y | P | Y | P | N | Y | N | P | Y | N | Y | Y | Y | Y | Y | Y | Low |

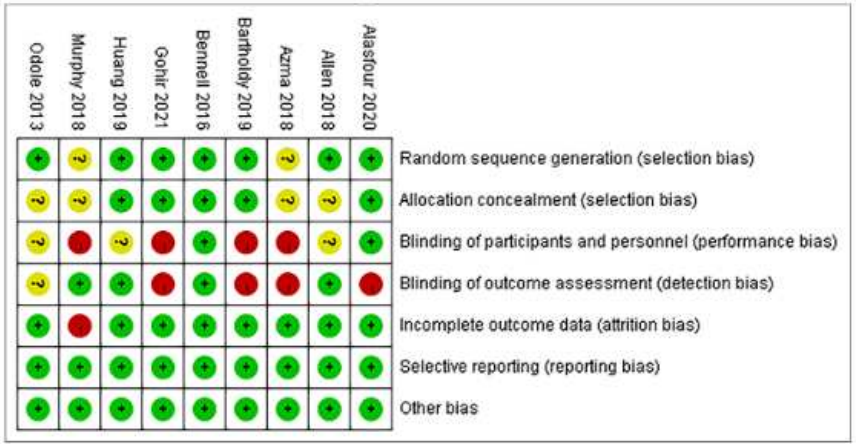
*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

| **3: Yang et al. 2022** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Yang, Y.; Li, S.; Cai, Y.; Zhang, Q.; Ge, P.; Shang, S.; Han, H. |
| **Year of publication** | 2022 |
| **Title** | Effectiveness of telehealth-based exercise interventions on pain, physical function and quality of life in patients with knee osteoarthritis: A meta-analysis |
| **Inclusion period** | • Inception to June 2021<br>• Knee<br>• Pain, function, quality of life<br>• 9 RCTs |
| **Inclusion criteria** | • RCTs written in English<br>• Participants aged 18 years or older<br>• Diagnosed by a clinician with osteoarthritis of the knee (based on physician diagnosis according to American College of Rheumatology (ACR) clinical criteria for knee OA or based on the radiographic evidence)<br>• Able to receive telehealth-based intervention meaning that participants had access to and ability to use a smartphone, internet or other technological products.<br>• Telehealth interventions are defined as the remote delivery of health services through a variety of telecommunication tools including telephone, web, smartphone APPs or other tools which can overcome the barriers of time and distance.<br>• Interventions should be exercise-related (e.g. exercise training programmes, exercise recommendations and health education on appropriate exercise) and can be combined with other interventions.<br>• The control group received non-telehealth treatments, which consisted of traditional face-to- face exercise treatment (e.g. exercise-related programmes, instruction and education provided by a physiotherapist in an outpatient clinic or rehabilitation centre), or received an exercise booklet, or usual care (UC) (including a waiting list). Waiting list means receiving usual care and then being treated as an intervention group after the trial completed. |
| **Comparisons** | Telehealth-based exercise intervention vs. Control (non-telehealth treatments, which consisted of traditional face-to- face exercise treatment, or received an exercise booklet, or usual care (including a waiting list)). |

| | |
|---|---|
| **Outcomes** | Pain, Function, Quality of life |
| | |
| **Number of RCTs** | 9 |
| **Range no. of participants** | 38-282 |
| **Ranges of duration of follow-up** | 6 weeks – 6 months |
| **Results per outcome measure** | PAIN<br>Telehealth-based exercise intervention vs. Non-telehealth control, SMD (95% CI)<br>• -0.28 (-0.49, -0.08)<br><br>FUNCTION<br>Telehealth-based exercise intervention vs. Non-telehealth control, SMD (95% CI)<br>• -0.17 (-0.42, 0.08)<br><br>QUALITY OF LIFE<br>Telehealth-based exercise intervention vs. Non-telehealth control, SMD (95% CI)<br>• 0.00 (-0.25, 0.26) |
| **Adverse events** | **Not reported** |

**Risk of Bias**

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**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yang 2022 | Y | N | Y | P | Y | Y | N | Y | Y | N | Y | Y | Y | Y | Y | Y | Critically low |

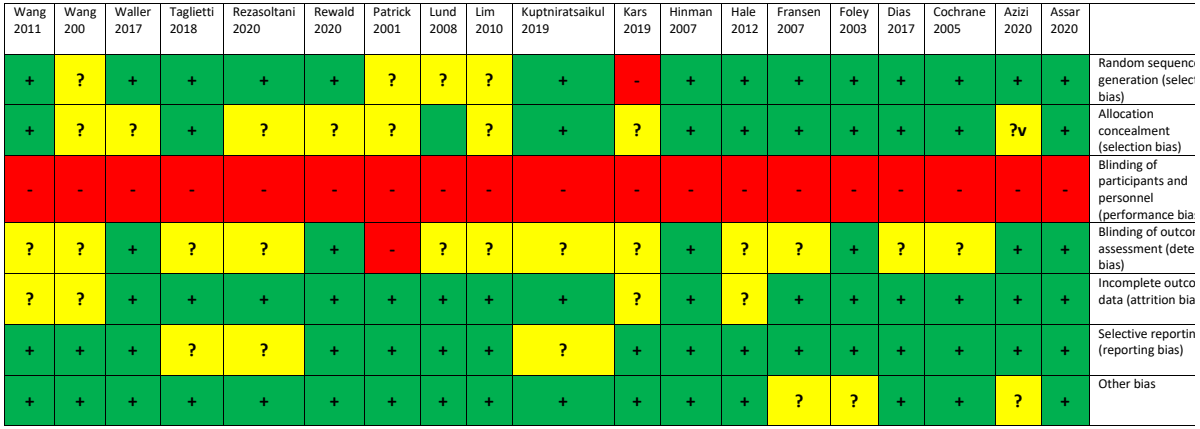
*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

| **4: Duan et al. 2022** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Duan, X., Wei W., Zhou O., Liu X., Yu J., Xu Y., Huang L., and Yang, S. |
| **Year of publication** | 2022 |
| **Title** | Effectiveness of aquatic exercise in lower limb osteoarthritis: a meta-analysis of randomized controlled trials |
| **Inclusion period** | Inception to January 2021 |
| **Inclusion criteria** | • Patients with primary knee osteoarthritis and (or) hip osteoarthritis based on the clinical and radiographic criteria of the American College of Rheumatology<br>• Have not undergone joint replacement surgery.<br>• Intervention is an aquatic training course or program supervised and instructed by a physiotherapist,<br>• Excluding exercises where patients do aquatic sports on their own, and passive hydrotherapy such as spa<br>• Comparison is no intervention (including usual care and unsupervised domiciliary activities), excluding land-based training<br>• Primary outcomes are pain and physical function measured by a validated scale or questionnaire, such as the Western Ontario McMaster University Osteoarthritis Index (WOMAC), the Knee injury and Osteoarthritis Outcome Score (KOOS), the Short-Form Health Survey-36 Items (SF-36) and Health Assessment Questionnaire (HAQ).<br>• Secondary outcomes are stiffness measured by the WOMAC subscale, sport measured by the KOOS subscale and adverse events<br>• Only RCTs are considered. |
| **Outcomes** | Pain and function |
| **Comparisons** | Short-term Aquatic exercise vs. control<br>Medium-term Aquatic exercise vs. control<br>Long-term Aquatic exercise vs. control |
| **Results** | |
| **Number of RCTs** | 19 |
| **Range no. of participants** | 24-302 |
| **Ranges of duration of follow-up** | 4 weeks- 18 months |
| **Results per outcome measure** | PAIN |

| | |
|---|---|
| | Aquatic exercise vs. control, SMD (95 % CI)<br>• Short-term (based on 18 studies): -0.54 (-0.81, -0.28)<br>• Medium-term (based on 2 studies): -4.53 (-12.95, 3.90)<br>• Long-term (based on 5 studies): -0.59 (-1.24, 0.07)<br><br>FUNCTION<br>Aquatic exercise vs. control, SMD (95 % CI)<br>• Short-term (based on 11 studies): -0.64 (-1.00, -0.28)<br>• Medium-term (based on 1 study): -7.62 (-9.81, -5.43)<br>• Long-term (based on 3 studies): -3.98 (-4.87, 3.08) |
| **Adverse events** | Ten included studies reported adverse events. All studies reported no major adverse events in relation to aquatic training. Six studies reported minor adverse events, for example, increased pain during the aquatic training program. |

**Risk of Bias**




**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Duan 2022 | Y | N | Y | P | Y | Y | N | P | Y | N | Y | Y | Y | Y | Y | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

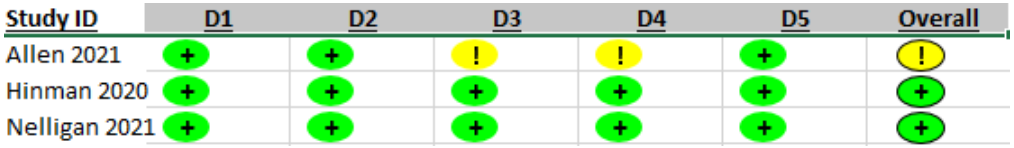
## RANDOMIZED CONTROLLED TRIALS

| Reference | No. | Hip Knee | Intervention | Control | Follow-up | Outcomes pain | Outcomes function | Other outcomes |
|---|---|---|---|---|---|---|---|---|
| **Allen 2021** | | K | The STEP-KOA intervention began with 3 months of an internet-based exercise program (step 1). Participants who did not meet response criteria for improvement in pain and function after step 1 progressed to step 2, which involved 3 months of biweekly physical activity coaching calls. Participants who did not meet response criteria after step 2 went on to in-person physical therapy visits (step 3). (n=230) | Control group received educational materials via mail every 2 weeks. (n=115) | 3, 6 and 9 months | WOMAC Pain (0-20) Mean Difference, Intervention - control (95% CI)<br><br>3 months: -0.9 (-1.7 to -0.1)<br>6 months: -0.5 (-1.4 to 0.5)<br>9 months: -1.4 (-2.3 to -0.6) | WOMAC Function (0-68) Mean Difference, Intervention - control (95% CI)<br><br>3 months: - 3.6 (-6.0 to -1.3)<br>6 months: -1.1 (-3.8 to 1.7)<br>9 months: -4.6 (-7.4 to -1.9) | Adverse events:<br>One study-related adverse event (nonserious) occurred; a participant in the STEP-KOA group reported increased hip pain after doing study exercises but did not seek medical care or discontinue the study<br><br>WOMAC total, 30-second chair stand test, 40-m fast-paced walk, Timed Up and Go test, stair climbing test (12 steps), and 6-minute walk test, Physical Activity Measures The Physical Activity Scale for the Elderly (PASE) |
| **Hinman 2020** | | K | Exisiting services as described for the control group + telephone calls from a physical therapist with delivery of a structured home strengthening exercise program. An initial call (45 min), | Existing service incl. provides information about OA; treatments and self-management strategies; community | 6 and 12 months | NRS (0-10) Difference in change between groups, Baseline to month 6, Mean difference (95%CI): 0.7 (0.0 to 1.4) 0.057 | WOMAC Function (0-68) Difference in change between groups, Baseline to month 6, Mean difference (95% CI): 4.7 (1.0 to 8.4) 0.013* | WOMAC pain, knee pain on walking, self-efficacy for pain and function (Arthritis Self-Efficacy Scale, fear of movement (Brief Fear of Movement Scale, physical activity (Physical Activity Scale |

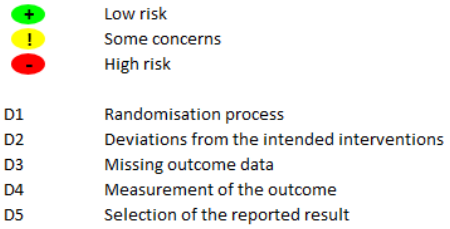
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | followed by a minimum of 4 (up to a maximum of 10 calls in total, each ~20 min), over 6 months (n= 87) | resources; assistance navigating services; emotional support and care escalation when needed. Participants received one call from a nurse, with additional calls if required (n=88) | | Difference in change between groups, Baseline to month 12, Mean difference (95%CI): 0.3 (–0.4 to 1.0) 0.44 | Difference in change between groups, Baseline to month 12, Mean difference (95% CI): 3.1 (–0.6 to 6.7) 0.097<br><br>*In favour of intervention | for the Elderly, Barriers to Physical Activity Scale, Benefits of Physical Activity Scale, health-related quality of life (Assessment of Quality of Life (AQoL), global changes (overall; pain; function) |
| Kaufman 2022<br><br>**Cost-effectivness of Allen 2021 stepped care** | K | | Stepped care as described in Allen 2021 | Education | | From conclusion: *The VA (veterans affairs) STEP-KOA intervention improves knee OA-related symptoms, improves QOL, and has a high probability of cost-effectiveness in the short term* | | |
| **Nelligan 2021** | | K | Access to educational website +. a 24-week self-directed strengthening regimen and guidance to increase physical activity, supported by automated behavior-change text messages encouraging exercise adherence (n=103) | Access to educational website (n=103) | 24 weeks | NRS (0-10) Difference in change between groups, Baseline to 24 weeks, Mean difference (95%CI): 1.6 (0.9 to 2.2), p= <.001*<br><br>*In favour of intervention | WOMAC Function (0-68) Difference in change between groups, Baseline to 24 weeks, Mean difference (95% CI): 5.2 (1.9 to 8.5), p= .002*<br><br>*In favour of intervention | KOOS pain, function in sport and recreation, and knee-related quality-of-life subscales, Assessment of Quality of Life (version AQoL-6D, Physical Activity Scale for the Elderly40 (PASE), Arthritis Self Efficacy Scale (ASES) pain and physical |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | function subscales, Self-Efficacy for Exercise scale (SEE), |

**Appraisal of the methodological quality – Rob 2**



| Study ID | D1 | D2 | D3 | D4 | D5 | Overall |
|---|---|---|---|---|---|---|
| Allen 2021 | + | + | ! | ! | + | ! |
| Hinman 2020 | + | + | + | + | + | + |
| Nelligan 2021 | + | + | + | + | + | + |



| | |
|---|---|
| + | Low risk |
| ! | Some concerns |
| - | High risk |
| D1 | Randomisation process |
| D2 | Deviations from the intended interventions |
| D3 | Missing outcome data |
| D4 | Measurement of the outcome |
| D5 | Selection of the reported result |

## PICO 7: EXERCISE

### Literature search results:

Data was extracted from 11 relevant systematic reviews and 7 randomised controlled trials. Additionally, in 21 listed systematic reviews, data was not extracted due to various reasons elaborated in the table. We chose not to extract data on studies of effects general exercise on pain and function as these effects have been thoroughly established previously

### Overview of relevant studies

| No. | Page | SR / RCT | Hip / knee | Publication | Topic | Comment |
|---|---|---|---|---|---|---|
| **1** | **20-22** | **SR** | **H** | **Hansen et al. 2020** Effectiveness of supervised resistance training for patients with hip osteoarthritis - A systematic review | **Supervised resistance training** | • Data extracted |
| **2** | **23-25** | **SR** | **H** | **Moseng et al. 2017** The importance of dose in land-based supervised exercise for people with hip osteoarthritis. A systematic review and meta-analysis | **Exercise dose** | • Data extracted |
| **3** | **26-28** | **SR** | **H** | **Teirlinck et al. 2020** Responders to Exercise Therapy in Patients with Osteoarthritis of the Hip: A Systematic Review and Meta-Analysis | **Characteristics of responders to exercise** | • Data extracted |
| | | | | | | |
| **4** | **29-31** | **SR** | **K** | **Bartholdy et al. 2017** The role of muscle strengthening in exercise therapy for knee osteoarthritis: A systematic review and meta-regression analysis of randomized trials | **Dose of muscle strengthening exercise** | • Data extracted |
| **5** | **32-35** | **SR** | **K** | **Hu et al. 2021** Tai Chi exercise can ameliorate physical and mental health of patients with knee osteoarthritis: systematic review and meta-analysis | **Tai Chi** | • Data extracted |
| **6** | **36-39** | **SR** | **K** | **Luan et al. 2021** Knee osteoarthritis pain and stretching exercises: a systematic review and meta-analysis | **Stretching exercises** | • Data extracted |

| | | | | | | |
|---|---|---|---|---|---|---|
| **7** | **40-44** | **SR** | **K** | **Luan et al. 2021**<br>Stationary cycling exercise for knee osteoarthritis: A systematic review and meta-analysis | **Stationary cycling** | • Data extracted |
| **8** | **45-48** | **SR** | **K** | **Wang et al. 2021**<br>Proprioceptive Training for Knee Osteoarthritis: A Systematic Review and Meta-Analysis of Randomized Controlled Trials | **Proprioceptive training** | • Data extracted |
| **12** | **58-60** | **RCT** | **K** | **Bennell et al. 2020**<br>What type of exercise is most effective for people with knee osteoarthritis and co-morbid obesity?: The TARGET randomized controlled trial | **Weight bearing and non-weight bearing exercise** | • Data extracted |
| **13** | **58-60** | **RCT** | K | **Chen et al. 2021**<br>Impacts of tai chi exercise on functional fitness in community-dwelling older adults with mild degenerative knee osteoarthritis: a randomized controlled clinical trial | **Tai Chi** | • Data extracted |
| **14** | **58-60** | **RCT** | K | **deZwart et al. 2022**<br>High-intensity versus low-intensity resistance training in patients with knee osteoarthritis: A randomized controlled trial | **High and low intensity strength training** | • Data extracted |
| **15** | **58-60** | **RCT** | K | **Holm et al. 2020**<br>Low-dose strength training in addition to neuromuscular exercise and education in patients with knee osteoarthritis in secondary care e a randomized controlled trial | **Neuromuscular + strength training** | • Data extracted |
| **16** | **58-60** | **RCT** | **K** | **Husted et al. 2022**<br>Knee-extensor strength, symptoms, and need for surgery after two, four, or six exercise sessions/week using a home-based one-exercise program: a randomized dose-response trial of knee-extensor resistance exercise in patients eligible for knee replacement (the QUADX-1 trial) | **Exercise dose** | • Data extracted |
| **17** | **58-60** | **RCT** | **K** | **Joshi et al. 2022**<br>Effects of progressive neuromuscular training on pain, function, and balance in patients with knee osteoarthritis: a randomised controlled trial | **Neuromuscular exercise** | • Data extracted |
| **18** | **58-60** | **RCT** | K | **Messier et al. 2021** | **High-Intensity Strength Training** | • Data extracted |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Effect of High-Intensity Strength Training on Knee Pain and Knee Joint Compressive Forces Among Adults With Knee Osteoarthritis The START Randomized Clinical Trial | | |
| | | | | | | |
| **9** | **49-51** | **SR** | **H/K** | **Goh et al. 2019**<br>Relative Efficacy of Different Exercises for Pain, Function, Performance and Quality of Life in Knee and Hip Osteoarthritis: Systematic Review and Network Meta-Analysis | **Comparisons of efficacy between exercise modalities** | • Data extracted |
| **10** | **52-54** | **SR** | **H/K** | **Lauche et al. 2019**<br>Yoga for Osteoarthritis: a Systematic Review and Meta-analysis | **Yoga** | • Data extracted |
| **11** | **55-57** | **SR** | **H/K** | **Mazzei et al. 2021**<br>Are education, exercise and diet interventions a cost-effective treatment to manage hip and knee osteoarthritis? A systematic review | **Cost-effectiveness** | • Data extracted<br>• Cost-effectivness analyses |
| | | | | | | |
| **19** | | **SR** | **H** | **Beumer et al. 2016**<br>Effects of exercise and manual therapy on pain associated with hip osteoarthritis: a systematic review and meta-analysis | **Manual therapy + exercise** | • Data not extracted.<br>• Manual therapy intervention |
| **20** | | **SR** | **H** | **Ceballos-Laita et al. 2019**<br>Effects of non-pharmacological conservative treatment on pain, range of motion and physical function in patients with mild to moderate hip osteoarthritis. A systematic review | **General exercise** | • Data not extracted<br>• General exercise<br>• No meta-analysis |
| **21** | | **SR** | **H** | **Fransen et al. 2014**<br>Exercise for osteoarthritis of the hip: a Cochrane systematic review | **General exercise** | • Data not extracted<br>• General exercise |
| **22** | | **SR** | **K** | **Fransen et al. 2015**<br>Exercise for osteoarthritis of the knee: a Cochrane systematic review | **General exercise** | • Data not extracted<br>• General exercise |
| **23** | | **SR** | **K** | **Ferreira et al. 2019**<br>Non-Pharmacological and Non-Surgical Interventions for Knee Osteoarthritis: A Systematic Review and Meta-Analysis | **General exercise** | • Data not extracted<br>• General exercise |

| | | | | | | |
|---|---|---|---|---|---|---|
| **24** | | **SR** | **H/K** | **Fernandopulle et al. 2017**<br>Effect of Land-Based Generic Physical Activity Interventions on Pain, Physical Function, and Physical Performance in Hip and Knee Osteoarthritis: A Systematic Review and Meta-Analysis | **General exercise** | • Data not extracted<br>• General exercise |
| **25** | | **SR** | **H/K** | **Goh et al. 2019**<br>Efficacy and potential determinants of exercise therapy in knee and hip osteoarthritis: A systematic review and meta-analysis | **Determinants of effect exercise therapy** | • Data not extracted<br>• General exercise |
| **26** | | **SR** | **H/K** | **Hall et al. 2017**<br>Effectiveness of Tai Chi for Chronic Musculoskeletal Pain Conditions: Updated Systematic Review and Meta-Analysis | **Tai Chi** | • Data not extracted<br>• Covered by a newer SR by Hu et al. 2021 |
| **27** | | **SR** | **K** | **Hislop et al. 2020**<br>Does adding hip exercises to quadriceps exercises result in superior outcomes in pain, function and quality of life for people with knee osteoarthritis? A systematic review and meta-analysis | **Hip exercises + quadriceps exercises** | • Data not extracted<br>• Too specific intervention |
| **28** | | **SR** | **H/K** | **Hurley et al. 2018**<br>Exercise interventions and patient beliefs for people with hip, knee or hip and knee osteoarthritis: a mixed method review | **General exercise** | • Data not extracted<br>• General exercise |
| **29** | | **SR** | **H/K** | **Kraus et al. 2019**<br>Effects of Physical Activity in Knee and Hip Osteoarthritis: A Systematic Umbrella Review | **General exercise** | • Data not extracted<br>• General exercise |
| **30** | | **SR** | **K** | **Kelley et al. 2022**<br>Clinical relevance of Tai Chi on pain and physical function in adults with knee osteoarthritis: An ancillary meta-analysis of randomized controlled trials | **Tai Chi** | • Data not extracted<br>• Similar data as presented in Hu 2021 |
| **31** | | **SR** | **K** | **Li et al. 2016**<br>The effects of resistance exercise in patients with knee osteoarthritis: a systematic review and meta-analysis | **Resistance exercise** | • Data not extracted<br>• Overlap Bartholdy 2017 |
| **32** | | **SR** | **K** | **Li et al. 2020** | **Tai Chi** | • Data not extracted<br>• Overlap Chen 2021 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Effectiveness of Traditional Chinese Exercise for Symptoms of Knee Osteoarthritis: A Systematic Review and Meta-Analysis of Randomized Controlled Trials | | |
| **33** | | **SR** | **K** | **Rafiq et al. 2020**<br>Non-pharmacological interventions for treating symptoms of knee osteoarthritis in overweight or obese patients; a review | **General exercise** | • Data not extracted<br>• General exercise |
| **34** | | **SR** | **K** | **RaghavaNeelapala et al. 2020**<br>Hip Muscle Strengthening for Knee Osteoarthritis: A Systematic Review of Literature | **Hip Muscle Strengthening for Knee Osteoarthritis** | • Data not extracted<br>• Too specific intervention |
| **35** | | **SR** | **H** | **Sampath et al. 2016**<br>The effects of manual therapy or exercise therapy or both in people with hip osteoarthritis: a systematic review and meta-analysis | **General exercise** | • Data not extracted<br>• General exercise<br>• Includes only RCTs published before 2012 |
| **36** | | **SR** | **K** | **Thorlund et al. 2022**<br>Similar Effects of Exercise Therapy, Nonsteroidal Anti-inflammatory Drugs, and Opioids for Knee Osteoarthritis Pain: A Systematic Review with Network Meta-analysis | **Effects of general exercise with different comparators** | • Data not extracted.<br>• General exercise |
| **37** | | **SR** | **H/K** | **Whittaker et al. 2021**<br>Osteoarthritis year in review 2020: rehabilitation and outcomes | **General exercise** | • Data not extracted<br>• No meta-analysis |
| **38** | | **SR** | **K** | **You et al. 2021**<br>Effects of Tai Chi exercise on improving walking function and posture control in elderly patients with knee osteoarthritis: A systematic review and meta-analysis | **Tai Chi** | • Data not extracted.<br>• Inapropriate analyses |
| **39** | | **SR** | **H/K** | **Zampogna et al. 2020**<br>The Role of Physical Activity as Conservative Treatment for Hip and Knee Osteoarthritis in Older People: A Systematic Review and Meta-Analysis. | **General exercise** | • Data not extracted<br>• General exercise |

# SUMMARY OF FINDINGS

- **Effect estimates higligted in green: statistically significant in favour of intervention group**
- **Effet estimates highligtes in red: statistically significant in favour of control / comparison group**

## HIP OA

### Resistance exercise (1 SR)

Supervised progressive resistance training vs. Control (common treatment without resistance training) (Hansen 2020, SR)

*Pain, MD HOOS 0-100 (95% CI)*

- 7.83 (2.64, 13.02)

*Function, MD HOOS 0-100 (95% CI)*

- 9.13 (4.45, 13.80)

*Quality of life, MD HOOS 0-100 (95% CI)*

- 6.80 (1.96, 11.63)

### Responders to general exercise (1 SR)

Exercise vs. usual care (e.g., medication and/or education), and no treatment or waiting list. (Teirlinck 2020 SR)

After-treatment

- 30% responders in exercise group vs. 16% in control goup (RD = 0.14, 95% CI 0.06–0.22)

Long-term

- 26% responders in exercise group vs. 13% in control group (RD = 0.14, 95% CI 0.07–0.20).

### Exercise dose general exercise (1 SR)

ACSM compliant exercise programs vs. no-exercise control (Moseng 2017, SR)

Pain, SMD (95 % CI):

- -0.42 (-0.58, -0.26)

Function, SMD (95 % CI):

- -0.41 (-0.58, -0.24)

Non-ACSM compliant exercise programs vs. no-exercise control
Pain, SMD (95 % CI):

- -0.05 (-0.35, 0.25)

Function, SMD (95 % CI):

- -0.23 (-0.52, 0.06)

## KNEE OA

**Stretching (1 SR)**

- Stretching exercise alone vs. Control (no exercises) (Luan 2021 SR)
  *Pain, MD (95% CI)*
  - VAS (0-10): 1.86 (1.31, 2.41)

- Stretching exercise + other exercise vs. Control (no exercise) (Luan 2021 SR)
  *Pain, MD (95% CI)*
  - VAS (0-10): 1.31 (0.77, 1.85)
  - WOMAC (0-50): 7.03 (3.93, 10.12)

- Stretching exercises + other exercises vs. Other exercises (Luan 2021 SR)
  *Pain, MD (95% CI)*
  - VAS (0-10): 0.60 (-0.20, 1.40)

**Tai Chi (1 SR, 1 RCT)**

Tai Chi vs. Control (no exercise, education class, standard care or physical therapy) (Hu 2020, SR)

*Pain, SMD (95% CI)*

- WOMAC pain: -0.69 (-0.95, -0.44)

*Function, SMD (95% CI)*

- WOMAC function: -0.92, (-1.16, -0.69)
- Six min walk test: 0.55 (0.10, 0.99)
- Timed up and go test: -0.55 (-0.82, -0.29)

Tai Chi vs. Patient education (Chen 2021, RCT)

*Function, Mean difference (95% CI)*

- 30-s chair stand (no. of times), 4.66 (2.97, 6.36), p= < 0.05

**Stationary cycling (1 SR)**

Stationary cycling vs. no exercise (Luan 2021 SR)

*Pain, MD (95% CI)*

- WOMAC pain (scale?): 12.86 (6.90, 18.81)
- KOOS pain (0-100): 6.87 (4.82, 8.92)

*Function, MD (95% CI)*

- WOMAC function (scale?): 8.28 (2.44, 14.11)
- 6 min walk test (meters): 18.47 (-37.54, 74.48)

Stationary cycling vs. other exercise (Luan 2021 SR)

*Pain, MD (95% CI)*

- WOMAC pain (scale?): 2.37 (-6.64, 11.39)
- KOOS pain (0-100): -2.19 (-4.48, 0.10)

*Function, MD (95% CI)*

- WOMAC function (scale?): -3.87 (-11.52, 3.78)
- 6 min walk test (meters): -7.68 (-27.92, 12.55)

**Proprioceptive training (1 SR)**

Proprioceptive training vs. no intervention (Wang 2021 SR)
Pain, SMD (95% CI)

- -1.07 (-1.46, -0.68)

Function, SMD (95% CI)

- -0.97 (-1.26, -0.67)

Proprioceptive training vs. other non-proprioceptive training (e.g., resistance and strength training) (Wang 2021 SR)
Pain, SMD (95% CI)

- -0.02 (-0.74, 0.69)

Function, SMD (95% CI)

- -0.03 (-0.76, 0.70)

Proprioceptive training with other non-proprioceptive training vs. other non-proprioceptive training (Wang 2021SR)
Pain, SMD (95% CI)

- -0.17 (-0.58, 0.23)

Function, SMD (95% CI)

- -0.34 (-0.56, -0.12)

**Exercise dose (1 SR, 1 RCT)**

ACSM compliant exercise programs vs. control (no intervention, waiting list, sham, or placebo) (Bartholdy 2017 SR)
Pain, SMD (95% CI)

- 0.62 (0.32, 0.93)

Function, SMD (95% CI)

- 0.64 (0.28, 1.00)

Non-ACSM compliant exercise programs vs. control (no intervention, waiting list, sham, or placebo (Bartholdy 2017 SR)

Pain, SMD (95% CI)

- 0.52 (0.35, 0.68)

Function, SMD (95% CI)

- 0.49 (0.33–0.65)

Knee extensor strength training: Two sessions/week vs Four sessions/week (Husted 2022 RCT)

Pain, KOOS (0-100), Mean change (95% CI) from baseline between groups:

- 6.1 (-1.6 to 13.8), p= 0.119

Function, KOOS sympt (0-100), Mean change (95% CI) from baseline between groups:

- 6.9 (-1.2 to 15.0), p= 0.093142

Knee extensor strength training: Four sessions/week vs Six sessions/week (Husted 2022 RCT)

Pain, KOOS (0-100), Mean change (95% CI) from baseline between groups:

- 1.9 (-9.8 to 5.8), p= 0.615142

Function, KOOS sympt (0-100), Mean change (95% CI) from baseline between groups:

- 2.6 (-10.6 to 5.7), p= 0.552142

**Weightbearing and non-weightbearing exercise (1 RCT)**

Weightbearing vs. non-weightbearing exercise (Bennell 2020 RCT)

*Pain, mean difference (95% CI)*

- NRS, (0-10): 0.73 (-0.05, 1.50), p= 0.067

*Function, mean difference (95% CI)*

- WOMAC function (0-68): 2.80 (-1.17, 6.76), p= 0.17

**Neuromuscular training (1 RCT)**

Neuromuscular training vs. strength training (Joshi 2022, RCT)

Pain, Between- group difference mean, (95% CI)

- NRS (0-10) 2.25 (1.8, 2.6), p= 0.005

Function, Between- group difference mean, (95% CI)

- Chair stand test (reps): 9.96 (10.5, 9.4) p=0.004

Neuromuscular training + strength training vs. neuromuscular training alone (Holm 2020, RCT)

*Pain*

- KOOS pain (0-100) 12 weeks:
  Control:61.2 (57.2-65.2) vs Intervention: 58.5 (54.2-62.8 ¸ adjusted between-group difference (95% CI):-2.65 (-3.24 to 8.54)

*Function*

- KOOS ADL (0-100) 12 weeks:
  Control 68.1 (64-72.2) Intervention: 67 (63.2-70.8), adjusted between-group difference (95% CI): -1.15 (-6.78 to 4.48)

**High-intensity strength training (2 RCTs)**

High-intensity resistance exercise vs. Low-intensity resistance exercise (deZwart 2022)

*Pain*

- NRS (0-10) Between group differences (over time), B (95% CI): -0.0 ( -0.5, 0.4) p =0.878

*Function*

- WOMAC function (0-68) Between group differences (over time), B (95% CI): -0.2 (-2.0, 1.6) p= 0.816

High-intensity strength training vs. Attention control (Messier 2021)

*Pain*

- WOMAC pain (0-20), Mean difference (95% CI): 0.3 (−0.6 to 1.2) p=0.56

*Function*

- WOMAC function (0-68) Mean difference (95% CI): 1.4 (−1.3 to 4.1) p= 0.32

Low-intensity strength training vs. Attention control (Messier 2021)

*Pain*

- WOMAC pain (0-20), Mean difference (95% CI): −0.6 (−1.5 to 0.3) P=0.22

*Function*

- WOMAC function (0-68) Mean difference (95% CI): −1.5 (−4.3 to 1.2) p=0.27

High-intensity strength training vs. Low-intensity strength training (Messier 2021)

*Pain*

- WOMAC pain (0-20), Mean difference (95% CI): 0.3 (−0.6 to 1.2) p=0.56

*Function*

- WOMAC function (0-68) Mean difference (95% CI): 2.9 (0.2 to 5.6) p= 0.03

**MIXED HIP/KNEE**

**Yoga (1 SR)**

Yoga vs. exercise control (Lauche 2019 SR)

Pain, SMD (95% CI)

- -1.07 [-1.92 -0.21]

Physical function, SMD (95% CI)

- 0.80 [0.36, 1.24]

Quality of life, SMD (95 % CI)

- 0.34 [-0.10, 0.78]

Yoga vs. no-exercise control (Lauche 2019 SR)

Pain, SMD (95% CI)

- -0.75 [-1.18, -0.31]

Physical function, SMD (95 % CI)

- 0.64 [0.30, 0.98]

Quality of life, SMD (95% CI)

- 0.21 [-0.20, 0.62]

**Cost-effectiveness of general exercise (1 SR)**

Cost-effectiveness of Education, exercise and dietary weight management compared to any control (Mazzei 2021 SR)

- Authors conclusion: *Exercise interventions with or without education and diet adjunct therapies compared to physician-delivered usual care or education appear to be cost-effective or cost-saving at conventional WTP thresholds in numerous health systems. We found 15 out of 16 publications concluded exercise interventions (four with education and two with diet) were cost-effective or cost-saving compared to education or physician-delivered usual care at conventional WTP thresholds while three publications reported exercise interventions compared to physiotherapist-delivered usual care were not cost-effective at conventional WTP thresholds.*

## Analysis

### Hip OA

*Supervised progressive resistance training*

- 1 SR found beneficial effects on pain, function and quality of life from supervised progressive resistance training compared to control interventions of common treatments without resistance training (Hansen 2020). Effect sized were small with large confidence intervals

*Responders to exercise*

- 1 SR found a larger rate of responders on pain and function in people receiving exercise compared to no-exercise control (Teirlinck 2020)

*Exercise dose*

- 1 SR on ACSM compliant and non-compliant exercise programs compared to no-exercise controls reported significant larger effects of the ACSM compliant programs on pain, and non-significant larger effects on function (Moseng 2017) Effect sizes of the ACSM compliant programs were moderate

### Knee OA

*Stretching*

- 1 SR found favorable results for stretching alone or stretching + other exercise compared to non-exercise control, with moderate to large effects. When comparing stretching + other exercise to other exercise, no group differences were detected (Luan 2021).

*Tai Chi*

- 1 SR reported positive results of Tai Chi over no-exercise control for pain and function, with moderate to large effect sizes (Hu 2021). 1 RCT reported superior results for function, with the 30-s chair stand test compared to patient education (Chen 2021)

*Stationary cycling*

- 1 SR on stationary cycling found this intervention beneficial with moderate effects, but large confidence intervals compared to no-exercise control for self-reported pain and function, but not for 6-minute walk test (Luan 2021).

*Proprioceptive training*

- 1 SR reported positive effects, with moderate to large effects of proprioceptive training compared to no-exercise control, but not compared to other types of exercise (Wang 2021).

*Exercise dose strengthening*

- 1 SR investigated the effect of ACSM compliant and no- compliant strengthening exercise programs vs. no-exercise control. The results showed effects of both sub-groups compared to the control, but larger effect sizes were reported for the ACSM compliant strengthening programs. A meta-regression analysis from the same SR reports a lower limit of 30-40% increase in knee extensor strength needed to achieve significant changes in pain and function (Bartholdy 2017).
- Another RCT on exercise dose investigated differences in changes to pain and function comparing 2 to 4 weekly sessions and 4 to 6 weekly session of knee extensor training. No between group differences were found (Husted 2022).

*Weight-bearing and non-weight bearing exercise*

- 1 RCT investigating differences in pain and function between weight bearing and no-weight bearing exercise for people with comorbid obesity found no between group differences (Bennell 2020).

*Neuromuscular exercise*

- 1 RCT on neuromuscular training found beneficial effects on pain and function compared to strength exercise (Joshi 2022). Another RCT combined neuromuscular exercise with strength training and compared the combination to neuromuscular exercise alone found no between group differences for pain and function

*High-intensity strength training vs. Low-intensity strength training*

- 1 RCT compared High-intensity strength training to low-intensity strength training and attention control. No between group differences were detected for pain and function (Messier 2021).
- Another RCT compared high intensity to low intensity resistance exercise and found no between group differences in pain or function (deZwart 2022)

**Mixed hip / knee**

*Yoga*

- 1 SR found beneficial effects with moderate to large effects and large confidence intervals of yoga compared to exercise control and no-exercise control for pain and function, but not quality of life (Lauche 2019).

*Cost-effect of general exercise*

- 1 SR on cost-effectiveness found that in a majority of studies included exercise was a cost-effective intervention (Mazzei 2021).

*Relative effectiveness of various exercise modalities*

- 1 SR with network meta-analysis investigated the relative effectiveness of different exercise modalities found that all the investigated modalities including aerobic, mind-body, strengthening, flexibility and skills exercise and mixed programs were superior to no usual care controls. When the separate modalities were compared head to head the differences were less clear.

**Adverse events:**

2 SRs investigating adverse events in exercise studies for hip (James 2021) and knee OA (von Heideken 2021) were identified.

- The study on hip OA search for reporting of adverse events and drop-outs in exercise RCTs of people with hip OA. Fourteen studies, with 707 participants exercising were included. Six studies (42.9%) included a statement of adverse events, and 32 adverse events were reported. All studies had a drop-out statement, but 29.0% of drop-outs occurred for unknown reasons. Six studies (42.9%) gave reasons for drop-outs that could be classified as adverse events in 9 participants; 41 participants (5.8%) experienced exercise related adverse events. Conclusion. Reports of adverse events were inconsistent, some drop-outs were potentially misclassified, and primary components of exercise interventions were frequently unreported. Despite these limitations, the overall low number of nonserious adverse events suggests that the exercise-related risk of harm is minimal for individuals with hip OA.

- The study on knee OA search for reporting of adverse events and drop-outs in exercise RCTs of people with knee OA. A total of 113 studies, with 5909 participants exercising were included. They found that fifty studies (44.2%) included an adverse event statement and 24 (21.2%) reported adverse events, yielding 297 patients. One hundred and three studies (91.2%) had a drop-out statement. Sixteen studies (15.5%) provided reasons for drop-outs that could be classified as adverse events among 39 patients, yielding a 13.1% increase in adverse events. Conclusions. In some studies, the reason for drop-outs could be considered adverse events, leading to potential underreporting of harm. Improvements in reporting of harm were found pre- and post-CONSORT-2010. Greater clarity regarding adverse events and drop-out definitions and therapeutic exercise intensity are needed to determine safe dosing and mode of therapeutic exercise for knee OA. Despite this, therapeutic exercise seems to be associated with minimal risk of harm.

**Conclusion:**

The new evidence adds information on cost-effectiveness, exercise dose for hip and knee separately and effectiveness of a variety of exercise modalities compared to no-exercise, but with less clear results when compared to other types of exercise. All SRs were of low or critically low quality as evaluated by AMSTAR 2.

| **1: Hansen et al. 2020** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Hansen, S.; Mikkelsen, L. R.; Overgaard, S.; Mechlenburg, I. |
| **Year of publication** | 2020 |
| **Title** | Effectiveness of supervised resistance training for patients with hip osteoarthritis - A systematic review |
| **Inclusion period** | Inception to January 2019 |
| **Inclusion criteria** | • Randomised controlled trials<br>• Patients with hip osteoarthritis<br>• Supervised progressive resistance training (a minimum intensity of 60% of 1 RM), two weekly supervised exercise sessions for six weeks)<br>• Compared with common treatment (without resistance training)<br>• Primary outcome: patient-reported function at end of treatment; and secondary outcomes: hip-related pain, health-related quality of life, performance-based function at end of treatment and at 6-12 months for patient-reported function. |
| **Outcomes** | Pain (HOOS), function (HOOS), QoL |
| **Comparisons** | Supervised progressive resistance training vs. control (common treatment without resistance training) |
| **Results** | |

| | |
|---|---|
| **Number of RCTs** | 3 RCTs |
| **Range no. of participants** | 18-91 |
| **Ranges of duration of follow-up** | 6 weeks- 4 months (end of study analyses) |
| **Results per outcome measure** | PAIN<br>Supervised progressive resistance training vs. control (MD (95% CI))<br>• HOOS (0-100): 7.83 (2.64, 13.02)<br><br>FUNCTION<br>Supervised progressive resistance training vs. control (MD (95% CI))<br>• HOOS (0-100): 9.13 (4.45, 13.80)<br><br>QUALITY OF LIFE<br>Supervised progressive resistance training vs. control (MD (95% CI))<br>• HOOS (0-100): 6.80 (1.96, 11.63)<br><br>All results in favour of interventioN |
| **Risk of bias** | |

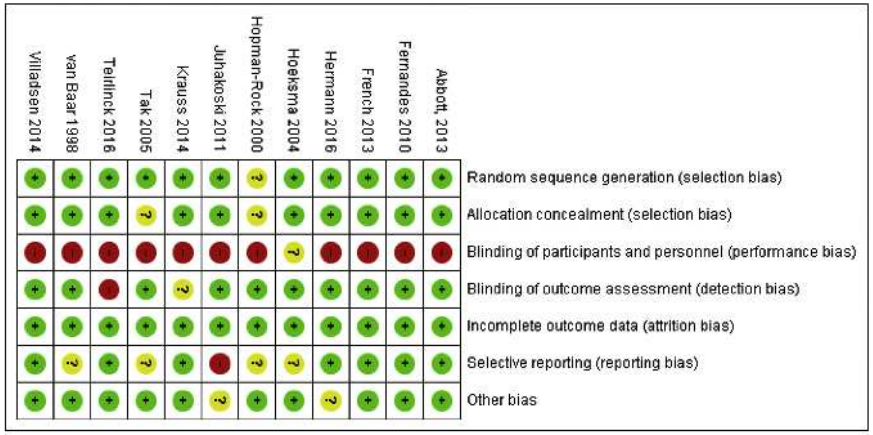
| Hermann 2016 | Foley 2003 | Bieler 2017 | |
|---|---|---|---|
| + | + | + | Random sequence generation (selection bias) |
| + | + | + | Allocation concealment (selection bias) |
| - | - | - | Blinding of participants and personnel (performance bias) |
| + | + | + | Blinding of outcome assessment (detection bias) |
| + | + | + | Incomplete outcome data (attrition bias) |
| + | ? | + | Selective reporting (reporting bias) |
| + | + | + | Other bias |

**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hansen 2020 | Y | Y | Y | P | Y | Y | N | P | Y | N | Y | N | Y | Y | N | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes
See attached AMSTAR 2 checklist for details on the content of the specific items

| **2: Moseng et al. 2017** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | T. Moseng, H. Dagfinrud, G. Smedslund, N. Østerås |
| **Year of publication** | 2017 |
| **Title** | The importance of dose in land-based supervised exercise for people with hip osteoarthritis. A systematic review and meta-analysis |
| **Inclusion period** | Inception to April 2016 |
| **Inclusion criteria** | • RCTs<br>• People diagnosed with symptomatic hip OA who had not undergone hip OA related surgery were included.<br>• The intervention could be any land-based exercise programmes including muscular strengthening, flexibility and/or cardiorespiratory exercises.<br>• The control intervention could be no treatment or any treatment that was not exercise related. Thus, studies comparing different types of exercise programs were excluded if they failed to have a control group that did not exercise.<br>• Studies including a mixed sample of people with hip and knee OA were included if the study authors could provide separate data for the hip OA participants. |
| **Outcomes** | Pain, function |
| **Comparisons** | ACSM compliant exercise programs vs. no-exercise control<br>Non-ACSM compliant exercise programs vs. no-exercise control |
| **Results** | |
| **Number of RCTs** | 12 |
| **Range no. of participants** | 34-203 |
| **Ranges of duration of follow-up** | 5-12 weeks |
| **Results per outcome measure** | PAIN<br>ACSM compliant exercise programs vs. no-exercise control, SMD (95 % CI):<br>• -0.42 (-0.58, -0.26)<br>Non-ACSM compliant exercise programs vs. no-exercise control, SMD (95 % CI):<br>• -0.05 (-0.35, 0.25) |

| | |
|---|---|
| | FUNCTION<br>ACSM compliant exercise programs vs. no-exercise control, SMD (95 % CI):<br>• -0.41 (-0.58, -0.24)<br>Non-ACSM compliant exercise programs vs. no-exercise control, SMD (95 % CI):<br>• -0.23 (-0.52, 0.06) |
| **Risk of Bias** |  <br>*Reprinted with permission from Elsevier* |
| **AMSTAR 2** | See table below |

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Moseng 2017 | Y | P | Y | P | Y | Y | Y | P | Y | N | Y | N | Y | Y | N | Y | Low |

*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

| **3: Teirlinck et al. 2020** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Teirlinck, C. H.; Verhagen, A. P.; Reijneveld, E. A. E.; Runhaar, J.; van Middelkoop, M.; van Ravesteyn, L. M.; Hermsen, L.; de Groot, I. B.; Bierma-Zeinstra, S. M. A. |
| **Year of publication** | 2020 |
| **Title** | Responders to Exercise Therapy in Patients with Osteoarthritis of the Hip: A Systematic Review and Meta-Analysis |
| **Inclusion period** | Up until march 2020 |
| **Inclusion criteria** | • Randomized trials<br>• Patients were >18 years old<br>• Clinical and/or radiological hip osteoarthritis<br>• the intervention was an active form of exercise therapy under supervision of a (physical) therapist.<br>• The intervention was not part of a multidisciplinary or multimodal program and was evaluated as a standalone intervention,<br>• The intervention in the control group was usual care (e.g., medication and/or education), and no treatment or waiting list.<br>• Studies with control interventions as hot packs, transcutaneous electrical nerve stimulations, and ultrasound were excluded.<br>• Furthermore, for this analysis, the outcomes enable us to calculate responders using the OMERACT-OARSI criteria at short term (directly after end of treatment) and/or at long term (6–8 months after end of treatment) |
| **Outcomes** | OMERACT-OARSI responder criteria |
| **Comparisons** | Exercise vs. control |
| **Results** | |
| **Number of RCTs** | 14 RCTs |
| **Range no. of participants** | 30-203 |
| **Ranges of duration of follow-up** | 5-16 weeks |
| **Results per outcome measure** | OMERACT OARSI RESPONDER CRITERIA<br><br>After-treatment (short-term) (12 trials, n = 1178) |

<table>
<tr><td></td><td>

- 30% responders in exercise group vs. 16% in control goup (RD = 0.14, 95% CI 0.06–0.22, number needed to treat 7.1, 95% CI 4.5–17)

Long-term (6-8 months after treatment) (6 trials, n = 519),

- 26% responders in exercise group vs. 13% in control group (RD = 0.14, 95% CI 0.07–0.20, number needed to treat 7.1, 95% CI 5.0–14.3).

</td></tr>
<tr><td>Risk of bias</td><td>

| Study | Random Sequence Generation | Allocation Concealment | Blinding of Participants and Personnel | Blinding of Outcome Assessment | Incomplete Outcome Data | Selective Reporting | Other Bias |
|---|---|---|---|---|---|---|---|
| V Baar 1998 | + | + | - | - | + | ? | + |
| Hopman-Rock 2000 | ? | ? | - | - | ? | ? | + |
| Stener-Victorin 2004 | + | ? | - | - | - | + | + |
| Tak 2005 | + | ? | - | - | + | ? | + |
| Fernandes 2010 | + | + | - | - | + | + | + |
| Juhakoski 2011 | + | + | - | - | + | ? | + |
| French 2013 | + | + | - | - | + | + | + |
| Abbott 2013 | + | + | - | - | + | + | ? |
| Villadsen 2014 | + | + | - | - | + | + | + |
| Krauss 2014 | + | + | - | - | + | + | + |
| Teirlinck 2016 | + | + | - | - | + | + | + |
| Hermann 2016 | + | + | - | - | + | + | ? |
| Saw 2016 | + | ? | - | - | ? | + | + |
| Bieler 2016 | + | + | + | + | + | + | + |

+ High risk of bias; - low risk of bias; ? unclear risk of bias.

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</td></tr>
<tr><td>AMSTAR 2</td><td>

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Teirlinck 2020 | Y | N | Y | P | Y | Y | N | P | Y | N | Y | Y | Y | Y | Y | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

</td></tr>
</table>

| **4: Bartholdy et al. 2017** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Bartholdy, C.; Juhl, C.; Christensen, R.; Lund, H.; Zhang, W.; Henriksen, M. |
| **Year of publication** | 2017 |
| **Title** | The role of muscle strengthening in exercise therapy for knee osteoarthritis: A systematic review and meta-regression analysis of randomized trials |
| **Inclusion period** | Inception to February 2015 |
| **Inclusion criteria** | • Randomized or quasi-randomized controlled trials comparing at least one exercise intervention with no intervention, waitinglist, sham, or placebo.<br>• The trial population should be diagnosed with knee OA in one or both knees.<br>• All studies having performed an exercise intervention and reporting a strength measurement of the lower limb, and included outcomes on self-reported pain or disability were eligible.<br>• Exercise interventions were categorized as "ACSM interventions" if they described the delivered intervention according to the ACSM recommendation of strength training for this patient group: *A voluntary contraction against an external resistance typically performed in especially designed equipment or with free weights. The external load should be above 40% of 1 repetition maximum (1RM) corresponding to very light to light intensity, and the exercises performed in 2–4 sets of 8–12 repetitions; preferably to contraction failure or muscular exhaustion. The exercise program should consist of at least 2–3 sessions per week.*<br>• Exercise interventions that in their description were considered not to follow all of the above definitions were categorized as "not-ACSM interventions", and include all other types of exercise interventions |
| **Outcomes** | Pain and function (related to exercise dose) |
| **Comparisons** | ACSM compliant exercise vs. control<br>Non-ACSM compliant exercise vs. control |
| **Results** | |
| **Number of RCTs** | 45 RCTs |
| **Range no. of participants** | 22-418 |
| **Ranges of duration of follow-up** | 4-120 weeks |

<table>
<tr><td>Results per outcome measure</td><td>PAIN<br>Exercise vs. control, SMD (95% CI)<br>• Programs following ACSM recommendation vs. control: 0.62 (0.32, 0.93)<br>• Program not following ACSM recommendation vs. control: 0.52 (0.35, 0.68)<br><br>FUNCTION<br>• Programs following ACSM recommendation vs. control: 0.64 (0.28, 1.00)<br>• Program not following ACSM recommendation vs. control: 0.49 (0.33–0.65)</td></tr>
<tr><td>Risk of bias</td><td>The methodological characteristics of the comparisons showed that 36 (64%) reported using an adequate sequence generation and 31 (55%) comparisons reported adequate allocation concealment. Blinding was graded as adequate in only 2 (4%) of the comparisons, and in 22 (39%) of the comparison analyses (intention to treat) were regarded adequate. The 2 comparisons that had adequate blinding of the participants/personnel did so by ensuring that the personnel who did the control and exercise interventions were blinded to who was in the opposite group, that participants were not informed of the fact that there was 2 different group, and by blinding outcome assessors. Reporting of selective outcome was considered adequate in 8 (14%) studies and the likelihood of other</td></tr>
<tr><td>AMSTAR 2</td><td>
<table>
<tr><th>Study</th><th>1</th><th>2*</th><th>3</th><th>4*</th><th>5</th><th>6</th><th>7*</th><th>8</th><th>9*</th><th>10</th><th>11*</th><th>12</th><th>13*</th><th>14</th><th>15</th><th>16</th><th>Overall quality</th></tr>
<tr><td>Bartholdy 2017</td><td>Y</td><td>P</td><td>Y</td><td>P</td><td>Y</td><td>N</td><td>Y</td><td>P</td><td>Y</td><td>N</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>N</td><td>Y</td><td>Low</td></tr>
</table>
*Critical items, Y=yes, N=No, P=partial yes<br>See attached AMSTAR 2 checklist for details on the content of the specific items</td></tr>
</table>

| **5: Hu et al. 2021** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Hu, L.; Wang, Y.; Liu, X.; Ji, X.; Ma, Y.; Man, S.; Hu, Z.; Cheng, J.; Huang, F. |
| **Year of publication** | 2021 |
| **Title** | Tai Chi exercise can ameliorate physical and mental health of patients with knee osteoarthritis: systematic review and meta-analysis |
| **Inclusion period** | Inception to June 2020 |
| **Inclusion criteria** | • Randomised controlled trial design<br>• Patients (⩾18 years old)<br>• Knee osteoarthritis confirmed by physician/specialist based on valid instruments (such as Classification Criteria of the American College of Rheumatology)<br>• Studies comparing Tai Chi with no exercise, education class, standard care or physical therapy<br>• Reporting at least one of outcome measures, such as symptoms, mood, balance and self-efficacy. |
| **Outcomes** | • Pain, function |
| **Comparisons** | • Tai Chi vs. control (no exercise, education class, standard care or physical therapy) |
| **Results** | |
| **Number of RCTs** | 16 |
| **Range no. of participants** | 18-204 |
| **Ranges of duration of follow-up** | 5-52 weeks |
| **Results per outcome measure** | PAIN<br>Tai chi vs. control (SMD (95% CI))<br>• WOMAC: -0.69 (-0.95, -0.44)*<br><br>FUNCTION<br>Tai chi vs. control (SMD (95% CI))<br><br>• WOMAC: -0.92, (-1.16, -0.69 |

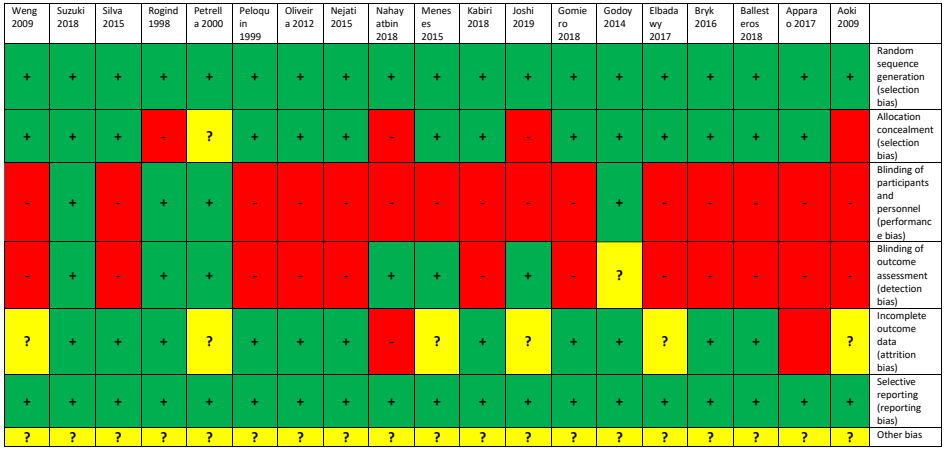
<table>
<tr><td></td><td>
<ul>
<li>Six min walk test: 0.55 (0.10, 0.99)*</li>
<li>Timed up and go test: -0.55 (-0-82, -0.29)*</li>
</ul>
*In favour of Tai Chi
</td></tr>
<tr><td>Quality of evidence</td><td>
GRADE
<table>
<tr><th>Outcome</th><th>No. of participants (studies)</th><th>Quality of the evidence (GRADE)</th></tr>
<tr><td>WOMAC pain</td><td>877 (14 RCTs)</td><td>⨁⨁⨁⊖ moderate</td></tr>
<tr><td>WOMAC function</td><td>844 (13 RCTs)</td><td>⨁⨁⨁⊖ moderate</td></tr>
<tr><td>6MWT</td><td>426 (6 RCTs)</td><td>⨁⨁⨁⊖ moderate</td></tr>
<tr><td>Timed up and Go</td><td>225 (5 RCTs)</td><td>⨁⨁⊖⊖ low</td></tr>
</table>
</td></tr>
<tr><td>AMSTAR 2</td><td>
<table>
<tr><th>Study</th><th>1</th><th>2*</th><th>3</th><th>4*</th><th>5</th><th>6</th><th>7*</th><th>8</th><th>9*</th><th>10</th><th>11*</th><th>12</th><th>13*</th><th>14</th><th>15</th><th>16</th><th>Overall quality</th></tr>
<tr><td>Hu 2021</td><td>Y</td><td>N</td><td>Y</td><td>P</td><td>Y</td><td>Y</td><td>N</td><td>P</td><td>Y</td><td>N</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Critically low</td></tr>
</table>
*Critical items, Y=yes, N=No, P=partial yes<br>
See attached AMSTAR 2 checklist for details on the content of the specific items
</td></tr>
</table>

| **6: Luan et al. 2022** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Luan, L.; El-Ansary, D.; Adams, R.; Wu, S.; Han, J. |
| **Year of publication** | 2022 |
| **Title** | Knee osteoarthritis pain and stretching exercises: a systematic review and meta-analysis |
| **Inclusion period** | • Inception to December 2020 |
| **Inclusion criteria** | • Participants with knee osteoarthritis<br>• Interventions involved stretching exercises<br>• Comparators were not a restriction<br>• Outcomes consisted of pain scores<br>• Studies were designed as RCTs |
| **Outcomes** | Pain |
| **Comparisons** | • Stretching exercise alone vs. Control (no exercises)<br>• Stretching exercise in combination with other exercise vs. Control (no exercise)<br>• Stretching exercises as well as other exercises vs. Other exercises |
| **Results** | |
| **Number of RCTs** | 19 studies. 18 in meta-analysis |
| **Range no. of participants** | 18-179 |
| **Ranges of duration of follow-up** | 4-16 weeks |
| **Results per outcome measure** | PAIN<br>Stretching exercise alone vs. control (no exercises) (MD (95% CI))<br>• VAS (0-10): 1.86 (1.31, 2.41)<br><br>Stretching exercise in combination with other exercise vs. Control (no exercise) (MD (95% CI))<br>• VAS (0-10): 1.31 (0.77, 1.85)<br><br>• WOMAC (0-50): 7.03 (3.93, 10.12) |

Stretching exercises as well as other exercises vs. Other exercises (MD (95% CI))

- VAS (0-10): 0.60 (-0.20, 1.40)
- KOOS (0-100): 2.50 (-3.75, 8.75)

**Risk of bias**




**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Luan 2022 | Y | Y | Y | P | Y | Y | N | P | Y | N | N | Y | Y | Y | N | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

| **7: Luan et al. 2021** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Luan, L.; Bousie, J.; Pranata, A.; Adams, R.; Han, J. |
| **Year of publication** | 2021 |
| **Title** | Stationary cycling exercise for knee osteoarthritis: A systematic review and meta-analysis |
| **Inclusion period** | Inception to September 2020 |
| **Inclusion criteria** | • Individuals with knee osteoarthritis<br>• Intervention: stationary cycling exercise<br>• Comparators: control (no exercise) or exercise therapy<br>• Outcome measures: there was no restriction, but this meta-analysis focused on those main patient reported outcome measures that can be counted and pooled<br>• Study design: the studies were randomized-controlled trials. |
| **Outcomes** | Pain, function |
| **Comparisons** | • Stationary cycling vs. no exercise<br>• Stationary cycling vs. other exercise |
| **Results** | |
| **Number of RCTs** | 11 RCTs. 8 included in meta-analysis |
| **Range no. of participants** | 28-100 |
| **Ranges of duration of follow-up** | 8-12 weeks |

**Results per outcome measure**

PAIN

Stationary cycling vs. no exercise (MD (95% CI))

- WOMAC pain: 12.86 (6.90, 18.81)
- KOOS pain: 6.87 (4.82, 8.92)

Stationary cycling vs. other exercise

- WOMAC pain: 2.37 (-6.64, 11.39)
- KOOS pain: -2.19 (-4.48, 0.10)

FUNCTION

Stationary cycling vs. no exercise (MD (95% CI))

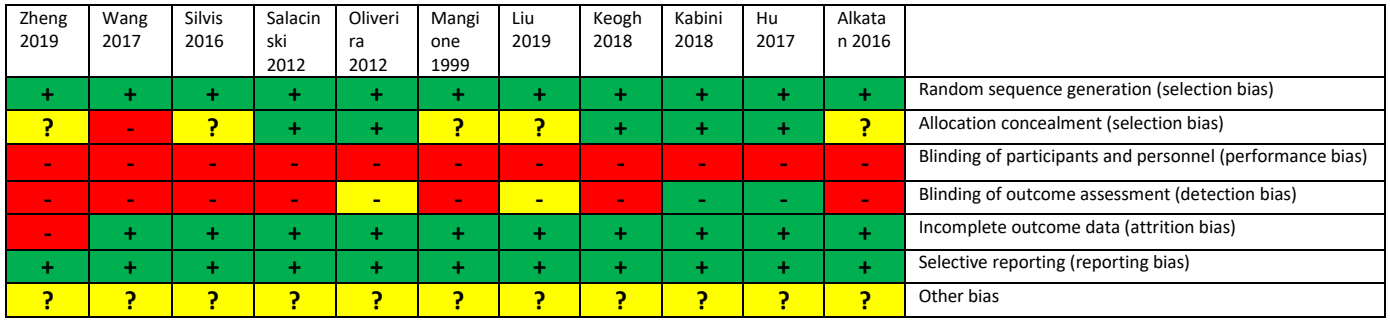
- WOMAC function: 8.28 (2.44, 14.11)
- 6 min walk test: 18.47 (-37.54, 74.48)

Stationary cycling vs. other exercise

- WOMAC function: -3.87 (-11.52, 3.78)
- 6 min walk test: -7.68 (-27.92, 12.55)

Positive values favour intervention. Scales are not reported

**Risk of bias**



| Zheng 2019 | Wang 2017 | Silvis 2016 | Salacinski 2012 | Oliveira 2012 | Mangione 1999 | Liu 2019 | Keogh 2018 | Kabini 2018 | Hu 2017 | Alkatan 2016 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + | + | + | + | + | Random sequence generation (selection bias) |
| ? | - | ? | + | + | ? | ? | + | + | + | ? | Allocation concealment (selection bias) |
| - | - | - | - | - | - | - | - | - | - | - | Blinding of participants and personnel (performance bias) |
| - | - | - | - | - | - | - | - | - | - | - | Blinding of outcome assessment (detection bias) |
| - | + | + | + | + | + | + | + | + | + | + | Incomplete outcome data (attrition bias) |
| + | + | + | + | + | + | + | + | + | + | + | Selective reporting (reporting bias) |
| ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | Other bias |

**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Luan 2021 | Y | P | Y | P | Y | Y | N | P | Y | N | Y | Y | Y | Y | N | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

| 8: Wang et al 2021 | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Wang, Y.; Wu, Z.; Chen, Z.; Ye, X.; Chen, G.; Yang, J.; Zhang, P.; Xie, F.; Guan, Y.; Wu, J.; Chen, W.; Ye, Z.; Xu, X |
| **Year of publication** | 2021 |
| **Title** | Proprioceptive Training for Knee Osteoarthritis: A Systematic Review and Meta-Analysis of Randomized Controlled Trials |
| **Inclusion period** | Inception to April 2021 |
| **Inclusion criteria** | • Adult patients with KOA<br>• Intervention; Proprioceptive training. Proprioceptive training includes proprioceptive, balance, and sensorimotor training. However, no restrictions were made in terms of the frequency, duration, or intensity of the intervention. Additionally, we excluded studies where the intervention was whole-body vibration or water training.<br>• Study Design: Randomized controlled trials (RCTs)<br>• Published in English. |
| **Outcomes** | Pain, physical function, adverse events |
| **Comparisons** | • Proprioceptive training vs. no intervention<br>• Proprioceptive training vs. other non-proprioceptive training (e.g., resistance and strength training)<br>• Proprioceptive training with other non-proprioceptive training vs. other non-proprioceptive training |
| **Results** | |
| **Number of RCTs** | 24 RCTs |
| **Range no. of participants** | 15-183 |
| **Ranges of duration of follow-up** | 2-16 weeks |
| **Results per outcome measure** | PAIN<br>Proprioceptive training vs. no intervention (SMD (95% CI))<br>• -1.07 (-1.46, -0.68)*<br><br>Proprioceptive training vs. other non-proprioceptive training (e.g., resistance and strength training) (SMD (95% CI))<br>• -0.02 (-0.74, 0.69)* |

| | |
|---|---|
| | Proprioceptive training with other non-proprioceptive training vs. other non-proprioceptive training<br>• -0.17 (-0.58, 0.23)*<br><br>FUNCTION<br>Proprioceptive training vs. no intervention (SMD (95% CI))<br>• -0.97 (-1.26, -0.67)*<br><br>Proprioceptive training vs. other non-proprioceptive training (e.g., resistance and strength training) (SMD (95% CI))<br>• -0.03 (-0.76, 0.70)*<br><br>Proprioceptive training with other non-proprioceptive training vs. other non-proprioceptive training<br>• -0.34 (-0.56, -0.12)*<br>Negative values favours intervention<br><br>ADVERSE EVENTS<br>Only eight studies reported safety-related data, however three of these trials stated that no adverse events were reported, and one trial reported that no serious adverse events during the intervention occurred. In addition, from another four studies that provided data (n = 210), 12 participants (5.7%) reported adverse events, including postexercise soreness, back pain, hip soreness, foot pain, and ankle injury. |
| **Risk of bas** | The mean PEDro scale score for all studies was 6.25 (range, 4–8; Table 2), suggesting that the studies were of moderate quality.<br>All 24 studies satisfied four of the PEDro criteria, namely “random allocation,” “similar baseline,” “between-group statistics,” and “point measures,” but only eight studies used concealed allocation to minimize allocation bias. However, except for two, the remaining studies did not account for “the blinding of the subjects and therapists,” of the studies employed assessor blinding. In addition, six of the studies lost more than 15% participants during follow-up and the inconsistent use of “intention-to-treat” analyses were found to be consistent trial limitations in most of the studies |
| **AMSTAR 2** | |

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wang 2021 | Y | Y | Y | P | Y | Y | N | P | P | N | Y | Y | Y | Y | Y | Y | Low |

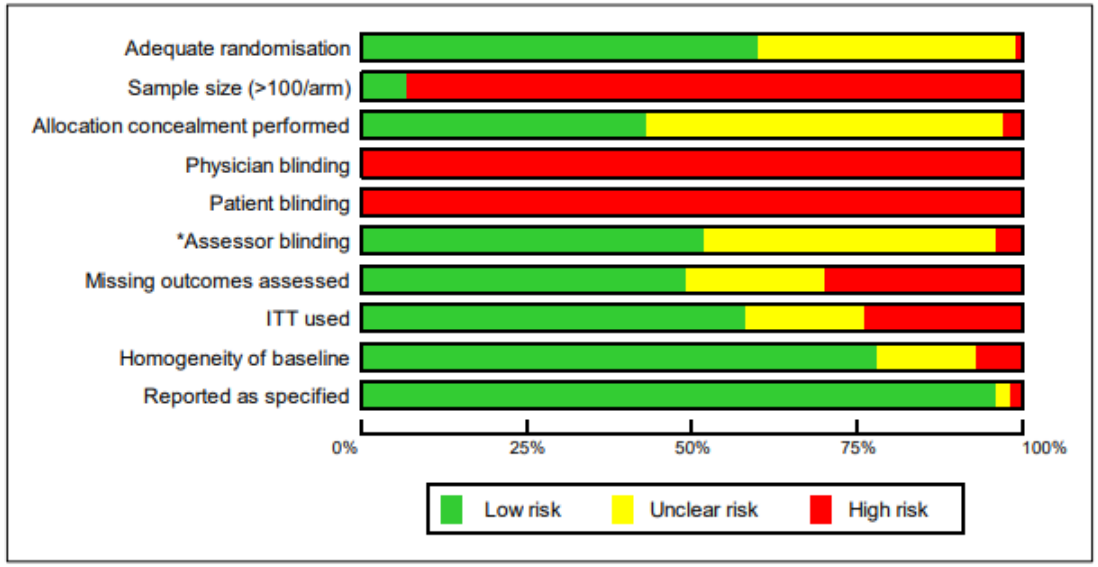
*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

<table>
<tr><th colspan="2">9: Goh et al 2019</th></tr>
<tr><th colspan="2">study characteristics</th></tr>
<tr><td>Study authors</td><td>Siew-Li Goh, Monica S. M. Persson, Joanne Stocks, Yunfei Hou, Nicky J. Welton, Jianhao Lin, Michelle C. Hall, Michael Doherty, Weiya Zhang</td></tr>
<tr><td>Year of publication</td><td>2019</td></tr>
<tr><td>Title</td><td>Relative Efficacy of Different Exercises for Pain, Function, Performance and Quality of Life in Knee and Hip Osteoarthritis: Systematic Review and Network Meta-Analysis</td></tr>
<tr><td>Inclusion period</td><td>Inception to December 2017</td></tr>
<tr><td>Inclusion criteria</td><td>• RCTs<br>• Participants with knee OA, hip OA, or mixed knee and hip OA diagnosed clinically and/or radiographically<br>• Assigned exercise programmes without additional active treatment (e.g. analgesics) as the intervention<br>• Assigned usual care/waiting list or a different exercise as the control group<br>• Measured at least one outcome for pain, function, objective performance or QoL.</td></tr>
<tr><td>Outcomes</td><td>Pain, function, performance quality of life</td></tr>
<tr><td>Comparisons</td><td></td></tr>
<tr><th colspan="2">Results</th></tr>
<tr><td>Number of RCTs</td><td>103 total<br>76 exercise vs. usual care.<br>27 comparisons between exercise types</td></tr>
<tr><td>Range no. of participants</td><td>NA</td></tr>
<tr><td>Ranges of duration of follow-up</td><td>Analyses conducted at, or nearest to, 8 weeks</td></tr>
<tr><td>Results per outcome measure</td><td>
<table>
<tr><td></td><td>Pain (89 trails, n= 7184)</td><td>Function (87 trial, n= 7163)</td><td>Quality of life (40 trials, n= 3190)</td></tr>
<tr><td></td><td>Vs usual care</td><td>Vs usual care</td><td>Vs usual care</td></tr>
<tr><td>Aerobic</td><td>1.11 (0.69, 1.54)</td><td>0.59 (0.10, 1.07)</td><td>0.39 (-0.06, 0.83)</td></tr>
</table>
</td></tr>
</table>

| | | | |
|---|---|---|---|
| Mind-Body | 1.11 (0.63, 1.59) | 0.81 (0.27, 1.36) | 0.24 (-0.09, 0.58) |
| Strength | 0.73 (0.49, 0.98) | 0.76 (0.48, 1.03) | 0.26 (0.05, 0.47) |
| Flex/skills | 0.65 (0.29, 1.00) | 0.68 (0.28, 1.09) | 0.33 (-0.03, 0.68) |
| Mixed | 0.47 (0.26, 0.69) | 0.43 (0.18, 0.69) | 0.19 (0.04, 0.35) |
| | **Vs. mixed** | **Vs. mixed** | **Vs. mixed** |
| Aerobic | 0.64 (0.21, 1.08) | 0.15 (-0.34, 0.65) | 0.19 (-0.29, 0.67) |
| Mind-Body | 0.64 (0.14, 1.13) | 0.38 (-0.19, 0.94) | 0.05 (-0.29, 0.39) |
| Strength | 0.26 (-0.04, 0.57) | 0.32 (-0.02, 0.66) | 0.06 (-0.18, 0.31) |
| Flex/skills | 0.18 (-0.19, 0.55) | 0.08 (-0.33, 0.48) | 0.13 (-0.22, 0.48) |
| | **Vs. flex/skills** | **Vs. flex/skills** | **Vs. flex/skills** |
| Aerobic | 0.47 (.0.06, 1.00) | -0.09 (-0.69, 0.50) | 0.06 (-0.5, 0.63) |
| Mind-Body | 0.46 (-0.12, 1.04) | 0.13 (-0.52, 0.79) | -0.08 (-0.56, 0.40) |
| Strength | 0.09 (-0.27, 0.44) | 0.08 (-0.33, 0.48) | -0.07 (-0.40, 0.27) |
| | **Vs. strength** | **Vs. strength** | **Vs. strength** |
| Aerobic | 0.38 (-0.07, 0.83) | -0.17 (-0.69, 0.36) | 0.13 (-0.36, 0.62) |
| Mind-Body | 0.37 (-0.15, 0.90) | 0.06 (-0.54, 0.66) | -0.02 (-0.40, 0.37) |
| | **Vs. Mind-body** | **Vs. Mind-body** | **Vs. Mind-body** |
| Aerobic | 0.01 (-0.64, 0.62) | -0.23 (-0.95, 0.49) | 0.15 (-0.70, 0.41) |
| Standardised mean differenc (95% credibility intervals) | | | |

**Risk of Bias**




* Data is for studies with objective performance test since assessor blinding is not possible for self-reported outcomes
ITT= intention to treat analysis



**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Goh 2019 | Y | Y | Y | P | N | Y | N | P | Y | N | Y | N | N | Y | Y | Y | Critically low |

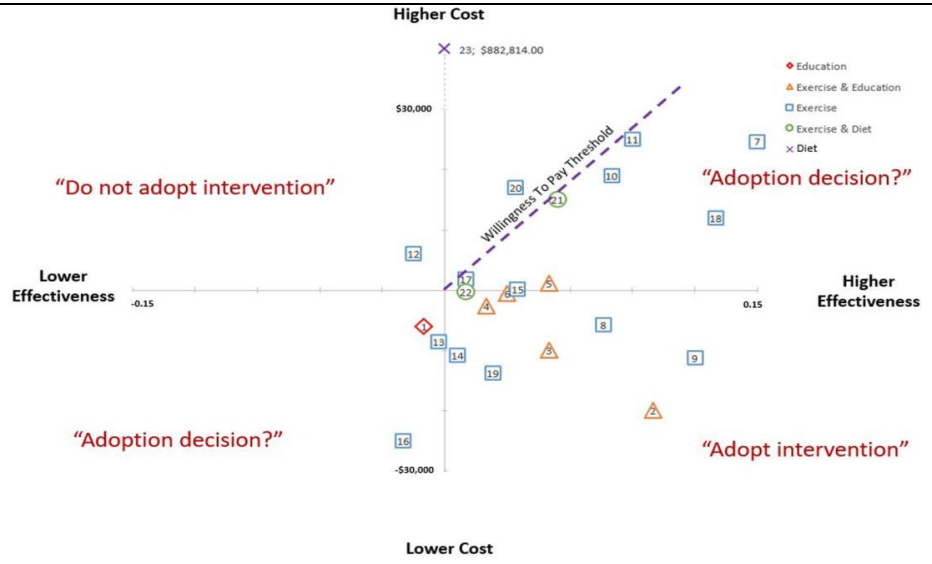
*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

| **10: Lauche et al. 2019** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Lauche, R.; Hunter, D. J.; Adams, J.; Cramer, H. |
| **Year of publication** | 2019 |
| **Title** | Yoga for Osteoarthritis: a Systematic Review and Meta-analysis |
| **Inclusion period** | Inception through April 2018 |
| **Inclusion criteria** | • Randomised controlled trials (RCTs), cluster-randomised trials, and randomised cross-over studies.<br>• Articles published in any languages<br>• Adults diagnosed with osteoarthritis, i.e. all studies on patients with osteoarthritis of the knee, hip, hand, feet, and spine were considered.<br>• No restrictions were applied regarding age, gender, and comorbidities, and diagnostic criteria utilised,<br>• Studies that assessed yoga as the main intervention were included. No restrictions regarding yoga style, length, or frequency of the intervention period were applied; multicomponent interventions employing postures, breathing, and/or meditation, as well as studies employing single components only, were acceptable.<br>• When co-interventions (such as pharmacotherapy) were applied, studies were eligible only if all participants in all groups received the same co-interventions.<br>• Studies comparing yoga to exercise or any non-exercise control (e.g. no treatment, usual care, attention-control, or nonexercise active control interventions) were eligible. |
| **Outcomes** | • Pain intensity, function, QoL |
| **Comparisons** | Yoga vs exercise control<br>Yoga vs non-exercise control |
| **Results** | |
| **Number of RCTs** | 5 RCTs in meta-analysis |
| **Range no. of participants** | 20-235 |
| **Ranges of duration of follow-up** | 8-12 weeks |
| **Results per outcome measure** | PAIN INTENSITY<br>Yoga vs. exercise control (based on 4 studies), SMD (95 % CI) |

<table>
<tr><td></td><td>
<ul><li>-1.07 [-1.92 -0.21]</li></ul>
Yoga vs. no-exercise control (based on 3 studies), SMD (95 % CI)
<ul><li>-0.75 [-1.18, -0.31]</li></ul>
Negative values favour yoga<br><br>
PHYSICAL FUNCTION<br>
Yoga vs. exercise control (based on 2 studies), SMD (95 % CI)
<ul><li>0.80 [0.36, 1.24]</li></ul>
Yoga vs. non-exercise control (based on 4 studies), SMD (95 % CI)
<ul><li>0.64 [0.30, 0.98]</li></ul>
Positive values favour yoga<br><br>
QUALITY OF LIFE<br>
Yoga vs. exercise control (based on 2 studies), SMD (95 % CI)
<ul><li>0.34 [-0.10, 0.78]</li></ul>
Yoga vs. non-exercise control (based on 4 studies), SMD (95 % CI)
<ul><li>0.21 [-0.20, 0.62]</li></ul>
Direction of scale unclear
</td></tr>
<tr><td>Risk of bias</td><td>Results indicate that risk of bias was mixed, with six trials reporting adequate random sequence generation, but only one trial reporting adequate allocation concealment as well. No trial had a low risk of bias for blinding of participants or personnel, or outcome assessment (for primary outcomes). All but three trials had a low risk of attrition bias, but the risk of selective reporting was low in only two trials. All trials had a high risk of other bias, including but not limited to undeclared potential conflicts of interest, inadequate statistical testing, or inconsistencies between multiple publications of the same study.</td></tr>
<tr><td>AMSTAR 2</td><td>
<table>
<tr><th>Study</th><th>1</th><th>2*</th><th>3</th><th>4*</th><th>5</th><th>6</th><th>7*</th><th>8</th><th>9*</th><th>10</th><th>11*</th><th>12</th><th>13*</th><th>14</th><th>15</th><th>16</th><th>Overall quality</th></tr>
<tr><td>Lauche 2019</td><td>Y</td><td>N</td><td>Y</td><td>P</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>Y</td><td>N</td><td>Y</td><td>Y</td><td>Y</td><td>N</td><td>Y</td><td>N</td><td>Low</td></tr>
</table>
*Critical items, Y=yes, N=No, P=partial yes<br>
See attached AMSTAR 2 checklist for details on the content of the specific items
</td></tr>
</table>

| **11: Mazzei et al. 2020** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Mazzei, D. R.; Ademola, A.; Abbott, J. H.; Sajobi, T.; Hildebrand, K.; Marshall, D. A. |
| **Year of publication** | 2020 |
| **Title** | Are education, exercise and diet interventions a cost-effective treatment to manage hip and knee osteoarthritis? A systematic review |
| **Inclusion period** | Inception to November 2019 |
| **Inclusion criteria** | • Full economic evaluations conducted alongside randomized or nonrandomized clinical trials<br>• People with hip and/or knee OA<br>• Receiving education, exercise and dietary weight management interventions compared to any control.<br>• Education was defined as any formal instruction about OA and self-management techniques.<br>• Exercise was defined as any prescribed activity requiring muscular contraction.<br>• Dietary weight management was defined as any type of intervention with the goal of caloric restriction.<br>• Full trial-based economic evaluations compare two or more comparators using a cost-utility analysis (CUA), cost-effectiveness analysis (CEA), cost-benefit analysis (CBA) or cost-minimization analysis (CMA).<br>• Publications were excluded if they did not have a comparator or evaluated surgical, pharmaceutical or nutraceutical interventions. |
| **Comparisons** | Education, exercise and dietary weight management interventions compared to any control |
| **Outcomes** | Economic evaluations: cost-minimization (n=2), cost-effectiveness (n=5) and cost-utility (n=16) analyses |
| **Results** | |
| **Number of RCTs** | 22 RCTs (RCTs, cluster RCTs, pragmatic RCTs) 1 non-random clinical study |
| **Range no. of participants** | 64-810 |
| **Ranges of duration of follow-up** | 6 months-5 years |
| **Results per outcome measure** | |

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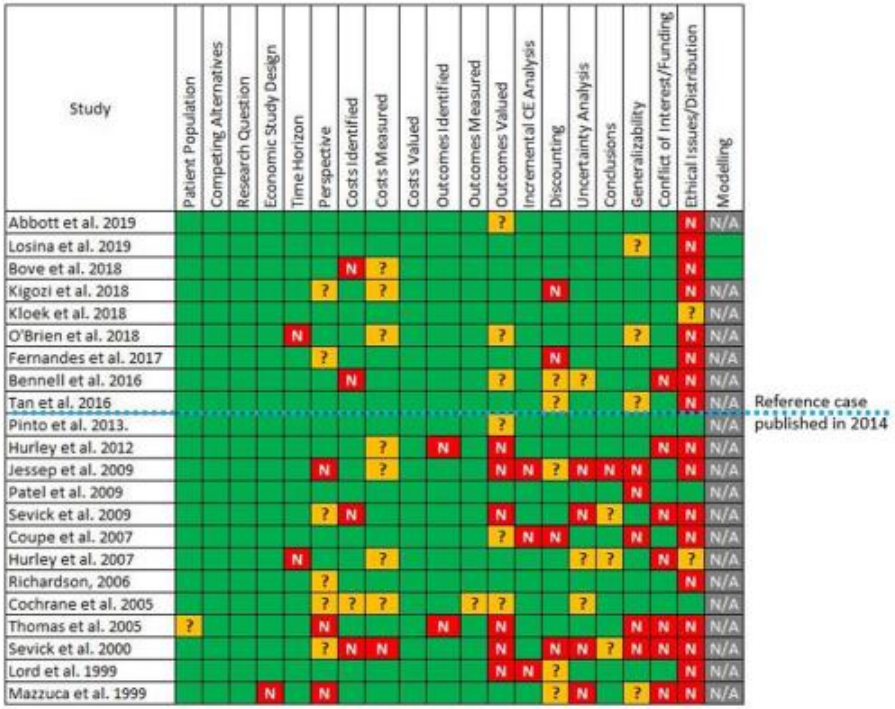
Risk of bias




Health Economic Criteria (CHEC) list. The CHEC list is a validated risk of bias tool with 19 yes-or-no questions. The CHEC list was designed and is recommended for systematic reviews of trial-based economic evaluations.

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AMSTAR 2

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mazzei 2020 | Y | P | N | P | Y | Y | N | P | N | N | N/M | N/M | N | N | N/M | Y | Low |

*Critical items, Y=yes, N=No, P=partial yes, N/M= No Meta-analysis
See attached AMSTAR 2 checklist for details on the content of the specific items

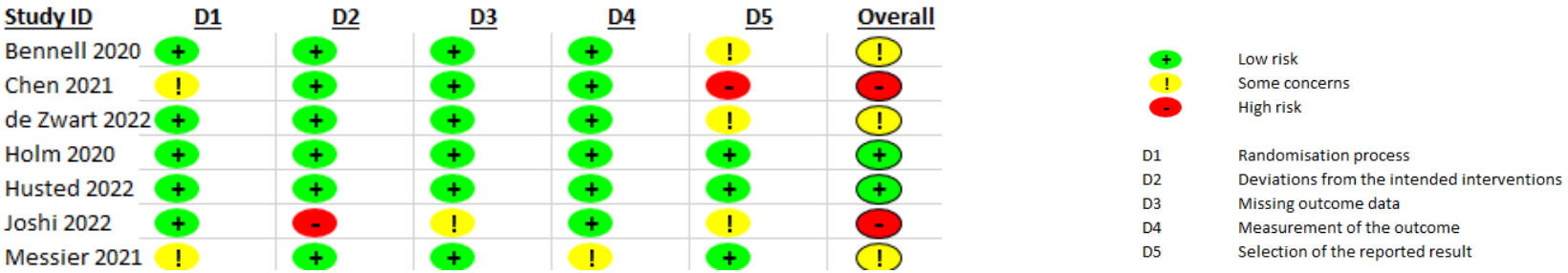
## RCTs

| Reference | Hip Knee | Intervention | Control | Follow-up | Outcomes pain | Outcomes function | Other outcomes |
|---|---|---|---|---|---|---|---|
| Bennell 2020 | K (+obesity) | Non-weight bearing (NWB) quadriceps strengthening exercise program (n=66) | Weight bearing (WB) functional exercise program (n=62) | 12 weeks | NRS (0-10) Between group change (BL-12 weeks), mean difference (95 % CI) 0.73 (0.05, 1.50), p= 0.067176 | WOMAC function Between group change (BL-12 weeks), mean difference (95 % CI) 2.80 (1.17, 6.76), p= 0.17176 | Overall average knee pain while walking (NRS), Pain (KOOS), Other symptoms (KOOS), Sport and recreation (KOOS), knee-related quality-of-life (KOOS), AQoL, 30-s chair sit-to-stand test, 40 m fast-paced walk test, 6-step stair-climb and descent test (secs), Timed single leg stance, Four-square step test (secs), Quadriceps strength, Hip abductor strength176 |
| Chen 2021 | K | Tai Chi (n= 36) | Patient education (n=32) | 12 weeks | NA | 30-s chair stand (no. of times), Mean difference (95% CI) 4.66 (2.97, 6.36 ), p= < 0.05 | 30-s arm curl test (no. of times), 2-min step test (no. of times) Chair sit-and-reach test (cm), Back-scratch flexibility test (cm), Single-leg stand with eyes opened, Single-leg stand with eyes closed (s), Functional-reach test (cm), 8-foot up-and-go test (s, 10-m walk test (s) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| de Zwart 2022 | K | Resistance exercise, high-intensity (70–80% of 1-repetition maximum) (n=89) | Resistance exercise, low intensity (40–50% of 1-RM) (n=88) | 12 and 36 weeks | NRS (0-10) Between group Differences (over time), B (95% CI): -0.0 ( -0.5, 0.4) p =0.878 | WOMAC function(0-68) Between group Differences (over time), B (95% CI): -0.2 (-2.0, 1.6) p= 0.816 | Muscle Strength, Ext. Strength, Flex. Strength, ICOAP, 6-MWT, Stair climbing, Proprioceptive accuracy, Activity, HADS, Knee instability, Knee confidence, Falls, CRP, ESR |
| Holm 2020 | K | Education + neuromuscular exercise + strength training (n= 45) | Education + neuromuscular exercise (n= 45) | 12 weeks | KOOS pain (0-100) 12 weeks: Control:61.2 (57.2-65.2) Intervention: 58.5 (54.2-62.8)<br><br>Adjusted between-group difference (95% CI) -2.65 (-3.24 to 8.54)177 | KOOS ADL (0-100) 12 weeks: Control 68.1 (64-72.2) Intervention: 67 (63.2-70.8)<br><br>Adjusted between-group difference (95% CI) -1.15 (-6.78 to 4.48) | KOOSsport/recy, KOOSQOL, KOOSsymptoms, Leg extension power, Time (s) on the 40-m walk test, Time (s) on the stair climb test, EQ-5D-5Lx, EQ-5D-5Lvisual analog scale, Reduction in the use of pain medication |
| Husted 2022 | K | Knee extensor strength training at three different doses (12 week intervention). 1 exercise w/elastic band, 12 RM<br><br>The two sessions/week group (n=39)<br><br>The four sessions/ week group (n=39) | NA | 12 weeks | KOOS pain (0-100), Mean change (95% CI) from baseline between groups):<br><br>Two sessions/week vs Four sessions/week: 6.1 (1.6 to 13.8), p= 0.119<br><br>Four sessions/week vs Six sessions/week 1.9 | KOOS Symp (0-100), Mean change (95% CI) from baseline between groups:<br><br>Two sessions/week vs Four sessions/week: 6.9 (1.2 to 15.0), p= 0.093177<br><br>Four sessions/week vs Six sessions/week 2.6 | KOOS ADL, KOOS Sport, KOOS QoL, OKS, Current knee pain (NRS), Avg. knee pain last week (NRS), 6MWT, SCT up, SCT down, Need for surgery |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | The six sessions/week group (n=39) | | | (9.8 to 5.8178), p= 0.615178 | (10.6 to 5.7), p= 0.552178 | |
| Joshi 2022 | K | Neuromuscular training (n=28) | Strength training (n=26) | 6 weeks | NPRS (cm 0-10) Between- group difference mean, (95% CI) 2.25±1.51 (1.8- 2.6), p= 0.005 | Chair Stand test (Repetitions) Between-group difference mean, (95% CI) 9.96±2.2 (10.5,9.4) p=0.004 | Balance (cm), WOMAC (Total Score), PSFS (cm), Stair climb test (seconds), Chair Stand test (Repetitions), TUG (seconds) |
| Messier 2021 | K | High-intensity strength training (n = 127)<br><br>Low-intensity strength training (n = 126) | Attention control (n = 124) | 18 months | WOMAC pain (0-20) Mean difference (95% CI): High intensity vs control: 0.3 (−0.6 to 1.2) p=0.56 High intensity vs low intensity 0.8 (−0.1 to 1.7) P=0.07 Low intensity vs control −0.6 (−1.5 to 0.3) P=0.22 | WOMAC function 0-68. Mean difference (95% CI): High intensity vs control 1.4 (−1.3 to 4.1) p= 0.32 High intensity vs low intensity 2.9 (0.2 to 5.6) p= 0.03 Low intensity vs control −1.5 (−4.3 to 1.2) p=0.27 | Knee joint compressive force during walk, 6-Minute walk distance, m, Knee extensor strength, Nm, Hip abductor strength, Nm, Thigh muscle volume, cm3, Thigh fat volume, cm3, Log IL-6c |

**Appraisal of the methodological quality – Rob 2**



## PICO 8: WEIGHT LOSS

### Overview of relevant studies

| No. | Page | SR / RCT | Hip / knee | Publication | Topic | Comment |
|---|---|---|---|---|---|---|
| **1** | **8-10** | **SR** | **H / K** | **Robson et al. 2020** Effectiveness of Weight-Loss Interventions for Reducing Pain and Disability in People With Common Musculoskeletal Disorders: A Systematic Review With Meta-Analysis | **Weight loss interventions** | • Data extracted |
| **2** | **11-13** | **SR** | **K** | **Panunzi et al. 2021** Comparative efficacy of different weight loss treatments on knee osteoarthritis: A network meta-analysis | **Weight loss interventions** | • Data extracted |
| **3** | **14-16** | **SR** | **K** | **Mazzei et al. 2021** Are education, exercise and diet interventions a cost-effective treatment to manage hip and knee osteoarthritis? A systematic review | **Weight loss interventions Cost-effect** | • Data extracted |
| **4** | | **SR** | **K** | **Hall et al. 2019** Diet-induced weight loss alone or combined with exercise in overweight or obese people with knee osteoarthritis: A systematic review and meta-analysis | **Diet and diet + exercise interventions** | • Data not extracted.<br>• Few studies in meta-analysis<br>• Overlapping results as in Robson 2020, small effect of diet and diet + exercise over control |
| **5** | | **SR** | **K** | **Rafiq et al. 2020** Non-pharmacological interventions for treating symptoms of knee osteoarthritis in overweight or obese patients; a review | **Diet and diet + exercise interventions** | • Data not extracted.<br>• Narrative synthesis |

# SUMMARY OF FINDINGS

- **Effect estimates higligted in green: statistically significant in favour of intervention group**
- **Effet estimates highligtes in red: statistically significant in favour of control / comparison group**

## HIP / KNEE MIXED

**All types of weight loss interventions (1SR)**

All weight loss interventions vs. minimal care (based on 10 studies) (Robson 2020, SR)
*Pain, SMD (95% CI)*
- -0.54 (-0.86, -0.22)

*Disability, SMD (95% CI)*
- -0.32 (-0.49, -0.14)

Excluding high ROB studies vs. minimal care (based on 5 / 7 studies) (Robson 2020, SR)
*Pain, SMD (95% CI)*
- –0.32 (–0.68, 0.04)

*Disability, SMD (95% CI)*
- –0.43 (–0.73, –0.13)

Weight loss only (diet) vs. minimal care (Robson 2020, SR)
*Pain, SMD (95% CI)*
- -0.36 (-0-71, -0.01)

*Disability, SMD (95% CI)*
- –0.40 (–0.69, –0.12)

Multifocused (comb. diets, telephone coaching, psychological pain-coping interventions/CBT, specialist referral education, exercise) vs. minimal care (Robson 2020, SR)
*Pain, SMD (95% CI)*
- -0.81 (-1.41, -0.21)

*Disability, SMD (95% CI)*
- –0.24 (–0.42, –0.05)

<12 mo in duration vs. minimal care (Robson 2020, SR)
*Pain, SMD (95% CI)*

- –0.85 (–1.39, –0.30)

*Disability, SMD (95% CI)*

- –0.46 (–0.74, –0.18)

≥12 mo in duration vs. minimal care (Robson 2020, SR)

*Pain, SMD (95% CI)*

- –0.13 (–0.28, 0.02)

*Disability, SMD (95% CI)*

- –0.18 (–0.33, –0.03)

## Knee

### Diet

Weight-loss focused interventions (diets) vs. Exercise (Based on 4 /5 studies) (Robson 2020, SR)

*Pain, SMD (95% CI)*

- –0.13 (–0.40, 0.14)

*Disability, SMD (95% CI)*

- –0.20 (–0.41, 0.00)

### Diet + Exercise

Dietary Weight Loss and Exercise vs. Dietary Weight Loss Only (Based on 3 /4 studies) (Robson 2020, SR)

*Pain, SMD (95% CI)*

- –0.48 (–0.94, –0.03)

*Disability, SMD (95% CI)*

- –0.38 (–0.76, 0.00)

Dietary Weight Loss and Exercise vs. Exercise Only (Based on 4 /5 studies) (Robson 2020, SR)

*Pain, SMD (95% CI)*

- –0.29 (–0.55, –0.03)

*Disability, SMD (95% CI*

- –0.38 (–0.55, –0.20)

**Cost-effectiveness (Mazzei 2021, SR)**

*Exercise and diet interventions*:

- an intensive 18-month diet and exercise intervention with the goal of 5% weight loss would likely be an efficient use of health care resources compared to a healthy lifestyle control.
- an intensive 18- month Intensive Diet and Exercise intervention with goal of 10% weight loss was cost-effective at US$50,000/QALY WTP Threshold compared to physician-delivered usual care over a lifetime horizon.

*Diet intervention telephone-based*:

- Telephone-delivered weight loss consultations to individually tailor national dietary and physical activity guidelines did not produce a clinical benefit and cost more compared to physician-delivered usual care for participants with knee OA waiting for a surgical consultation in AU.

## Analysis

**Hip /knee OA**

Different types of weight loss interventions were compared in 1 SR by Robson and colleagues. Favorable results on pain and function were found for all types of interventions combined compared to minimal care. When excluding high risk of bias studies from the analysis favorable results were still found for disability, but not for pain. Favorable results were also found for weight loss only (diets) and multifocused interventions compared to minimal care for both pain and disability. Programs lasting <12 months were superior to programs lasting ≥12 months compared to minimal care. Overall, effect estimates were moderate, with large confidence intervals ranging from no effects to large effects,

**Knee OA**

When comparing Weight-loss focused interventions (diets) to exercise, no between group differences were detected for pain or disability. When comparing Dietary Weight Loss and Exercise to Dietary Weight Loss Only or exercise only, small effects were found for the combined intervention.

In a network meta-analysis Bariatric surgery was found to be the most effective pain reducing intervention followed by low calorie diet + exercise; intensive weight-loss programme+ exercise; intensive weight loss programme alone; very low calorie diet alone; and low calorie diet alone

On cost-effectiveness, 1 SR reported that exercise and diet programs were likely cost-effective, but a telephone delivered weight loss and physical activity consultation was not.

**Conclusion**:

New evidence is added on the effect of multifocused or combined interventions and cost-effectiveness of these types of interventions

| **1: Robson et al. 2020** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Robson, E. K.; Hodder, R. K.; Kamper, S. J.; O'Brien, K. M.; Williams, A.; Lee, H.; Wolfenden, L.; Yoong, S.; Wiggers, J.; Barnett, C.; Williams, C. M. |
| **Year of publication** | 2020 |
| **Title** | Effectiveness of Weight-Loss Interventions for Reducing Pain and Disability in People With Common Musculoskeletal Disorders: A Systematic Review With Meta-Analysis |
| **Inclusion period** | Inception to February 2019 |
| **Inclusion criteria** | • Randomized controlled trials (RCTs) and cluster randomized controlled trials (C-RCTs) with parallel groups.<br>• Participants with a primary complaint of hip or knee OA or spinal pain (low back or neck pain).<br>• Diagnosis of hip or knee OA could be radiographic or clinical.<br>• We only included trials of mixed conditions when data were reported separately for OA and spinal pain.<br>• **We included trials that assessed the effect of any intervention with a stated intention of reducing weight, regardless of the content, delivery methods, providers, intensity, or duration. This could include pharmacological, surgical, behavioral (diet and/ or physical activity), or cognitive and psychological strategies**.<br>• A comparison group could be any inactive or active control, including no care, wait list, minimal intervention, usual care, placebo or sham intervention, or an alternative intervention (eg, therapeutic exercise intervention).<br>• We included a trial of OA (knee or hip) or spinal pain if it reported the effects of the intervention on pain intensity and disability outcomes, our primary outcomes of interest. |
| **Outcomes** | Pain, disability, weight, physical performance measures, mental health, and quality of life. |

| | |
|---|---|
| **Comparisons** | • All weight loss interventions vs. minimal care for OA<br>• Weight loss focused interventions vs. versus exercise for knee OA<br>• Dietary weight loss and exercise vs. dietary weight loss only for knee OA<br>• Dietary weight loss and exercise vs. exercise only for knee OA |
| **Results** | |
| **Number of RCTs** | 16 RCTs in meta-analysis, of which 13 hip/knee OA. Separate analysis for OA and spinal pain |
| **Range no. of participants** | 24-537 |
| **Ranges of duration of follow-up** | 6 weeks to 3 years |
| **Results per outcome measure** | **PAIN**<br>**All weight loss interventions vs. minimal care for OA (based on 10 studies), SMD (95% CI)**<br>• -0.54 (-0.86, -0.22)<br>Weight loss only (diet)<br>• -0.36 (-0-71, -0.01)<br>Multifocused (comb. diets, telephone coaching, psychological pain-coping interventions/CBT, specialist referral education, exercise)<br>• -0.81 (-1.41, -0.21)<br>Excluding high ROB studies (based on 5 studies)<br>• –0.32 (–0.68, 0.04)<br><12 mo in duration<br>• –0.85 (–1.39, –0.30)<br>≥12 mo in duration<br>• –0.13 (–0.28, 0.02)<br><br>**Weight-loss focused interventions vs. exercise for knee OA (based on 4 studies), SMD (95% CI)**<br>• –0.13 (–0.40, 0.14)<br><br>**Dietary Weight Loss and Exercise vs. Dietary Weight Loss Only for Knee OA (based on 3 studies), SMD (95% CI)**<br>• –0.48 (–0.94, –0.03)<br><br>**Dietary Weight Loss and Exercise Versus Exercise Only for Knee OA (based on 4 studies), SMD (95% CI)**<br>• –0.29 (–0.55, –0.03) |

| | |
|---|---|
| | **DISABILITY**<br>**All weight loss interventions vs. minimal care for OA (based on 11 studies), SMD (95% CI)**<br>• -0.32 (-0.49, -0.14)<br>Weight loss only (diet)<br>• –0.40 (–0.69, –0.12)<br>Multifocused (comb. diets, telephone coaching, psychological pain-coping interventions/CBT, specialist referral, education, exercise)<br>• –0.24 (–0.42, –0.05)<br>Excluding high ROB (based on 7 studies)<br>• –0.43 (–0.73 –0.13)<br><12 mo in duration<br>• –0.46 (–0.74, –0.18)<br>≥12 mo in duration<br>• –0.18 (–0.33, –0.03)<br><br>**Weight-loss focused interventions vs. exercise for knee OA (based on 5 studies), SMD (95% CI)**<br>• –0.20 (–0.41, 0.00)<br><br>**Dietary Weight Loss and Exercise vs. Dietary Weight Loss Only for Knee OA (based on 4 studies), SMD (95% CI)**<br>• –0.38 (–0.76, 0.00)<br><br>**Dietary Weight Loss and Exercise vs. Exercise Only for Knee OA (based on 5 studies), SMD (95% CI)**<br>• –0.38 (–0.55, –0.20) |
| **Adverse events** | Adverse events was not reported |

**Risk of bias**

| Yazigi | Wolf et al | Williams et al | Toda et al | Stebkowa and Alekseva | Somers et al | Sarabaoon et al | Rieck e et al | Rawaud et al | O'brien et al. | Muehlbacker et al | Miller et al | Messier et al | Messier et al | Messier et al | Lim et al | Iraniroust et al | Ghroubi et al | Christensen et al | Christensen et al | Allen et al | Allen et al | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ? | ? | + | - | | + | ? | + | - | + | + | ? | ? | + | ? | ? | ? | ? | + | ? | + | + | 1 |
| ? | ? | + | ? | ? | + | + | + | - | + | ? | ? | ? | ? | ? | - | ? | ? | + | + | ? | ? | 2 |
| - | ? | ? | - | - | - | - | + | - | + | + | - | - | - | - | - | ? | ? | - | - | - | - | 3 |
| - | ? | - | ? | - | - | - | - | - | - | - | - | - | - | - | - | - | ? | - | - | - | - | 4 |
| + | - | + | + | ? | - | + | + | - | + | + | + | + | - | + | + | ? | - | - | - | + | + | 5 |
| + | + | + | ? | + | + | ? | + | + | + | ? | ? | + | + | ? | ? | - | + | + | ? | + | + | 6 |
| + | + | + | + | + | + | - | + | - | ? | + | + | + | + | + | + | ? | + | ? | + | + | + | 7 |

The authors judged 7 trials as having a high overall risk of bias. Due to the nature of interventions and outcomes (self-report), almost all trials were at high risk of bias for blinding. Two trials had a high risk of bias for not randomizing group selection or selection bias, 2 for allocation concealment, and 7 for incomplete outcome data (attrition bias). Two trials were at high risk of recruitment bias or bias due to having no adjustment for clustering.

**AMSTAR 2**

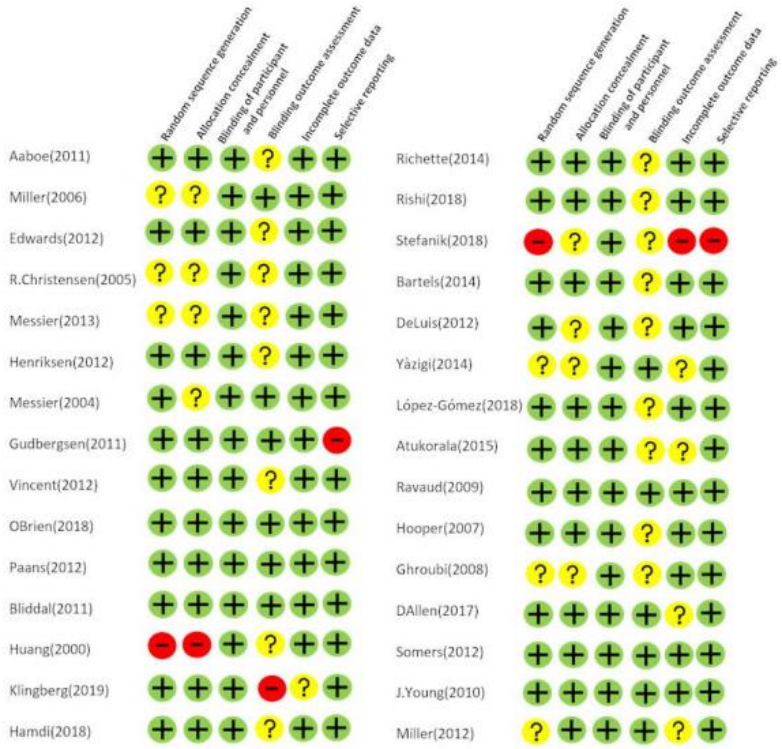
| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Robson 2020 | Y | Y | Y | P | Y | Y | N | P | Y | N | Y | Y | Y | Y | Y | Y | Low |

*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

| **2: Panunzi et al 2021** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Panunzi, S., Maltese, S., De Gaetano, A., Capristo, E., Bornstein, S., Mingrone, G. |
| **Year of publication** | 2021 |
| **Title** | Comparative efficacy of different weight loss treatments on knee osteoarthritis: A network meta-analysis |
| **Inclusion period** | Inception to November 2020 |
| **Inclusion criteria** | • Randomized controlled trials (RCTs) or prospective studies<br>• Adults (age ≥ 18 years) with knee OA based on radiographic evidence.<br>• Available data on weight or BMI at the baseline and at the end of follow-up or their variations preintervention–postintervention. |
| **Outcomes** | Pain and function |
| **Comparisons** | NA |
| **Results** | |
| **Number of RCTs** | 30 |
| **Range no. of participants** | 30-1383 |
| **Ranges of duration of follow-up** | NA |
| **Results per outcome measure** | A+B: Effect sizes refers to percentage improvement in pain from pre- to post intervention |

**Risk of Bias**

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**AMSTAR 2**

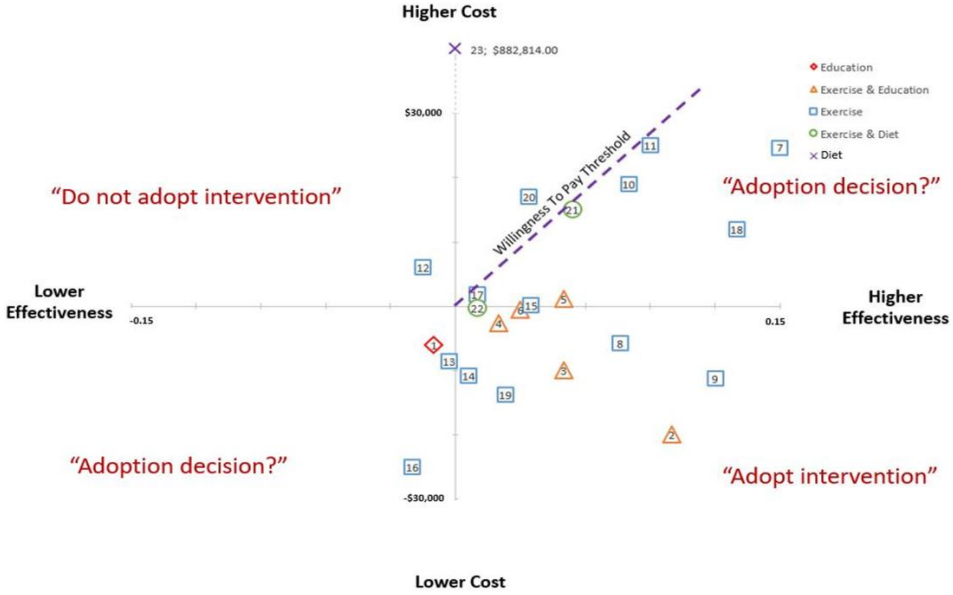
| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Panunzi 2020 | Y | N | N | P | Y | N | N | N | Y/N | N | N | N | N | N | Y | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes

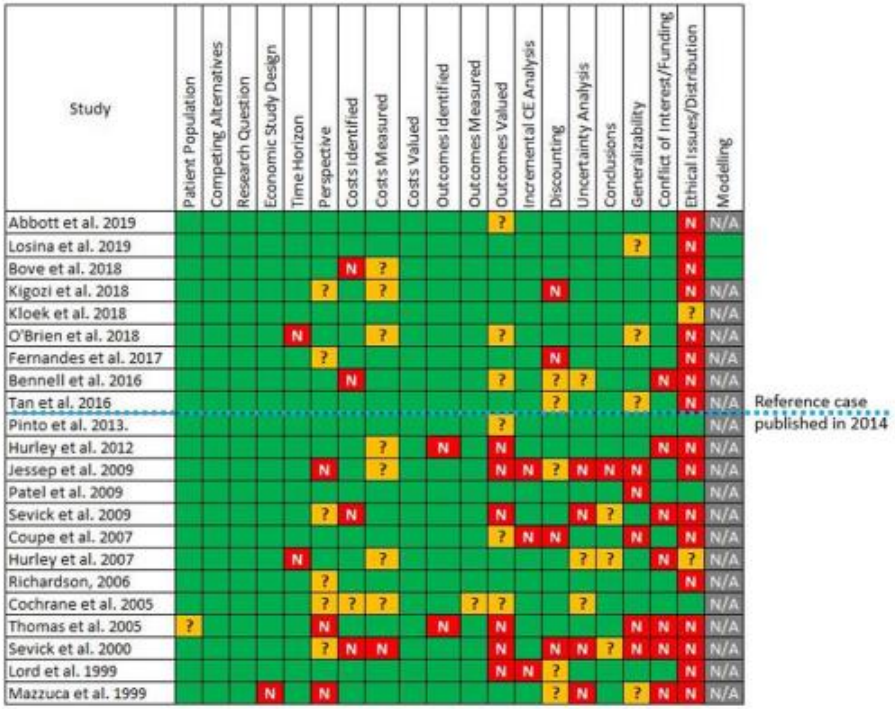
See attached AMSTAR 2 checklist for details on the content of the specific items

Item 9: Y/N = "yes" for RCTs and "no" for NRSI

| **11: Mazzei et al 2020** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Mazzei, D. R.; Ademola, A.; Abbott, J. H.; Sajobi, T.; Hildebrand, K.; Marshall, D. A. |
| **Year of publication** | 2020 |
| **Title** | Are education, exercise and diet interventions a cost-effective treatment to manage hip and knee osteoarthritis? A systematic review |
| **Inclusion period** | Inception to November 2019 |
| **Inclusion criteria** | • Full economic evaluations conducted alongside randomized or nonrandomized clinical trials<br>• People with hip and/or knee OA<br>• Receiving education, exercise and dietary weight management interventions compared to any control.<br>• Education was defined as any formal instruction about OA and self-management techniques.<br>• Exercise was defined as any prescribed activity requiring muscular contraction.<br>• Dietary weight management was defined as any type of intervention with the goal of caloric restriction.<br>• Full trial-based economic evaluations compare two or more comparators using a cost-utility analysis (CUA), cost-effectiveness analysis (CEA), cost-benefit analysis (CBA) or cost-minimization analysis (CMA).<br>• Publications were excluded if they did not have a comparator or evaluated surgical, pharmaceutical or nutraceutical interventions. |
| **Comparisons** | Education, exercise and dietary weight management interventions compared to any control |
| **Outcomes** | Economic evaluations: cost-minimization (n=2), cost-effectiveness (n=5) and cost-utility (n=16) analyses |
| **Results** | |
| **Number of RCTs** | 22 RCTs (RCTs, cluster RCTs, pragmatic RCTs) 1 non-random clinical study |
| **Range no. of participants** | 64-810 |
| **Ranges of duration of follow-up** | 6 months-5 years |
| **Results per outcome measure** | *Exercise and diet interventions*:<br>Two studies in the US evaluated the combination of exercise and diet compared to physician-delivered usual care or a healthy lifestyle education program. Sevick et al. used a CEA to show an intensive 18-month diet and exercise intervention with the goal of 5% weight loss would likely be an efficient use of health care resources compared to a healthy lifestyle control. Losina et al. used a validated OA model to perform a CUA showing an intensive 18- month Intensive Diet and Exercise for Arthritis (IDEA) intervention was cost-effective at US$50,000/QALY WTP Threshold compared to physician-delivered usual care over a lifetime horizon. The IDEA |

| | |
|---|---|
| | trial aimed for 10% weight loss using a structured intensive daily caloric restriction program with a 18 month facility or home-based exercise intervention completed three times per week.<br><br>*Diet interventions O'Brien et al*.: showed telephone-delivered weight loss consultations to individually tailor national dietary and physical activity guidelines did not produce a clinical benefit and cost more<br>compared to physician-delivered usual care for participants with knee OA waiting for a surgical consultation in AU.<br>  <br><br>*Reprinted with permission from Elsevier* |

Risk of bias




Health Economic Criteria (CHEC) list. The CHEC list is a validated risk of bias tool with 19 yes-or-no questions. The CHEC list was designed and is recommended for systematic reviews of trial-based economic evaluations.

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AMSTAR 2

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mazzei 2020 | Y | P | N | P | Y | Y | N | P | N | N | N/M | N/M | N | N | N/M | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes, N/M= No Meta-analysis
See attached AMSTAR 2 checklist for details on the content of the specific items

## PICO 9: FOOTWEAR

**Overview of relevant studies:**

| No. | Page | SR / RCT | Hip / knee | Publication | Topic | Comment |
|---|---|---|---|---|---|---|
| **1** | **6-8** | **SR** | **K** | **Khosravi et al. 2021**<br>Effect of knee braces and insoles on clinical outcomes of individuals with medial knee osteoarthritis: A systematic review and meta-analysis | Knee braces and insoles | • Data extracted |
| **2** | **9-11** | **SR** | **K** | **Yu et al. 2021**<br>Effects of orthopaedic insoles on patients with knee osteoarthritis: a meta-analysis and systematic review | Orthopaedic insoles | • Data extracted |
| **3** | **12-14** | **SR** | **K** | **Zhang et al. 2018 (a)**<br>Is the Wedged Insole an Effective Treatment Option When Compared with a Flat (Placebo) Insole: A Systematic Review and Meta-Analysis | Wedged insoles | • Data extracted |
| **4** | **15-17** | **SR** | **K** | **Zhang et al. 2018 (b)**<br>Ineffectiveness of lateral-wedge insoles on the improvement of pain and function for medial knee osteoarthritis: a meta-analysis of controlled randomized trials | Lateral-wedge insoles | • Data extracted |
| **5** | **18** | **RCT** | **K** | **Reichenbach et al. 2020**<br>Effect of Biomechanical Footwear on Knee Pain in People With Knee Osteoarthritis The BIOTOK Randomized Clinical Trial | Biomechanical Footwear | • Data extracted |
| **6** | **18** | **RCT** | **K** | **Felson et al. 2019**<br>The Efficacy of a Lateral Wedge Insole for Painful Medial Knee Osteoarthritis After Prescreening: A Randomized Clinical Trial | Lateral Wedge Insoles | • Data extracted |

| | | | | | | |
|---|---|---|---|---|---|---|
| **7** | **18-19** | **RCT** | **K** | **Paterson et al. 2021**<br>The Effect of Flat Flexible Versus Stable Supportive Shoes on Knee Osteoarthritis Symptoms A Randomized Trial | Flat Flexible and Stable Supportive Shoes | • Data extracted |

# SUMMARY OF FINDINGS

- **Effect estimates higligted in green: statistically significant in favour of intervention group**
- **Effet estimates highligtes in red: statistically significant in favour of control / comparison group**

## Knee OA

### Insoles (4 SRs, 1 RCT)

Brace vs. Lateral wedge insole (Khosravi, 2021, SR)
*Pain, SMD (95% CI)*:

- -0.12 (-0.34, 0.10)

Wedged insoles vs. flat insoles, SMD (95% CI) (Zhang 2018 a, SR)
*Pain, SMD (95% CI):*

- 0.03 (-0.14, 0.21)

*Function, SMD (95% CI):*

- 0.13 (-0.04, 0.31)

Lateral wedge insoles vs. Control (neutral insole or nothing) (SMD (95% CI)) (Zhang 2018 b, SR)
*Pain, SMD (95% CI)*:

- -0.21 (-0.50, 0.08)

*Function, SMD (95% CI):*

- 0.22 (-0.27, 0.70)

Lateral wedged insoles (with or without subtalar strapping) vs. control (neutral, or other sole types) (Yu 2021, SR)

*Pain, SMD (95% CI)*

- -0.21 (-2.61, 0.18)

*Function, SMD (95% CI)*

- 0.34 (-2.66, 3.34)

Lateral wedge insole (after prescreening) vs. neutral insole (Felson 2019, RCT)

Pain

- NRS 0-10, between group difference (95% CI): 0.70 (0.12, 1.27), p=0.02
- KOOS pain (0-100), between group difference (95% CI): −1.84 (−6.31, 2.62)

Function

- KOOS symptoms (0-100), between group difference (95% CI): −1.23 (−5.11, 2.65)

Quality of Life

- KOOS QoL (0-100), between group difference (95% CI): −0.09 (−4.64, 4.47)

**Footwear (2 RCTs)**

Biomechanical footwear (convex sole pods) vs. Control footwear (non-convex sole pods) (Reichenbach 2020, RCT)

Pain

- WOMAC pain (0-10), mean difference (95% CI): −1.3 (−1.8 to −0.9), p= <.001

Function

- WOMAC function (0-10), mean difference (95% CI): −1.1 (−1.5 to −0.7), p= <.001

Flat flexible shoes vs. stable supportive shoes (Paterson 2021, RCT)

Pain

- NRS (0-10), Mean difference (95% CI): 1.1 (0.5 to 1.8)

Function

- WOMAC (0-68), Mean difference (95% CI): 2.3 (-0.9 to 5.5)

## Analysis

**Knee OA**

*Insoles*

The 4 systematic reviews investigating effects of lateral wedge insoles compared with other types of insoles including flat / neutral soles or knee braces could not find any between group differences for any of the comparisons on pain or function. 1 RCT found positive effects on NRS pain, but not on KOOS pain, function or QoL subscales for lateral wedge insoles compared to neutral insoles in subjects pre-screened to knee adduction moment improvements using lateral wedge insoles.

*Biomechanical footwear*

1 RCT found positive effects of biomechanical footwear with individually adjustable external convex pods attached to the outsole compared to control footwear.

*Flat flexible and stable supportive shoes*

1 RCT found positive effects after 6 months on pain, but not on function from wearing stable supportive shoes over flat flexible shoes for at least 6 hours per day

**Conclusion:**

There is added evidence regarding the effects of insoles and footwear for knee OA

| **1: Khosravi et al. 2021** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Khosravi, M.; Babaee, T.; Daryabor, A.; Jalali, M. |
| **Year of publication** | 2021 |
| **Title** | Effect of knee braces and insoles on clinical outcomes of individuals with medial knee osteoarthritis: A systematic review and meta-analysis |
| **Inclusion period** | Inception to February 2020 |
| **Inclusion criteria** | • Randomized control trials (cross-over or parallel groups) and quasi-experimental studies.<br>• Participants with medial knee osteoarthritis according to the clinical and radiological criteria<br>• Investigating knee braces (three-point pressure, pneumatic, and valgus brace designs) and lateral wedge insoles (with and without arch support, heel or full length wedged)<br>• Investigating the effectiveness of knee brace and lateral wedge insoles separately or combined together<br>• Pain, function, quality of life, stiffness, activities of daily living, satisfaction and muscle strength as outcome measures. |
| **Outcomes** | Pain |
| **Comparisons** | Brace vs. laterale wedge insole |
| **Results** | |
| **Number of RCTs** | A total of 32 studies in quantitative synthesis.<br>4 RCTs and 1 randomized controlled cross-over trial in meta-analysis: data extracted only from the meta-analysis |
| **Range no. of participants** | 24-120 (the studies included in meta-analysis) |
| **Ranges of duration of follow-up** | 4-36 weeks (the studies included in meta-analysis) |

**Results per outcome measure**

**PAIN**

Brace vs. lateral wedge insole (SMD (95% CI)):

- -0.12 (-0.34, 0.10)

**Risk of bias**

Modified downs and black quality index results, and inter-rater reliability for each item and score

| Question number | Q1 | Q2 | Q3 | Q4 | Q6 | Q7 | Q9 | Q10 | Q11 | Q14 | Q18 | Q20 | Q23 | Q26 | Q27 | AD | MKH | Final |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Comparison of brace & insole studies* | | | | | | | | | | | | | | | | | | |
| Author | | | | | | | | | | | | | | | | | | |
| Arazpour & Bani | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 8 | 9 | 8 |
| Jones | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 13 | 13 | 13 |
| Arazpour & Zarezadeh | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 8 | 10 | 8 |
| Sattari | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 10 | 10 | 10 |
| Niazi | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 11 | 11 | 11 |
| Van Raaij | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 9 | 9 | 9 |

**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Khosravi 2021 | Y | N | N | N | Y | Y | N | P | N | N | N | N | N | N | N | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

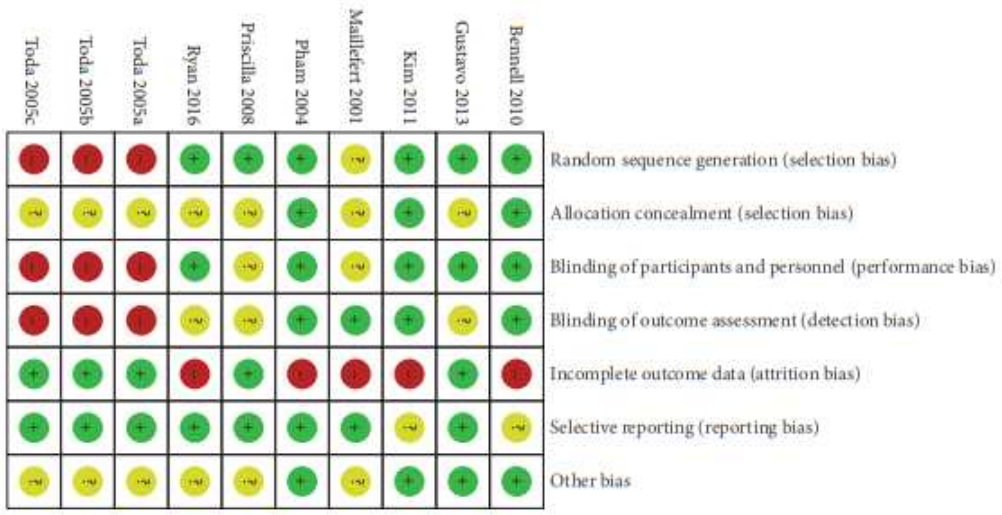
| **2: Zhang et al. 2018 (a)** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Zhang B., Yu, X., Liang L., Zhu, L., Dong X., Xiong Y., Pan Q., Sun Y. |
| **Year of publication** | 2018 |
| **Title** | Is the Wedged Insole an Effective Treatment Option When Compared with a Flat (Placebo) Insole: A Systematic Review and Meta-Analysis |
| **Inclusion period** | Inception to April 2018 |
| **Inclusion criteria** | • Randomized controlled trial<br>• KOA<br>• wedge insole (control group includes fat insole, neutral insole);<br>• (4) outcomes should include one of WOMAC, pain, femorotibial angle (FTA), and Lequesne index.<br>• When multiple time points were reported either in one particular report of a study or over the course of several articles from the same study, the longest follow-up period on treatment was considered in our article.<br>• If overlapping subject populations were enrolled in different reports, the one of higher quality or with a larger sample size was selected for inclusion<br>• |
| **Outcomes** | Pain and function |
| **Comparisons** | Wedged insoles vs. flat insoles |
| **Results** | |
| **Number of RCTs** | 8 / 3 included in meta-analysis |
| **Range no. of participants** | 156-200 (in meta-analysis) |
| **Ranges of duration of follow-up** | 2 weeks- 12 months |
| **Results per outcome measure** | **Pain**<br>Wedged insoles vs. flat insoles, SMD (95% CI)<br>• 0.03 (-0.14, 0.21) |

**Function**

Wedged insoles vs. flat insoles, SMD (95% CI)

- 0.13 (-0.04, 0.31)

**Risk of bias**

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**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Zhang 2018 | Y | N | Y | P | Y | Y | N | P | Y | N | Y | Y | Y | Y | N | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes

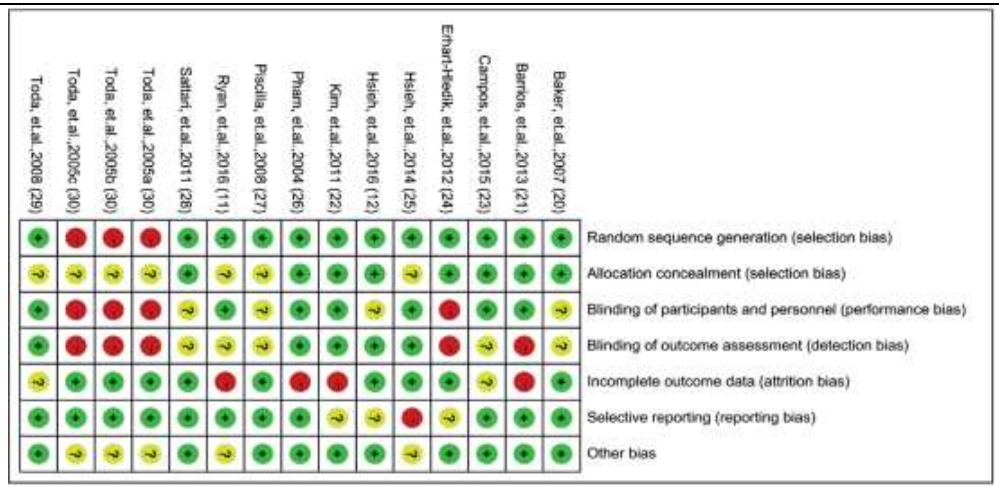
See attached AMSTAR 2 checklist for details on the content of the specific items

| **3: Zhang et al. 2018 (b)** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Zhang, J.; Wang, Q.; Zhang, C. |
| **Year of publication** | 2018 |
| **Title** | Ineffectiveness of lateral-wedge insoles on the improvement of pain and function for medial knee osteoarthritis: a meta-analysis of controlled randomized trials |
| **Inclusion period** | Inception to October 2017 |
| **Inclusion criteria** | • Randomized controlled trials<br>• A lateral-wedge treatment group<br>• Control group (placebo or no treatment)<br>• Participants diagnosed with medial compartment knee osteoarthritis based on X-ray examination. |
| **Outcomes** | Pain, function |
| **Comparisons** | Lateral wedge insole vs. control (neutral insole or nothing) |
| **Results** | |
| **Number of RCTs** | 10 |
| **Range no. of participants** | 40-179 |
| **Ranges of duration of follow-up** | 6 weeks- 24 months |
| **Results per outcome measure** | **PAIN**<br>Lateral wedge insoles vs. control (SMD (95% CI)):<br>• -0.21 (-0.50, 0.08)*[a]<br><br>**FUNCTION**<br>Lateral wedge insoles vs. control (SMD (95% CI)):<br>• 0.22 (-0.27, 0.70)*[b] |

<table>
<tr><td></td><td>*Negative values favours intervention group, [a]Based on 10 studies, [b]Based on 7 studies.</td></tr>
<tr><td>Risk of bias</td><td>Not reported</td></tr>
<tr><td>AMSTAR 2</td><td>
<table>
<tr><th>Study</th><th>1</th><th>2*</th><th>3</th><th>4*</th><th>5</th><th>6</th><th>7*</th><th>8</th><th>9*</th><th>10</th><th>11*</th><th>12</th><th>13*</th><th>14</th><th>15</th><th>16</th><th>Overall quality</th></tr>
<tr><td>Zhang 2018</td><td>Y</td><td>N</td><td>Y</td><td>N</td><td>Y</td><td>N</td><td>N</td><td>P</td><td>N</td><td>N</td><td>Y</td><td>N</td><td>N</td><td>Y</td><td>Y</td><td>Y</td><td>Critically low</td></tr>
</table>
*Critical items, Y=yes, N=No, P=partial yes<br>
See attached AMSTAR 2 checklist for details on the content of the specific items
</td></tr>
</table>

| **4: Yu et al. 2021** | |
|---|---|
| **Study characteristics** | |
| **Study authors** | Yu, l., Wang, Y., Yang, J., Wang, J., Zhang, Y. |
| **Year of publication** | 2021 |
| **Title** | Effects of orthopaedic insoles on patients with knee osteoarthritis:<br>A meta-analysis and systematic review |
| **Inclusion period** | Inception to February 2021 |
| **Inclusion criteria** | • RCTs<br>• Assessment of effect of orthopaedic insoles<br>• Patients with knee OA; diagnosed with medial compartment knee OA after X-ray<br>• Necessary data was available or could be calculated from the published articles<br>• Publications in English or Chinese<br>• If authors published multiple papers using overlapping sample data, only the most inclusive publication or the last-published paper was included in the analysis. |
| **Outcomes** | Pain, function |
| **Comparisons** | Lateral wedged insoles (with or without subtalar strapping) vs. control (neutral, or other sole types) |
| **Results** | |
| **Number of RCTs** | 15 RCTs (13 articles) |
| **Range no. of participants** | 30-200 |
| **Ranges of duration of follow-up** | 2 weeks- 2 years |
| **Results per outcome measure** | PAIN<br>Lateral wedge insoles vs. control, SMD (95% CI)<br>• -0.21 (-2.61, 0.18)<br><br>FUNCTION<br>Lateral wedge insoles vs. control, SMD (95% CI)<br>• 0.34 (-2.66, 3.34) |

**Risk of bias**






**AMSTAR 2**

| Study | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yu 2021 | N | N | Y | P | Y | Y | N | P | Y | N | Y | N | N | Y | Y | Y | Critically low |

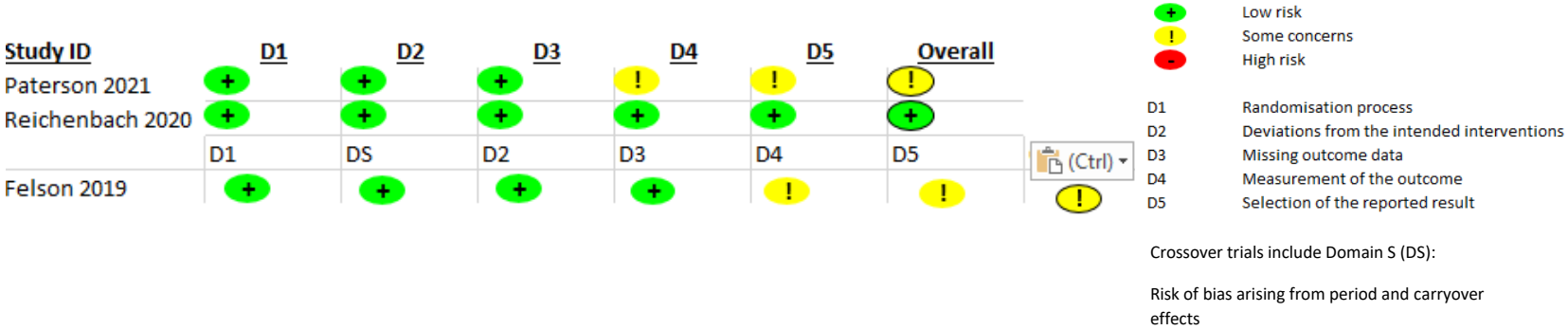
*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

| Reference | Hip Knee | Intervention | Control | Follow-up | Outcomes pain | Outcomes function | Other outcomes |
|---|---|---|---|---|---|---|---|
| Felson et al. 2019 | K | Use of lateral wedge insole after prescreening for knee adduction moment reduction with insoles (n= 31) | Neutral insole (n= 31) | 8 weeks | NRS past week (0-10) Difference between group (95% CI): 0.70 (0.12, 1.27), p=0.02<br><br>KOOS pain (0-100) Difference between group (95% CI): −1.84 (−6.31, 2.62) | KOOS symptoms (0-100) Difference between group (95% CI): −1.23 (−5.11, 2.65) | KOOS QoL (0-100): Difference between group (95% CI): −0.09 (−4.64, 4.47)<br><br>KOOS, Bone marrow lesions |
| Reichenbach et al. 2020 | K | Biomechanical footwear involving shoes with individually adjustable external convex pods attached to the outsole (n = 111) | Control footwear that had visible outsole pods that were not adjustable and did not create a convex walking surface (n = 109) | 24 weeks | WOMAC pain (0-10) Mean difference, −1.3 (−1.8 to −0.9), p= <.001 | WOMAC function (0-10) Mean difference, −1.1 (−1.5 to −0.7), p= <.001 | WOMAC, SF-36<br><br>Adverse events: Twenty-six participants (23.4%) in the biomechanical footwear group and 38 participants (34.9%) in the control footwear group experienced an adverse event and 3 (2.7%) and 9 (8.3%), respectively, experienced serious adverse events. None were considered to be related to treatment |
| Paterson et al. 2021 | K | Flat flexible shoes, worn for at least 6 hours a day (n= 82) | Stable supportive shoes, worn for at least 6 hours a day (n = 82), | 6 months | NRS pain (0-10) Mean Difference in Change Between Groups, Baseline to Month 6 (95% CI): 1.1 (0.5 to 1.8) (In favour of | WOMAC function (0-68) Mean Difference in Change Between Groups, Baseline to Month 6 (95% CI): 2.3 (-0.9 to 5.5) | KOOS subscales pain, sport and recreation, quality of life, and patellofemoral pain and osteoarthritis. Pain at 7 lower-limb sites |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | stable supportive shoes) | | (back, hips, knees, and feet and ankles), assessed by 11-point NRSs, health-related quality of life, physical activity during the previous week, overall global changes in pain and physical function at 6 months |

**Appraisal of the methodological quality – Rob 2**



### PICO 10: ASSISTIVE TECHNOLOGY

**Overview of relevant studies:**

| No. | Page | SR / RCT | Hip / knee | Publication | Topic | Comment |
|---|---|---|---|---|---|---|
| **1** | **4** | **RCT** | **K** | **Jones et al. 2012** Impact of cane use on pain, function, general health and energy expenditure during gait in patients with knee osteoarthritis: a randomised controlled trial | Cane use | • Data extracted |
| **2** | **4** | **RCT** | **K** | **Van Ginckel et al. 2019** Effect of cane use on bone marrow lesion volume in people with medial tibiofemoral knee osteoarthritis: randomized clinical trial | Cane use | • Data extracted |

## SUMMARY OF FINDINGS

- **Effect estimates higligted in green: statistically significant in favour of intervention group**
- **Effet estimates highligtes in red: statistically significant in favour of control / comparison group**

**Knee OA**

Cane use vs. no cane use (Jones 2012, RCT)

*Pain (mean between-group difference)*

- VAS (0-10): −2.11

*Function (mean between-group difference)*

- Lequesne (0-24): -2.53
- SF 36 physical function (0-100): 9.06

Cane use vs. no cane use (Van Ginckel 2019, RCT)

*Pain, between group difference (95 % CI)*

- NRS (0-10): 0.4 (-0.5, 1.3)

*Function, between group difference (95 % CI)*

- WOMAC (0-68): -0.7 (-4.1, 2.7)

## Analysis

**Knee OA**

1 RCT found evidence for the effectiveness of cane use over no use of any auxiliary gait devices in people with knee OA for pain and function measured with Lequesne index, but not with SF-36 physical function. No confidence intervals were reported for the estimated effects. Another RCT did not find any between group differences for pain or function when investigating cane use to no use of cane or other walking aids

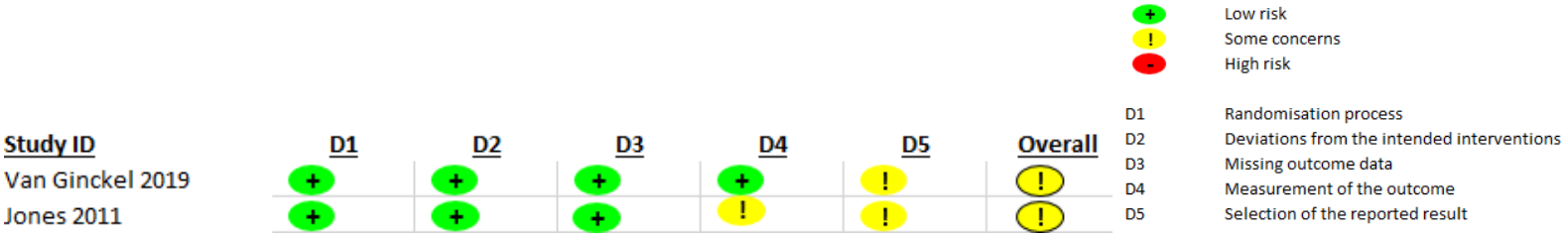
**Conclusion**:

Some evidence is added on the effect of cane use in people with knee OA

| Reference | Hip Knee | Intervention | Control | Follow-up | Outcomes pain | Outcomes function | Other outcomes |
|---|---|---|---|---|---|---|---|
| Jones et al. 2012 | K | Individually height adjusted wooden canes with a T-shaped handle (n= 32) | No use of any auxiliary gait devices (n= 32) | 60 days | VAS (0-10)<br>Mean between-group difference: −2.11, p= <0.001 | Lequesne (0-24)<br>Mean between-group difference: -2.53 (<0.001)<br><br>SF-36 physical functioning (0-100)<br>Mean between-group difference: 9.06, p= 0.078 | WOMAC total, SF-36, 6MWT, cane use, NSAIDs use |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Van Ginckel et al. 2019 | K | Cane group (using a cane whenever walking) (n= 82) | Control group (not using any gait aid) (n= 82) | 3 months | Overall knee pain (NRS 0-10) Difference in change between groups (95% CI): 0.4 (-0.5, 1.3) | WOMAC function (0-68) Difference in change between groups (95% CI): -0.7 (-4.1, 2.7) | Medial tibiofemoral bone marrow lesion volume, Knee pain (WOMAC), Average knee pain with walking (NRS), Average knee pain with walking in non-study knee (NRS), Quality of life (AQoL-6D), Physical activity (PASE), Average daily step count |

**Appraisal of the methodological quality – Rob 2**



### PICO 11: VOCATIONAL REHABILITATION

**Overview of relevant studies:**

| No. | Page | SR / RCT | Hip / knee | Publication | Topic | Comment |
|---|---|---|---|---|---|---|
| **1** | **3** | **RCT** | **H/K** | **Östlind et al. 2022** Promoting work ability with a wearable activity tracker in working age individuals with hip and/or knee osteoarthritis: a randomized controlled trial | Physical activity, wearable activity trackers and work ability | • Data extracted |
| | | | **H/K** | **Chopp-Hurley et al. 2017** Randomized Controlled Trial Investigating the Role of Exercise in the Workplace to Improve Work Ability, Performance, and Patient-Reported Symptoms Among Older Workers With Osteoarthritis | | • Data not extracted<br>• Includes only 24 participant in total |

## SUMMARY OF FINDINGS

- **Effect estimates higligted in green: statistically significant in favour of intervention group**
- **Effet estimates highligtes in red: statistically significant in favour of control / comparison group**

**Knee OA**

Self-management + activity tracker vs. Self-management

Work Ability Index (WAI)(7-49), adjusted mean difference (95% CI):

- 3 months: 0.2 (-1.8, 2.1)
- 6 months: 0.4 (-1.4, 2.2)
- 12 months: 0.5 (-1.4, 2.3)

## Analysis

### Hip / Knee OA

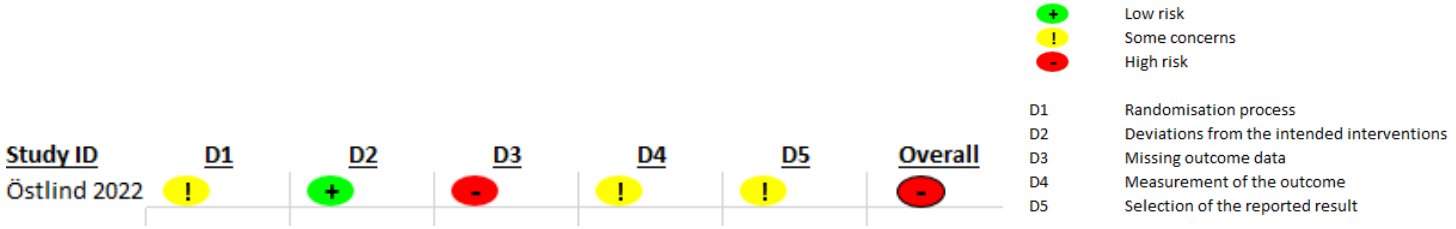
The results form 1 RCT showed no differences in work ability between self-management + wearable activity tracker and self-management alone. Pain and function were not included as outcomes in the trial.

**Conclusion**:

New evidence is added on the ineffectiveness of wearable activity trackers for work-ability

| Reference | Hip Knee | Intervention | Control | Follow-up | Outcomes pain | Outcomes function | Other outcomes |
|---|---|---|---|---|---|---|---|
| Östlind et al. 2022 | H/K | Supported Osteoarthritis Self-Management Program with the addition of self-monitoring PA using a commercial wearable activity tracker (n= 86) | Supported Osteoarthritis Self-Management Program only (n= 74) | 12weeks | NA | NA | Primary outcome - Work Ability Index (WAI) (7-49 higher score = better work ability).<br>Adjusted mean difference (95% CI),<br>3 months: 0.2 (-1.8, 2.1), p= 0.877<br>6 months: 0.4 (-1.4, 2.2), p= 0.650<br>12 months: 0.5 (-1.4, 2.3), p= 0.618 |

**Appraisal of the methodological quality – Rob 2**



## 6. Risk of bias per study

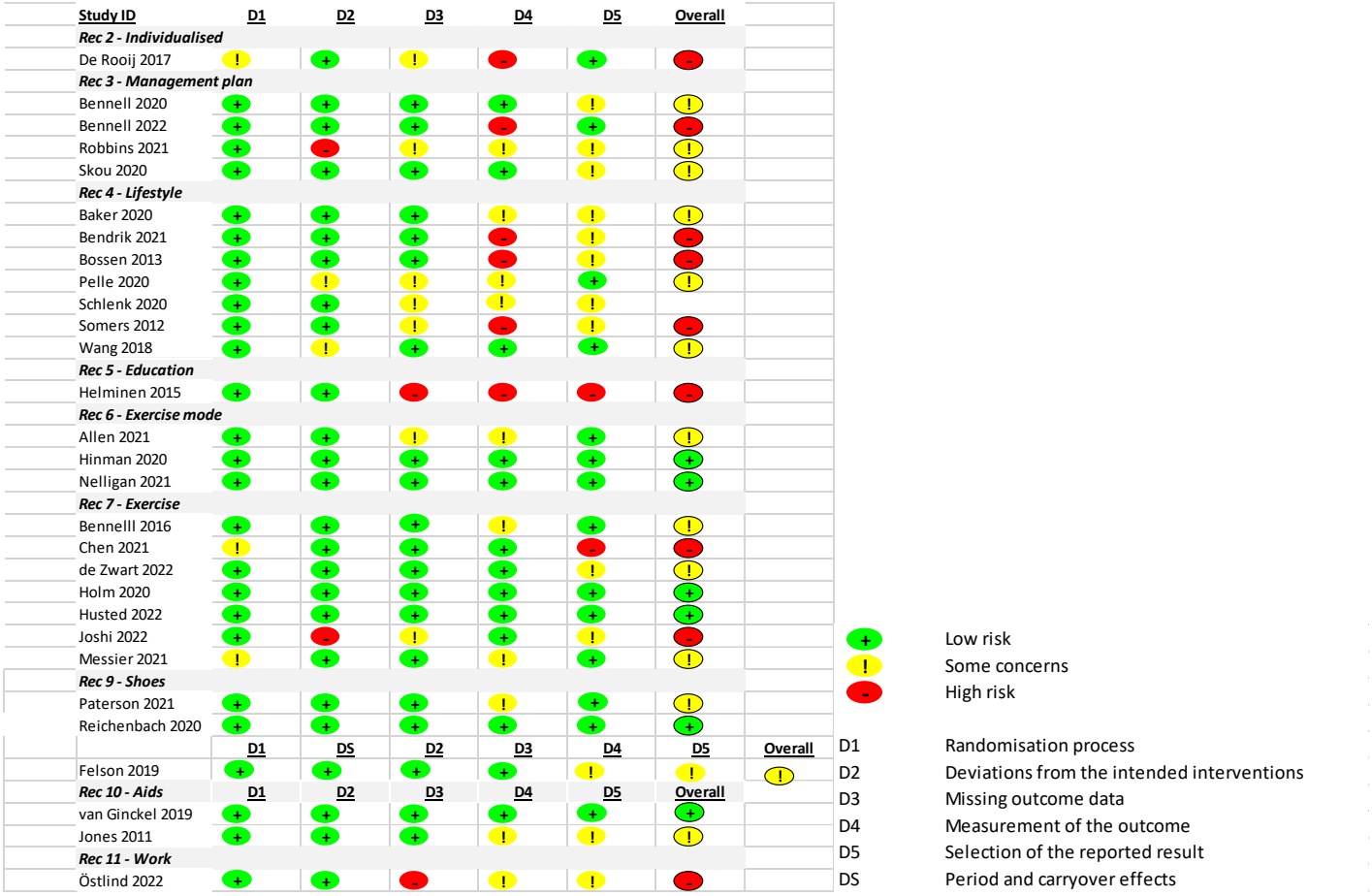
**Systematic reviews – quality evaluated with AMSTAR II tool**

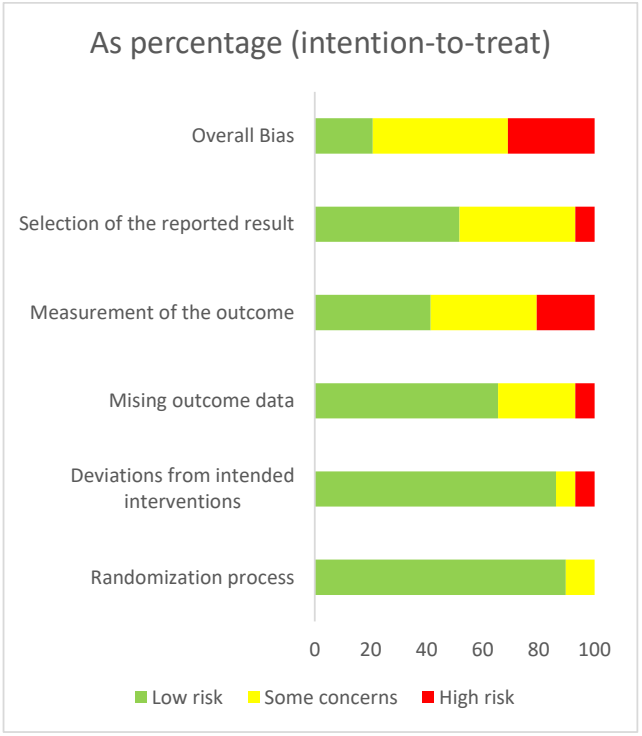
| Meta-analyses | 1 | 2* | 3 | 4* | 5 | 6 | 7* | 8 | 9* | 10 | 11* | 12 | 13* | 14 | 15 | 16 | Overall quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Rec 3 - management plan*** | | | | | | | | | | | | | | | | | |
| Alrushud 2017 | Y | N | Y | P | Y | Y | N | P | Y | N | Y | Y | Y | Y | Y | Y | Critically low |
| Goff 2021 | Y | P | Y | P | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | N | Y | Low |
| Hall 2019 | Y | Y | Y | P | Y | Y | N | Y | Y | N | Y | Y | y | Y | Y | Y | Low |
| Pitsillides 2021 | Y | N | Y | P | Y | Y | N | P | Y | N | N | Y | Y | Y | Y | Y | Critically low |
| Xie 2021 | Y | N | Y | P | Y | Y | N | P | P | N | Y | N | N | Y | N | Y | Critically low |
| ***Rec 4 - lifestyle*** | | | | | | | | | | | | | | | | | |
| Nicolson 2017 | Y | N | Y | P | Y | Y | N | Y | Y | N | Y | Y | Y | Y | N | Y | Critically low |
| ***Rec 5 - education*** | | | | | | | | | | | | | | | | | |
| Goff 2021 | Y | P | Y | P | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | N | Y | Low |
| Wu 2022 | Y | Y | Y | P | Y | Y | N | P | Y | N | Y | Y | Y | Y | Y | Y | Low |
| O'Brien 2018 | Y | Y | Y | P | Y | Y | N | Y | Y | N | Y | Y | Y | Y | Y | Y | Low |
| Safari 2020 | Y | Y | Y | P | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y | Y | High |
| ***Rec 6 - exercise mode*** | | | | | | | | | | | | | | | | | |
| Chen 2021 | N | P | Y | P | Y | Y | N | P | Y | N | Y | N | N | Y | Y | Y | Critically low |
| Dong 2018 | Y | P | Y | P | N | Y | N | P | Y | N | Y | Y | Y | Y | Y | Y | Low |
| Yang 2022 | Y | N | Y | P | Y | Y | N | Y | Y | N | Y | Y | Y | Y | Y | Y | Critically low |
| Duan 2022 | Y | N | Y | P | Y | Y | N | N | Y | N | Y | N | Y | Y | Y | Y | Critically low |
| ***Rec 7 - exercise*** | | | | | | | | | | | | | | | | | |
| Hansen 2020 | Y | Y | Y | P | Y | Y | N | P | Y | N | Y | N | Y | Y | N | Y | Critically low |
| Moseng 2017 | Y | P | Y | P | Y | Y | Y | P | Y | N | Y | N | Y | Y | N | Y | Low |
| Teirlinck 2020 | Y | N | Y | P | Y | Y | N | P | Y | N | Y | Y | Y | Y | Y | Y | Critically low |
| Bartholdy 2017 | Y | P | Y | P | Y | N | Y | P | Y | N | Y | Y | Y | Y | N | Y | Low |
| Hu 2021 | Y | N | Y | P | Y | Y | N | P | Y | N | Y | Y | Y | Y | Y | Y | Critically low |
| Luan 2021 | Y | P | Y | P | Y | Y | N | P | Y | N | Y | Y | Y | Y | N | Y | Critically low |
| Luan 2022 | Y | Y | Y | P | Y | Y | N | P | Y | N | N | Y | Y | Y | N | Y | Critically low |
| Wang 2021 | Y | Y | Y | P | Y | Y | N | P | P | N | Y | Y | Y | Y | Y | Y | Low |
| Goh 2019 | Y | Y | Y | P | N | Y | N | P | Y | N | Y | N | N | Y | Y | Y | Critically low |
| Lauche 2019 | Y | N | Y | P | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | Y | Low |
| Mazzei 2020 | Y | P | N | P | Y | Y | N | P | N | N | N/M | N/M | N | N | N/M | Y | Critically low |
| James 2021 | Y | P | Y | P | Y | N | N | P | P | N | N/M | N/M | N | Y | N/M | Y | Critically low |
| Von Heideken 2021 | Y | N | Y | P | Y | N | N | N | P | N | N/M | N/M | N | N | N/M | Y | Critically low |
| ***Rec 8 - weight*** | | | | | | | | | | | | | | | | | |
| Robson 2020 | Y | Y | Y | P | Y | Y | N | P | Y | N | Y | Y | Y | Y | Y | Y | Low |
| Panunzi 2020 | Y | N | N | P | Y | N | N | N | Y/N | N | N | N | N | N | Y | Y | Critically low |
| Mazzei 2020 | Y | P | N | P | Y | Y | N | P | N | N | N/M | N/M | N | N | N/M | Y | Critically low |
| ***Rec 9 - shoes*** | | | | | | | | | | | | | | | | | |
| Khosravi 2021 | Y | N | N | N | Y | Y | N | P | N | N | N | N | N | N | N | Y | Critically low |
| Yu 2021 | N | N | Y | P | Y | Y | N | P | Y | N | Y | N | N | Y | Y | Y | Critically low |
| Zhang 2018 | Y | N | Y | P | Y | Y | N | P | Y | N | Y | Y | Y | Y | N | Y | Critically low |
| Zhang 2018 | Y | N | Y | N | Y | N | N | P | N | N | Y | N | N | Y | Y | Y | Critically low |

*Critical items, Y=yes, N=No, P=partial yes

See attached AMSTAR 2 checklist for details on the content of the specific items

**Single randomized controlled trials – evaluated with Cochrane Risk of Bias tool 2 (RoB 2)**




As percentage (intention-to-treat)
Overall Bias
Selection of the reported result
Measurement of the outcome
Mising outcome data
Deviations from intended interventions
Randomization process
0
20
40
60
80
100
Low risk
Some concerns
High risk