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EULAR recommendations for the non-pharmacological core management of hip and knee osteoarthritis: 2023 update

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ABSTRACT

Introduction Hip and knee osteoarthritis (OA) are increasingly common with a significant impact on individuals and society. Non-pharmacological treatments are considered essential to reduce pain and improve function and quality of life. EULAR recommendations for the non-pharmacological core management of hip and knee OA were published in 2013. Given the large number of subsequent studies, an update is needed.

Methods The Standardised Operating Procedures for EULAR recommendations were followed. A multidisciplinary Task Force with 25 members representing 14 European countries was established. The Task Force agreed on an updated search strategy of 11 research questions. The systematic literature review encompassed dates from 1 January 2012 to 27 May 2022. Retrieved evidence was discussed, updated recommendations were formulated, and research and educational agendas were developed.

Results The revised recommendations include two overarching principles and eight evidence-based recommendations including (1) an individualised, multicomponent management plan; (2) information, education and self-management; (3) exercise with adequate tailoring of dosage and progression; (4) mode of exercise delivery; (5) maintenance of healthy weight and weight loss; (6) footwear, walking aids and assistive devices; (7) work-related advice and (8) behaviour change techniques to improve lifestyle. The mean level of agreement on the recommendations ranged between 9.2 and 9.8 (0–10 scale, 10=total agreement). The research agenda highlighted areas related to these interventions including adherence, uptake and impact on work.

Conclusions The 2023 updated recommendations were formulated based on research evidence and expert opinion to guide the optimal management of hip and knee OA.

INTRODUCTION

Osteoarthritis (OA) is the most common joint disease worldwide,[1] with an increasing global burden of disability and healthcare utilisation.[2] The number of people with OA globally rose by 28% from 2010 to 2019, affecting over 500 million people, and about 6%, worldwide.[3] Due to an ageing population, increasing obesity and sport-related joint injuries, the disease will become even more prevalent in the forthcoming years.[2] In 2019, OA was the 15th highest-ranked cause of years lived with disability (YLDs) worldwide and was responsible for 2% of the total global YLDs.[3] OA is regarded as a severe disease, and serious condition and people with OA commonly experience pain, stiffness and associated functional loss.[4] Optimal management of hip and knee OA has important implications for the individual and society through the potential for improving individual health, work participation and utilisation of healthcare services. However, most people with OA do not receive optimal management.[5 6] In order to reduce the evidence-to-practice gap and the future burden[7] of this disease, the healthcare services', policy-makers' and the population awareness of the importance and benefits of evidence-based management of OA must be improved.

EULAR recommendations, including priorities for implementation and future research, can play a role in increasing awareness and uptake of best evidence care. In 2013, an EULAR Task Force (TF) developed recommendations for the non-pharmacological core management of hip and knee OA.[8] Since then there remains no cure in sight for OA, and effective disease-modifying drugs are lacking.[2] Therefore, non-pharmacological approaches are still considered a core treatment for people with hip and knee OA, aiming to alleviate symptoms and improve or maintain physical function. Since the publication of the 2013 recommendations, a large number of studies on the effectiveness of core non-pharmacological treatment modalities and new methods for delivery and follow-up of such treatments have been published. An update of these recommendations would potentially have implications for the level of evidence (LoE) categories and could lead to revisions of the recommendations and formulation of new recommendations with important implications for OA management.

The main aim of this TF process was to update the 2013 evidence-based recommendations for non-pharmacological core management, provide additional details on effectiveness, safety and cost-effectiveness, and formulate research and educational agendas and priorities for implementation activities. The target groups for the updated recommendations are people with hip or knee OA, all healthcare providers involved in the delivery of non-pharmacological interventions in OA care, researchers in the field of OA, officials in healthcare governance and reimbursement agencies and policy-makers.

METHODS

The Standardised Operating Procedures for EULAR-endorsed Recommendations[9] were used as a framework for this project. The structure of the manuscript is guided by the Appraisal of Guidelines, Research and Evaluation instrument.[10]

To pursue the task of updating the 2013 recommendations, a multidisciplinary TF with in-depth knowledge of non-pharmacological OA care was established. The TF consisted of 25 members from 14 European countries and included 9 physiotherapists, 6 rheumatologists, 2 orthopaedic surgeons, 2 psychologists, 2 patient research partners, 1 occupational therapist, 1 nurse, 1 general practitioner and 1 nutrition expert. A steering group, including a convenor (NØ), a methodologist (TPMVV) and a research fellow (TM), managed the process.

During the first digital TF meeting, the rationale for the update of the recommendations was presented, and the definition of core non-pharmacological management was clarified. The TF agreed on 11 research questions based on the research propositions from the 2013 recommendation. For the subsequent systematic literature review (SLR), the research questions were organised according to the population, intervention, control and outcome (PICO) format with associated search terms (online supplemental file 1). The new search terms added to the previous search strategy were related to the following topics: remote care, shared decision-making, psychological interventions/cognitive behaviour therapy (CBT)-based interventions and specific exercise modalities (eg, strength training and aerobic exercise). Due to the expected large body of published literature since the previous literature review from 2012, combined with the available resources and strict timeline for this update, it was decided that this SLR should primarily focus on evidence from systematic reviews (SRs) and meta-analyses of randomised controlled trials (RCTs) and secondarily on evidence from single RCTs. As this SLR was an update of a previously unpublished SLR, along with its pragmatic approach, it was decided that the details were best presented as online supplemental file 1 rather than a publication of its own.

The SLR was conducted by the fellow and convenor in close collaboration with an experienced librarian (HIF) and with support from the methodologist. Three main literature searches were conducted in the databases Medline (Ovid), Embase (Ovid), AMED (Ovid), Cochrane Library (Cochrane TRIALS), CINAHL (Ebsco) and Epistemonikos (SR search only).

The primary literature search aimed at identifying relevant SRs of RCTs investigating the effectiveness of core non-pharmacological management strategies as specified in the PICOs. The search was conducted from 2012 (the end year of the previous search) until 17 February 2022 and later updated until 27 May 2022 (online supplemental file 1). Based on the PICOs, two authors (TM and NØ) independently screened titles and abstracts. Potentially relevant studies were read and evaluated in full text. Studies were included if they were SRs, including a meta-analysis of two or more RCTs on people diagnosed with hip or knee OA or with persisting knee pain in people 45 years or older and investigating non-pharmacological core management strategies. Relevant comparisons were no intervention, usual care or any other intervention. Relevant outcomes were pain, physical function, quality of life (QoL), patient global assessment of target joint, adverse effects or cost-effectiveness. The included studies were categorised under the 11 research questions. If relevant, one study could inform multiple research questions. The quality of the included SRs was evaluated with A MeaSurement Tool to Assess systematic Reviews (AMSTAR II).[11] The assessments were conducted independently by three assessors (GS, EAB and IS), working in pairs independent of the TF, with experience in quality assessment of SRs and RCTs. Disagreements between the assessors were resolved through discussion.

A second literature search with a comparable search strategy was conducted to identify newer RCTs not included in the latest published SR on the same topic, or relevant RCTs not included in any SRs, or RCTs on research questions for which no relevant SRs were identified. To identify such RCTs published in the past four to 5 years, the search was conducted from 1 January 2018 to 27 May 2022.

A third literature search was conducted with a similar search strategy from 1 January 2012 to 31 December 2017, aiming to identify relevant RCTs specifically on the research questions for which no relevant SRs had been identified. The two last searches were screened independently by the same two authors, and relevant studies were read and evaluated in full text. Studies were included if they were RCTs relevant to the PICOs. The quality of the included RCTs was assessed with the Cochrane Risk of Bias tool 2 (RoB2)[12] independently by two researchers (EAB and IS) independent of the TF. Disagreements between the assessors were resolved through discussion.

In the period before the second TF meeting, five digital subgroup meetings were arranged. Groups of 4–5 TF members and the steering group participated in each meeting. The purpose of the subgroup meetings was to go through the relevant results from the SLR and to discuss and prepare preliminary suggestions for revisions and updates of the recommendations to guide the discussion at the second TF meeting. The group discussed between 1 and 3 of the previous 11 recommendations in each subgroup meeting. This method was implemented to allow all TF members to express their opinions in smaller forums and potentially to reduce the workload of the second TF meeting.

During the second digital TF meeting, the results from the SLR, along with the proposed updates from the subgroups, were presented to the whole TF. The previous recommendations and the proposed updates were then discussed in light of the SLR and the expertise of the group. After the discussions and revisions, the TF members voted for consensus on each revised overarching principle and recommendation (defined as 75% or more in favour of the suggested updates). After the meeting, the updated list of recommendations was collated and emailed to the TF members in a digital survey to rate the level of agreement (LoA) on a 0–10 point scale (0=totally disagree, 10=totally agree). Further, the TF voted on the prioritised order of the recommendations for implementation activities. The TF also formulated a research agenda based on identified gaps in the evidence. The steering group defined the LoE and strength of each recommendation in accordance with the Oxford Levels of Evidence.[13] The steering group also formulated the educational agenda on behalf of the TF.

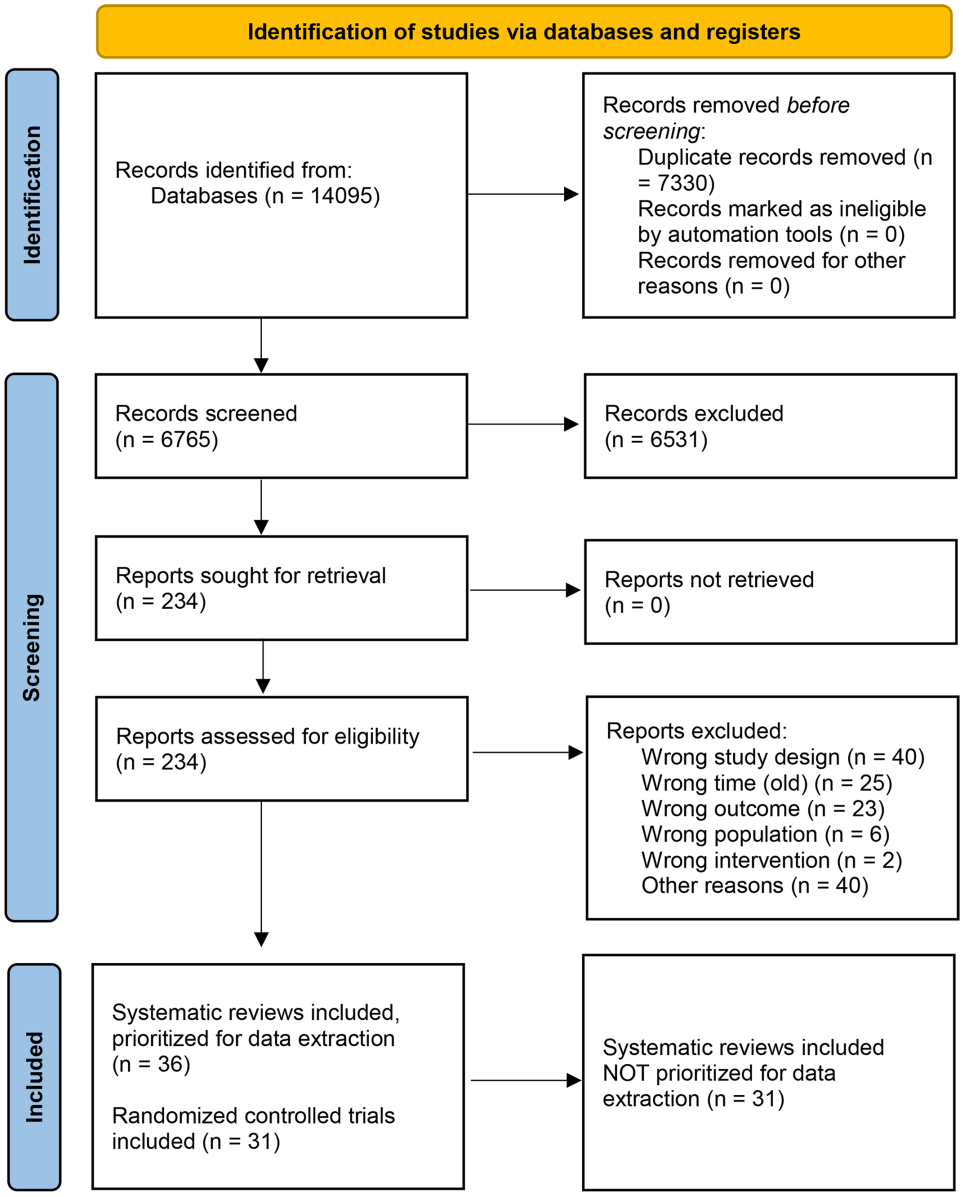

Figure 1 PRISMA flow diagram. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

RESULTS

The three systematic literature searches yielded a total of 6816 references after the removal of duplicates (figure 1). From these, 67 SRs and 31 RCTs were initially considered relevant for the SLR. However, we chose to extract data from 36 of the SRs due to reasons elaborated in online supplemental file 1, p.49,. The most frequent reason was that the interventions under study were not considered relevant for this review. The quality of the included SRs was generally poor, with 35 of 36 studies being rated with an overall low or critically low quality by the AMSTAR II tool (online supplemental file 1). The critical items that most often contributed to the overall low quality of the studies were: the lack of an explicit statement that the review methods were established prior to the conduct of the review; the lack of the use of a comprehensive literature search strategy; and lack of a list of excluded studies with reasons for exclusion. There was large variation in the overall quality of the included RCTs as assessed by the RoB2 tool (online supplemental file 1). Most studies with a low risk of bias were on exercise interventions and delivery, whereas there were higher concerns related to the studies on, for example, lifestyle-related interventions. Most commonly, these concerns were related to the elements of measurement of the outcome (eg, the lack of a blinded outcome assessor).

The main updates to the recommendations are summarised in box 1. The TF agreed to rephrase and change two previous recommendations into overarching principles. These were the recommendations on: (1) the use of a biopsychosocial approach in the initial assessment and (2) the recommendation on

Box 1 What is new?

⇒ The updated recommendations have been reorganised into two overarching principles and eight treatment recommendations.
⇒ The wording of each recommendation is condensed.
⇒ The level of agreement is above 9 for all recommendations.
⇒ The level of evidence is 1a/1b for seven of the eight recommendations.

Table 1 Overarching principles and specific recommendations for the non-pharmacological core management of hip and knee osteoarthritis

Overarching principles (A–B) and recommendations (1–8)		Level of agreement, mean (SD), median (range)	Level of evidence	Strength of recommendation	Prioritised order of implementation, rank
A	In people with hip or knee OA, initial assessment should use a biopsychosocial approach to consider physical and psychological status, activities of daily living, participation including work, social determinants and environmental factors.	9.8 (0.5), 10 (8–10)	–	–	–
B	Treatment of people with hip or knee OA should be based on shared decision-making considering the needs, preferences and capabilities of the individual.	9.8 (0.5), 10 (8–10)	–	–	–
1	People with hip or knee OA should be offered an individualised, multicomponent management plan that includes the recommended core non-pharmacological approaches.	9.8 (0.7), 10 (7–10)	1a	A	2
2	People with hip or knee OA should be offered information, education and advice on self-management strategies (considering available modes of delivery) and these should be included and reinforced at subsequent clinical encounters.	9.6 (0.7), 10 (7–10)	1a	A	1
3	All people with hip or knee OA should be offered an exercise programme (eg, strength, aerobic, flexibility or neuromotor*) of adequate dosage with progression tailored to their physical function, preferences and available services.	9.6 (0.8), 10 (7–10)	1a	A	3
4	The mode of delivery of exercises (eg, individual or group sessions, supervised or unsupervised, face to face or by using digital technology, land-based or aquatic exercise) should be selected according to local availability and patient preferences. The exercises preferably should be embedded in an individual plan for physical activity.	9.6 (0.6), 10 (8–10)	1a	A	4
5	People with hip or knee OA should be offered education on the importance of maintaining a healthy weight. Those overweight or obese should be offered support to achieve and maintain weight loss.	9.2 (1.4), 10 (4–10)	1a	A	5
6	For people with hip or knee OA, consider walking aids, appropriate footwear, assistive devices and adaptations at home and at work to reduce pain and increase participation.	9.3 (1.0), 10 (6–10)	1b	A	8
7	People with hip or knee OA with or at risk of work disability should be offered timely advice on modifiable work-related factors and, where appropriate, referral for expert advice.	9.4 (1.0), 10 (6–10)	5	D	7
8	Consider employing elements of behaviour change techniques when lifestyle modifications are needed (eg, physical activity, weight loss) for people with hip or knee OA.	9.2 (0.8), 9 (8–10)	1b	A	6

*Neuromotor exercise includes various motor skills, including balance, coordination, gait, agility, proprioceptive training and activities combining neuromotor exercise, resistance exercise and flexibility (eg, tai chi, yoga).
OA, osteoarthritis.

individualisation of treatment. It was decided that these were generic statements used to inform the basis for management rather than specific treatment recommendations. Inherent to the nature of these statements, relevant studies were absent from the SLR.[14]

It was further decided to revise the nine previous recommendations into eight updated recommendations by merging the recommendations on footwear and walking aids, other assistive devices and adaptations. Moreover, to improve readability the previous recommendations were shortened, and subsections were rewritten and moved to the explanatory text. In addition, the TF also discussed the order for the presentation of the recommendations and decided to change this into a more logical sequence.

High LoAs were achieved for all eight recommendations, and seven recommendations were graded with LoE 1a/1b and strength level A. Recommendation 2—on delivery of information, patient education and self-management—was ranked by the TF as having the highest priority for implementation. Table 1 summarises the updated overarching principles, recommendations, LoA, LoE, strength of recommendation and priority for implementation.

Recommendation 1

People with hip or knee OA should be offered an individualised, multicomponent management plan that includes the recommended core non-pharmacological approaches.

This recommendation deals with the provision of an integrated package of care rather than single treatments alone or in succession. The majority of new, relevant SRs and RCTs informing this recommendation investigated the effectiveness of the combination of patient education and exercise or the combination of patient education, exercise and diet or the combination of behaviour change techniques/pain-coping skills training and

exercise, compared with information or one of the treatments alone.[15–18] The updated evidence shows that combining treatments leads to larger effects on pain and function compared with providing the treatments separately, thereby providing a rationale for combining different treatment modalities. The combination of education, exercise and dietary weight management was also considered cost-effective compared with physician-delivered usual care investigated in five healthcare systems.[19] The TF discussed that, although not all potential combinations of treatments are investigated in meta-analyses or newer RCTs, the results of available studies are likely to be generalisable to different combinations. Thus, the TF agreed on the general consideration of multicomponent treatments from a broader spectrum of potential combinations based on an assessment of a patient's individual needs and preferences.

Through the SLR, no specific evidence was retrieved with regard to the effects of pacing and maintenance of activity. This specific element was therefore removed from the recommendation.

Recommendation 2

People with hip or knee OA should be offered information, education and advice on self-management strategies (considering available modes of delivery) and these should be included and reinforced at subsequent clinical encounters.

Recommendation 2 concerns the delivery of information, education and advice on self-management strategies. New evidence from the SLR showed zero to small significant effects on pain and function from patient education as a single intervention in the short term, which is in line with the previous recommendation.[15 20] In 2013, this recommendation focused on how education and information should be delivered in terms of being individualised, being included in every aspect of management, and specifically addressing the nature, causes, consequences and prognosis of OA. Moreover, it was stated that this should be reinforced and developed, supported by written or other types of material, including partners or carers of the individual, if relevant. The current TF acknowledged the importance of these aspects to ensure the effective delivery of information and education for people with hip and knee OA. However, none of the studies from the SLR could provide specific evidence for any of these aspects, except with regard to delivery method. One SR reported the effects of patient education delivered through telephone when compared with usual care, but the results were not significant for pain or disability.[20] The TF further chose to add self-management to the updated recommendation. Evidence from two SRs, including seven RCTs, compared structured self-management programmes against a large range of control interventions. Zero to small favourable effects were found for self-management, delivered face to face or digitally, compared with routine/usual care.[21 22] Despite the limited effects reported in the literature, the TF agreed that self-management is a concept closely related both to the delivery of information and education in a clinical setting and to the uptake of other relevant treatment modalities.

Recommendation 3

All people with hip or knee OA should be offered an exercise programme (eg, strength, aerobic, flexibility or neuromotor) of adequate dosage with progression tailored to their physical function, preferences and available services.

The body of literature investigating the effects of different types of exercise regimes was already large when the 2013 recommendations were published. Aiming to progress the knowledge on the effects of exercise for hip and knee OA, the current SLR did not focus on studies investigating the effects of general exercise on hip and knee OA as these effects were well established previously.[23 24] The aim was rather to identify studies investigating the effects of well-defined exercise modalities, as well as studies looking more specifically into exercise dosage.

For hip OA, one SR summarised the effects of supervised, progressive resistance training, which reported beneficial effects on pain, function and QoL. The effect sizes, however, were small with large CIs.[25]

For knee OA, four SRs and five additional RCTs were identified on the exercise[26–28] modalities Tai Chi, yoga, stationary cycling, proprioceptive training, weight-bearing and non-weight bearing exercise, and neuromuscular exercise combined with strength training.[29–33] Overall, the results showed small to moderate positive effects on pain and function for all these exercise modalities compared with no-exercise control (no intervention, waiting list or non-exercise interventions). Still, the results were less clear in head-to-head comparisons of different exercise types, modalities or doses.

In summary, results showed that a variety of exercise modalities might lead to improved pain and function for people with hip or knee OA, making it difficult to recommend one type of exercise over another. The optimal exercise dosage is also difficult to establish, with evidence from 1 SR on hip OA (including 12 RCTs) and 1 SR on knee OA (including 45 RCTs) providing some evidence that exercise in line with dose recommendations from the American College of Sports Medicine provided larger improvements in pain compared with non-compliant exercise programmes.[34–36] The differences, however, were small, and the clinical relevance is debatable. Two newer RCTs on knee OA, comparing high-intensity to low-intensity resistance training or no-exercise control, found no or only small between-group differences with regard to pain and function,[37 38] thus making it difficult to make explicit recommendations on exercise dosage.

With respect to safety, adverse events in exercise studies for hip and knee OA were investigated in two SRs.[39 40] The two studies concluded that, although the report of adverse events in exercise studies was inconsistent and some patient drop-outs were potentially misclassified, adverse events were generally uncommon and non-serious, and that exercise seemed to be associated with minimal risk of harm. Concerning the economic aspects of exercise, one SR on cost-effectiveness found that in the majority of the 12 included studies, exercise for hip and knee OA showed cost-effectiveness at conventional willingness-to-pay thresholds.[19]

The TF chose to update this recommendation, highlighting that the choice of exercise should be based on individual function, patient preferences and available services.[41] Overall, exercise is by far the most studied and strongly recognised non-pharmacological core management treatment option and this recommendation has the strongest evidence base. The TF also expressed the importance of maintaining exercise over time for the positive effects to persist.

Recommendation 4

The mode of delivery of exercises (eg, individual or group sessions, supervised or unsupervised, face to face or by using digital technology, land-based or aquatic exercise) should be selected according to local availability and patient preferences. The exercises preferably should be embedded in an individual plan for physical activity.

Table 2 Research agenda for the non-pharmacological core management of people with hip and knee osteoarthritis

Theme	Research questions
Hip OA	What are the benefits and harms of non-pharmacological treatment modalities for people with hip OA?
Weight	What are the benefits and harms of weight loss for people with hip OA?
	What are the long-term effects of weight loss for people with hip or knee OA?
Exercise	What are the mechanisms for beneficial effects of exercise on hip or knee OA?
	What is the optimal exercise dosage/how to prescribe an optimal exercise dosage for people with hip or knee OA?
	What is the minimum exercise dosage in order to achieve beneficial effects in people with hip or knee OA?
Adherence	How can we improve long-term adherence to non-pharmacological treatment in people with hip or knee OA?
Uptake	How can we improve the uptake of core management strategies from treatment recommendations in people with hip or knee OA?
Work	What are the benefits and harms of interventions to improve or maintain work ability in people with hip or knee OA?

OA, osteoarthritis.

As established in the description of recommendation 3, there is convincing evidence for the effectiveness of various exercise modalities on pain and function in hip and knee OA. However, the delivery method of exercise programmes varies largely across studies and may influence study outcomes.

One SR found superior effects from technology-supported exercise compared with control with non-technological or no care services on pain, function and QoL,[42] whereas another SR found superior effects from telehealth-based exercise compared with no-telehealth exercise control for pain but not for function or QoL.[43] The reported effect sizes were small. One additional RCT found a small, significant effect on function at 6 months follow-up for an education combined with strengthening exercise follow-up through telephone calls compared with education alone, but no other between-group differences in pain and function were detected after 6 and 12 months.[44] Another RCT comparing access to an educational website combined with exercise supported by automated behaviour change text messages to access to the educational website alone found significant superior effects of the combined first intervention on pain and function after 24 weeks.[45] For aquatic exercise, one SR reported small short-term beneficial effects for pain and function compared with no intervention or usual care. However, another SR comparing aquatic exercise to land-based exercise did not find any of these modes superior to the other.[46 47] One RCT of a three-stage stepped care exercise programme compared with educational materials found beneficial, although not clinically relevant, effects of the stepped care programme on pain and function at 3 and 9 months, but not at 6 months.[48] Analyses of the cost-effectiveness of the same stepped-care intervention concluded that there is a high probability of short-term cost-effectiveness.[49]

The new evidence adds information on technology-supported delivery of exercise, aquatic exercise and a stepped care strategy for exercise delivery. The results from these studies show a wide variety of potentially effective delivery methods for exercise, which in clinical practice should be aligned with patient preferences and the availability of local services. The TF also underlined the importance of the exercise programme being embedded in an individual plan for physical activity. Such plans should be set up in accordance with well-recognised recommendations for physical activity, such as from the WHO or EULAR.[41 50] General physical activity has multiple health benefits and is also important for the management of common comorbidities associated with OA, such as cardiovascular disease and diabetes.[51 52]

Recommendation 5

People with hip or knee OA should be offered education on the importance of maintaining a healthy weight. Those overweight or obese should be offered support to achieve and maintain weight loss.

In the updated SLR, three SRs were identified, including one network meta-analysis investigating the effects of weight loss interventions. Two were on studies of knee OA,[19 53] whereas the third included studies of both hip and knee OA, although only 2 of the 19 trials included in that study were conducted on a mixed hip and knee OA population.[54] The results from this SR showed beneficial effects, compared with minimal care, of both diet and multifocused weight-loss interventions (combining diets, telephone coaching, psychological pain-coping interventions/CBT, specialist referral education and exercise) on pain and disability, with the largest effect size on pain for multifocused interventions. Further, it was reported that when comparing weight-loss-focused interventions (diets) to exercise, no between-group differences were detected for pain or disability. When comparing combined interventions of dietary weight loss and exercise to dietary weight loss or exercise alone, small effects were found in favour of the combined intervention.

In the network meta-analysis, bariatric surgery was the most effective pain-reducing intervention, followed by a low-calorie diet combined with exercise intervention.[53] The last SR on knee OA used cost-effectiveness as an outcome and reported that an intensive 18-month diet and exercise intervention with the goal of 5% weigth loss was likely to be an efficient use of healthcare resources compared with a healthy lifestyle control.[19]

The above-mentioned studies made it clear that there is increasing evidence supporting multifocused weight loss interventions as beneficial for OA pain and disability. Therefore, the TF recommended that people with overweight or obesity and OA should be offered support to achieve and maintain weight loss. The TF notes that the amount of evidence mainly stems from studies on knee OA. As overweight and obesity are strong risk factors for the development and progression of OA, and in particular knee OA,[2] the TF also wanted to add to the recommendation the importance of education on the benefits of maintaining a healthy weight.

Recommendation 6

For people with hip or knee OA, consider walking aids, appropriate footwear, assistive devices and adaptations at home and at work to reduce pain and increase participation.

Through the SLR, four SRs investigating the effects on knee OA of lateral wedge insoles compared with other types of insoles, including flat/neutral insoles or knee braces, were retrieved. These studies did not report any between-group differences for any comparisons on pain or function.[55–58] On the other hand, one RCT reported a small between-group difference

Table 3 Educational agenda for the non-pharmacological core management of people with hip and knee OA

1	Increase the knowledge about hip and knee OA among health professionals and people living with OA
2	Increase the knowledge about recommended hip and knee OA management among health professionals and people living with OA
3	Contribute to regular updates and training for health professionals to ensure delivery of high-quality OA care
4	Collaborate with the authors of the EULAR online course for health professionals to ensure that the educational content aligns with the current recommendations

OA, osteoarthritis.

in favour of lateral wedge insoles compared with neutral insoles on a single pain scale in people prescreened to knee adduction moment improvements (but not on other pain scales, function or QoL).[59] For footwear, one RCT found positive effects of biomechanical footwear with individually adjustable external convex pods attached to the outsole compared with control footwear.[60] Another RCT found small 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.[61]

Summarised, most evidence did not support the use of any lateral wedged or other insoles to affect pain or function in knee OA. The results from one RCT provided some support for the use of stable, supportive shoes. The TF wanted to add that from a clinical perspective, the use of comfortable shoes, big enough to give ample space for the toes when weight-bearing, is still a general recommendation for people with hip and knee OA.

For other types of assistive aids and devices, two RCTs comparing the use of canes to the non-use of auxiliary gait devices were identified. The results were contradictory, and conclusions on the effect of cane were difficult to draw from the available evidence.[62 63] No studies were retrieved for other types of assistive devices or home adaptations. Based on the expert knowledge of the group, it was argued that such devices could still be useful to some people with hip or knee OA in terms of reducing pain, undertaking daily activities and improving participation. The TF wanted to emphasise that improving participation is an important aspect underpinning this specific recommendation. Assistive devices may serve as means to reduce pain and improve participation both at home and at work and should, therefore, be considered in that context. Examples of such devices might be devices to aid dressing, height-adjustable chairs, raised toilet seats, handrails in staircases or the use of appropriate walking aids.

Recommendation 7

People with hip or knee OA with or at risk of work disability should be offered timely advice on modifiable work-related factors and, where appropriate, referral for expert advice.

OA is one of the leading causes of reduced work participation, and the disease may critically affect the number of sick days and, ultimately, the extension of a person's work career.[64] Although there are well-known occupational risk factors, such as heavy lifting and knee straining activities associated with the development of knee OA,[65] it was noted that there is a lack of studies on vocational rehabilitation for people with hip or knee OA. In the current update, only one relevant RCT was retrieved. This study used workability as an outcome, whereas the study intervention in both groups focused on self-management with the addition of an activity tracker in the intervention group. In this study, no between-group differences were reported for workability.[66]

Although little research has been conducted, the TF considered that appropriate interventions to increase work participation for people with hip and knee OA are highly relevant. A proper assessment of the individual work situation may have a large impact and should receive attention during consultations.[67] Health professionals, in cooperation with the employer, should be able to offer timely advice on modifiable work-related factors such as working from home, the use of height-adjustable desks and office chairs, the possibility of changing work tasks, commuting to/from work, use of assistive technology, and receiving support from management, colleagues and family towards employment. The TF also noted that adaptations to improve workability might be considered and applied not only at the workplace but also in the home.

Recommendation 8

Consider employing elements of behaviour change techniques when lifestyle modifications are needed (eg, physical activity, weight loss) for people with hip or knee OA.

This recommendation concerns the potential need for lifestyle change in people with hip and knee OA. It focuses specifically on physical activity and weight loss as part of a healthy lifestyle since these aspects are specifically relevant for people with hip or knee OA. One SR and eight additional RCTs were identified on various interventions to enhance a healthy lifestyle, mainly through maintaining physical activity over time. The SR reported small to moderate effects of adding booster sessions to exercise programmes to improve mid-term to long-term adherence to exercise.[68] Furthermore, one RCT reported statistically significant improvements in pain and function from a combined programme of pain coping skills training and lifestyle behavioural weight management lasting 24 weeks compared with these interventions alone or standard care.[69] Interventions from the other RCTs aiming to support people with OA to improve their lifestyle and sustain such changes over time, included interventions of behaviour-graded activity, improving exercise adherence with telephone counselling, an app to enhance a healthy lifestyle, physical activity with telephone follow-up and a self-management lifestyle intervention.[70–72] However, when the effects on pain and function of these interventions were compared with standard care or other minimal interventions, none to very small between-group differences were observed for the comparisons. The TF wanted to enhance the importance of long-term follow-up on health behaviour change and not just recommend lifestyle change as a single intervention. The TF also discussed that the EULAR recommendation on core competencies for health professionals in rheumatology underlines that health professionals should be able to provide the principles of behaviour change techniques in the management of people with rheumatic and musculoskeletal disorders.[73]

Research and educational agendas

The proposed research agenda (table 2) was based on gaps identified in the literature and on topics which emerged during discussions among the TF members.

The education agenda (table 3) highlights activities relevant to promote appropriate management of people with hip and knee OA.

DISCUSSION

Through this update, the recommendations for the non-pharmacological core management of hip and knee OA have been revised into two overarching principles and eight treatment recommendations. The revisions are based on research evidence, expert discussions and consensus. Since the publication of the 2013 recommendations, a number of new studies have been published on non-pharmacological treatment modalities and their methods of delivery. The updates to the recommendations are thus well anchored in evidence from research and the perspectives of the TF members, representing different professional, cultural and personal backgrounds, including the perspective of people with OA. The process led to a broad consensus within the TF on the updated principles and recommendations, reflected by the high LoA for all the revised recommendations. Such strong consensus gives reason to believe that the recommendations are suitable for use and implementation across European healthcare systems. These recommendations are also in line with recently published treatment recommendations for hip and knee OA by other societies.[74–76]

The number of relevant SRs and RCTs retrieved through the SLR was high, especially for the research questions concerning exercise and delivery of exercise, with data drawn from a total of 15 SRs and 11 additional RCTs. The number of new studies led to an upgrade of the LoE for most of the recommendations, and seven of eight recommendations are now supported by level 1a or 1b evidence. However, it should be noted that the stated LoE does not necessarily involve all aspects of every recommendation and does not distinguish between hip and knee OA. The number of studies on hip OA was markedly lower than those on knee OA for all the treatment modalities. Therefore, the recommendations are generally weaker for hip OA than knee OA. There is an increasing recognition of differences between hip and knee OA, which heightens the need for more hip OA-specific studies to improve outcomes for this group specifically.[77] This is also highlighted in the proposed research agenda (table 2). Further, as the aim was to address relevant non-pharmacological core management strategies, the recommendations do not specifically advise the management of subgroups of the OA population, for instance, younger adults or adults with a high burden of comorbidities. The authors are also aware of a number of ongoing studies addressing a range of innovative digital programmes in OA care. Such approaches will likely receive further attention in future updates of these recommendations.[78–81]

With regard to outcomes, most of the included studies reported effects primarily on pain and physical function. To follow the recommendations on prioritised outcomes in OA research,[82] more studies investigating the effects of interventions on QoL and patients' global assessment of the target joint may have provided additional relevant information. Workability and cost-effectiveness are two other outcomes of increasing interest when investigating the effect of interventions from a broader perspective. This SLR identified some studies including these outcomes, thus adding new and important knowledge to the recommendations. Nevertheless, additional studies with a focus on interventions to prevent the decline in workability and studies examining cost-effectiveness are still needed as such knowledge is important for healthcare governance and policy-makers when planning and prioritising effective OA care. Another relevant aspect of this update is the inclusion of studies investigating potential harm or adverse events from the interventions under study. Only two SRs specifically looking into this subject were identified. Still, the results add new knowledge to this important, although understudied, aspect of non-pharmacological interventions.[83]

The challenges of implementing recommended care for people with hip and knee OA are well documented.[84] It is also apparent that developing recommendations is not sufficient on its own to influence practice.[85] Therefore, efforts have been made to address the impact and to develop strategies for the implementation of treatment recommendations. For future implementation, collaboration with other organisations focusing on OA care, such as The Osteoarthritis Research Society International, must be considered. EULAR highlights that implementing all recommendations at once is probably not feasible in practice.[86] The TF voted that the recommendation on information, education and self-management was ranked as the recommendation with the highest priority for implementation. This recommendation may play an important role as a basis for all other management and may improve people's ability to live a good life with OA, as well as being an enabler of, aspects such as physical activity.[87] The prioritisation of the recommendations for implementation activities is also important with respect to the effective utilisation of healthcare services. As the OA population is growing, the need for effective healthcare utilisation and sustainable management strategies to improve outcomes will be vital to minimising the burden of OA at an individual and a societal level.[88]

To conclude, the TF reached a broad consensus on the updated recommendation for non-pharmacological core OA management as well as on a research agenda highlighting the current evidence gaps, on an educational agenda and on the priority of the recommendations to support implementation activities.

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

30. june 2023

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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: **What are the benefits and harms of a biopsychosocial approach at initial assessment in core management of hip and knee OA?** 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$, attitude to health, health literacy, ehealth literacy, contextual factors
Research question #2: **What are the benefits and harms of individualised treatment in core management of hip and knee OA?** Search strategy terms: Individualized medicine, individual$, 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: **What are the benefits and harms of an individualised comprehensive package of care in core management of hip and knee OA?** 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: **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: **What are the benefits and harms principles of information and education in core management of hip and knee OA?** 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$,
Research question #6: **What are the benefits and harms of principles of exercise education in core management of hip and knee OA?** Search strategy terms: Exercise Tolerance, Exercise Therapy, exercise, physical activity, pacing, dose, progression, link$, Integrate, adhere$, remote care, remote management, digital intervention, digital information, digital tool, web based, application, app$, aquatic exercise, pool, hydrotherap$ +supervised/homebased, group/individual?
Research question #7: **What are the benefits and harms of exercise regimen in core management of hip and knee OA?** 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: **What are the benefits and harms of education in weight loss in core management of hip and knee OA?** 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 session$, support weight
Research question #9: **What are the benefits and harms of footwear in core management of hip and knee OA?** Search strategy terms: Shoes, insole$, lateral wedge$, shoe$
Research question #10: **What are the benefits and harms of assistive technology and home/work adaptations in core management of hip and knee OA?** 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

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

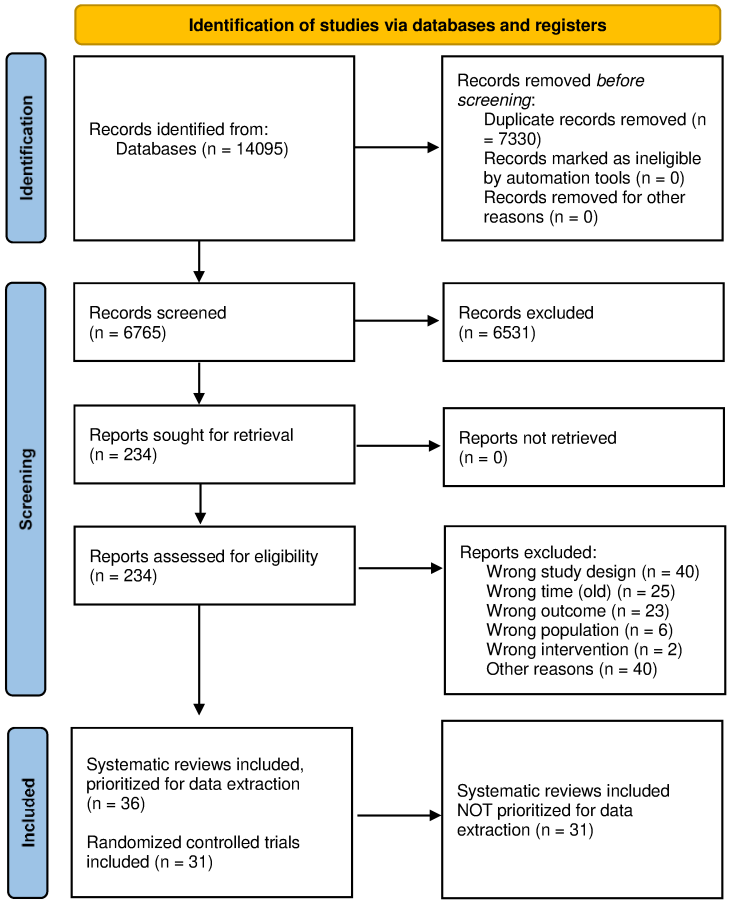


Figure 1. PRISMA flow diagram

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

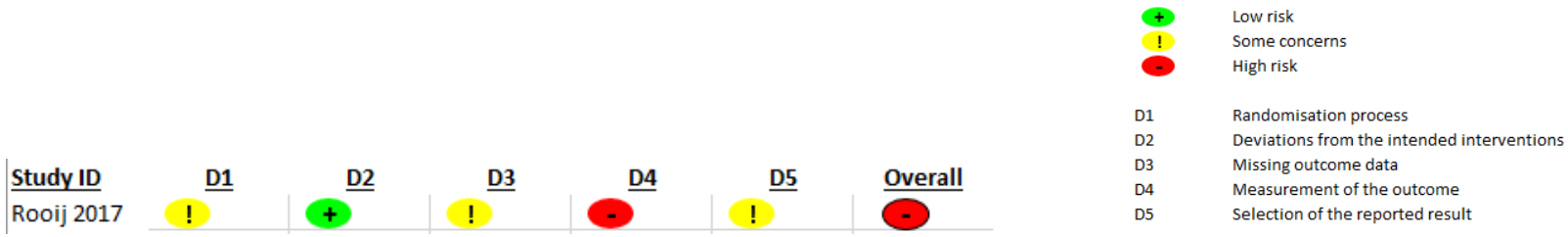
No relevant systematic reviews or RCTs identified

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 20 weeks 32 weeks	WOMAC-p (0-17): Difference over time, B (95% CI) -1.78 (-2.65, -0.91) 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) 6MWT (meters): Difference over time, B (95% CI) -1.41 (-1.87, -0.95)	Get-up and go Stair climbing up Stair climbing down Sf-36 pf subscale Patient-specific functioning list (PSFL) Walking questionnaire (WQ-35) Climbing stairs questionnaire (CSQ 15) 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 • 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 • This SR will also inform rec. 8 – weight management

4	SR	K	**Pitsillides et al. 2021** 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** 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** 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** 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** 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** 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** 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 • 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** Structured education and neuromuscular exercise program for hip and/or knee osteoarthritis: A health technology assessment	Education and exercise	• Data not extracted • 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.

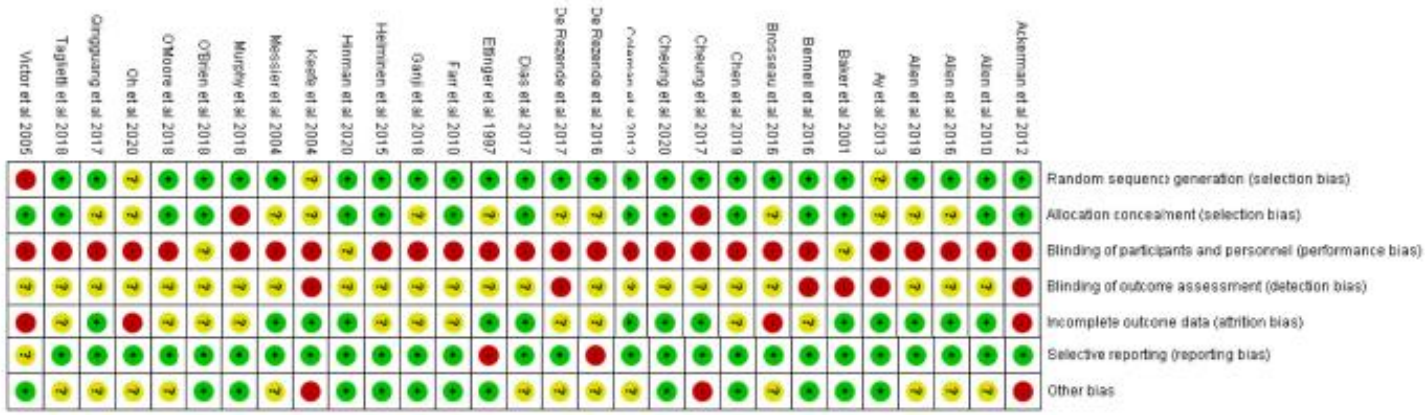
DATA EXTRACTION SYSTEMATIC REVIEWS

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). • Overweight or obese with BMI ≥25kg/m2 • 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. • Randomised controlled trials. • Interventions: Combined physical activity and dietary restriction programmes. • 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). • 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)** Combined diet and exercise vs. exercise (MD (95% CI)) 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
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 • Any form of patient education • Clinical or radiographically confirmed knee OA • Control: any non-pharmacological intervention, even if the patient educational intervention was the control intervention.
Comparisons	• Exercise vs. patient education + exercise • 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** Exercise vs. patient education + exercise (SMD (95% CI)) • Short-term (based on 3 studies): 0.61 (-0.40, 1.62) • Medium-term (based on 2 studies): 0.10 (-0.30, 0.50) Patient education vs. patient education + exercise (SMD (95% CI)) • Short-term (based on 5 studies): 0.44 (0.19, 0.69)* • Medium-term (based on 4 studies): 0.14 (-0.04, 0.32) • Long-term (based on 3 studies): 0.13 (-0.08, 0.33) **FUNCTION** Exercise vs. patient education + exercise (SMD (95% CI)) • Short-term (based on two studies): 1.32 (-0.57, 3.20) Patient education vs. patient education + exercise (SMD (95% CI)) • Short-term (based on 3 studies): 0.81 (0.54, 1.08)* • Medium-term (based on 2 studies): 0.39 (0.15, 0.62)* • Long-term (based on 3 studies): 0.24 (-0.06, 0.54) *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 • Knee OA as defined by the study investigators. This involved self-reported, clinical and or/radiographic diagnoses • ≥45 years • Body mass index >25 kg/m2 • Any non-surgical non-pharmacological weight loss treatment, with or without any exercise treatment designed for people with knee OA. • 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. • The comparator (control) group could be an active (given any non-diet treatment) or no treatment (including placebo or waiting list) group. • If studies involved mixed patient populations, at least 80% of the sample had to have knee OA. • 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 Diet + Exercise vs. control (active (given any non-diet treatment) or no treatment). (based on 3 studies), SMD (95% CI)

64

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<12 months -0.78 (-1.25, -0.31) 0.001*
≥12 months -0.22 (-0.46, 0.03) 0.08
Total -0.37 (-0.69, -0.04) 0.029*

FUNCTION
Diet + Exercise vs. control (active (given any non-diet treatment) or no treatment), (based on 4 studies) SMD (95% CI)

<12 months -0.63 (-1.01, -0.25) 0.001*
≥12 months -0.17 (-0.41, 0.07) 0.17
Total -0.32 (-0.56, -0.08) 0.010*

*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.
[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.
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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
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. • Intervention: studies of CBT and exercise delivered by physical therapists, no co-interventions were allowed. • Control: Any control group • Randomized controlled clinical trial. • English language
Comparisons	• Centre-based CBT+ exercise vs. control • Distance- delivered CBT+ exercise vs. control • 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** Centre-based CBT+ exercise vs. control (based on 2 studies) (SMD (95% CI)) • -1.62 (-1.97, -1.27)* Distance- delivered CBT+ exercise vs. control (based on 2 studies) (SMD (95% CI)) • -1.28 (-1.75, -0.81)* Overall: CBT+ exercise vs. control (SMD (95% CI)) • -1.42 (-1.76, -1.09)* *Statistically significant in favor of intervention

Adverse events

Not reported

Risk of bias

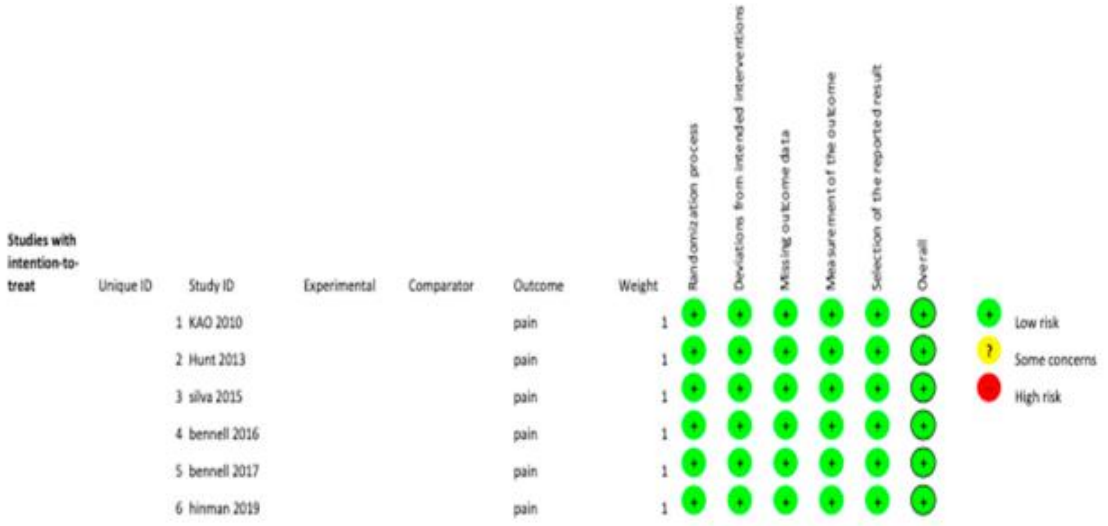

Fig. 4. Methodological quality assessment (RoB2).

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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
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 • Effect of internet-based rehabilitation programs • 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 • English or Chinese language. • Participants above 18 years, • 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. • Internet-based rehabilitation could be the only intervention or could be combined with another form of physiotherapy. • 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. • Rehabilitation methods include exercise, patient education, and self-management. • Interventions used for participants had to be internet-based such as by email, websites, or software systems. • 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 Internet-based rehabilitation vs. conventional therapy, SMD (95 % CI): • -0.21 (-0.40, -0.01) FUNCTION Internet-based rehabilitation vs. conventional therapy, SMD (95 % CI): • -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 • 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) • Randomized controlled trials (RCT) • Multimodal interventions including an active exercise rehabilitation program, and at least one other medical, educational or biopsychosocial intervention • Control: usual medical care including medication prescription or to no intervention • 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 • 3-6 months • 1 year
Results per outcome measure	**PAIN** Multimodal intervention vs. control (MD (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)* *Statistically significant in favor of multimodal intervention

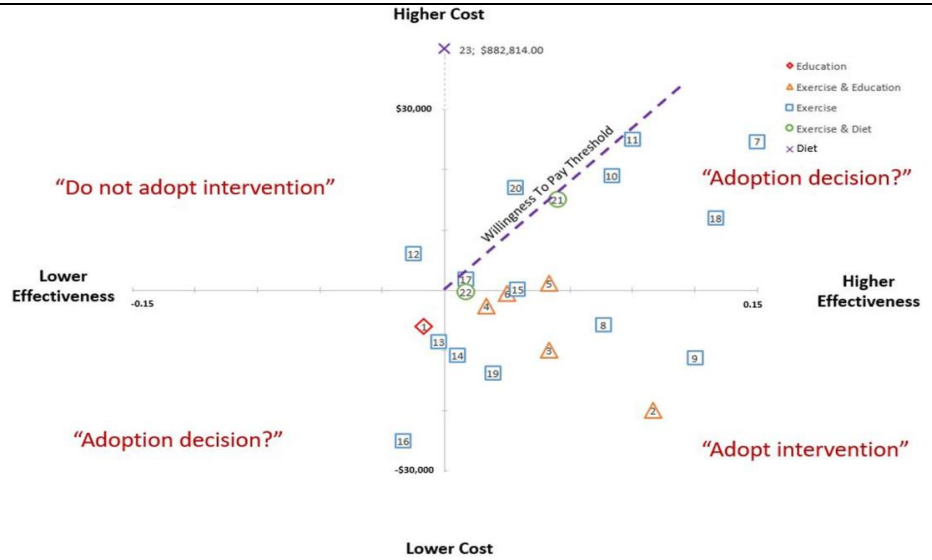
	FUNCTION Control vs. multimodal intervention (SMD (95 % CI)) • 6-12 weeks: 0.47 (0.34, 0.61)* • 3-6 months: 0.26 (0.12, 0.39)* • 1 year: 0.29 (0.13, 0.46)* *Statistically significant in favor of multimodal intervention
Adverse events	Not reported
Risk of bias	

AMSTAR 2

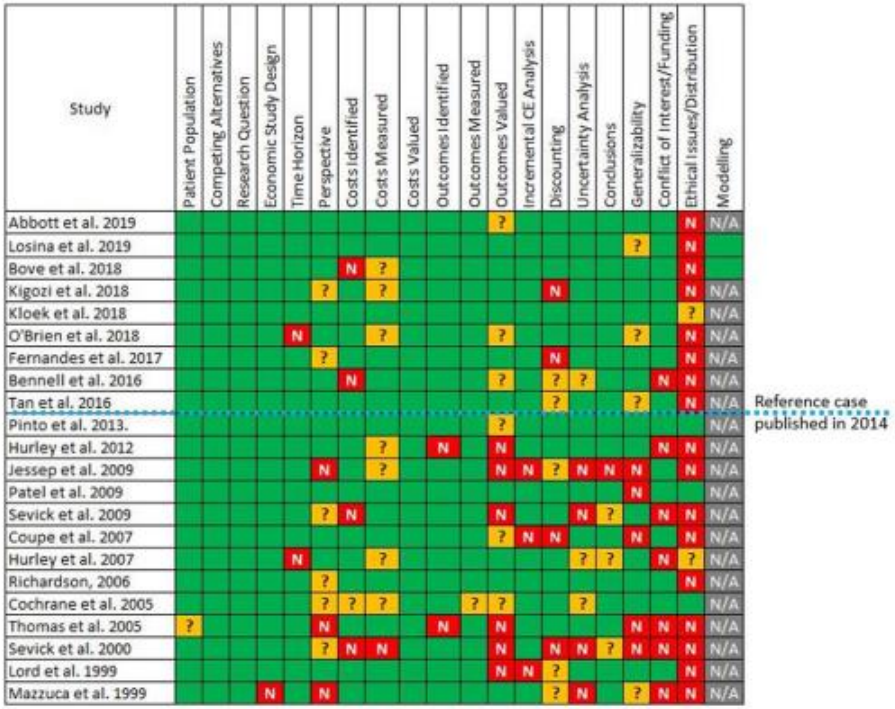
Study	1	2*	3	4*	5	6	7*	8	9*	10	11*	12	13*	14	15	16	Overall quality
Kechichian 2022	Y	Y	Y	P	Y	Y	N	P	Y	N	Y	N	N	Y	Y	Y	Critically low

*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 • People with hip and/or knee OA • Receiving education, exercise and dietary weight management interventions compared to any control. • Education was defined as any formal instruction about OA and self-management techniques. • Exercise was defined as any prescribed activity requiring muscular contraction. • Dietary weight management was defined as any type of intervention with the goal of caloric restriction. • 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). • 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	

	 *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) Exercise only (n=61)	12, 32, 53 weeks	VAS pain (0-100) PCST/ex vs. exercise 0-12wk: 5.8 (-1.4, 13.0) 0-32wk: 9.4 (1.0,17.9)* 0-52wk: 2.8 (-5.2, 10.7) *Significantly in favor of PCST/ex PCST/ex vs. PCST 0-12wk: 6.7 (-0.6, 14.1) 0-32wk: 8.4 (0.3,16.6)* 0-52wk: 2.6 (-5.2, 10.4) *Significantly in favor of PCST/ex PCST vs. exercise 0-12wk: -0.9 (-8.1, 6.3) 0-32wk: 1.0 (-7.0, 9.0) 0-52wk: 0.2 (-8.2, 8.5)	WOMAC function (0-68) PCST/ex vs. exercise 0-12wk: 3.7 (0.4, 7.0)* 0-32wk: 4.4 (0.2, 8.7)* 0-52wk: 2.8 (-1.0, 6.6) *Significantly in favor of PCST/ex PCST/ex vs. PCST 0-12wk: 7.9 (4.7, 11.2)* 0-32wk: 6.6 (2.3, 10.8)* 0-52wk: 5.5 (1.6, 9.3)* *Significantly in favor of PCST/ex PCST vs. exercise 0-12wk: -4.2 (-7.6, -0.9)* 0-32wk: -2.1 (-6.4, 2.1) 0-52wk: -2.7 (-6.9, 1.5) *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. *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) *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 12 months	NRS (0-10) *Change BL-6 months:* Exercise vs. control -0.8 (-1.5 to -0.2), p = 0.011 Diet and exercise vs. control: -1.5 (-2.1 to -0.8), p= <0.001 Diet and exercise vs. exercise: -0.6 (-1.1 to -0.2), p= 0.005 *Change BL-12 months:* Exercise vs. control -0.7 (-1.4 to -0.1), p= 0.028 Diet and exercise vs. control: -1.3 (-2.0 to -0.7), p= <0.001 Diet and exercise vs. exercise: -0.6 (-1.0 to -0.1), p= 0.010	WOMAC function (0-68) *Change BL-6 months:* Exercise vs. control -7.0 (-9.7 to -4.2), p= <0.001 Diet and exercise vs. control: -9.8 (-12.5 to -7.0), p= <0.001 Diet and exercise vs. exercise: -2.8 (-4.7 to -0.8), p= 0.005 *Change BL-12 months:* Exercise vs. control -4.4 (-7.4 to -1.4), p= 0.004 Diet and exercise vs. control: -7.5 (-10.4 to -4.5), p= <0.001 Diet and exercise vs. exercise: -3.1 (-5.1 to -1.1), p= 0.003	Quality of life (AQoL-8D) Scale, -0.04 to 1.00; higher scores indicate better quality of life *Change BL-6 months:* Exercise vs. control 0.05 (0.00 to 0.09), p= 0.031 Diet and exercise vs. control: 0.08 (0.04 to 0.12), p= <0.001 Diet and exercise vs. exercise: 0.03 (0.00 to 0.06), p= 0.019 *Change BL-12 months:* Exercise vs. control 0.03 (-0.01 to 0.07), p= 0.112 Diet and exercise vs. control: 0.06 (0.01 to 0.10), p= 0.007 Diet and exercise vs. exercise: 0.02 (-0.00 to 0.05), p= 0.083 Body weight Physical activity (IPEQ-W) Depression (DASS-21) 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 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 32 weeks: Between group Δ: 6.0 (1.0-11.0), p = 0.02, favoring intervention	BMI Waist-hip ratio Knee flexion Knee extension TUG 40m FPWT Knee strength Depression score Baseline 77/6.1 ± 6.2 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** 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 • Exercise adherence as outcome
2	12-15	RCT	K/H	**Bendrik et al. 2021** 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** 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** 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** 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 • Economic evaluation
6	12-15	RCT	K	**Baker et al. 2020** 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.

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 • 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. • Any form of therapeutic exercise was eligible, including aerobic exercise, strengthening exercise, balance exercise and so on. • Studies were required to test an intervention that aimed to improve adherence to therapeutic exercise. • 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. • 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 Exercise without booster sessions vs. exercise with booster sessions (SMD (95% CI)) • 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

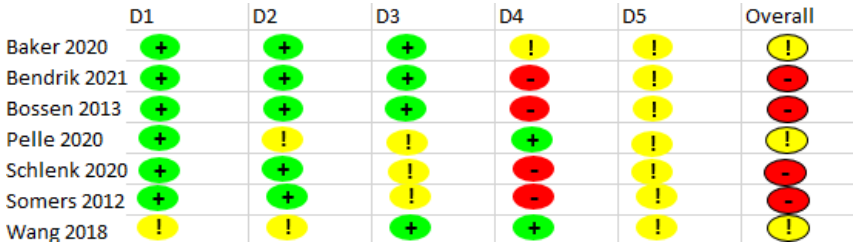
Reference	Hip Knee	Intervention	Control	Follow-up	Outcomes pain	Outcomes function	Other outcomes
Bendrik et al. 2021	K/H	One-hour educational session. Physical activity on prescription incl. goal setting, action planning, self-monitoring, review and graded tasks	One-hour educational session. Individual 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 Accelerometer assessed physical activity Fitness and pain after 6MWT EQ-VAS 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) Change score (Intervention-control) 3 months: −1 (−1.6 to −0.38), p= 0.002 12 months: −0.36 (−1.1 to 0.38), p= 0.33	HOOS/KOOS-function Change score (Intervention-control) 3 months: 6.5 (1.8-11.2), p=0.006 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) Δ overall (95 % CI) 3.5 (0.9, 6.0)	H/KOOS function (0-100) Δ overall (95 % CI) 2.6 (0.4, 4.9)	H/KOOS QoL(0-100) Δ overall (95 % CI) 0.3 (-2.5, 3.1) 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) PCT only (n=60) BMW only (n=59)			BWM only: 8.3 (2.5-14.1), p=0.002 PCST only: 7.3 (1.3, 13.3), p=0.01 Standard care: 10.8 (4.6- 16.9) p=0.0002	BWM only: 10.8 (5.3–16.2), p=<0.0001 PCST only: 10.0 (4.4–15.6) , p=0.0001 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) Knee pain increase OR (95 % CI) 0.37 (0.14, 1.01) 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** 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 This SR will also inform rec. 3 – management plan
2	**14-17**	**SR**	**K**	**Wu et al. 2022** 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** 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** 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** 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. 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** 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** 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. Includes 3 RCTS on patient education, all published <2012
		SR	**H/K**	**Sinatti et al. 2022** 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)

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)

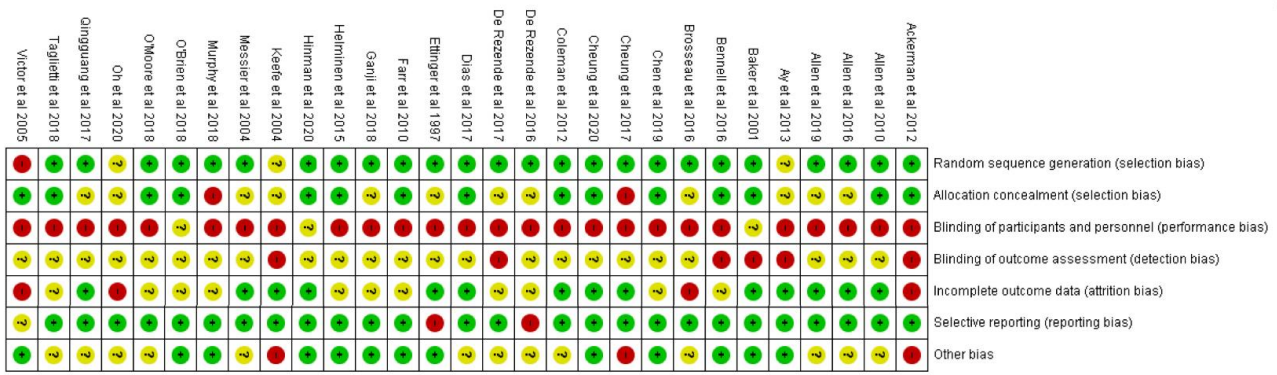
Conclusion:

- 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 • Any form of patient education • Clinical or radiographically confirmed knee OA • Control: any non-pharmacological intervention, even if the patient educational intervention was the control intervention.
Comparisons	• Patient education vs. usual care • Patient education vs. exercise • Patient education versus patient education + exercise • The comparisons exercise vs. patient education + exercise and patient education versus patient education + exercise is reported with recommendation #3 (management plan/package of care). • 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** Patient education vs. usual care (SMD (95% CI)) • Short-term: -0.35 (-0.56, -0.14)*,[a] • Medium-term: -0.10 (-0.26, 0.05)[c] • Long-term: -0.12 (-0.30, 0.05)[e]

	Patient education vs. exercise (SMD (95% CI)) • Short-term: 0.77 (0.07, 1.47) %, b • Medium-term: 0.12 (-0.11, 0.36) c • Long-term: 0.18 (-0.11, 0.46)d Patient education versus patient education + exercise (SMD (95% CI)) • Short-term: 0.44 (0.19, 0.69) %,b • Medium-term: 0.14 (-0.04, 0.32 c • Long-term: 0.13 (-0.08, 0.33) d **FUNCTION** Patient education vs. usual care (SMD (95% CI)) • Short-term: -0.31 (-0.62, -0.00)*a • Medium-term: -0.17 (-0.40, 0.07)c Patient education vs. exercise (SMD (95% CI)) • Short-term: 0.33 (-0.02, 0.69)d • Medium-term: 0.23 (-0.08, 0.54)e Patient education versus patient education + exercise (SMD (95% CI)) • Short-term: 0.81 (0.54, 1.08) %,d • Medium-term: 0.39 (0.15, 0.62)%, e • Long-term: 0.24 (-0.06, 0.54)d *Statistically significant in favour of patient education (alone) over control %Statistically significant in favour of control over patient education (alone) 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. • No restrictions on participants' age, duration of disease, the severity of disease, etc. • Participants who have previously undergone total knee arthroplasty will not be included. • 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 • Any type of control group could be included in this study, such as routine care, standard treatment, and spa therapy. • Only RCTs • The language of literature was restricted to those published in English.
Outcomes	• Pain, Function
Comparisons	• Self- management vs. Routine care • Self-management + routine care vs. routine care • 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** Self- management vs. Routine care (based on 4 studies), SMD (95 % CI) • -1.51 (-2.41, -0.62)

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

Risk of bias

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AMSTAR 2

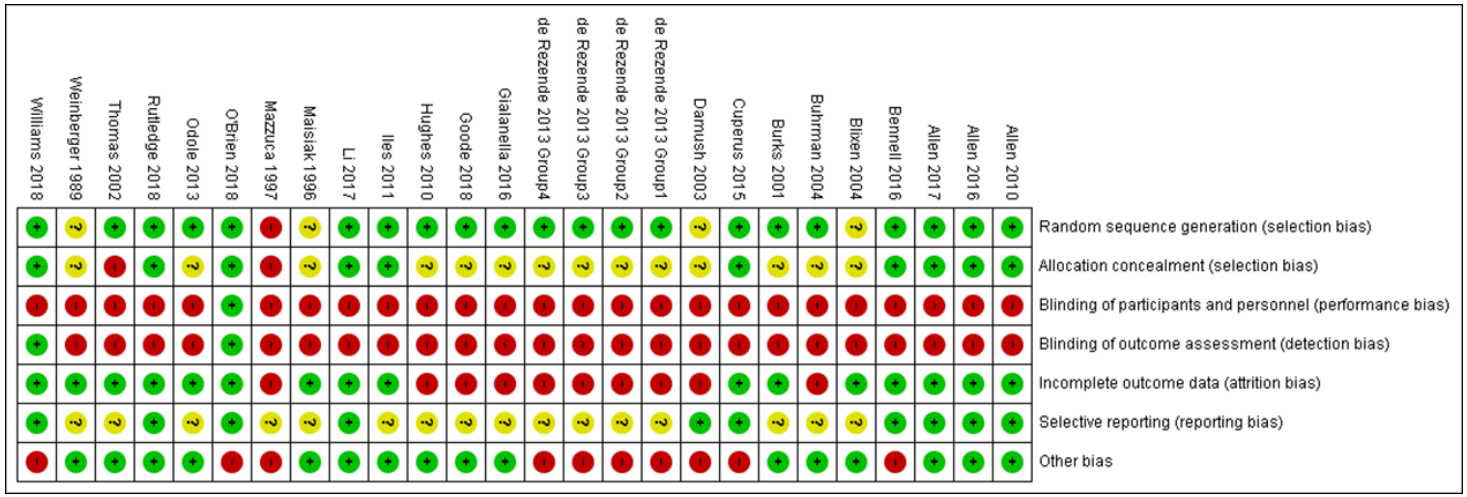
Study	1	2*	3	4*	5	6	7*	8	9*	10	11*	12	13*	14	15	16	Overall quality
Wu 2022	Y	Y	Y	P	Y	Y	N	P	Y	N	Y	Y	Y	Y	Y	Y	Low

*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). • Eligible comparison groups included other interventions, no treatment, usual care, wait-list control or attention control. • Participants with osteoarthritis of the knee or hip, or spinal pain (back or neck pain). • 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. • 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). • There were no restrictions on intensity or duration of participant symptoms. • Studies that included patients with a serious pathology (e.g. cancer, infection, etc.) or included patients in the postoperative period were excluded. • 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). • 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 • Telephone plus comprehensive face-to-face interventions vs. face-to face interventions alone
Results	
Number of RCTs	8 trials on knee OA 5 trials on patients with hip and/or knee OA 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** Telephone-based interventions (with educational materials) versus usual care (SMD (95% CI)), based on 3 OA studies -0.16 (-0.47, 0.14) Telephone plus comprehensive face-to-face interventions versus face-to-face interventions alone (SMD (95% CI)), based on 3 OA studies -0.13 (-0.30, 0.04) **DISABILITY** Telephone-based interventions (with educational materials) versus usual care (SMD (95% CI)), based on 3 OA studies -0.13 (-0.30, 0.04) Telephone plus comprehensive face-to-face interventions versus face-to-face interventions alone (SMD (95% CI)), based on 3 OA studies -0.06 (-0.31, 0.19)

Risk of bias



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AMSTAR 2

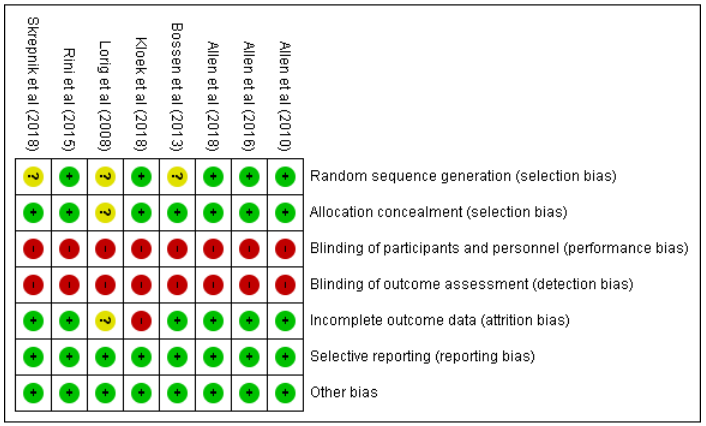
Study	1	2*	3	4*	5	6	7*	8	9*	10	11*	12	13*	14	15	16	Overall quality
O'Brien 2018	Y	Y	Y	P	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Low

*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 • English language • Adults (≥18 years of age) • Confirmed diagnosis of OA, radiologically or by a health practitioner • All types of OA at any stage of the disease • Studies recruiting patients with OA with other conditions only if outcome data for OA patients were provided. • 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). • 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. • Any type of control group
Outcomes	Pain, function, quality of life (QoL)
Comparisons	• Digital-based structured SMP vs. usual care/no treatment • Digital-based structured SMP vs. physical therapy or health education • 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 Function: 9-52 weeks QoL: 4 and 12 months
Results	(Forrest plots for all outcomes and comparisons are presented below this table) **PAIN** Digital-based structured SMP (telephone + video, mobile app, internet) vs. usual care/no treatment (SMD (95% CI)): • Post-intervention: -0.28 (-0.38, -0.18)*[,a] • 12 months: -0.20 (-0.35, -0.05)*[,b] Digital-based structured SMP (telephone + video, mobile app, internet) vs. physical therapy or health education (SMD (95% CI)): • Post intervention: -0.15 (-0.29, 0.01) [b] • 12 months: -0.12 (-0.31, 0.07)[c] **FUNCTION** Digital-based structured SMP (telephone + video, mobile app, internet) vs. usual care/no intervention (SMD (95% CI)): • Post intervention: -0.26 (-0.35, -0.16)*[,a] • 12 months: -0.23 (-0.38, 0.08)[b] Digital-based structured SMP (telephone + video, mobile app, internet) vs. physical therapy or health education (SMD (95% CI)): • Post intervention: -0.04 (-0.18, 0.11) [b] • 12 months: -0.03 (-0.22, 0.16) [c] **QUALITY OF LIFE** Web-based SMP vs. wait-list control (SMD (95% CI)): • Post intervention: -0.17 (-0.47, 0.14)[d] • 12 months: -0.07 (-0.39, 0.26) [d] 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

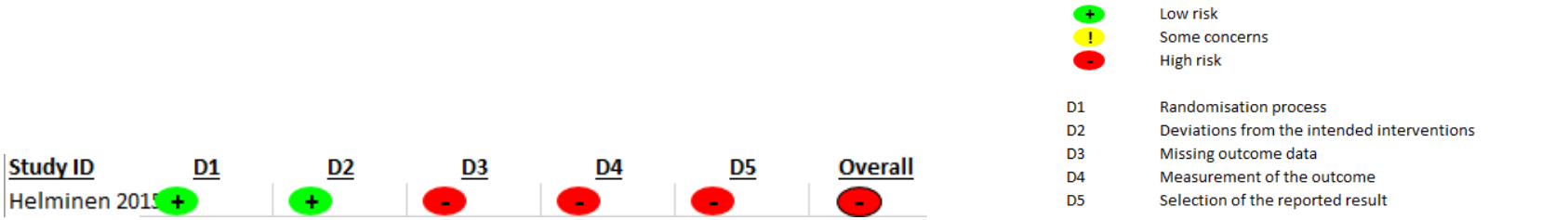
Study	1	2*	3	4*	5	6	7*	8	9*	10	11*	12	13*	14	15	16	Overall quality
Safari 2020	Y	Y	Y	P	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	High

*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 Between group change (BL-posttreatment average), mean (95 % CI) -3.9 (-11.8, 4.0), p= 0.332	WOMAC function Between group change (BL-posttreatment average), mean (95 % CI) -0.3 (-8.3, 7.8), 0.951	HR QoL, 15D Between group change (BL-posttreatment average), mean (95 % CI) -0.03 (-0.06, 0.00), 0.068 RAND-36, 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** 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** 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** 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** 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** 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** 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** 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** 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** Aquatic exercise for the treatment of knee and hip osteoarthritis	**Aquatic exercise**	• Data not extracted • Covered by Duan 2022 • Includes only studies published pre 2012
		SR	**H/K**	**Corso et al. 2022** 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 • No meta-analysis • Rapid review
		SR	**K**	**Chen et al. 2019** Are aquatic exercises efficacious in postmenopausal women with knee osteoarthritis? A meta-analysis of randomized controlled trials	**Aquatic exercise**	• Data not extracted • Selected group of postmenopausale women
		SR	**K**	**Schafer et al. 2018** 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 • 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 • Adults ≥18 years of age • Diagnosis of knee OA or had chronic knee pain for at least 1 month in the last 12 months prior to the studies • Examined the effects of technology-supported exercise programs on knee pain, physical function, or quality of life • Were written in English • 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 Technology-supported exercise vs. control (SMD (95% CI)) • -0.29 (-0.48, -0.10)* PHYSICAL FUNCTION Technology-supported exercise vs. control (SMD (95% CI)) • 0.22 (0.00, 0.46)** QUALITY OF LIFE Technology-supported exercise vs. control (SMD (95% CI)) • 0.25 (0.04, 0.46)** *A negative difference favours the intervention group ** 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

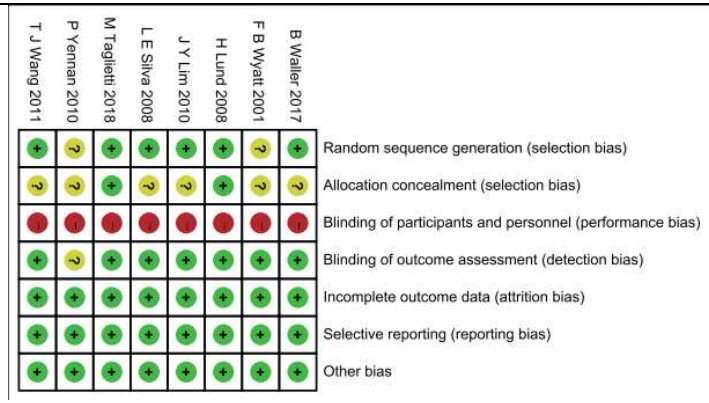
*Critical items, Y=yes, N=No, P=partial yes

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 • Patients diagnosed with knee OA according to symptoms and radiologic findings without any invasive intervention • The RCT compared aquatic exercise (AQE) to land-based exercise (LBE). • All types of exercise developed in a therapeutic/heated indoor/outdoor pool were eligible • 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: • Aquatic exercise vs. land-based exercise (short-term) *Data not extracted, due to only two studies included in fragmented meta-analysis:* • *Aquatic exercise vs. land-based exercise (long-term)* • *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 VAS (based on 5 studies): aquatic exercise versus land-based exercise, SMD (95 % CI) • - 0.62 (-1.27, 0.03)

	WOMAC pain (based on 2 studies): aquatic exercise versus land-based exercise, SMD (95 % CI) • -1.66 (-4.90, 1.58) • KOOS pain (based on 4 studies): aquatic exercise versus land-based exercise, SMD (95 % CI) • 0.19 (-0.07, 0.45) FUNCTION KOOS symptom (based on 4 studies): aquatic exercise versus land-based exercise, SMD (95 % CI) • 0.19 (-0.32, 0.71) KOOS ADL (based on 4 studies): aquatic exercise versus land-based exercise, SMD (95 % CI) • 0.17 (-0.08, 0.43) KOOS sport&rec (based on 4 studies): aquatic exercise versus land-based exercise, SMD (95 % CI) • 0.24 (-0-19, 0.67) SF-36 physical function (based on 2 studies): aquatic exercise versus land-based exercise, SMD (95 % CI) • -1.68 (-5.38, 2.03) • QUALITY OF LIFE KOOS Qol (based on 4 studies): aquatic exercise versus land-based exercise, SMD (95 % CI) • 0.19 (-0.07, 0.44) 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

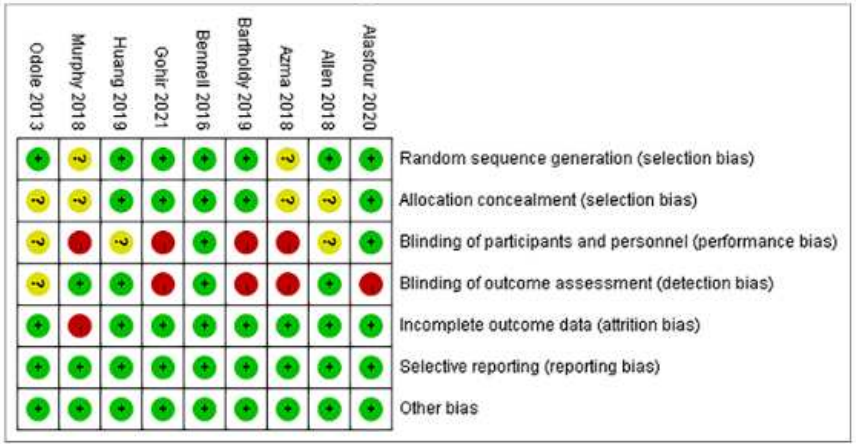
*Critical items, Y=yes, N=No, P=partial yes

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 • Knee • Pain, function, quality of life • 9 RCTs
Inclusion criteria	• RCTs written in English • Participants aged 18 years or older • 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) • Able to receive telehealth-based intervention meaning that participants had access to and ability to use a smartphone, internet or other technological products. • 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. • 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. • 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 Telehealth-based exercise intervention vs. Non-telehealth control, SMD (95% CI) • -0.28 (-0.49, -0.08) FUNCTION Telehealth-based exercise intervention vs. Non-telehealth control, SMD (95% CI) • -0.17 (-0.42, 0.08) QUALITY OF LIFE Telehealth-based exercise intervention vs. Non-telehealth control, SMD (95% CI) • 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

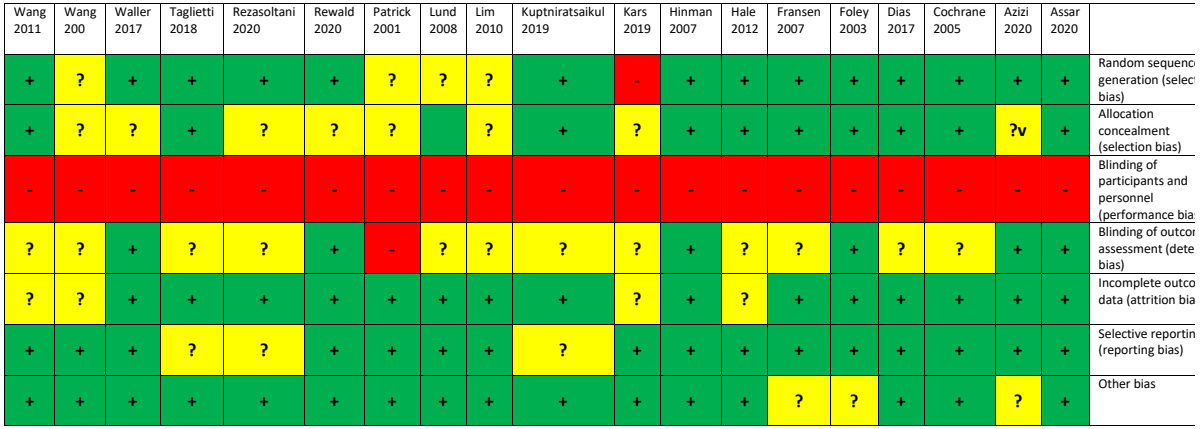
*Critical items, Y=yes, N=No, P=partial yes

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 • Have not undergone joint replacement surgery. • Intervention is an aquatic training course or program supervised and instructed by a physiotherapist, • Excluding exercises where patients do aquatic sports on their own, and passive hydrotherapy such as spa • Comparison is no intervention (including usual care and unsupervised domiciliary activities), excluding land-based training • 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). • Secondary outcomes are stiffness measured by the WOMAC subscale, sport measured by the KOOS subscale and adverse events • Only RCTs are considered.
Outcomes	Pain and function
Comparisons	Short-term Aquatic exercise vs. control Medium-term Aquatic exercise vs. control 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) • Short-term (based on 18 studies): -0.54 (-0.81, -0.28) • Medium-term (based on 2 studies): -4.53 (-12.95, 3.90) • Long-term (based on 5 studies): -0.59 (-1.24, 0.07) FUNCTION Aquatic exercise vs. control, SMD (95 % CI) • Short-term (based on 11 studies): -0.64 (-1.00, -0.28) • Medium-term (based on 1 study): -7.62 (-9.81, -5.43) • 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



Wang 2011	Wang 200	Waller 2017	Taglietti 2018	Rezasoltani 2020	Rewald 2020	Patrick 2001	Lund 2008	Lim 2010	Kuptniratsaikul 2019	Kars 2019	Hinman 2007	Hale 2012	Fransen 2007	Foley 2003	Dias 2017	Cochrane 2005	Azizi 2020	Assar 2020	
+	?	+	+	+	+	?	?	?	+	-	+	+	+	+	+	+	+	+	Random sequenc generation (selec bias)
+	?	?	+	?	?	?		?	+	?	+	+	+	+	+	+	?v	+	Allocation concealment (selection bias)
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Blinding of participants and personnel (performance bia
?	?	+	?	?	+	-	?	?	?	?	+	?	?	+	?	?	+	+	Blinding of outcor assessment (dete bias)
?	?	+	+	+	+	+	+	+	+	?	+	?	+	+	+	+	+	+	Incomplete outco data (attrition bia
+	+	+	?	?	+	+	+	+	?	+	+	+	+	+	+	+	+	+	Selective reportin (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
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

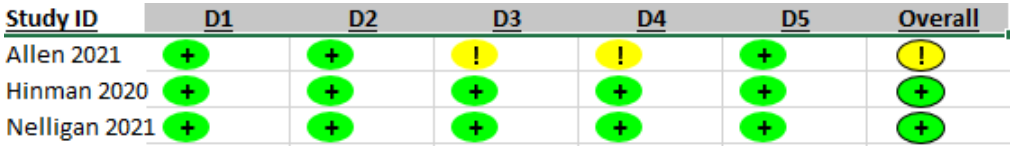
RANDOMIZED CONTROLLED TRIALS

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) 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)	WOMAC Function (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)	Adverse events: 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 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

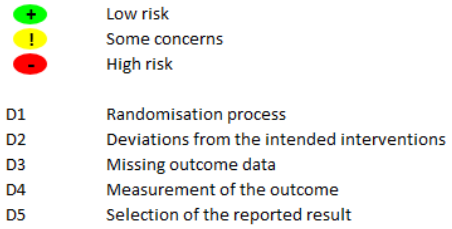
			followed by a minimum of 4 (up to a maximum of 10 calls in total, each ~20 min), over 6 months (n= 87)	resources; assistance navigating services; emotional support and care escalation when needed. Participants received one call from a nurse, with additional calls if required (n=88)		Difference in change 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 *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 **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* *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* *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** 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** 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** 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** 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** 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** 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** 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** 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** 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** Yoga for Osteoarthritis: a Systematic Review and Meta-analysis	**Yoga**	• Data extracted
11	**55-57**	**SR**	**H/K**	**Mazzei et al. 2021** Are education, exercise and diet interventions a cost-effective treatment to manage hip and knee osteoarthritis? A systematic review	**Cost-effectiveness**	• Data extracted • Cost-effectivness analyses
19		**SR**	**H**	**Beumer et al. 2016** Effects of exercise and manual therapy on pain associated with hip osteoarthritis: a systematic review and meta-analysis	**Manual therapy + exercise**	• Data not extracted. • Manual therapy intervention
20		**SR**	**H**	**Ceballos-Laita et al. 2019** 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 • General exercise • No meta-analysis
21		**SR**	**H**	**Fransen et al. 2014** Exercise for osteoarthritis of the hip: a Cochrane systematic review	**General exercise**	• Data not extracted • General exercise
22		**SR**	**K**	**Fransen et al. 2015** Exercise for osteoarthritis of the knee: a Cochrane systematic review	**General exercise**	• Data not extracted • General exercise
23		**SR**	**K**	**Ferreira et al. 2019** Non-Pharmacological and Non-Surgical Interventions for Knee Osteoarthritis: A Systematic Review and Meta-Analysis	**General exercise**	• Data not extracted • General exercise

24		**SR**	**H/K**	**Fernandopulle et al. 2017** 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 • General exercise
25		**SR**	**H/K**	**Goh et al. 2019** 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 • General exercise
26		**SR**	**H/K**	**Hall et al. 2017** Effectiveness of Tai Chi for Chronic Musculoskeletal Pain Conditions: Updated Systematic Review and Meta-Analysis	**Tai Chi**	• Data not extracted • Covered by a newer SR by Hu et al. 2021
27		**SR**	**K**	**Hislop et al. 2020** 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 • Too specific intervention
28		**SR**	**H/K**	**Hurley et al. 2018** Exercise interventions and patient beliefs for people with hip, knee or hip and knee osteoarthritis: a mixed method review	**General exercise**	• Data not extracted • General exercise
29		**SR**	**H/K**	**Kraus et al. 2019** Effects of Physical Activity in Knee and Hip Osteoarthritis: A Systematic Umbrella Review	**General exercise**	• Data not extracted • General exercise
30		**SR**	**K**	**Kelley et al. 2022** 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 • Similar data as presented in Hu 2021
31		**SR**	**K**	**Li et al. 2016** The effects of resistance exercise in patients with knee osteoarthritis: a systematic review and meta-analysis	**Resistance exercise**	• Data not extracted • Overlap Bartholdy 2017
32		**SR**	**K**	**Li et al. 2020**	**Tai Chi**	• Data not extracted • 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** Non-pharmacological interventions for treating symptoms of knee osteoarthritis in overweight or obese patients; a review	**General exercise**	• Data not extracted • General exercise
34		**SR**	**K**	**RaghavaNeelapala et al. 2020** Hip Muscle Strengthening for Knee Osteoarthritis: A Systematic Review of Literature	**Hip Muscle Strengthening for Knee Osteoarthritis**	• Data not extracted • Too specific intervention
35		**SR**	**H**	**Sampath et al. 2016** 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 • General exercise • Includes only RCTs published before 2012
36		**SR**	**K**	**Thorlund et al. 2022** 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. • General exercise
37		**SR**	**H/K**	**Whittaker et al. 2021** Osteoarthritis year in review 2020: rehabilitation and outcomes	**General exercise**	• Data not extracted • No meta-analysis
38		**SR**	**K**	**You et al. 2021** 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. • Inapropriate analyses
39		**SR**	**H/K**	**Zampogna et al. 2020** 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 • 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 • Patients with hip osteoarthritis • Supervised progressive resistance training (a minimum intensity of 60% of 1 RM), two weekly supervised exercise sessions for six weeks) • Compared with common treatment (without resistance training) • 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 Supervised progressive resistance training vs. control (MD (95% CI)) • HOOS (0-100): 7.83 (2.64, 13.02) FUNCTION Supervised progressive resistance training vs. control (MD (95% CI)) • HOOS (0-100): 9.13 (4.45, 13.80) QUALITY OF LIFE Supervised progressive resistance training vs. control (MD (95% CI)) • HOOS (0-100): 6.80 (1.96, 11.63) All results in favour of interventioN
Risk of bias	

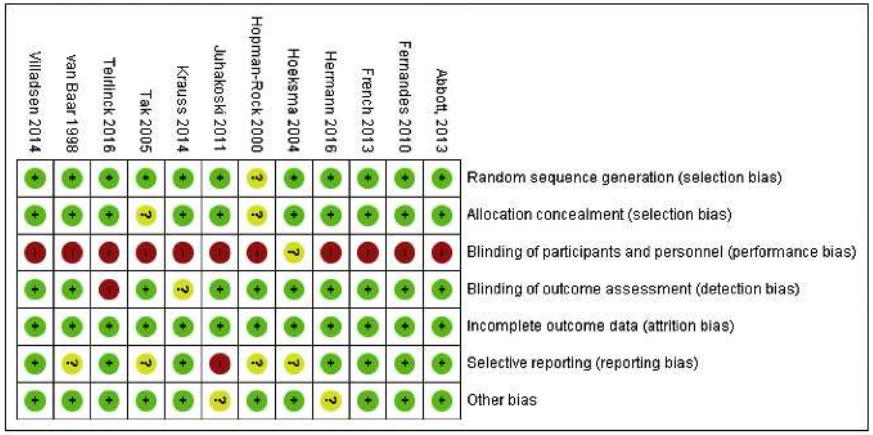
Hermann 2016	Foley 2003	Bieler 2017	
+	+	+	Random sequence generation (selection bias)
+	+	+	Allocation concealment (selection bias)
-	-	-	Blinding of participants and personnel (performance bias)
+	+	+	Blinding of outcome assessment (detection bias)
+	+	+	Incomplete outcome data (attrition bias)
+	?	+	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 • People diagnosed with symptomatic hip OA who had not undergone hip OA related surgery were included. • The intervention could be any land-based exercise programmes including muscular strengthening, flexibility and/or cardiorespiratory exercises. • 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. • 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 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 ACSM compliant exercise programs vs. no-exercise control, SMD (95 % CI): • -0.42 (-0.58, -0.26) Non-ACSM compliant exercise programs vs. no-exercise control, SMD (95 % CI): • -0.05 (-0.35, 0.25)

	FUNCTION ACSM compliant exercise programs vs. no-exercise control, SMD (95 % CI): • -0.41 (-0.58, -0.24) Non-ACSM compliant exercise programs vs. no-exercise control, SMD (95 % CI): • -0.23 (-0.52, 0.06)
Risk of Bias	 *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 • Patients were >18 years old • Clinical and/or radiological hip osteoarthritis • the intervention was an active form of exercise therapy under supervision of a (physical) therapist. • The intervention was not part of a multidisciplinary or multimodal program and was evaluated as a standalone intervention, • The intervention in the control group was usual care (e.g., medication and/or education), and no treatment or waiting list. • Studies with control interventions as hot packs, transcutaneous electrical nerve stimulations, and ultrasound were excluded. • 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 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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<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. • The trial population should be diagnosed with knee OA in one or both knees. • 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. • 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.* • 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 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
Exercise vs. control, SMD (95% CI)
• Programs following ACSM recommendation vs. control: 0.62 (0.32, 0.93)
• Program not following ACSM recommendation vs. control: 0.52 (0.35, 0.68)

FUNCTION
• Programs following ACSM recommendation vs. control: 0.64 (0.28, 1.00)
• 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
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 • Patients (⩾18 years old) • Knee osteoarthritis confirmed by physician/specialist based on valid instruments (such as Classification Criteria of the American College of Rheumatology) • Studies comparing Tai Chi with no exercise, education class, standard care or physical therapy • 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 Tai chi vs. control (SMD (95% CI)) • WOMAC: -0.69 (-0.95, -0.44)* FUNCTION Tai chi vs. control (SMD (95% CI)) • WOMAC: -0.92, (-1.16, -0.69

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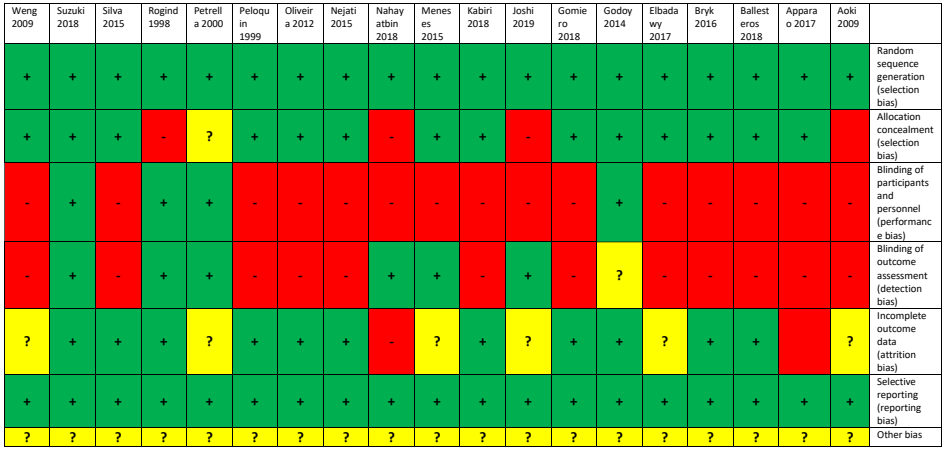
Six min walk test: 0.55 (0.10, 0.99)*
Timed up and go test: -0.55 (-0-82, -0.29)*

*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
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 • Interventions involved stretching exercises • Comparators were not a restriction • Outcomes consisted of pain scores • Studies were designed as RCTs
Outcomes	Pain
Comparisons	• Stretching exercise alone vs. Control (no exercises) • Stretching exercise in combination with other exercise vs. Control (no exercise) • 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 Stretching exercise alone vs. control (no exercises) (MD (95% CI)) • VAS (0-10): 1.86 (1.31, 2.41) Stretching exercise in combination with other exercise vs. Control (no exercise) (MD (95% CI)) • VAS (0-10): 1.31 (0.77, 1.85) • 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	See tables below

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 • Intervention: stationary cycling exercise • Comparators: control (no exercise) or exercise therapy • Outcome measures: there was no restriction, but this meta-analysis focused on those main patient reported outcome measures that can be counted and pooled • Study design: the studies were randomized-controlled trials.
Outcomes	Pain, function
Comparisons	• Stationary cycling vs. no exercise • 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))

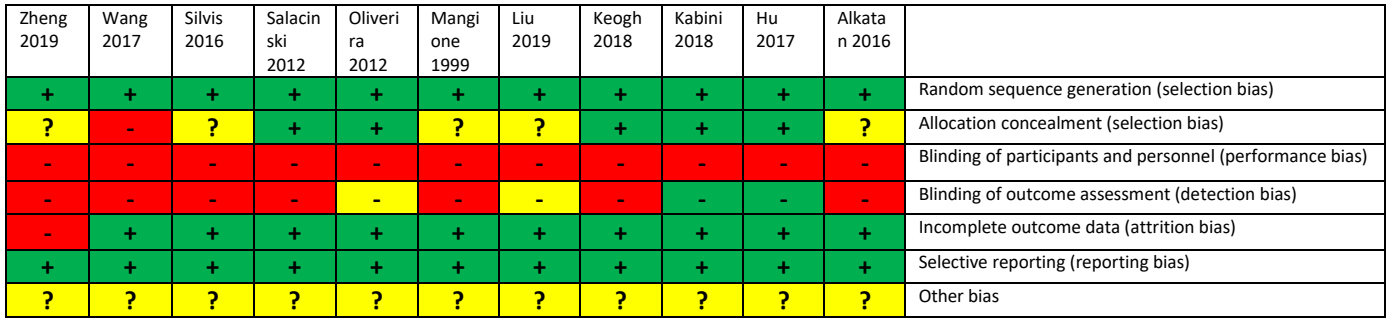
- WOMAC function: 8.28 (2.44, 14.11)
- 6 min walk test: 18.47 (-37.54, 74.48)

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 • 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. • Study Design: Randomized controlled trials (RCTs) • Published in English.
Outcomes	Pain, physical function, adverse events
Comparisons	• Proprioceptive training vs. no intervention • Proprioceptive training vs. other non-proprioceptive training (e.g., resistance and strength training) • 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 Proprioceptive training vs. no intervention (SMD (95% CI)) • -1.07 (-1.46, -0.68)* Proprioceptive training vs. other non-proprioceptive training (e.g., resistance and strength training) (SMD (95% CI)) • -0.02 (-0.74, 0.69)*

	Proprioceptive training with other non-proprioceptive training vs. other non-proprioceptive training • -0.17 (-0.58, 0.23)* FUNCTION Proprioceptive training vs. no intervention (SMD (95% CI)) • -0.97 (-1.26, -0.67)* Proprioceptive training vs. other non-proprioceptive training (e.g., resistance and strength training) (SMD (95% CI)) • -0.03 (-0.76, 0.70)* Proprioceptive training with other non-proprioceptive training vs. other non-proprioceptive training • -0.34 (-0.56, -0.12)* Negative values favours intervention ADVERSE EVENTS 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. 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

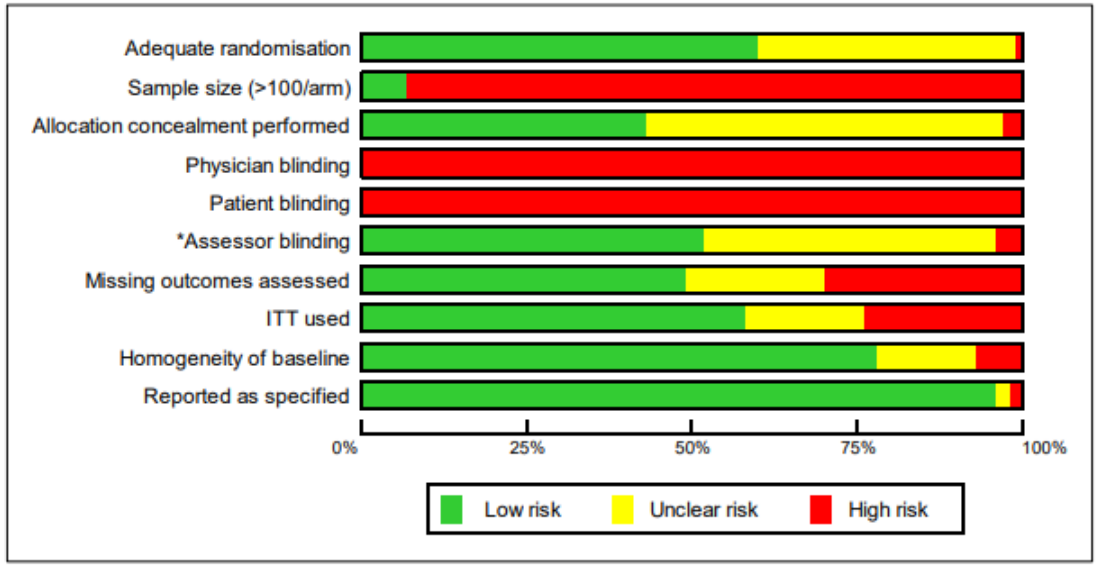
*Critical items, Y=yes, N=No, P=partial yes

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
• Participants with knee OA, hip OA, or mixed knee and hip OA diagnosed clinically and/or radiographically
• Assigned exercise programmes without additional active treatment (e.g. analgesics) as the intervention
• Assigned usual care/waiting list or a different exercise as the control group
• 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
76 exercise vs. usual care.
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

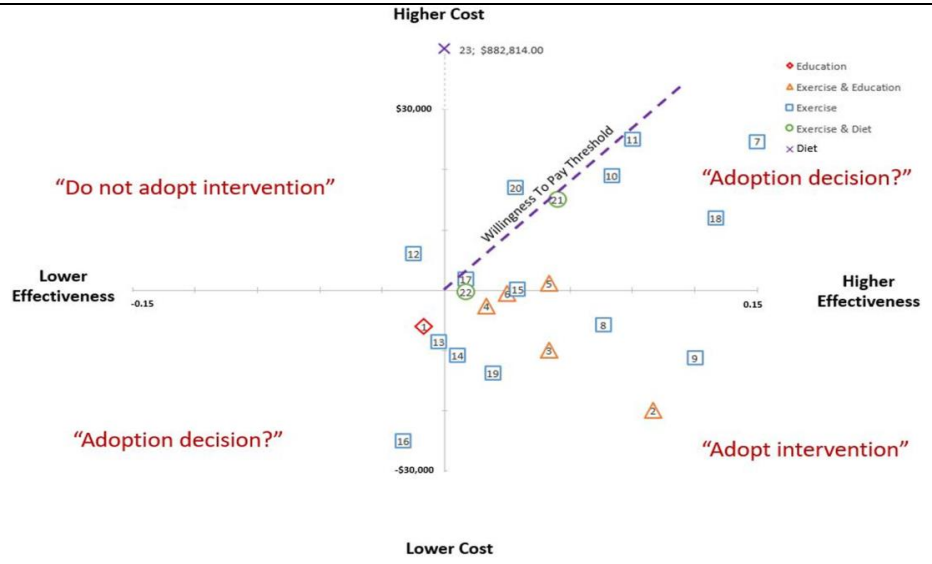
10: Lauche et al. 2019	
Study characteristics	
Study authors	Lauche, R.; Hunter, D. J.; Adams, J.; Cramer, H.
Year of publication	2019
Title	Yoga for Osteoarthritis: a Systematic Review and Meta-analysis
Inclusion period	Inception through April 2018
Inclusion criteria	• Randomised controlled trials (RCTs), cluster-randomised trials, and randomised cross-over studies. • Articles published in any languages • Adults diagnosed with osteoarthritis, i.e. all studies on patients with osteoarthritis of the knee, hip, hand, feet, and spine were considered. • No restrictions were applied regarding age, gender, and comorbidities, and diagnostic criteria utilised, • 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. • When co-interventions (such as pharmacotherapy) were applied, studies were eligible only if all participants in all groups received the same co-interventions. • 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 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 Yoga vs. exercise control (based on 4 studies), SMD (95 % CI)

<table>
<tr><td></td><td>
-1.07 [-1.92 -0.21]
Yoga vs. no-exercise control (based on 3 studies), SMD (95 % CI)
-0.75 [-1.18, -0.31]
Negative values favour yoga

PHYSICAL FUNCTION
Yoga vs. exercise control (based on 2 studies), SMD (95 % CI)
0.80 [0.36, 1.24]
Yoga vs. non-exercise control (based on 4 studies), SMD (95 % CI)
0.64 [0.30, 0.98]
Positive values favour yoga

QUALITY OF LIFE
Yoga vs. exercise control (based on 2 studies), SMD (95 % CI)
0.34 [-0.10, 0.78]
Yoga vs. non-exercise control (based on 4 studies), SMD (95 % CI)
0.21 [-0.20, 0.62]
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
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 • People with hip and/or knee OA • Receiving education, exercise and dietary weight management interventions compared to any control. • Education was defined as any formal instruction about OA and self-management techniques. • Exercise was defined as any prescribed activity requiring muscular contraction. • Dietary weight management was defined as any type of intervention with the goal of caloric restriction. • 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). • 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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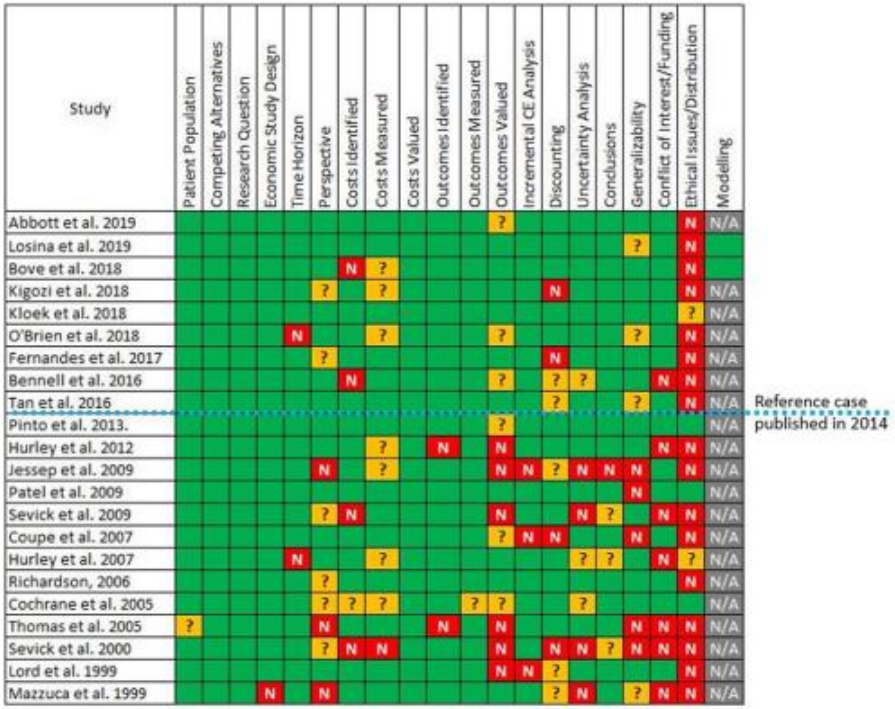
Risk of bias



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

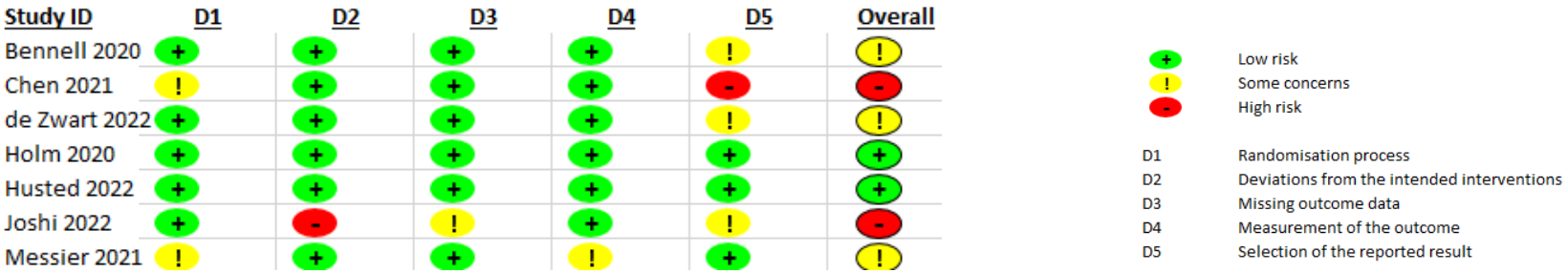
RCTs

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) 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) 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 The two sessions/week group (n=39) The four sessions/ week group (n=39)	NA	12 weeks	KOOS pain (0-100), Mean change (95% CI) from baseline between groups): Two sessions/week vs Four sessions/week: 6.1 (1.6 to 13.8), p= 0.119 Four sessions/week vs Six sessions/week 1.9	KOOS Symp (0-100), Mean change (95% CI) from baseline between groups: Two sessions/week vs Four sessions/week: 6.9 (1.2 to 15.0), p= 0.093177 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) 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. • Few studies in meta-analysis • 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. • 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. • Participants with a primary complaint of hip or knee OA or spinal pain (low back or neck pain). • Diagnosis of hip or knee OA could be radiographic or clinical. • We only included trials of mixed conditions when data were reported separately for OA and spinal pain. • **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**. • 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). • 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 • Weight loss focused interventions vs. versus exercise for knee OA • Dietary weight loss and exercise vs. dietary weight loss only for knee OA • 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** **All weight loss interventions vs. minimal care for OA (based on 10 studies), SMD (95% CI)** • -0.54 (-0.86, -0.22) Weight loss only (diet) • -0.36 (-0-71, -0.01) Multifocused (comb. diets, telephone coaching, psychological pain-coping interventions/CBT, specialist referral education, exercise) • -0.81 (-1.41, -0.21) Excluding high ROB studies (based on 5 studies) • –0.32 (–0.68, 0.04) <12 mo in duration • –0.85 (–1.39, –0.30) ≥12 mo in duration • –0.13 (–0.28, 0.02) **Weight-loss focused interventions vs. exercise for knee OA (based on 4 studies), SMD (95% CI)** • –0.13 (–0.40, 0.14) **Dietary Weight Loss and Exercise vs. Dietary Weight Loss Only for Knee OA (based on 3 studies), SMD (95% CI)** • –0.48 (–0.94, –0.03) **Dietary Weight Loss and Exercise Versus Exercise Only for Knee OA (based on 4 studies), SMD (95% CI)** • –0.29 (–0.55, –0.03)

	DISABILITY **All weight loss interventions vs. minimal care for OA (based on 11 studies), SMD (95% CI)** • -0.32 (-0.49, -0.14) Weight loss only (diet) • –0.40 (–0.69, –0.12) Multifocused (comb. diets, telephone coaching, psychological pain-coping interventions/CBT, specialist referral, education, exercise) • –0.24 (–0.42, –0.05) Excluding high ROB (based on 7 studies) • –0.43 (–0.73 –0.13) <12 mo in duration • –0.46 (–0.74, –0.18) ≥12 mo in duration • –0.18 (–0.33, –0.03) **Weight-loss focused interventions vs. exercise for knee OA (based on 5 studies), SMD (95% CI)** • –0.20 (–0.41, 0.00) **Dietary Weight Loss and Exercise vs. Dietary Weight Loss Only for Knee OA (based on 4 studies), SMD (95% CI)** • –0.38 (–0.76, 0.00) **Dietary Weight Loss and Exercise vs. Exercise Only for Knee OA (based on 5 studies), SMD (95% CI)** • –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	Rieckie 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

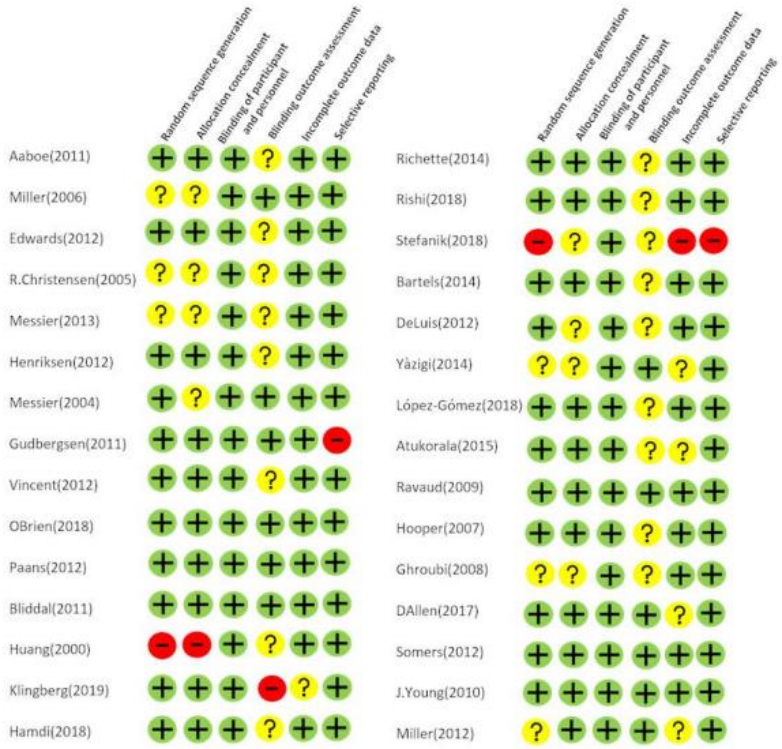
Study	1	2*	3	4*	5	6	7*	8	9*	10	11*	12	13*	14	15	16	Overall quality
Robson 2020	Y	Y	Y	P	Y	Y	N	P	Y	N	Y	Y	Y	Y	Y	Y	Low

*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 • Adults (age ≥ 18 years) with knee OA based on radiographic evidence. • 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

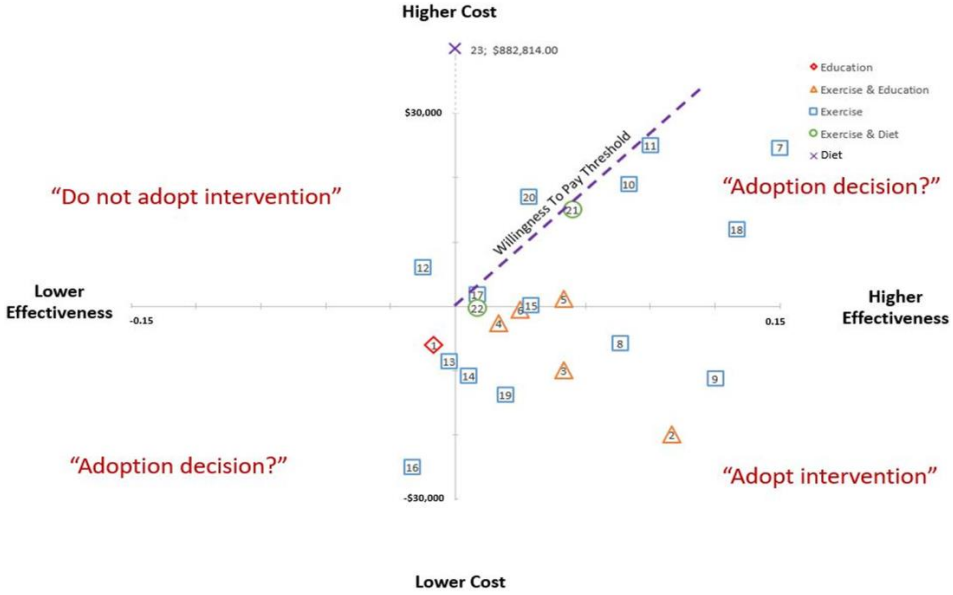
Study	1	2*	3	4*	5	6	7*	8	9*	10	11*	12	13*	14	15	16	Overall quality
Panunzi 2020	Y	N	N	P	Y	N	N	N	Y/N	N	N	N	N	N	Y	Y	Critically low

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

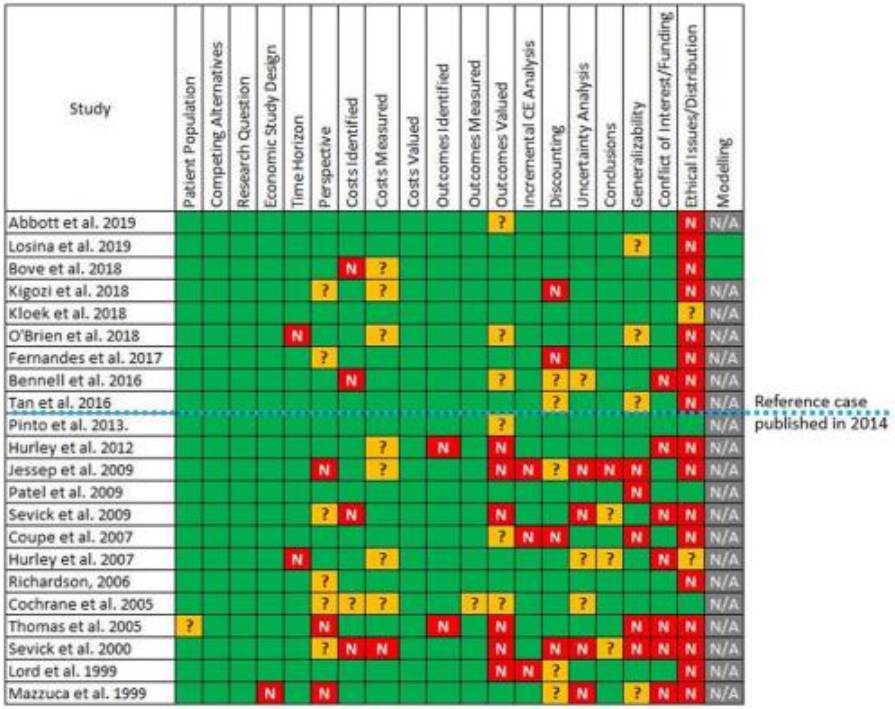
See attached AMSTAR 2 checklist for details on the content of the specific items

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 • People with hip and/or knee OA • Receiving education, exercise and dietary weight management interventions compared to any control. • Education was defined as any formal instruction about OA and self-management techniques. • Exercise was defined as any prescribed activity requiring muscular contraction. • Dietary weight management was defined as any type of intervention with the goal of caloric restriction. • 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). • 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*: 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. *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 compared to physician-delivered usual care for participants with knee OA waiting for a surgical consultation in AU.  *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** 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** 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)** 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)** 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** 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** 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** 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. • Participants with medial knee osteoarthritis according to the clinical and radiological criteria • 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) • Investigating the effectiveness of knee brace and lateral wedge insoles separately or combined together • 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. 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

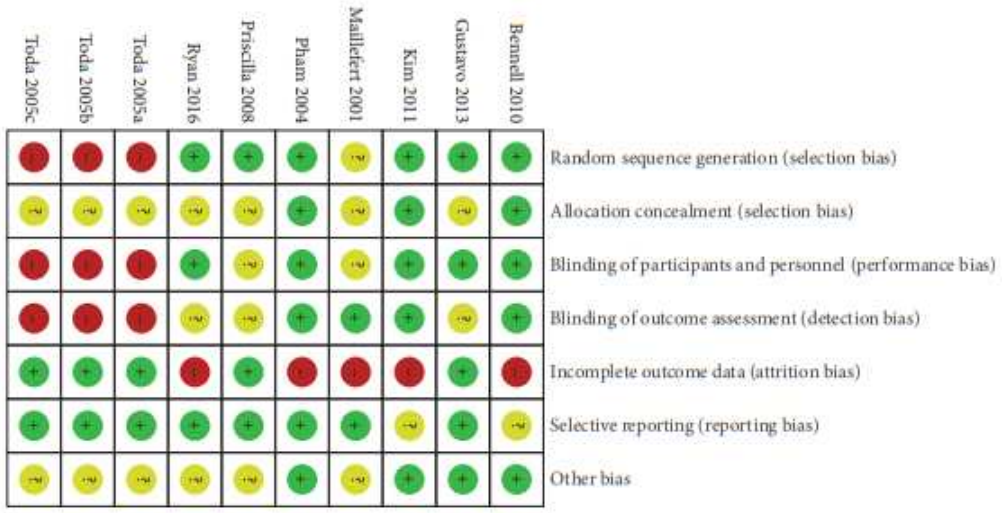
AMSTAR 2

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 • KOA • wedge insole (control group includes fat insole, neutral insole); • (4) outcomes should include one of WOMAC, pain, femorotibial angle (FTA), and Lequesne index. • 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. • If overlapping subject populations were enrolled in different reports, the one of higher quality or with a larger sample size was selected for inclusion •
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** Wedged insoles vs. flat insoles, SMD (95% CI) • 0.03 (-0.14, 0.21)

	Function Wedged insoles vs. flat insoles, SMD (95% CI) • 0.13 (-0.04, 0.31)
Risk of bias	 *Reprinted under the Creative Commons Attribution License*
AMSTAR 2	See table below

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

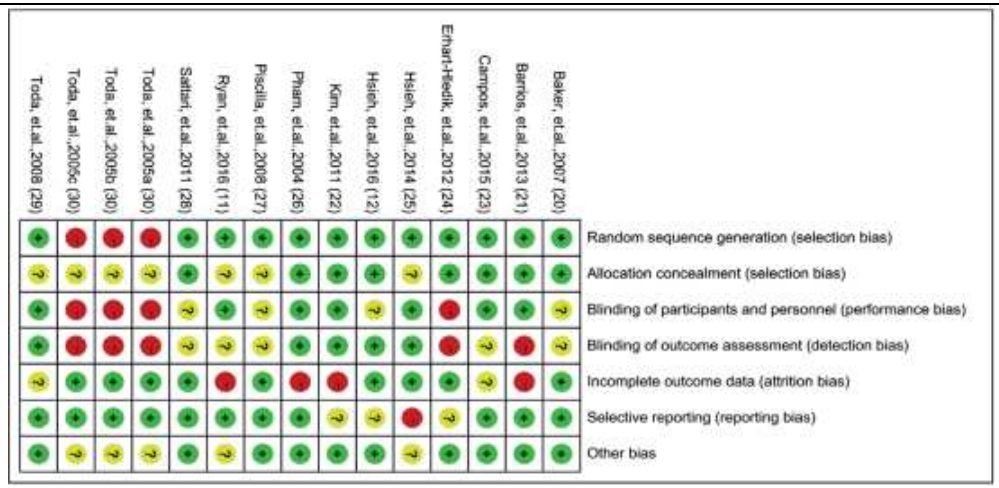
*Critical items, Y=yes, N=No, P=partial yes
See attached AMSTAR 2 checklist for details on the content of the specific items

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 • A lateral-wedge treatment group • Control group (placebo or no treatment) • 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** Lateral wedge insoles vs. control (SMD (95% CI)): • -0.21 (-0.50, 0.08)*[a] **FUNCTION** Lateral wedge insoles vs. control (SMD (95% CI)): • 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
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: A meta-analysis and systematic review
Inclusion period	Inception to February 2021
Inclusion criteria	• RCTs • Assessment of effect of orthopaedic insoles • Patients with knee OA; diagnosed with medial compartment knee OA after X-ray • Necessary data was available or could be calculated from the published articles • Publications in English or Chinese • 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 Lateral wedge insoles vs. control, SMD (95% CI) • -0.21 (-2.61, 0.18) FUNCTION Lateral wedge insoles vs. control, SMD (95% CI) • 0.34 (-2.66, 3.34)

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
Yu 2021	N	N	Y	P	Y	Y	N	P	Y	N	Y	N	N	Y	Y	Y	Critically low

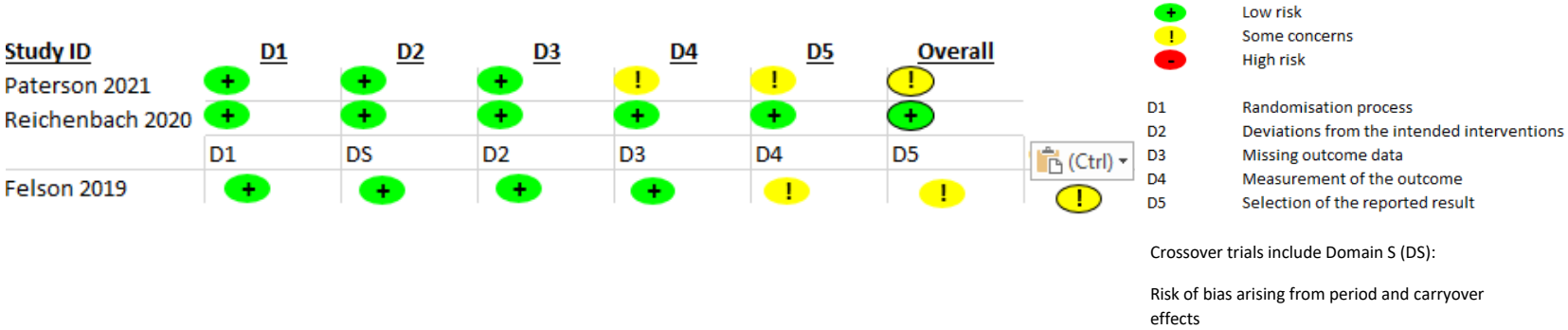
*Critical items, Y=yes, N=No, P=partial yes

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 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) 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 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

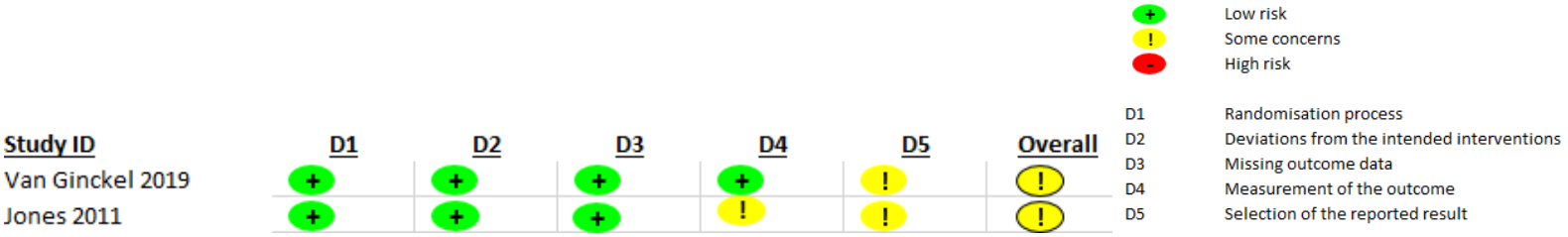
Conclusion:

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) Mean between-group difference: −2.11, p= <0.001	Lequesne (0-24) Mean between-group difference: -2.53 (<0.001) SF-36 physical functioning (0-100) 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 • 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

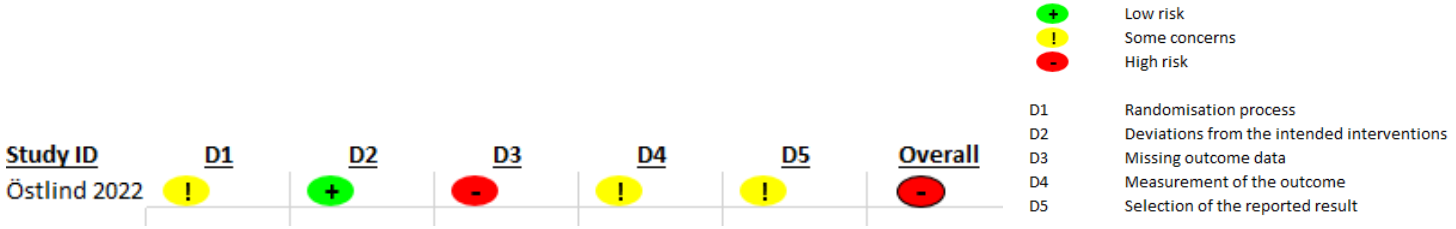
The results form 1 RCT showed no differences in work ability between self-management + wearable activity tracker and self-management alone. Pain and function were not included as outcomes in the trial.

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). Adjusted mean difference (95% CI), 3 months: 0.2 (-1.8, 2.1), p= 0.877 6 months: 0.4 (-1.4, 2.2), p= 0.650 12 months: 0.5 (-1.4, 2.3), p= 0.618

Appraisal of the methodological quality – Rob 2



6. Risk of bias per study

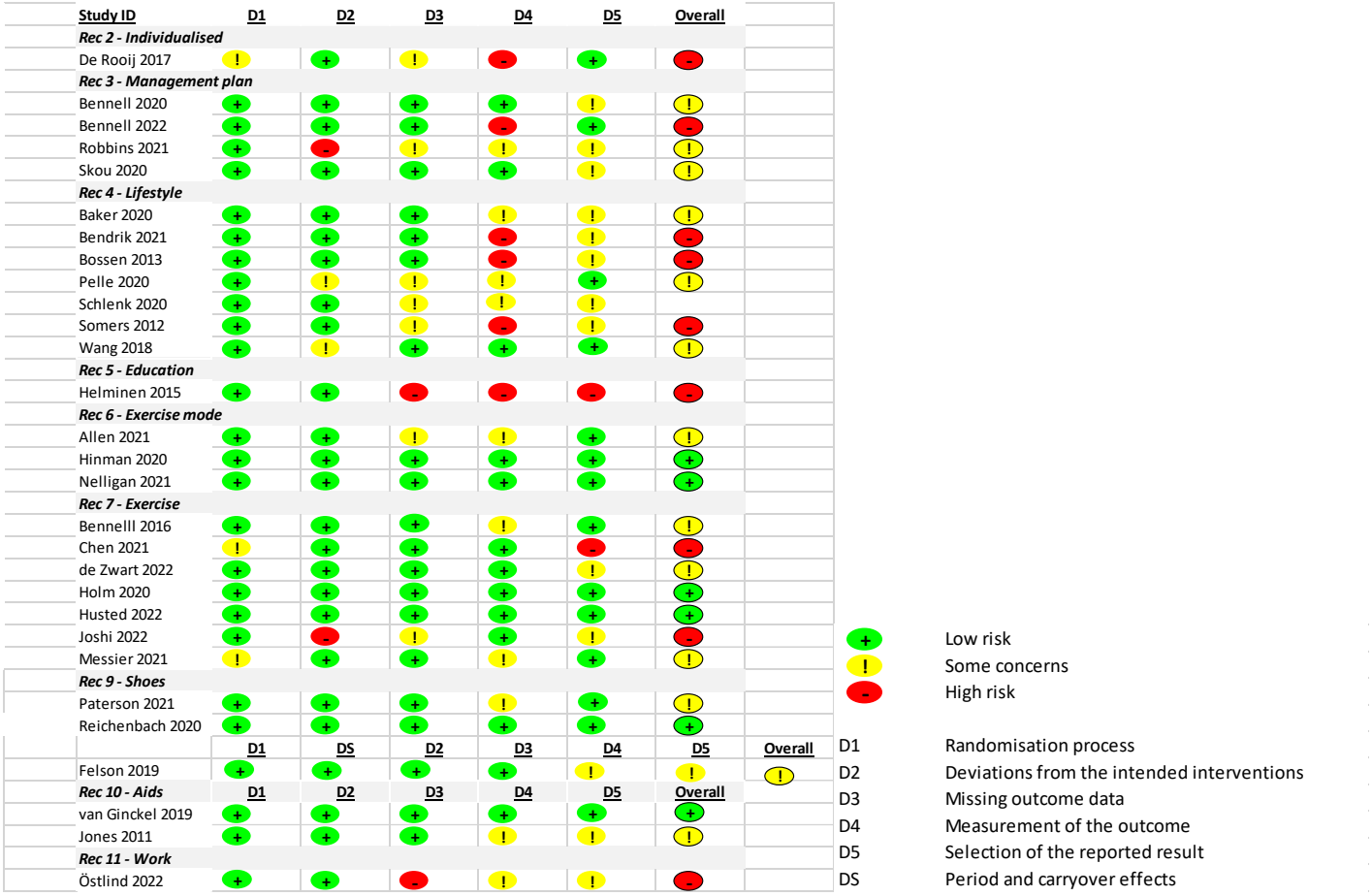
Systematic reviews – quality evaluated with AMSTAR II tool

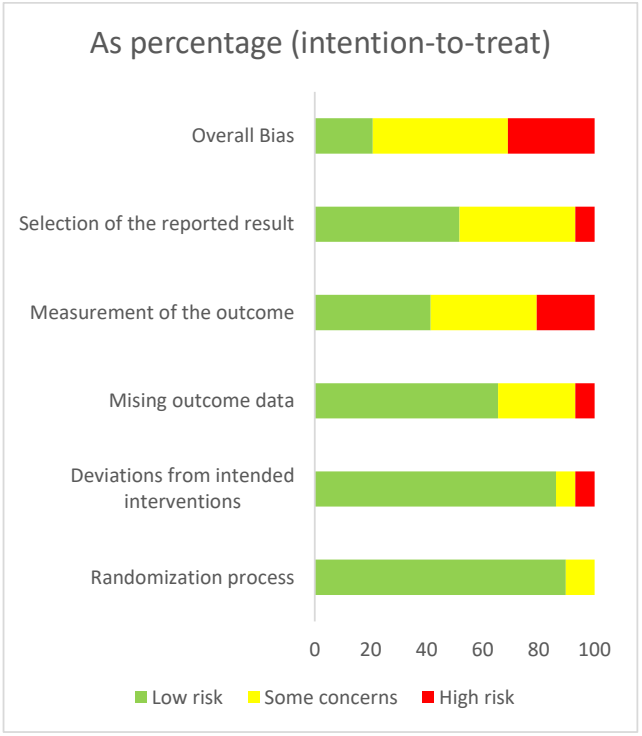
Meta-analyses	1	2*	3	4*	5	6	7*	8	9*	10	11*	12	13*	14	15	16	Overall quality
Rec 3 - management plan																	
Alrushud 2017	Y	N	Y	P	Y	Y	N	P	Y	N	Y	Y	Y	Y	Y	Y	Critically low
Goff 2021	Y	P	Y	P	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Low
Hall 2019	Y	Y	Y	P	Y	Y	N	Y	Y	N	Y	Y	y	Y	Y	Y	Low
Pitsillides 2021	Y	N	Y	P	Y	Y	N	P	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