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Recommendations

EULAR recommendations for physical activity in people with inflammatory arthritis and osteoarthritis: 2025 update

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ABSTRACT

Objectives: The 2018 European Alliance of Associations for Rheumatology (EULAR) recommendations for physical activity (PA) in people with inflammatory arthritis (IA) and osteoarthritis (OA) required revision as new studies have been published on interventions using technology and/or the combination of educational and behavioural strategies to promote PA or reduce sedentary behaviour (SB). Moreover, the World Health Organisation released updated general PA guidelines in 2020 with an emphasis on reducing SB. This work aimed to update the 2018 EULAR recommendations for PA in IA and OA.

Methods: The EULAR Standardised Operating Procedures for developing recommendations were followed. A multidisciplinary task force (TF) was established. Systematic literature searches related to 13 research questions were conducted in August 2024. Recommendations were updated, and the TF members rated their level of agreement and estimated impact and implementability (0-10 scale, with 10 highest).

Results: The revised recommendations include 4 overarching principles and 11 recommendations on PA and SB including *inter alia* PA promotion as standard care, measurements of PA, and intervention modalities considering dose, adaptations and the application of (technology-based) behaviour change techniques. The mean level of agreement for the recommendations ranged from 9.0 to 9.8, the mean impact between 8.3 and 9.2, and the mean feasibility of implementation between 7.2 and 8.5. In addition, quality indicators, research and educational agendas were defined.

Conclusions: The updated EULAR recommendations for PA should guide the development, conduct and evaluation of PA interventions and promotion, including the reduction of SB, in people with IA and OA. These recommendations should be implemented with consideration of individual needs, environmental conditions, and the broader national health care context.

INTRODUCTION

The importance of physical activity (PA) for improving the health of people with rheumatic and musculoskeletal diseases (RMDs) has been recognised for decades [1,2]. Nevertheless, people with RMDs were found to be less physically active than healthy individuals [3–5]. The reasons for this are multifaceted, including fear among people with RMDs and health care providers of aggravating the disease by performing PA, as well as lack of time or lack of clear instructions on how much and how PA can best be performed in their specific situation [6–9].

The 2018 European Alliance of Associations for Rheumatology (EULAR) recommendations for PA in people with inflammatory arthritis (IA, specifically rheumatoid arthritis [RA] and spondyloarthritis [SpA]) and hip osteoarthritis (HOA) and knee osteoarthritis (KOA) [10] were developed to advise health care providers (HCPs, including rheumatology health professionals [eg, physiotherapist, occupational therapist, nurse, podiatrist, psychologist], physical education professionals and medical doctors [rheumatologists and other specialists]) and people with RMDs appropriately regarding the optimal nature and dosage of PA and the extent to which public health recommendations on PA are applicable. To summarise, the 2018 EULAR recommendations for PA identified that the World Health Organisation (WHO) PA recommendations published in 2010 [11] and exercise prescription guidelines provided by the American College of Sports Medicine (ACSM) [12] are applicable to people with IA or OA. This included the effectiveness and safety of the recommended amount of PA, encompassing a minimum of 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic PA per week or any equivalent combination, plus regular strength, flexibility and neuromotor exercises. For the appropriate interpretation of these guidelines, the 2018 recommendations also provided insight into the terminology related to PA and exercise. PA is defined as any bodily movement produced by skeletal muscles that requires energy expenditure above resting (basal) levels and can be performed at different intensity levels in different settings, such as work, leisure, active transportation, exercise, or sports activities [12,13]. Exercise is defined as subcategory of PA 'that is planned, structured and repetitive and has, as a final or intermediate objective, the improvement or maintenance of one or more dimensions of physical fitness' [12,13]. The intensity of PA (eg, moderate vs vigorous) is commonly expressed in metabolic equivalents of

WHAT IS ALREADY KNOWN ON THIS TOPIC

- Physical activity, including the reduction of sedentary behaviour, is important for improving population health, with substantial evidence showing that regular engagement in physical activity reduces morbidity and mortality associated with non-communicable diseases.
- Engagement in physical activity has a positive influence on disease activity, physical functioning and quality of life in people living with inflammatory arthritis or osteoarthritis.
- Given the evidence for its effectiveness, feasibility and safety, promotion of physical activity is recommended as an integral part of standard care for people with inflammatory arthritis and osteoarthritis throughout the course of disease.

WHAT THIS STUDY ADDS

- The 2025 update of the European Alliance of Associations for Rheumatology (EULAR) recommendations for physical activity incorporates the current 2020 guidelines for physical activity and sedentary behaviour from the World Health Organisation as well as results from disease-specific studies. It provides practical guidance on integrating current evidence into clinical rheumatology care.
- In line with the guidelines from the World Health Organisation, the EULAR recommendations emphasise the relevance of reducing sedentary behaviour; however, this work identified a scarcity of research investigating the effectiveness of sedentary behaviour reduction interventions in inflammatory arthritis and osteoarthritis.
- The updated recommendations underpin that interventions need to be personalised and include specific counselling strategies targeting increased physical activity or reduced sedentary behaviour.
- The updated recommendations suggest the use of technology for assessment and interventions targeting physical activity and/or sedentary behaviour.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- The promotion of physical activity and the reduction of sedentary behaviour in people with inflammatory arthritis and osteoarthritis are interventions that can significantly improve the health of individuals, reduce the overall burden of disease, advance the management of chronic conditions and population health, and potentially reduce health care costs. This approach aligns with the EULAR strategy and public health policies in Europe. This collaborative work will inform clinicians, researchers and individuals living with inflammatory arthritis or osteoarthritis and facilitate shared decision making and best practice in daily rheumatology care, as well as direct future research and education.

task (METs); however, more practical in clinical care are assessments such as the talk test or rating of perceived exhaustion [14]. High-intensity exercises are PAs performed at a level of effort close to a person's maximum capacity, typically involving short bursts of intense effort followed by rest or low-intensity periods. These exercises significantly elevate heart rate, breathing rate, and energy expenditure.

Since the publication of the 2018 EULAR recommendations for PA in people with IA and hip and knee OA, several developments have occurred in the field. First, the public health guidelines on PA and sedentary behaviour (SB) released by the WHO were modified in 2020 [15]. The recommended total minutes per week of moderate- and/or vigorous-intensity PA now include a minimum range (150-300 and 75-150 minutes, respectively), and it is no longer recommended that this total be made up of bouts lasting at least 10 minutes. Instead, WHO suggests brief intermittent, ie, as many as possible, PA bouts lasting seconds to minutes throughout the day (eg, 'exercise snacks'), a suggestion that is based on the finding that even short bursts of movement can provide meaningful health benefits, particularly in counteracting the adverse effects of prolonged SB [16]. SB is any waking behaviour characterised by an energy expenditure ≤1.5 METs while in a sitting, reclining or lying posture [17] (Fig). Although PA and SB are interrelated concepts describing pieces of a behavioural continuum, they are physiologically distinct and contribute independently to higher all-cause mortality risks in a dose-response-related manner [18]. Although regular vigorous-intensity PA can mitigate some of the adverse effects of prolonged sitting, it may not eliminate the increased risk associated with high proportions of SB [19,20]. Therefore, addressing both increasing PA and reducing SB is crucial for optimising and improving health outcomes.

In addition to the 2020 WHO guideline changes, several new intervention studies related to PA in IA and OA have been published, including interventions targeting SB reduction, specific exercise interventions, and interventions using technology and/or the combination of educational and behavioural strategies. Given these developments, it was deemed timely to integrate the various new aspects of PA promotion, including reducing SB, into an updated set of PA recommendations. Therefore, this document presents the 2025 EULAR recommendations for PA in people with IA and OA and describes the process of their development.

METHODS

The Standardised Operating Procedures (SOPs) for EULAR-endorsed recommendations were followed [21]. The structure of the manuscript was guided by the Appraisal of Guidelines, Research and Evaluation instrument (AGREE II) [22].

A task force (TF) was constituted according to the regulations described in the SOPs, including 26 members from 17 countries and comprising 4 rheumatologists (VB, MN, TD, and UK), 1 orthopaedic surgeon (K-PG), one general practitioner (LW), 12 physiotherapists (TD, DO, YH, CF, TWS, CJ, NK, NB, SB, TPMVV, KN, and AR), 1 psychologist (KK), 1 occupational therapist (TT), 2 nurses (BAE and RJOF), 3 exercise physiologists (GM, AC, and RA), and 1 patient representative (VRP). Two members represented EMEUNET (the EULAR network of young professionals) (SB and RA). The TF met twice, guided by the convenor (KN), 2 methodologists (TPMVV and RJOF), and the fellow (A-KRO). A second patient representative was invited to the TF meetings but was finally not able to participate. Fourteen members were already involved in developing the 2018 recommendations. During the first meeting (online) in February 2024, the TF agreed on relevant definitions, eg, using the WHO definition for PA and SB, based on METs, and the 2 main reference documents by WHO and ACSM [14,15] describing the public health PA recommendations for the general population with prescription guidelines (hereinafter called general PA recommendations), as well as 13 updated research questions (Supplementary Material S1). The 3 related PICOS (population, intervention, control, outcome, study) frameworks were updated subsequently, including the new topics SB and technology. PICOS 1 was about the effectiveness, safety and feasibility of PA and exercise promotion interventions; PICOS 2 was dedicated to barriers and facilitators for PA and exercise adherence; and PICOS 3 focused on the effectiveness of behaviour change techniques

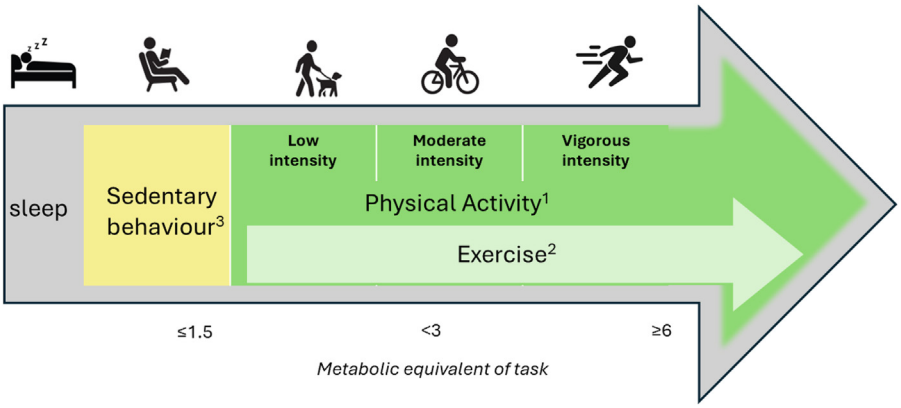

Figure. The continuum of physical activity intensity.

[1]Physical activity is defined as any bodily movement produced by skeletal muscles that requires energy expenditure above resting (basal) levels and can be performed at different intensity levels in different settings, such as occupation, leisure, active transportation, exercise, or sports activities.

[2]Exercise is a subcategory of physical activity 'that is planned, structured and repetitive and has, as a final or intermediate objective, the improvement or maintenance of one or more dimensions of physical fitness'.

[3]Sedentary behaviour is defined as any waking behaviour characterised by an energy expenditure ≤1.5 metabolic equivalents of task (METs) while in a sitting, reclining, or lying posture.

(BCTs) for the promotion of PA and reduction of SB (Supplementary Material S1). The use of technology was explicitly taken into account with all 3 PICOS designs. An experienced librarian (JS) revised the search strategies accordingly. For the 2018 EULAR PA recommendations, studies investigating interventions that did not fulfil the minimal dose recommended by the ACSM [12] were excluded to ensure that the recommended dose for healthy people was also effective, safe and feasible for people with RMD. However, since the 2020 WHO guidelines for PA and SB [15] emphasise that any bout of PA can be beneficial for physical and mental well-being, interventions of all doses were included in this updated PA recommendations.

Three systematic literature searches following the 3 PICOS strategies were conducted to identify new evidence published from April 1, 2017, to August 1, 2024, on adults with RA, SpA, or hip/knee OA. All 3 searches were performed in PubMed/Medline, Cochrane Library, Embase, Web of Science, EMCare, and PsycINFO, using both MeSH terms and free text (Supplementary Material S1). Citations of the 2018 EULAR PA recommendations were tracked and added to the yield.

For search 1 related to PICOS 1, the fellow (AR) applied a systematic but pragmatic approach, focusing on systematic reviews (SRs, including umbrella reviews and meta-analyses) of randomised controlled trials (RCTs) investigating the effectiveness, safety and feasibility of interventions promoting PA or exercise and/or reducing SB in people with IA or OA. For search 2 related to PICOS 2, the fellow focused on qualitative data describing the facilitators and barriers associated with PA or exercise. Search 3 related to PICOS 3, was conducted to identify SRs (including umbrella reviews and meta-analysis), scoping reviews, or RCTs not yet included in SRs investigating which BCTs and which delivery modes are most effective in promoting PA or reducing SB.

The subsequent screening of titles and abstracts resulting from the searches and the selection of full-text papers fulfilling the selection criteria was done by the 2 researchers, RJOF and AR, for searches 1 and 3 and by TD and AR for search 2.

The TF members double-checked the final yield for their field of expertise to make sure no relevant studies were missing. The quality of the selected studies was assessed using the AMSTAR 2 (A MeaSurement Tool to Assess systematic Reviews) tool [23] for SRs, the Cochrane Risk of Bias tool 2 [24] for RCTs, and the CASP (Critical Appraisal Checklists) tool for qualitative studies [25] (DO, KK, and A-KRO).

The retrieved evidence and consequences for the recommendations were discussed in 4 online subgroup meetings in autumn 2024. The meetings were moderated by the convenor, while the fellow presented the findings of the literature review and the methodologists ensured solid methodological proceeding. Each subgroup was composed of 4 to 9 experts on specific themes, with each group preparing preliminary suggestions for updating 3 to 6 of the previous overarching principles (OAPs) and recommendations. The steering group prepared the presentation of the evidence and the subgroups' update suggestions to all TF members during the second TF meeting, held on site in November 2024. The steering group also suggested the preliminary Level of Evidence (LoE) and strength of each recommendation following the Oxford Levels of Evidence [26]. After discussing and adapting the update suggestions with the entire TF group, the group voted on each proposed recommendation, updated or not, to achieve a consensus (defined *a priori* as >75% in favour [21]). If <75% agreed on the recommendation, the TF discussed until consensus was achieved in another vote. According to the EULAR SOPs, suggestions for the research and educational agenda based on gaps in research and implementation were collected and prioritised. Both are proposed by the TF to facilitate and guide future activities of the community.

After the meeting, the TF completed a survey to (1) ascertain the Level of Agreement (LoA) (0-10, 10 = totally agree) with each OAP or recommendation and (2) rate both the impact and feasibility for implementation (0-10, 10 = highest) of each recommendation. The survey procedure was performed by e-mail, administered by an assistant not involved in the project to ensure anonymity of the TF members regarding their LoA. The latter was done to facilitate the development of quality indicators for evaluating future implementation success, because trying to implement all recommendations at once is not deemed realistic [21]. Based on this vote, the steering group selected the 3 recommendations with the highest ranked impact and feasibility ratings to define quality indicators. These quality indicators were then developed and, via e-mail rounds, discussed with the TF. Finally, also by means of e-mail discussions, the TF agreed on the research and educational agenda items to close existing gaps in evidence and clinical practice.

RESULTS

New evidence encompassing 54 SRs, 2 scoping reviews, 31 RCTs, 25 qualitative studies, and expert opinions informed the updated OAPs and recommendations. The yield for each of the 3 systematic literature searches, as well as the quality appraisal for all studies, is described in Supplementary Material S1. Changes made compared to the 2018 version of the recommendations are described in Supplementary Material S2.

The updated process resulted in 4 OAPs and 11 recommendations on PA and SB in people with IA and OA. To improve readability, the name of the target group for the recommendations was changed to 'people with IA and OA' (previously people with RA/SpA/HOA/KOA).

The OAPs and the recommendations, along with categories, strengths of evidence, and TF LoAs, are described in Table 1 [10,21,26]. High LoAs were achieved for all 11 recommendations, and 5 recommendations were graded with LoE 1a/1b and strength level A; Recommendations 1, 6 (formerly 3) and 10 achieved an upgrade based on the new literature available.

OAPs

The new aspect of SB was added to OAPs 1 and 2, acknowledging the relevance of PA and SB for quality of life (OAP 1) [27−30] as well as the separate risks to health posed by suboptimal levels of PA and SB (OAP 2) [31−34]. This emphasis on SB is now in line with the 2020 WHO guidelines for PA and SB [15]. The term 'muscle strength' was replaced with 'muscle fitness', which encompasses muscle power, endurance and strength (OAP 3) [14]. OAP 4 underlines that promoting PA should be based on shared decision making. Shared decision making is a mechanism that aims to decrease the information and power asymmetry between clinicians and patients by empowering patients to be actively involved in their disease management [35]. Patients are enabled to co-decide based on the information provided by HCPs and personal goals. It is an essential part of the concept of person-centredness, value 1 of the EULAR strategy [36] and supported by EULAR-endorsed recommendations [36,37].

Recommendations

The order of updated or reworded recommendations was adapted according to the natural flow of the clinical process of self-management support (assess, advise, agree, assist, arrange) [38]. The previous Recommendation 4 was divided into 2 new recommendations, accounting for the 2-step process of assessment (Recommendation 3) and intervention delivery (Recommendation 7). The previous recommendation 5 on contraindications for PA was removed, because there are no disease-specific contraindications for PA *per se* [14,39,40], but of course, the intensity of PA needs to be adapted according to the current

Table 1
2025 updated EULAR recommendations for physical activity in people with IA and OA

Overarching principles	Level of agreement, mean (SD)
1. Regular PA and reduced SB are essential for health-related quality of life in people with IA and OA.	9.9 (0.3)
2. Reducing SB has health benefits for people with IA and OA, independent of their level of PA.	9.7 (0.6)
3. General PA recommendations including the 4 domains (cardiorespiratory fitness, muscular fitness, flexibility, and neuromotor performance) are applicable (feasible and safe) for people with IA and OA.	9.6 (0.7)
4. Promoting PA* requires shared decision making between healthcare providers and people with IA and OA that accounts for peoples' preferences, capabilities and resources.	9.9 (0.2)

Recommendations	Level of evidence	Strength of evidence	Level of agreement, mean (SD)	Impact, mean (SD)	Feasibility, mean (SD)
1. Promoting PA*/** consistent with general PA recommendations should be an integral part of standard care throughout the course of disease in people with IA and OA.	1A	A	9.9 (0.3)	9.2 (1.0)	8.4 (1.5)
2. All HCPs involved in the management of people with IA and OA should take responsibility for promoting PA*/**, including collaborating and making referrals as necessary.	4	D	9.6 (0.8)	9.1 (1.1)	7.7 (1.5)
3. HCPs should use standardised methods to identify which of the 4 domains** of general PA recommendations can be targeted for improvement.	4	D	8.9 (0.9)	8.6 (1.4)	7.5 (1.8)
4. Individual, sociocultural, economic, environmental, and disease-related barriers and facilitators to performing PA*/** should be identified and addressed.	4	D	9.6 (0.8)	8.3 (1.9)	6.9 (1.6)
5. Physical, psychological and social factors should be assessed to identify the need for individual adaptations to PA*/** recommendations.	4	D	9.4 (1.1)	8.8 (1.6)	7.2 (2.0)
6. PA* interventions should be delivered to people with IA and OA by competent HCPs.	1B	A	9.6 (0.8)	9.1 (1.1)	8.1 (1.4)
7. HCPs delivering PA** interventions should define the frequency, intensity, time, type, volume, and progression of PA.	4	D	9.1 (1.3)	9.0 (1.3)	8.1 (1.1)
8. Interventions for PA*/** should be evaluated over time, preferably by use of a combination of subjective and objective measures.	4	D	9.1 (0.9)	9.0 (1.3)	7.6 (2.0)
9.HCPs should plan, deliver and follow-up PA*/** interventions that include self-monitoring, goal setting, action planning, feedback, and problem-solving.	1A	A	9.7 (0.7)	9.2 (1.1)	7.6 (2.0)
10. HCPs should consider different modes of delivery of PA** intervention (eg, supervised/not supervised, individual/group, face-to-face/digital) in line with people's preferences.	1A	B	9.6 (0.9)	9.1 (1.3)	7.7 (2.1)
11. Wearable activity trackers and other digital technologies should be considered when promoting PA*/**.	1A	A	9.1 (1.3)	8.3 (1.4)	8.0 (1.3)

EULAR, European Alliance of Associations for Rheumatology; HCP, health care practitioner; IA, inflammatory arthritis; OA, osteoarthritis; PA, physical activity; SB, sedentary behaviour.
Even though the term 'exercise' is not mentioned, it is understood to be subset of PA. Regarding PA types, * includes reduction of sedentary behaviour and ** specifically addresses exercise, such as aerobic exercise, strength exercise, flexibility exercises, and neuromotor exercises. Level of Evidence and strength of each recommendation were defined according to the Oxford Levels of Evidence and EULAR Standardised Operating Procedures [21,26]. Changes compared to the first version [10] are described in Supplementary File S2.

disease activity and health status. For example, whereas a flare might prevent someone from performing high-intensity activities, activities of lower intensity such as going for a walk or range of motion exercises might still be possible. Further, if vigorous-intensity activities involving the affected body region (eg, swollen knee) are to be avoided, vigorous-intensity activities might be still possible using unaffected body regions (upper limbs instead of lower limbs).

In Table 1, some recommendations are highlighted with an asterisk (*) if PA and the reduction of SB are equally important. Exercises are defined as a subset of PA. Recommendations are highlighted with 2 asterisks (**) if these are specifically relevant for or applicable to exercises.

Recommendation 1

Promoting PA consistent with general PA recommendations should be an integral part of standard care throughout the course of disease in people with IA and OA.

Recommendation 1 was not changed. Given the updated evidence demonstrating the effectiveness, feasibility and safety of exercise, including those regimens that are in line with current public health recommendations, the general PA recommendations are applicable to people with IA or OA; thus, PA promotion should be an integral part of standard care for people with these conditions. Studies investigating interventions with high-intensity training load [41–44] or in study populations with IA with severe functional limitations [45,46] did not result in higher drop-out rates compared to control groups or serious adverse events [47,48]. Overall, reported adverse events with exercise and/or PA interventions in IA or OA were transient and mild [27,47,49], including eg, muscle pain and tiredness. Studies in IA and OA reported no detrimental of exercise on disease activity [50–52]. In management recommendations for RA, axial SpA (axSpA) and HOA/KOA exercise, as a subset of PA, together with education, is considered to be the cornerstone of nonpharmacological management [47,53–55] as the beneficial effects of exercise on pain, function and quality of life have been clearly shown [27,29,50,51,56–58].

Recommendation 2

All HCPs involved in the management of people with IA and OA should take responsibility for promoting PA, including collaborating and making referrals as necessary.

The wording of Recommendation 2, regarding responsibilities for screening, prescribing and promoting PA, was slightly modified, keeping its original meaning. According to ACSM guidelines [14], all HCPs are responsible for screening and promoting PA behaviour. For screening, the global initiative Exercise is Medicine, led by ACSM, implements the so-called Physical Activity Vital Sign, consisting of 3 short questions, as one example of an easily applicable screening instrument [14]. These 3 questions are: (1) On average, how many days per week do you engage in moderate to strenuous exercise? (2) On average, how many minutes do you engage in exercise at this level? (3) How many days a week do you perform muscle strengthening exercises, such as bodyweight exercises or resistance exercises? The answers help identify individuals who may be insufficiently active and could benefit from increased PA. Additionally, there are HCPs specialised in PA promotion, eg, physiotherapists, psychologists, occupational therapists, nurses, or exercise physiologists, who have the knowledge and skills to assess, counsel and instruct interventions aiming to increase PA and/or decrease sedentary time. HCPs not having the time or competencies related to PA and RMDs should refer individuals to colleagues who do.

Recommendation 3

HCPs should use standardised methods to identify which of the 4 domains of general PA recommendations can be targeted for improvement.

Recommendation 3 is new, underpinning the relevance of specific activities in all 4 exercise dimensions, ie, aerobic, strength, flexibility, and neuromotor, as part of the general PA recommendations. In addition to measures of PA and SB (see Recommendation 8), measures of health-related physical fitness (eg, cardiorespiratory or muscular fitness) and skills-related components such as agility and muscle power are essential to define a specific exercise prescription [14].

Recommendation 4

Individual, sociocultural, economic, environmental, and disease-related barriers and facilitators to performing PA should be identified and addressed.

Recommendation 4 merged the previous Recommendations 5 and 7. Regarding the potential health risks associated with exercise, several general pre-exercise risk screening tools are available [14]. Additionally, potential disease-specific barriers (eg, fatigue, pain, comorbidities, cardiovascular risk factors) need to be considered when developing individual PA prescriptions. Regarding the most relevant barriers and facilitators for PA in people with IA or OA (see Supplementary Material S1), comprehensive literature is available addressing different levels or domains [59–61]. The updated literature has added the field of technology, which can act as both a barrier and a facilitator to engaging in PA. For example, the use of a wearable device that monitors the amount of PA can be highly motivating, as it provides a sense of accomplishment and gratification when a PA goal is reached. However, the increased awareness of one's limitations or difficulty using a specific device can also be seen as a barrier [62–64]. Furthermore, barriers and facilitators related to high-intensity exercises were explored [65], showing that these exercises are perceived as a positive challenge for both body and mind, with rapid physiological responses. In SB, some disease-specific barriers and facilitators may occur in people with OA and IA. People with IA may sit more due to fatigue or unpredictable flares rather than joint-specific and load-related pain, which is typical for OA. Further, people with OA are typically older adults who typically show increases SB with age ≥65 years [66]. Overall, it was concluded that understanding and addressing the various barriers and facilitators people with IA and OA may encounter is highly relevant for the development of personalised interventions to increase PA and decrease SB.

Recommendation 5

Physical, psychological and social factors should be assessed to identify the need for individual adaptations to PA recommendations.

Recommendation 5 is a revised version of previous Recommendation 8 and focuses on individual adaptations to general PA recommendations. The TF emphasised that the entire spectrum of biopsychosocial factors should be considered when evaluating potential adaptations. There is no evidence that any specific physical, psychological or social factors are more relevant than others in terms of adherence to a physically active lifestyle, and in the end, patients' perceptions, capabilities, and resources are decisive. Even though the ACSM PA and exercise guidelines for aerobic and strength exercise in the general

population will likely be appropriate for most people living with IA and OA [14], some considerations regarding an individual's exercise mode and intensity can be helpful to optimise adoption and adherence to exercise. For example, higher pain rates until 48 to 72 hours after activities might be due to delayed-onset muscle soreness, which is a normal reaction, especially in exercise novices. Individuals living with IA or OA in particular need to be informed about this and the possible discomfort during or directly after exercise. Some studies applied the '24 hour-rule', that is, the exercise intensity was reduced when the increased pain persisted for >24 hours [67−69]. For cases in which specific activities cause joint pain, alternative exercises using the same muscle group and energy systems should be considered. In deconditioned individuals or those having significant functional limitations, activities at moderate or vigorous intensity may initially be too exhausting. It is appropriate to start with a lower dose that is safely tolerated and increase the duration or load progressively over the first 4 to 6 weeks.

Recommendation 6

PA interventions should be delivered to people with IA and OA by competent HCPs.

Recommendation 6 was previously Recommendation 3 and was related to HCPs delivering advice and interventions on PA and SB. In this respect, the TF understood 'competent HCPs' as professionals who are trained and experienced in rheumatology, person-centred communication, and PA and exercise. Indeed, the EULAR generic core competencies for HCPs in rheumatology are of particular importance in this respect [70], but for personalised exercise prescription and delivery, specific additional skills may be required.

Recommendation 7

HCPs delivering PA interventions should define the frequency, intensity, time, type, volume, and progression of PA.

As described above, this recommendation was previously included in Recommendation 4. To emphasise the importance of administering the correct dose of PA interventions, Recommendation 7 focuses on the FITT-VP principles, defining the components of activities as Frequency, Intensity, Time, Type, Volume, and Progression [71]. HCPs providing specific exercise interventions should carefully determine the dose using these criteria to ensure alignment with general exercise prescription guidelines [12,14].

Recommendation 8

Interventions for PA should be evaluated over time, preferably by use of a combination of subjective and objective measures.

Recommendation 8 was previously Recommendation 6. However, the focus is now clearly on the regular evaluation of PA, SB, and predefined goals. There are objective and subjective measures available to assess PA and SB [72]. The choice between direct observations, device-based measures, eg, heart rate monitor, wearables, or patient-reported outcomes such as questionnaires or diaries can depend on various factors such as the aim of the assessment, available resources, size of the target group, (digital) health literacy, burden of data collection/analysis, and potential bias such as recall or social desirability. Correspondingly, RCTs in people with IA and OA report the use of various instruments combining objective and subjective data on PA and SB.

Recommendation 9

HCPs should plan, deliver and follow-up PA interventions that include self-monitoring, goal setting, action planning, feedback, and problem-solving.

Recommendation 9 is based on the evidence related to BCTs [73]. A behavioural approach using BCTs should be an integral component of PA interventions including planning, delivery and follow-up sessions, often considered as booster sessions, as it is relevant to the success of interventions aimed at starting or maintaining a physically active lifestyle [74−77]. The majority of the interventions in the additional 25 RCTs published since 2017 (see references in Supplementary Material S1) applied technology-based BCTs in combination with in-person contact. Interventions applied between 4 and 17 different BCTs, the most frequent ones being goal setting, action planning, problem-solving, and instructions on how to perform the targeted behaviour. Studies with interventions aimed at reducing SB are scarce, and the effect of the interventions included in our associated meta-analysis seemed uncertain [78]. In the context of reducing SB, short bouts of exercise ('exercise snacks') are one commonly used method [57,79].

Recommendation 10

HCPs should consider different modes of delivery of PA intervention (eg, supervised/not supervised, individual/group, face-to-face/digital) in line with people's preferences.

Recommendation 10 was not changed, except for the term 'online', which was replaced with 'digital' as that term is more comprehensive, and 'booster sessions' was removed. The latter are included in Recommendation 9, in terms of follow-up sessions. No evidence was found to support a superior delivery mode. Therefore, HCPs should consider the entire range of options according to the patients' characteristics, including eg, the available resources, (digital) health literacy, or individual preferences.

Recommendation 11

Wearable activity trackers and other digital technologies should be considered when promoting PA.

This new recommendation takes into account the established use of technologies in promoting PA and their effectiveness [80]. A number of recent RCTs on interventions aiming to decrease SB or increase PA applied technology-based BCTs (such as [81−85]), demonstrating that the use of technology can be of great value for the collection of objective data and integration in interventions offering valuable feedback, maintaining motivation and adherence to prescribed PA.

Everyday clinical practice shows that many people with IA or OA regularly use smart devices to track their health data. The acceptance of wearables, such as the Fitbit, is high, as can be seen from adherence rate >80% [82,83]. In addition to being used as an assessment tool, wearables and other technology can be used as stand-alone intervention or in combination with multifaceted wearable technology-related components such as counselling or education. HCPs may encourage the use of this information to set exercise goals, track exercise progress and help interpret the data. HCPs may also provide devices for a testing period evaluating eg, number of steps per day, exercise intensity or sitting duration as well as for the provision of direct feedback for PA behaviour. To ensure health equity, the individuals' digital health literacy and access to devices must always be accounted for when considering the use of technology.

Prioritisation of recommendations and implementability

Based on the TF's ratings of perceived feasibility and potential impact of each recommendation (Table 1), Recommendations 1, 2, and 9 emerged as the highest ranked. Table 2 provides a proposed set of quality indicators, including methods for measurement and suggested timing for their assessment. This framework is intended to support a more standardised evaluation of implementation success.

Research and educational agendas

The proposed agendas are based on research (Box 1) and educational (Box 2) gaps identified in the literature, as well as topics that emerged during the TF's discussions. Due to the wide variety of topics, the TF has prioritised a selection based on the previous list and new topics.

Box 1 *Research agenda*

1. To perform long-term effectiveness trials on combined interventions including other health behaviours, eg, healthy diet
2. To investigate the combined effect of exercise and pharmacological treatment
3. To evaluate the long-term effectiveness of physical activity (PA) at different intensities and types and monitoring adverse events
4. To explore approaches to reduce health inequality within individuals and countries in terms of use and access to PA. Need for studies from low-income countries and underserved communities (recruitment bias)
5. To identify which (technology-based) PA-intervention strategies work best to increase PA level and adherence in various subgroups
6. To investigate the effect of different exercise intensities (vigorous, moderate, low)
7. To explore the impact of digital self-assessments of disease activity on PA behaviour
8. To further develop and evaluate (technology-based) strategies to reduce and monitor a change in sedentary behaviour
9. To investigate the benefits and considerations of exercising intensity and modalities during disease flares
10. To develop PA recommendations for children and adolescents with inflammatory arthritis
11. To explore the relationship between mental health problems and their impact on PA behaviour

Box 2 *Educational agenda*

1. To develop recommendations to improve health care professionals' and physicians' skills to communicate/inform patients about physical activity (PA) (avoid deleterious beliefs)
2. To improve skills to screen/assess PA, taking different professions into account
3. To improves skills to apply behaviour change techniques
4. To translate existing material (eg, EULAR products such as recommendations or training modules, potential future material) into different languages
5. To increase knowledge about PA among health care professionals, physicians and people with inflammatory arthritis and osteoarthritis
6. To use artificial intelligence delivering education related to PA and sedentary behaviour
7. To propose a session on updated PA evidence at every EULAR congress and at national congresses

EULAR, European Alliance of Associations for Rheumatology.

DISCUSSION

The update of the 2018 EULAR Recommendations for PA in people with IA and OA resulted in 4 OAPs and 11 recommendations. The update was based on research evidence, expert opinion and consensus among the TF members. The most notable improvements are the ensured alignment with the current 2020 WHO guidelines, emphasising the relevance of reduction of SB and breaking up SB with short, frequent bursts of PA ('exercise snacks'). Moreover, the update recognises the opportunities that current and emerging technology provide for measurements and interventions related to PA and SB.

The amount of relevant recent literature, consisting of more than 50 SRs, 30 RCTs, and 25 qualitative studies, was large. Their findings led to an upgrade of the LoE in Recommendations 1, 10, and 6 (formerly Recommendation 3) and the definition of the new Recommendation 11 with strong LoE. Accordingly, the update is underpinned by robust research and shaped by the diverse professional, cultural and personal perspectives of the TF members, which comprised a multiprofessional and international panel of 26 HCPs, physicians, and 1 patient from across Europe. It is a limitation that not all invited patient representatives were able to participate in the TF activities as planned. Nevertheless, the process resulted in a broad consensus among TF members regarding the updated OAPs and recommendations. This strong consensus suggests that the recommendations are appropriate for adoption and implementation across different European health care systems.

The list of recommendations has been ordered according to the usual flow of the clinical process from screening, providing advice on PA promotion and reduction of SB, referring, prescribing specific exercises, assessing, and finally instructing PA and SB. Therefore, the recommendations provide practical guidance to HCPs with varying levels of expertise and roles in promoting PA. This includes a range of various tasks, ranging from providing information to making referrals and delivering interventions. The recommendations can thereby serve across HCP roles and health care systems.

To ensure the feasibility of the update process, a pragmatic approach was adopted for conducting the systematic literature reviews. The mixed nature of the research questions and the use of predefined and somewhat overarching PICOS strategies for multiple research questions might, however, have led to an incomplete anthology of current evidence. Moreover, the selection of studies was limited in certain aspects, such as the exclusion of observational studies investigating descriptive, predictive or causal phenomena. On the other hand, in contrast to the 2018 recommendations, we did not exclude studies with interventions that did not meet the minimum dosage of exercise according to ACSM's recommendations for PA and exercise with the update. Nevertheless, the current update of the literature on the effectiveness and safety of PA interventions led to the same conclusions as the previous SR. In the present SR, high-intensity exercises proved to be a relevant topic with a lot of research activity. This particular type of training is increasingly being used, but its feasibility in people with RMDs is sometimes questioned. The identified literature [43,65,86,87] demonstrated that high-intensity exercises are generally not perceived as a barrier but rather as a positive challenge for both body and mind. Recommendation 9 mentions some effective BCTs for PA promotion; however, behaviour change is a nonlinear and dynamic process, and the impact of BCTs is highly contextual and influenced by multiple interaction factors. Therefore, a prioritisation of BCTs is not possible. Current best practice is to tailor the choice of combined BCTs to context and individual needs [88].

Given the relevance of SB in particular, one meta-analysis on the effect of interventions on SB was conducted in the context of

Table 2
Quality indicators regarding care related to PA in people with IA or OA

Recommendation	Quality indicator	Examples of measurement methods	Timing
1. Promoting PA*/** consistent with general PA recommendations should be an integral part of standard care throughout the course of disease in people with IA and OA.	• Proportion of people with IA or OA reporting the receipt of information about PA/exercise and SB from any HCP • Proportion of patients with IA or OA reporting the receipt of personalised PA/exercise prescription from any HCP • Knowledge of people with IA or OA' on PA/exercise and reduction of SB as a self-management strategy	Survey of people with IA or OA[a]	Every 5 y
2. All HCPs involved in the management of people with IA and OA should take responsibility for promoting PA*/**, including collaborating and making referrals as necessary.	• Proportion of HCPs reporting one or more of the following activities related to PA and exercise promotion and reduction of SB in people with IA or OA: screening/provision of information/making referrals/provision of personalised instruction and guidance on PA/exercise and reduction of SB • HCPs' knowledge about PA/exercise and reduction of SB in people with IA or OA • HCPs self-perceived competencies regarding screening/provision of information/making referrals/provision of personalised instruction and guidance on PA/exercise and/or reduction of SB	Survey of HCPs[b]	Every 5 y
9. HCPs should plan, deliver and follow-up PA*/** interventions that include self-monitoring, goal setting, action planning, feedback and problem-solving.	• Frequency of the application of behaviour change techniques described in interventions in effectiveness studies on PA/exercise in people with IA or OA (study protocols, published studies) • Frequency and content of applied strategies separately for promoting PA and reducing SB	Literature search Survey of HCPs that are commonly involved in the actual delivery of PA/exercise interventions	Every 5 y

HCP, health care practitioner; IA, inflammatory arthritis; OA, osteoarthritis; PA, physical activity; SB, sedentary behaviour. Regarding PA types, * includes reduction of sedentary behaviour and ** specifically addresses exercise.
[a] As people with IA or OA may see or have seen multiple HCPs over the course of their condition, a survey of people with IA or OA is the only means to assess alignment with this quality indicator.
[b] Specific HCPs that are most frequently involved in the care of people with IA or OA may be selected, eg, rheumatologists, clinical nurse specialists, physiotherapists, general practitioners, and/or orthopaedic surgeons.

the present SR [78]. Overall, the number of studies investigating strategies to reduce SB was surprisingly small. However, the TF is aware of some ongoing studies addressing this topic [eg, 86,87], which may receive attention in a future update of these recommendations. Future recommendations might take the 24-hour approach into account, considering PA, SB, and sleep as relevant to a healthy lifestyle [89], as research will also emerge in this field [90]. Even though the majority of interventions in recent RCTs apply technology-based strategies to increase PA or decrease SB (such as use of wearables or digital reminders), the number of meta-analyses pooling these data and evaluating the effect is still small. Further, the reporting quality of interventions using wearable trackers targeting PA needs to be improved to enable replications [91]. Despite these limitations, the TF members agreed that the integration of technology in interventions will advance, and many new publications are to be expected. It will be necessary to compare the effectiveness of different digital interventions in different target groups and elaborate on how intervention effects can be sustained in long-term perspective behaviour. Consequently, the literature should be regularly re-evaluated and the recommendations updated accordingly.

Overall, the number of published studies on PA varied largely among different conditions. Most studies were available in KOA, fewer in HOA, RA, and axSpA, whereas there were almost no studies in psoriatic arthritis [92]. Therefore, the recommendations might be weaker in some patient populations within the field of IA. The considerable heterogeneity of included conditions may limit the precision of recommendations. Therefore, additional, disease-specific recommendations might be useful for clinical care. It should also be noted that overall, the inadequate reporting of interventions in many studies prevents the meaningful pooling of data or transfer into practice, thereby limiting the yield of research resources. Better adherence with guidelines for the reporting of interventions, such as TIDieR (Template for Intervention Description and Replication) [93], may help solve this problem. The same holds for the suboptimal reporting of adverse events in exercise trials [48,49]. Finally, economic evaluations of PA interventions in IA or OA are scarce. In that respect, study designs including workability and cost-effectiveness would be of great interest for national governance and policymakers. It is important to consider that some more recent literature on the effectiveness of PA, specifically exercise in KOA, points into a smaller effect than previous studies considered for the 2018 EULAR recommendations [94,95]. This is, however, not an argument against PA in OA, given the multiple and general benefits of PA and exercise. Nevertheless, these developments should be carefully taken into account when interpreting the evidence. For that purpose, continued monitoring of the evolving literature on the effectiveness of PA will be important to ensure the robustness and clinical relevance of these recent findings.

It is well known that developing recommendations is not sufficient on its own for knowledge translation [96]. The rheumatology community has the responsibility to better understand the best approaches for promoting PA as well as put effort into closing the knowledge-to-practice gaps. Adequate reporting of intervention elements and delivery in effectiveness studies are essential, as well as systematically addressing aspects that are important for future implementation in the study design. Regarding the latter, (hybrid) implementation effectiveness studies are needed to strengthen the implementation of effective PA interventions in rheumatology practice [97]. In that respect, prioritisation of the recommendations for implementation is crucial for the efficient utilisation of health care resources. The TF therefore rated how implementable they considered each recommendation.

Given the growing number of people with IA and OA, the development of effective care delivery models and sustainable management strategies is critical to improving clinical outcomes and mitigating the burden of disease at both the individual and societal levels.

In conclusion, the broad consensus on the updated OAPs and corresponding recommendations, along with their prioritisation, provides a strong foundation for implementation efforts. This represents a significant opportunity to integrate PA promotion and SB reduction into the standard of care for individuals with IA and OA. Furthermore, the proposed research agenda, aimed at addressing current evidence gaps, together with the educational agenda designed to facilitate knowledge translation, will further advance the field in both domains.

CRediT authorship contribution statement

Anne-Kathrin Rausch Osthoff: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Theodora P M Vliet Vlieland:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Methodology, Investigation, Funding acquisition, Formal analysis. **Ricardo J O Ferreira:** Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Resources, Methodology, Investigation, Formal analysis. **Raj Amarnani:** Writing – review & editing, Validation. **Simone Battista:** Writing – review & editing, Validation. **Denislav Orlinov:** Writing – review & editing, Validation. **Vladimira Boyadzhieva:** Writing – review & editing, Validation. **Nina Brodin:** Writing – review & editing, Validation. **Ashley Cox:** Writing – review & editing, Validation. **Thomas Davergne:** Writing – review & editing, Validation. **Tuncay Duruöz:** Writing – review & editing, Validation. **Bente Appel Esbensen:** Writing – review & editing, Validation. **Camilla Fongen:** Writing – review & editing, Validation. **Klaus-Peter Günther:** Writing – review & editing, Validation. **Yves Henrotin:** Writing – review & editing, Validation. **Carsten Juhl:** Writing – review & editing, Validation, Methodology, Funding acquisition, Conceptualization. **Norelee Kennedy:** Writing – review & editing, Validation, Conceptualization. **Uta Kiltz:** Writing – review & editing, Validation, Methodology, Conceptualization. **Keegan Knittle:** Writing – review & editing, Validation. **George Metsios:** Writing – review & editing, Validation, Funding acquisition, Conceptualization. **Michael Nurmohamed:** Writing – review & editing, Validation. **Victoria Romero Pazos:** Writing – review & editing, Validation. **Thijs W Swinnen:** Writing – review & editing, Validation, Conceptualization. **Tanja Thomsen:** Writing – review & editing, Validation, Methodology. **Louise Warburton:** Writing – original draft, Validation. **Karin Niedermann:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization.

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Contributors

The task force was led by the steering group, consisting of KN (convenor, project lead), TPMVV (methodologist), RJOF (methodologist in training), and AR (fellow). KN organised and chaired the task force meetings. AR performed the literature screening, partly supported by RJOF and TD, and analysis under supervision of the methodologists and drafted the manuscript. DO, KK and AR did the quality appraisal of all included studies. KK coded the behaviour change techniques described by included studies. CB performed an informing meta-analysis on interventions aiming to reduce sedentary behaviour, which is reported elsewhere. All authors have contributed to the recommendations by participating in the task force meetings and subgroup meetings; checking the yield of the literature search and contributing to the discussion and agreement on the recommendations; and revising and approving the manuscript for publication.

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REFERENCES

[1] American College of Sports Medicine Position Stand. Exercise and physical activity for older adults. Med Sci Sports Exerc 1998;30:992–1008.
[2] Ytterberg SR, Mahowald ML, Krug HE. Exercise for arthritis. Baillieres Clin Rheumatol 1994;8:161–89. doi: 10.1016/s0950-3579(05)80230-4.
[3] Hernández-Hernández V, Ferraz-Amaro I, Díaz-González F. Influence of disease activity on the physical activity of rheumatoid arthritis patients. Rheumatology (Oxford) 2014;53:722–31. doi: 10.1093/rheumatology/ket422.
[4] Yuksel Karsli T, Bayraktar D, Ozer Kaya D, Oz HE, Gucenmez S, Gercik O, et al. Comparison of physical activity levels among different sub-types of axial spondyloarthritis patients and healthy controls. Mod Rheumatol 2021;31:1202–7. doi: 10.1080/14397595.2021.1891676.
[5] De Groot IB, Bussmann JB, Stam HJ, Verhaar JAN. Actual everyday physical activity in patients with end-stage hip or knee osteoarthritis compared with healthy controls. Osteoarthritis Cartilage 2008;16:436–42. doi: 10.1016/j.joca.2007.08.010.
[6] Uritani D, Kasza J, Campbell PK, Metcalf B, Egerton T. The association between psychological characteristics and physical activity levels in people with knee osteoarthritis: a cross-sectional analysis. BMC Musculoskelet Disord 2020;21:269. doi: 10.1186/s12891-020-03305-2.

[7] Demmelmaier I, Björk A, Dufour AB, Nordgren B, Opava CH. Trajectories of fear-avoidance beliefs on physical activity over two years in people with rheumatoid arthritis. Arthritis Care Res (Hoboken) 2018;70:695–702. doi: 10.1002/acr.23419.

[8] Halls S, Law RJ, Jones JG, Markland DA, Maddison PJ, Thom JM. Health professionals' perceptions of the effects of exercise on joint health in rheumatoid arthritis patients. Musculoskeletal Care 2017;15:196–209. doi: 10.1002/msc.1157.

[9] Larkin L, Gallagher S, Fraser A, Kennedy N. If a joint is hot it's not the time: health professionals' views on developing an intervention to promote physical activity in rheumatoid arthritis. Disabil Rehabil 2017;39:1106–13. doi: 10.1080/09638288.2016.1180548.

[10] Rausch Osthoff AK, Niedermann K, Braun J, Adams J, Brodin N, Dagfinrud H, et al. 2018 EULAR recommendations for physical activity in people with inflammatory arthritis and osteoarthritis. Ann Rheum Dis 2018;77:1251–60. doi: 10.1136/annrheumdis-2018-213585.

[11] World Health Organization. Global recommendations on physical activity for health [Internet]. 2010. Available from: https://www.who.int/publications/i/item/9789241599979 Accessed July 8, 2025

[12] Garber CE, Blissmer B, Deschenes MR, Franklin BA, Lamonte MJ, Lee IM, et al. American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. Med Sci Sports Exerc 2011;43:1334–59. doi: 10.1249/MSS.0b013e318213fefb.

[13] Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. Public Health Rep 1985;100:126–31.

[14] Liguori G, Feito Y, Fountaine C, Roy BA, editors. ACSM's guidelines for exercise testing and prescription. 11th ed. Philadelphia (PA): Wolters Kluwer; 2022.

[15] Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. Br J Sports Med 2020;54:1451–62. doi: 10.1136/bjsports-2020-102955.

[16] Islam H, Gibala MJ, Little JP. Exercise snacks: a novel strategy to improve cardiometabolic health. Exerc Sport Sci Rev 2022;50:31–7. doi: 10.1249/jes.0000000000000275.

[17] Tremblay MS, Aubert S, Barnes JD, Saunders TJ, Carson V, Latimer-Cheung AE, et al. Sedentary Behavior Research Network (SBRN) – Terminology Consensus Project process and outcome. Int J Behav Nutr Phys Act 2017;14:75. doi: 10.1186/s12966-017-0525-8.

[18] Ekelund U, Tarp J, Steene-Johannessen J, Hansen BH, Jefferis B, Fagerland MW, et al. Dose-response associations between accelerometry measured physical activity and sedentary time and all cause mortality: systematic review and harmonised meta-analysis. BMJ 2019;366:l4570. doi: 10.1136/bmj.l4570.

[19] Bruellman R, Pahlen S, Ellingson JM, Corley RP, Wadsworth SJ, Reynolds CA. A twin-driven analysis on early aging biomarkers and associations with sitting-time and physical activity. PLoS One 2024;19:e0308660. doi: 10.1371/journal.pone.0308660.

[20] Riopel-Meunier J, Poirier P, Després JP. Piché ME. Is the time right for preventive cardiology guidelines on sedentary behaviours and sitting time? Can J Cardiol 2025;41:412–26. doi: 10.1016/j.cjca.2024.12.024.

[21] European Alliance of Associations for Rheumatology. EULAR SOPs Standard Operating Procedure for Task Forces, Version 53. Zurich, Switzerland: EULAR; 2024.

[22] Brouwers MC, Kho ME, Browman GP, Burgers JS, Cluzeau F, Feder G, et al. AGREE II: advancing guideline development, reporting and evaluation in health care. CMAJ 2010;182:E839–42. doi: 10.1503/cmaj.090449.

[23] Shea BJ, Reeves BC, Wells G, Thuku M, Hamel C, Moran J, et al. AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. BMJ 2017;358:j4008. doi: 10.1136/bmj.j4008.

[24] Higgins JPT, Green S, editors. Cochrane handbook for systematic reviews of interventions. Hoboken (NJ): Wiley-Blackwell; 2008.

[25] Critical Appraisal Skills Programme. CASP qualitative studies checklist [Internet]. 2024. Available from: https://casp-uk.net/casp-tools-checklists/qualitative-studies-checklist/ Accessed March 19, 2025

[26] OCEBM Levels of Evidence Working Group. The Oxford Levels of Evidence 2 [Internet]. 2011. Available from: https://www.cebm.ox.ac.uk/resources/levels-of-evidence/ocebm-levels-of-evidence Accessed March 19, 2025

[27] Varongot-Reille C, Barrero-Santiago L, Cuenca-Martínez F, Paris-Alemany A, La Touche R, Herranz-Gómez A. Effectiveness of exercise on pain intensity and physical function in patients with knee and hip osteoarthritis: an umbrella and mapping review with meta-meta-analysis. Disabil Rehabil 2024;46:3475–89. doi: 10.1080/09638288.2023.2252742.

[28] Björk M, Dragioti E, Alexandersson H, Esbensen BA, Boström C, Friden C, et al. Inflammatory arthritis and the effect of physical activity on quality of life and self-reported function: a systematic review and meta-analysis. Arthritis Care Res (Hoboken) 2022;74:31–43. doi: 10.1002/acr.24805.

[29] Brady SM, Veldhuijzen van Zanten JJCS, Dinas PC, Nightingale TE, Metsios GS, Elmsmari SMA, et al. Effects of lifestyle physical activity and sedentary behaviour interventions on disease activity and patient- and clinician- important health outcomes in rheumatoid arthritis: a systematic review with meta-analysis. BMC Rheumatol 2023;7:27. doi: 10.1186/s41927-023-00352-9.

[30] Pinto D, Song J, Lee J, Chang RW, Semanik PA, Ehrlich-Jones LS, et al. Association between sedentary time and quality of life from the Osteoarthritis Initiative: who might benefit most from treatment? Arch Phys Med Rehabil 2017;98:2485–90. doi: 10.1016/j.apmr.2017.06.004.

[31] Fenton SAM, Veldhuijzen Van Zanten JJCS, Kitas GD, Duda JL, Rouse PC, Yu CA, et al. Sedentary behaviour is associated with increased long-term cardiovascular risk in patients with rheumatoid arthritis independently of moderate-to-vigorous physical activity. BMC Musculoskelet Disord 2017;18:131. doi: 10.1186/s12891-017-1473-9.

[32] Master H, Thoma LM, Dunlop DD, Christiansen MB, Voinier D, White DK. Joint association of moderate-to-vigorous intensity physical activity and sedentary behavior with incident functional limitation: data from the Osteoarthritis Initiative. J Rheumatol 2021;48:1458–64. doi: 10.3899/jrheum.201250.

[33] He J, Zhang C, Yang L. Association between sedentary behavior, physical activity, and osteoarthritis: results from NHANES 2007-2020 and Mendelian randomization analysis. Front Public Health 2025;12:1454185. doi: 10.3389/fpubh.2024.1454185.

[34] Fenton SAM, O'Brien CM, Kitas GD, Duda JL, Veldhuijzen van Zanten JJCS, Metsios GS. The behavioural epidemiology of sedentary behaviour in inflammatory arthritis: where are we, and where do we need to go? Rheumatol Adv Pract 2023;7:rkac097. doi: 10.1093/rap/rkac097.

[35] Charles C, Gafni A, Whelan T. Shared decision-making in the medical encounter: what does it mean? (or it takes at least two to tango). Soc Sci Med 1997;44:681–92. doi: 10.1016/S0277-9536(96)00221-3.

[36] European Alliance of Associations for Rheumatology. EULAR strategy 2024-2028 [Internet]. Available from: https://www.eular.org/eular-strategy Accessed January 12, 2025

[37] Nikiphorou E, Santos EJF, Marques A, Böhm P, Bijlsma JW, Daien CI, et al. 2021 EULAR recommendations for the implementation of self-management strategies in patients with inflammatory arthritis. Ann Rheum Dis 2021;80:1278–85. doi: 10.1136/annrheumdis-2021-220249.

[38] Glasgow RE, Emont S, Miller DC. Assessing delivery of the five 'As' for patient-centered counseling. Health Promot Int 2006;21:245–55. doi: 10.1093/heapro/dal017.

[39] Peter WF, Swart NM, Meerhoff GA. Vliet Vlieland TPM. Clinical practice guideline for physical therapist management of people with rheumatoid arthritis. Phys Ther 2021;101:pzab127. doi: 10.1093/ptj/pzab127.

[40] van Doormaal MCM, Meerhoff GA, Vliet Vlieland TPM, Peter WF. A clinical practice guideline for physical therapy in patients with hip or knee osteoarthritis. Musculoskeletal Care 2020;18:575–95. doi: 10.1002/msc.1492.

[41] Bilberg A, Dagfinrud H, Sveaas SH. Supervised intensive exercise for strengthening exercise health beliefs in patients with axial spondyloarthritis: a multicenter randomized controlled trial. Arthritis Care Res (Hoboken) 2022;74:1196–204. doi: 10.1002/acr.24556.

[42] Bilberg A, Mannerkorpi K, Borjesson M, Svedlund S, Sivertsson J, Klingberg E, et al. High-intensity interval training improves cardiovascular and physical health in patients with rheumatoid arthritis: a multicentre randomised controlled trial. Br J Sports Med 2024;58:1409–18. doi: 10.1136/bjsports-2024-108369.

[43] Nordén KR, Semb AG, Dagfinrud H, Hisdal J, Sexton J, Fongen C, et al. Effect of high-intensity interval training in physiotherapy primary care for patients with inflammatory arthritis: the ExeHeart randomised controlled trial. RMD Open 2024;10:e003440. doi: 10.1136/rmdopen-2023-003440.

[44] Thomsen RS, Nilsen TIL, Haugeberg G, Bye A, Kavanaugh A, Hoff M. Effect of high-intensity interval training on cardiovascular disease risk factors and body composition in psoriatic arthritis: a randomised controlled trial. RMD Open 2018;4:e000729. doi: 10.1136/rmdopen-2018-000729.

[45] van Wissen MAT, van den Ende CHM, Gademan MGJ, Teuwen MMH, Peter WF, Mahler EAM, et al. One-year effectiveness of long-term exercise therapy in people with axial spondyloarthritis and severe functional limitations. Rheumatology (Oxford) 2025;64:1817–25. doi: 10.1093/rheumatology/keae323.

[46] Teuwen MMH, van Weely SFE, Vliet Vlieland TPM, van Wissen MAT, Peter WF, den Broeder AA, et al. Effectiveness of longstanding exercise therapy compared with usual care for people with rheumatoid arthritis and severe functional limitations: a randomised controlled trial. Ann Rheum Dis 2024;83:437–45. doi: 10.1136/ard-2023-224912.

[47] National Institute for Health and Care Excellence (NICE). Osteoarthritis in over 16s: diagnosis and management. NICE Guideline, No. 226. London: NICE; 2022.
[48] Vancampfort D, Van Damme T, McGrath RL, Hemmings L, Gillis V, Bernar K, et al. Dropout from exercise interventions in adults with knee or hip osteoarthritis: a systematic review and meta-analysis. Arch Phys Med Rehabil 2024;105:2317–26. doi: 10.1016/j.apmr.2024.02.735.
[49] Teuwen MMH, Vlieland TPMV, van Weely SFE, Schoones JW, Rausch Osthoff AK, Juhl CB, et al. Quality of reporting and nature of harms in clinical trials on supervised exercise in patients with rheumatoid arthritis or axial spondyloarthritis. Rheumatol Int 2024;44:25–39. doi: 10.1007/s00296-023-05502-3.
[50] Zhang M, Liang Z, Tian L, Han Y, Jiang X, Li Y, et al. Effects of exercise therapy in axial spondyloarthritis: a systematic review, meta-analysis, and meta-regression of randomized trials. Arch Phys Med Rehabil 2025;106:113–23. doi: 10.1016/j.apmr.2024.06.005.
[51] Hu X, Chen J, Tang W, Chen W, Sang Y, Jia L. Effects of exercise programmes on pain, disease activity and function in ankylosing spondylitis: a meta-analysis of randomized controlled trials. Eur J Clin Invest 2020;50:e13352. doi: 10.1111/eci.13352.
[52] Kraus VB, Sprow K, Powell KE, Buchner D, Bloodgood B, Piercy K, et al. Effects of physical activity in knee and hip osteoarthritis: a systematic umbrella review. Med Sci Sports Exerc 2019;51:1324–39. doi: 10.1249/MSS.0000000000001944.
[53] Ramiro S, Nikiphorou E, Sepriano A, Ortolan A, Webers C, Baraliakos X, et al. ASAS-EULAR recommendations for the management of axial spondyloarthritis: 2022 update. Ann Rheum Dis 2023;82:19–34. doi: 10.1136/ard-2022-223296.
[54] National Institute for Health and Care Excellence (NICE). Rheumatoid arthritis in adults: management. NICE Guideline, No.100. London: NICE; 2020.
[55] Moseng T, Vliet Vlieland TPM, Battista S, Beckwée D, Boyadzhieva V, Conaghan PG, et al. EULAR recommendations for the non-pharmacological core management of hip and knee osteoarthritis: 2023 update. Ann Rheum Dis 2024;83:730–40. doi: 10.1136/ard-2023-225041.
[56] Boudjani R, Challal S, Semerano L, Sigaux J. Impact of different types of exercise programs on ankylosing spondylitis: a systematic review and meta-analysis. Disabil Rehabil 2023;45:3989–4000. doi: 10.1080/09638288.2022.2140842.
[57] Thomsen T, Aadahl M, Beyer N, Hetland ML, Løppenthin K, Midtgaard J, et al. The efficacy of motivational counselling and SMS reminders on daily sitting time in patients with rheumatoid arthritis: a randomised controlled trial. Ann Rheum Dis 2017;76:1603–6. doi: 10.1136/annrheumdis-2016-210953.
[58] Cheng HY, Liang CW, Lee YH, Vitoonpong T, Liao CD, Huang SW. Effects of the combination of various pharmacological treatments and exercise on knee osteoarthritis: a systematic review and network meta-analysis. EFORT Open Rev 2024;9:668–75. doi: 10.1530/EOR-23-0136.
[59] Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. Implement Sci 2012;7:37. doi: 10.1186/1748-5908-7-37.
[60] Garcia L, Mendonça G, Benedetti TRB, Borges LJ, Streit IA, Christofoletti M, et al. Barriers and facilitators of domain-specific physical activity: a systematic review of reviews. BMC Public Health 2022;22:1964. doi: 10.1186/s12889-022-14385-1.
[61] Michie S, Johnston M, Abraham C, Lawton R, Parker D, Walker A, et al. Making psychological theory useful for implementing evidence based practice: a consensus approach. Qual Saf Health Care 2005;14:26–33. doi: 10.1136/qshc.2004.011155.
[62] Leese J, MacDonald G, Backman CL, Townsend A, Nimmon L, Li LC. Experiences of wearable technology by persons with knee osteoarthritis participating in a physical activity counseling intervention: qualitative study using a relational ethics lens. JMIR Mhealth Uhealth 2021;9:e30332. doi: 10.2196/30332.
[63] Östlind E, Ekvall Hansson E, Eek F, Stigmar K. Experiences of activity monitoring and perceptions of digital support among working individuals with hip and knee osteoarthritis - a focus group study. BMC Public Health 2022;22:1641. doi: 10.1186/s12889-022-14065-0.
[64] Rausch Osthoff AK, Nast I, Niedermann K. Understanding beliefs related to physical activity in people living with axial spondyloarthritis: a theory-informed qualitative study. BMC Rheumatol 2022;6:40. doi: 10.1186/s41927-022-00270-2.
[65] Bilberg A, Sveaas SH, Dagfinrud H, Mannerkorpi K. How do patients with axial spondyloarthritis experience high-intensity exercise? ACR Open Rheumatol 2020;2:207–13. doi: 10.1002/acr2.11128.
[66] Beller J, Graßhoff J, Safieddine B. Differential trends in prolonged sitting time in Europe: a multilevel analysis of European Eurobarometer data from 2013 to 2022. J Public Health (Berl) 2025;33:943–51. doi: 10.1007/s10389-023-02090-1.
[67] van den Ende CH, Hazes JM, le Cessie S, Mulder WJ, Belfor DG, Breedveld FC, et al. Comparison of high and low intensity training in well controlled rheumatoid arthritis. Results of a randomised clinical trial. Ann Rheum Dis 1996;55:798–805. doi: 10.1136/ard.55.11.798.
[68] Lyngberg KK, Harreby M, Bentzen H, Frost B. Danneskiold-Samsøe B. Elderly rheumatoid arthritis patients on steroid treatment tolerate physical training without an increase in disease activity. Arch Phys Med Rehabil 1994;75:1189–95. doi: 10.1016/0003-9993(94)90003-5.
[69] Swärdh E, Brodin N. Effects of aerobic and muscle strengthening exercise in adults with rheumatoid arthritis: a narrative review summarising a chapter in Physical activity in the prevention and treatment of disease (FYSS 2016). Br J Sports Med 2016;50:362–7. doi: 10.1136/bjsports-2015-095793.
[70] Edelaar L, Nikiphorou E, Fragoulis GE, Iagnocco A, Haines C, Bakkers M, et al. 2019 EULAR recommendations for the generic core competences of health professionals in rheumatology. Ann Rheum Dis 2020;79:53–60. doi: 10.1136/annrheumdis-2019-215803.
[71] Metsios GS, Brodin N, Vlieland TPMV, Van den Ende CHM, Stavropoulos-Kalinoglou A, Fatouros I, et al. Position statement on exercise dosage in rheumatic and musculoskeletal diseases: the role of the IMPACT-RMD toolkit. Mediterr J Rheumatol 2021;32:378–85. doi: 10.31138/mjr.32.4.378.
[72] 2018 Physical Activity Guidelines Advisory Committee. 2018 Physical Activity Guidelines Advisory Committee Scientific Report. Washington, DC: US Department of Health and Human Services; 2018.
[73] Michie S, Richardson M, Johnston M, Abraham C, Francis J, Hardeman W, et al. The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. Ann Behav Med 2013;46:81–95. doi: 10.1007/s12160-013-9486-6.
[74] Willett M, Duda J, Fenton S, Gautrey C, Greig C, Rushton A. Effectiveness of behaviour change techniques in physiotherapy interventions to promote physical activity adherence in lower limb osteoarthritis patients: a systematic review. PLoS One 2019;14:e0219482. doi: 10.1371/journal.pone.0219482.
[75] Ariie T, Takasaki H, Okoba R, Chiba H, Handa Y, Miki T, et al. The effectiveness of exercise with behavior change techniques in people with knee osteoarthritis: a systematic review with meta-analysis. PM R 2023;15:1012–25. doi: 10.1002/pmrj.12898.
[76] Sekhon M, White C, Godfrey E, Amirova A, Revenäs Å, King S, et al. Effectiveness of web-based and mobile health interventions designed to enhance adherence to physical activity for people with inflammatory arthritis: a systematic review. Rheumatol Adv Pract 2021;5:rkab016. doi: 10.1093/rap/rkab016.
[77] Chaplin H, Sekhon M, Godfrey E. The challenge of exercise (non-)adherence: a scoping review of methods and techniques applied to improve adherence to physical activity and exercise in people with inflammatory arthritis. Rheumatol Adv Pract 2023;7:rkac096. doi: 10.1093/rap/rkac096.
[78] Rausch Osthoff AK, Juhl C, Thomsen T, Metsios GS, Brodin N, Ferreira RJO, et al. OP0384-HPR Effectiveness of interventions aiming to reduce sedentary behavior: meta-analysis informing the updated EULAR physical activity recommendations in people with inflammatory arthritis and osteoarthritis. Ann Rheum Dis 2025;84:310–1. doi: 10.1016/j.ard.2025.05.386.
[79] Pinto AJ, Meireles K, Peçanha T, Mazzolani BC, Smaira FI, Rezende D, et al. Clinical and cardiometabolic effects of reducing sedentary behavior in postmenopausal women with rheumatoid arthritis. Med Sci Sports Exerc 2025;57:23–32. doi: 10.1249/mss.0000000000003546.
[80] Davergne T, Pallot A, Dechartres A, Fautrel B, Gossec L. Use of wearable activity trackers to improve physical activity behavior in patients with rheumatic and musculoskeletal diseases: a systematic review and meta-analysis. Arthritis Care Res (Hoboken) 2019;71:758–67. doi: 10.1002/acr.23752.
[81] Li LC, Sayre EC, Xie H, Falck RS, Best JR, Liu-Ambrose T, et al. Efficacy of a community-based technology-enabled physical activity counseling program for people with knee osteoarthritis: proof-of-concept study. J Med Internet Res 2018;20:e159. doi: 10.2196/jmir.8514.
[82] Li LC, Feehan LM, Xie H, Lu N, Shaw CD, Gromala D, et al. Effects of a 12-week multifaceted wearable-based program for people with knee osteoarthritis: randomized controlled trial. JMIR Mhealth Uhealth 2020;8:e19116. doi: 10.2196/19116.
[83] Li LC, Feehan LM, Xie H, Lu N, Shaw C, Gromala D, et al. Efficacy of a physical activity counseling program with use of a wearable tracker in people with inflammatory arthritis: a randomized controlled trial. Arthritis Care Res (Hoboken) 2020;72:1755–65. doi: 10.1002/acr.24199.
[84] Kurt T, Vossen D, Schumacher F, Strunk J, Fedkov D, Peine C, et al. Effect of lifestyle counselling via a mobile application on disease activity control in inflammatory arthritis: a single-blinded, randomized controlled study. Nutrients 2024;16:1488. doi: 10.3390/nu16101488.

[85] Labat G, Hayotte M, Bailly L, Fabre R, Brocq O, Gerus P, et al. Impact of a wearable activity tracker on disease flares in spondyloarthritis: a randomized controlled trial. J Rheumatol 2022;49:1109–16. doi: 10.3899/jrheum.220140.

[86] Thomsen RS, Nilsen TIL, Haugeberg G, Sitter B, Kavanaugh A, Pedersen SJ, et al. Changes of inflammation in patients with psoriatic arthritis after high intensity interval training assessed by ultrasound and MRI, a randomized controlled trial. BMC Musculoskelet Disord 2023;24:743. doi: 10.1186/s12891-023-06871-3.

[87] Hua J, Sun L, Teng Y. Effects of high-intensity strength training in adults with knee osteoarthritis: a systematic review and meta-analysis of randomized controlled trials. Am J Phys Med Rehabil 2023;102:292–9. doi: 10.1097/phm.0000000000002088.

[88] Matting L, Pfeifer K, Sudeck G, Jung A, Langhirt F, Geidl W. Physical activity promotion in physical therapy, exercise therapy and other movement-based therapies: a scoping review and content analysis of intervention studies and theoretical works. Int J Behav Nutr Phys Act 2025;22:72. doi: 10.1186/s12966-025-01772-1.

[89] Ross R, Chaput JP, Giangregorio LM, Janssen I, Saunders TJ, Kho ME, et al. Canadian 24-hour movement guidelines for adults aged 18−64 years and adults aged 65 years or older: an integration of physical activity, sedentary behaviour, and sleep. Appl Physiol Nutr Metab 2020;45:S57–102. doi: 10.1139/apnm-2020-0467.

[90] De Lucia A, Prior Y, Jones R, Bertoni G, Dell'Isola A, Donisi V, et al. Sleep measurement in osteoarthritis and inflammatory arthritis: a systematic scoping review protocol. Musculoskeletal Care 2025;23:e70140. doi: 10.1002/msc.70140.

[91] van Wissen MAT, Berger MAM, Schoones JW, Gademan MGJ, van den Ende CHM, Vliet Vlieland TPM, et al. Reporting quality of interventions using a wearable activity tracker to improve physical activity in patients with inflammatory arthritis or osteoarthritis: a systematic review. Rheumatol Int 2022;43:803–24. doi: 10.1007/s00296-022-05241-x.

[92] Kaerts M, Swinnen TW, Dankaerts W, de Vlam K, Neerinckx B. Physical fitness and physical activity in psoriatic arthritis: a systematic review. Rheumatol Adv Pract 2025;9:rkaf066. doi: 10.1093/rap/rkaf066.

[93] Hoffmann TC, Glasziou PP, Boutron I, Milne R, Perera R, Moher D, et al. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. BMJ 2014;348:g1687. doi: 10.1136/bmj.g1687.

[94] Holden MA, Hattle M, Runhaar J, Riley RD, Healey EL, Quicke J, et al. Moderators of the effect of therapeutic exercise for knee and hip osteoarthritis: a systematic review and individual participant data meta-analysis. Lancet Rheumatol 2023;5:e386–400. doi: 10.1016/s2665-9913(23)00122-4.

[95] Henriksen M, Christensen R, Kristensen LE, Bliddal H, Bartholdy C, Boesen M, et al. Exercise and education vs intra-articular saline for knee osteoarthritis: a 1-year follow-up of a randomized trial. Osteoarthritis Cartilage 2023;31:627–35. doi: 10.1016/j.joca.2022.12.011.

[96] Dadich A, Vaughan P, Watfern C, Triandafilidis Z, Habak S, Boydell KM. Growing and fostering knowledge translation: recommendations for health organisations from the SPHERE Envisionarium. Heliyon 2024;10:e36817. doi: 10.1016/j.heliyon.2024.e36817.

[97] Van Bodegom-Vos L, Vliet Vlieland TPM. Bridging the gap: facilitating the use of rheumatology research results in clinical practice with hybrid implementation effectiveness studies. RMD Open 2024;10:e004259. doi: 10.1136/rmdopen-2024-004259.