



The barriers and facilitators to physical activity in people with a musculoskeletal condition: A rapid review of reviews using the COM-B model to support intervention development

Justin Webb^{a,*}, Anna Baker^a, Tiffany Palmer^a, Amelia Hall^b, Ashleigh Ahlquist^b, Jenny Darlow^b, Victoria Olaniyan^b, Rhian Horlock^b, Duncan Stewart^a

^a School of Social Sciences and Professions, London Metropolitan University, 166-220 Holloway Rd, London, N7 8DB, UK

^b Versus Arthritis, Saffron House, 6-10 Kirby Street, London, EC1N 8TS, UK

ARTICLE INFO

Keywords:

Physical activity
Musculoskeletal condition
COM-B
Behaviour change
Intervention development
Health improvement

ABSTRACT

Objectives: The objective of this review of reviews was to identify the potentially modifiable barriers and facilitators to physical activity in people with a musculoskeletal condition to influence intervention development.

Study design: A rapid review of reviews.

Methods: The Cochrane library and PubMed Central were searched for reviews using pre-defined search terms and relevant synonyms for “physical activity”, “barriers” or “facilitators”, and “musculoskeletal condition”. The identified reviews were screened for inclusion by the principal investigator in line with recognised streamlining approaches for a rapid review. Only review papers investigating the barriers and facilitators to physical activity in adults with a musculoskeletal condition were included. A team of seven assessed the included reviews for identification of the barriers and facilitators to physical activity coded using the COM-B model of behaviour.

Results: 503 reviews were identified with 12 included for analysis across a mix of conditions and designs (n = 2: qualitative; n = 6: quantitative; n = 4 mixed). A multitude of interrelated factors were identified across the COM-B components. The most prevalent factors included disease symptoms and physical function (physical capability), knowledge of the specific benefits of physical activity and knowing what to do (psychological capability), the accessibility of facilities and individualised programming (physical opportunity), tailored advice from healthcare professionals and peer support (social opportunity), beliefs about the benefits or harms of being active (reflective motivation) and having the self-efficacy to be active and experiencing positive emotions (automatic motivation).

Conclusions: This review of reviews identified the complex nature of physical activity in people living with a musculoskeletal condition. The identified barriers and facilitators should be considered by intervention designers when developing behaviour change interventions for this population group.

1. Introduction

In the UK it is estimated that over 20 million people live with a musculoskeletal condition [1] that is a condition impacting the locomotor system typically characterised by pain and limitations in physical function [2]. The most common causes of pain and disability from a musculoskeletal condition in the UK are from back pain (10 million people) and osteoarthritis (8.5 million people) [1]. Adults with a musculoskeletal condition can benefit from being physically active with reductions in pain and improvements in independence and quality of life

reported [3]. However, between 41% and 50% of people with a musculoskeletal condition in the UK are classified as inactive [4].

The most successful approaches to changing health-related behaviours are those that intervene not just with individuals but also at a community and systems level [5–7]. Formulating partnerships across stakeholder groups, for example with healthcare professionals, planning and transport agencies and workplaces, can improve the effective promotion of physical activity [7]. Promotional campaigns including mass-media campaigns, prompts and cues to ‘nudge’ behaviour and health promotion within the community have been suggested to be

* Corresponding author. London Metropolitan University, 166-220 Holloway Rd, London, N7 8DB, UK.

E-mail address: j.webb1@londonmet.ac.uk (J. Webb).

<https://doi.org/10.1016/j.puhip.2022.100250>

Received 11 August 2021; Received in revised form 1 March 2022; Accepted 30 March 2022

Available online 16 April 2022

2666-5352/© 2022 The Authors. Published by Elsevier Ltd on behalf of The Royal Society for Public Health. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

effective at improving physical activity, as has increasing social support and workplace intervention [7]. At a systems level, environmental and policy approaches including active travel, planning and infrastructure initiatives, can increase opportunities for safe and accessible physical activity [7].

In England, the Department of Health, NHS England and Public Health England (now the Office for Health Improvement and Disparities) call for support for people with a musculoskeletal condition to become and stay physically active, advocating for an increase in accessible community programmes and facilities, supervised physical activity, as-well-as more specialist rehabilitation programmes and individualised support [3].

Successful approaches to behaviour change are based on a thorough understanding of the barriers and the facilitators to the desired behaviour using a relevant theory to increase understanding of these determining factors [5,8]. Knowledge of the widespread influences on physical activity can enable development of multilevel interventions to improve the likelihood of successful behavioural change [9].

Many theories, models and frameworks exist to understand behaviour and design interventions to bring about change; however, not many combine an understanding of behaviour, within an intervention development framework [10]. The Behaviour Change Wheel [10] synthesizes 19 behaviour change frameworks with a behavioural model, the COM-B model, sitting at its centre allowing intervention designers to move directly from a behaviour diagnosis to intervention development. The COM-B model postulates that behaviour is part of a system involving one's capability to perform a behaviour, and the opportunity, and motivation to carry out that behaviour [10].

The barriers and facilitators to physical activity in people with specific musculoskeletal conditions have been investigated and systematic reviews undertaken; to the knowledge of the authors, a review of reviews in this area has yet to be published. Identification of common barriers and facilitators to becoming and staying active, across musculoskeletal conditions, can support the development, delivery and evaluation of intervention approaches to bring about change.

Evidence-based decision making is the foundation of public health. Evidence syntheses are increasingly employed to inform decision-making in public health and healthcare where decisions need to be made rapidly [11,12]. This review of reviews was conducted in support of the work of UK charity, Versus Arthritis, specifically the development, delivery and evaluation of their UK wide physical activity programme funded by Sport England, a time-limited programme of work to adhere to the funding requirements. Three-months were available to complete this evidence review to inform evaluation of the existing Versus Arthritis physical activity programmes and support development of new approaches. The research team (JW, AB, TP and DS) and stakeholders from the charity (AH, AA, JD, VO, RH) worked in partnership to deliver on this time sensitive programme of work.

This review of reviews aims to answer the following question: What are the modifiable capability, opportunity, and motivational barriers and facilitators to physical activity in people with a musculoskeletal condition? Further, this paper aims to present a case study to public health and healthcare professionals of an approach to synthesise the best available evidence to support effective decision making when limited by time and resource.

2. Method

2.1. Study design

Whilst a systematic review of reviews may be seen as the gold standard, the time and resources available did not allow this within the context of the development, delivery and evaluation of the Versus Arthritis physical activity programme as highlighted in the Introduction. Therefore, a rapid review approach, seen as a streamlined approach to synthesising evidence in a timely manner, was adopted [13].

Rapid reviews synthesise the literature in much the same way as a systematic review, however, the process is simplified to produce information in a timelier manner. Streamlining methods include limiting the sources of information to one or two databases, having one person screen the identified articles for inclusion, in some cases not conducting a quality appraisal, and presenting the results as a narrative summary [13,14]. Rapid reviews are completed, on average within 12 weeks and are shown to be valuable products to support evidence-based decision making [14], and draw comparable conclusions to full systematic reviews [15].

This review of reviews was based on the following seven-steps identified by Khangura et al. [13], for rapid 'knowledge to action' evidence summaries:

- (1) Identification of the need for the assessment
- (2) Development of a research question
- (3) Justification for the rapid review approach
- (4) A systematic search of the literature
- (5) Screening of the identified literature
- (6) A narrative synthesis of the included studies
- (7) Dialogue with the 'knowledge users' to ensure knowledge exchange

Steps 1 through 3 are described above. The remainder of the Methods section will cover steps 4 through 7. This review of reviews took place over 9 weeks between January and March 2021.

2.2. Systematic search of the literature

The following search string was used to identify the literature pertaining to the barriers and facilitators to physical activity in people with a musculoskeletal condition.

("physical activity"[Title] OR "physically active"[Title] OR exercise [Title])

AND (barriers OR facilitators OR determinants OR causes OR factors OR drivers OR motivat* OR adherence) AND ("back pain" OR fibromyalgia OR arthritis OR osteoarthritis OR "ankylosing spondylitis" OR "musculoskeletal condition" OR "musculoskeletal disorder" OR MSK) AND review[Title]

The search was completed in PubMed Central and the Cochrane Library (the search term 'review[Title]' was not included in the search of the Cochrane Library as it contains reviews only).

2.3. Inclusion/exclusion criteria

Reviews were included if they met the following criteria:

- (1) Population: Adults with a musculoskeletal condition including inflammatory conditions, such as rheumatoid arthritis and Spondylarthritis, as-well-as conditions of musculoskeletal pain, such as osteoarthritis, fibromyalgia and back pain.
- (2) Outcome of Interest: Only reviews where the primary or secondary outcome was an understanding of the barriers and facilitators to physical activity or exercise were included; review papers not focused on understanding physical activity behaviour in people with a musculoskeletal condition were excluded.
- (3) Study design: Peer reviewed journal articles were included within this review. Only review papers were included; this included narrative reviews, systematic reviews, and any other term to explain a literature review; this review was inclusive of qualitative and quantitative reviews. Papers not considered research such as commentary articles or opinion pieces were excluded.
- (4) Language of publication: Reviews published in English.
- (5) Date range: No date range was set.

2.4. Screening of the literature

Identified reviews were screened for inclusion by the principal investigator (JW) in line with the recognised streamlining approaches for a rapid review [13,14]. First the titles were screened, excluding those not relevant, followed by an abstract review with exclusion based on the inclusion and exclusion criteria. Finally, the remaining papers were reviewed in full, again with exclusion in line with the inclusion and exclusion criteria.

2.5. Data synthesis

The results and discussion sections of the identified reviews were assessed by framework analysis using the components of the COM-B model. The identified reviews were deductively coded for the capability, opportunity, and motivational barriers and facilitators to physical activity. Each review was coded by JW and AB, TP coded six reviews; JW, AB and TP are experienced in using the COM-B model to understand behaviour [16–21] and in reviews of the literature to inform decision making in public health [20,22–24]. AH, AA, VO and JD, brought into the research team as ‘knowledge users’ (detailed below), coded one or two reviews each. A data extraction template was created in Microsoft Excel to support the coding process.

The coding of the barriers and facilitators by COM-B component was reached by consensus. Few differences in coding between researchers were identified; where differences occurred, these were related to the classification of the barrier or facilitator by COM-B component, rather than the identification of the barrier or facilitator itself. Where there were coding differences, these differences were discussed and an agreement reached.

2.6. Dialogue with knowledge users

To support knowledge exchange, members of the UK charity Versus Arthritis (AH, AA, VO and JD) were brought into the research team to support data synthesis and interpretation as described in the previous section. AH, AA, VO and JD attended a workshop facilitated by the

principal investigator in which they were orientated to the COM-B model and the coding process, completing a worked example. A follow-up workshop was held four-weeks later to review the coding and discuss differences. The principal investigator was on hand to answer questions between the workshops. JW, AB and TP met following the second workshop to agree the final coding against the COM-B components. The agreed barriers and facilitators were presented to a wider stakeholder audience within Versus Arthritis.

3. Results

3.1. Description of the included reviews

The search identified 503 reviews once the duplicates were removed. Following screening, 12 reviews were included for analysis (see Fig. 1). The included reviews covered a mix of conditions, three focused on hip and knee osteoarthritis combined [25–27], one on rheumatoid arthritis and osteoarthritis combined [28], one on lower-back pain, hip and knee osteoarthritis combined [29], two with a focus on rheumatoid arthritis [30,31], one on knee osteoarthritis [32], one on spondylarthritis [33], two with a focus on chronic pain from a musculoskeletal condition [34, 35], and one with a focus on lower-back pain [36]. Two reviews were qualitative in nature [26,31], six reviews were quantitative in nature [28,29,33–36], with four mixed-methods reviews [25,27,30,32].

3.2. The barriers and facilitators to physical activity

A multitude of interrelated factors influencing physical activity in people with a musculoskeletal condition were identified as presented in Table 1. The constructs of the COM-B model, as identified by its creators [37], influence one another. The greater one’s capability and the presence of opportunities, the more likely a behaviour is to happen when motivation arises, and a person is more likely to be motivated if they are capable and the environment provides the necessary opportunities. A narrative of the identified barriers and facilitators to physical activity in people with a musculoskeletal condition by COM-B component, and the potential relationship between these components, is provided.

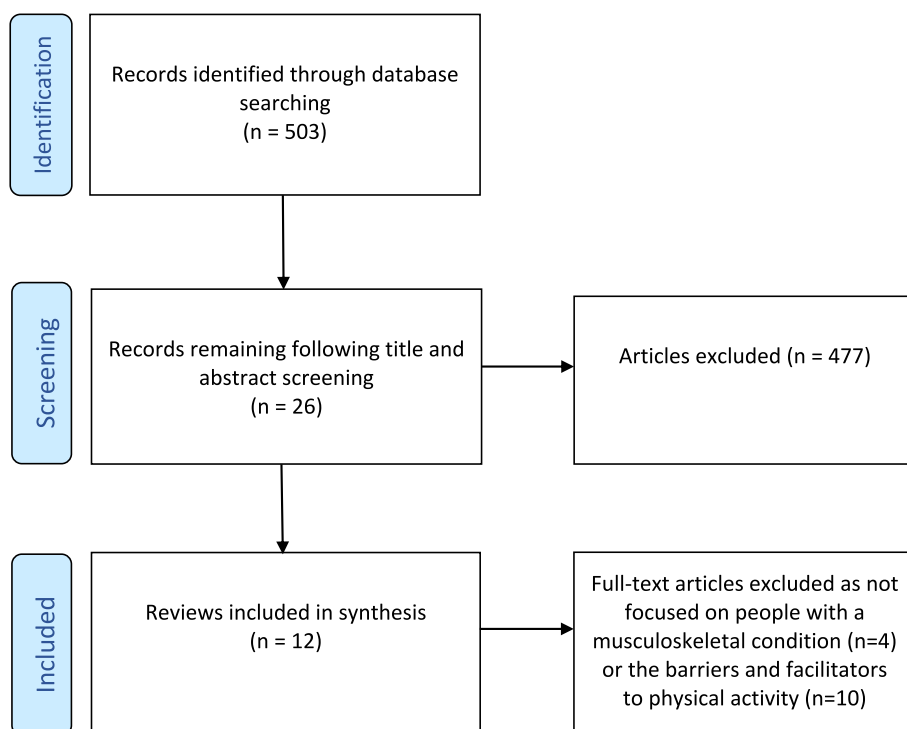


Fig. 1. The identification, screening and inclusion of reviews in this review of reviews.

Table 1
The barriers and facilitators to physical activity in people with a musculoskeletal condition.

COM-B Component	Barriers	Facilitators
Capability – Physical	Disease/symptoms [25–27,30–33], comorbidities and/or poor general health [25–27,30,32], lack of physical fitness and function [25–27,30,32], exercise-induced discomfort [26,30,32].	Stable symptoms [26,27,31,32], good general health [26,27,32] and physical function [25–27,30–32], being well rested physically [25], having the physical skills [25].
Capability – Psychological	Failure to follow advice due to a lack of understanding [32], lack of knowledge of the benefits [25,26], mental tiredness [25], forgetfulness [25, 32], lack of mental ability to make physical activity decisions (not sure how, what level or activity) [25,26,30], lack of awareness of physical activity as a strategy for self-management [27,30], not a priority due to other commitments [25–27,30].	Knowledge of the condition specific benefits [25–28,30,32–34], being well rested mentally [25], possessing the mental skills to make physical activity decisions (know-how, level, activity, barrier reduction and adaptations) [25,26,28,30, 32–34], the skills to self-monitor/self-regulate physical activity [29,32–34], prioritisation of physical activity [25–27,30], integration into daily life [25–27, 32], commitment to others [25,29].
Opportunity – Physical	Lack of time [27,30–32], bad weather [25,30,31], inaccessible facilities or activities (time, location, transport, parking) [25,27,30–32,34], cost/money [25,27,30,32], unqualified instructors [26], activity level unequal to skill and ability [30].	Physical activity diary and resources to self-monitor [25,29,34], exercise information and education [30,33,36], exercise prescription (individualised programming, instructions and demonstrations, delivered early in the condition pathway) [26–28,30,32,33,35], graded programmes [28,29,34,36], condition management programmes [34], greater frequency/less intensity [32], structured consultation [32], follow-up sessions [29,32,34], convenient and accessible facilities [25,27,30–32], low cost [25,30,32], understanding, knowledgeable and skilled instructors [27,28,30,32,34], choice of activities and mode of delivery (home based, individual and group based activities) [32,34] inclusive of family and friends [27], good weather [25,31], exercise in warm water [27,31], time [30].
Opportunity – Social	Lack of support, poor and conflicting information from healthcare professionals [26,27,30–32], lack of engagement and interaction with care providers [32], lack of instructions on what to do [25,30], lack of a training partner [25,30], negative social comparisons [26], lack of social support [25,26,31], no encouragement [30].	Inclusive, therapeutic alliance between care providers and patient [27,32] with early intervention [32], tailored advice, information, support and encouragement from healthcare and exercise professionals [25–35] with regular contact [32], opportunity to share concerns [32], involvement in making physical activity programme decisions [25,34], demonstrations and instructions on what to do by healthcare professionals [25,26], supervision [26,32,33,36], being accountable to others [31], creating a behavioural contract [34], social/peer support [25–27,30–32,34,35], group socialisation [26,27,31], exercising with a partner [25–27,30,32], positive reinforcement [27,29,30,34].
Motivation – Reflective	Negative beliefs and/or experiences of physical activity on symptoms [25–27,30–32], safety and suitability concerns [25,27], negative general health beliefs and attitudes [32], belief that nothing can be done to help condition [25–27], belief that physical activity caused condition [27], no or limited physical improvements from physical activity [27,30,32], sceptical of the benefits of physical activity [26,27], perception that symptoms meant physical activity was not possible [25,30], perception that comorbidities meant physical activity was not possible [25,27,30], poor self-image [25], self-perception of being inactive [25], belief that already active enough [25], belief that lacking in skills and function to become active [27], energy needed for other tasks [26,30,32], low-levels of motivation [25,26,30,32], low importance [32], too much time/effort [25, 27,30,32], belief that activities of daily living are not enough [27], low physical activity self-efficacy [27,32,33].	Positive beliefs about the benefits of physical activity in general [25,26,30–32], belief that physical activity is a means to self-manage condition and symptoms [25,26,30,32], and to prevent medication and surgery [26,27,32], taking control of condition [25,26,30,36], physical activity self-efficacy [25,27,30,32–34], self-efficacy for condition management [27,32], self-motivation [25,29,30,32], understanding post activity physical feelings [32], identifying as an active person [25–27], few perceived barriers [25], belief that activity could be incorporated into daily life [27], normative beliefs [27,32], way of getting out of the house [27], setting and achieving goals and intentions [32–35].
Motivation – Automatic	Unpredictability of symptoms prevents habit formation [27,32], loss of previous activity patterns due to condition [26], sedentary habits formed [25], lack of positive reinforcement [25], lack of enjoyment from non-positive experiences of physical activity (historically and with condition) [25–27], fear of further damage [27,30], apathy towards physical activity [26,30,32], fear of contact with others [31], condition impacts on sense of self (particularly if considered previously active) [27], poor mental wellbeing [25,26,32,33].	Positive emotions, experiences and outcomes of physical activity [25–27,30–33], positive reinforcement [25,29,30], good mental wellbeing [25,26,32], not wanting to let people down [27,32], disease acceptance [32], normalising physical activity and making it a habit [27,32]

3.3. Capability - physical

Feeling physically incapable of being active was identified as a barrier to physical activity [25–27,30–33]. Physical incapability to be active was attributed to the musculoskeletal condition and the severity of symptoms, other comorbidities, or a general lack of health, fitness and physical function [25–27,30–33]. Exercise-induced discomfort [26,30, 32] stimulated the belief that physical activity was damaging, making the condition worse, an identified Reflective Motivation [25–27,30–32]. Stable symptoms [26,27,31,32], good general health [26,27,32] and physical function [25–27,30–32] with the necessary physical skills, maybe gained from prior experiences of being active, were identified facilitators to physical activity [25].

3.4. Capability – psychological

It was suggested by Veldhuijzen van Zanten et al. [30], that psychological factors were more important than physiological and social

barriers and facilitators to becoming and staying active. Knowledge of the benefits of physical activity, not just for general health but specifically for condition management [25–28,30,32–34] was an important facilitator in the psychological capability domain; conversely, a lack of such knowledge was a barrier to physical activity [25,26]. Knowing how to become more physically active, being able to make personal decisions about the level and type of physical activity, understanding how to overcome barriers to activity and how to adapt plans and exercises, were identified as facilitators of becoming and staying active [25,26,28,30, 32–34]. Conversely, a lack of knowledge in these areas was an identified barrier [25,26,30]. One review found a lack of understanding of instructions from health and exercise professionals to be a reason for failure to follow physical activity advice [32]. Possessing the ability to monitor and self-regulate physical activity encouraged adherence to exercise programmes [29,32–34].

Mental tiredness and forgetfulness were identified as barriers to becoming active [25,32], whereas being well rested was a facilitator of physical activity [25]. Those making physical activity a priority and part

of daily life were more likely to be active [25–27,30]. However, the prioritisation of family commitments made physical activity less likely [25–27,30]. The prioritisation of physical activity against other commitments was considered a decision process and therefore coded within the psychological capability domain as opposed to a physical lack of time afforded by the environment, which has been coded under the physical opportunity domain. Interpersonal skills fall within the domain of psychological capability; a perceived lack of the interpersonal skills required to take part in physical activity could explain the emotional response (an Automatic Motivation) of fear of being around others as identified in one review [31]. Making a commitment to others was an identified facilitator of physical activity [25,29].

3.5. Opportunity – physical

As is common in the general population [38], the availability of time, money, good weather, facilities, activities and opportunities afforded by the local environment to be active, were identified as facilitators of physical activity when available, and barriers when lacking [25,27,30–32,34].

Having access to exercise information and education [30,33,36], and resources to monitor and self-regulate physical activity were facilitators to staying active [25,29,34]. In addition, having access to an exercise prescription, specific exercise instructions and demonstrations, were also facilitators of physical activity [26–28,30,32,33,35]. Access to a structured behaviour consultation was identified as a facilitator of becoming and staying active [32]; intervention early in the condition journey was identified as important [32].

Access to a wide range of family friendly regular physical activity programmes [27,32,34] that improve knowledge [30,33,36] and build up gradually based on abilities [28,29,34,36] were suggested to facilitate physical activity if delivered by knowledgeable, skilled and supportive instructors [27,28,30,32,34]; unqualified instructors [26] and activities not equal to skill and ability level [30] had a negative impact and put people off from taking part. Sessions delivered with greater frequency but less intensity were preferred [32]. Further, condition management programmes were identified as a facilitator of physical activity [34] with follow-up sessions also supporting people to become physically active [29,32,34].

3.6. Opportunity – social

Social and peer support were widely cited facilitators of physical activity [25–27,30–32,34,35], with a lack of social support a barrier [25,26,31]. Receiving encouragement and positive reinforcement from others was a facilitator of physical activity [27,29,30,34] with a lack of encouragement a barrier [30]. Interacting and socialising with others was a facilitator to becoming and staying active [26,27,31], as was having a training partner or buddy [25–27,30,32], a barrier if lacking [25,30]. Social opportunities created a sense of commitment and accountability to others, facilitators of becoming and staying active as highlighted in the psychological capability domain [25,29,31,34]. However, comparison to others had the potential to have a negative impact on levels of physical activity [26].

Healthcare professionals were identified as important individuals whose information, advice and support carried weight; the opportunities afforded by the interpersonal interactions with these individuals constituted important barriers [26,27,30–32] and facilitators [25–36] to physical activity. The creation of therapeutic alliances between care providers, activity leaders and individuals [27,32], shared planning based on needs, abilities and preferences, [25,34] with regular contact [32], clear instructions, demonstrations [25,26], and supervision [26,32,33,36] were all facilitators to physical activity. Further, the creation of behavioural contracts [34], as-well-as sharing concerns about physical activity [32], contributed to becoming and staying active. A lack of support, advice, information and instructions from such trusted

professionals, or worse, conflicting information, were barriers to becoming and staying active [26,27,30–32].

3.7. Motivation – reflective

Negative beliefs and attitudes towards physical activity and health in general were identified as a barrier to change [25–27,30–32]. Having a poor self-image, a self-perception of being an inactive person [25], as-well-as a fatalistic view that nothing can be done to improve one's condition [25–27], were identified barriers to physical activity. Further, taking part in physical activity but not seeing any or only limited physical improvements [27,30,32], and a scepticism of the benefits of physical activity [26,27], were identified barriers. A belief that being active is too much time and effort [25,27,30,32], of low importance [32] with energy being needed for other tasks [26,30,32], were also barriers to change. Some believed that they were already active enough [25].

A belief that physical activity improves general health [25,26,30–32], supports condition management and the taking control of the condition [25,26,30,32,36] were identified facilitators of being physically active. A belief that physical activity improves symptoms [25,26,30,32], prevents the need for medication and surgery [26,27,32], as-well-as an understanding and a positive interpretation of post-exercise feelings [32], were facilitators to becoming and staying active.

Perceiving few physical barriers to physical activity, or knowing how to work around such barriers [25], and identifying as an active person [25–27], were reported to positively influence beliefs and attitudes towards physical activity and one's ability to change. A belief that physical activity can be incorporated into daily life was a facilitator to becoming and staying active [27], normalising physical activity and making it a habit (an automatic motivation) [27,32]. Physical activity as a means to get out of the house was identified as a motivating factor [27]. However, it was also identified that activities of daily living were believed not to be enough for health benefits [27].

A belief that physical activity provision was not suitable with concerns about personal safety were identified barriers linked to the opportunity domain [25,27]. Physical activity self-efficacy and the confidence to self-manage one's condition were frequently identified factors in becoming and staying active [25–27,30,32–34,36]. The setting of goals, and the achievement of set goals, were identified as facilitators of physical activity [32–35].

3.8. Motivation – automatic

The belief that physical activity can be detrimental to one's condition was identified as evoking a feeling of fear toward being active [27,30]; fear of contact with others was also reported [31]. Good mental wellbeing was identified as a facilitator of physical activity [25,26,32] and conversely, poor mental wellbeing a barrier [25,26,32,33].

Already ingrained sedentary habits were identified as barriers to physical activity [25]. The impact of physical symptoms, and their unpredictability, as highlighted in the physical capability domain, were reported to impact upon the ability to make physical activity a habit and break positive physical activity habits that may have previously existed [26,27,32], impacting on the sense of self if previously active [27]. An acceptance of one's condition and physical limitations were facilitators to becoming and staying active [32].

A general apathy towards activity [26,30,32], a lack of enjoyment and non-positive experiences of being active, both historically and with the condition [25–27], were reported to evoke negative emotions towards physical activity, where-as positive experiences and outcomes resulted in positive emotions [25–27,30–33]. Linked to the social opportunities domain, positive reinforcement evoked positive feelings toward physical activity [25,29,30]; support from others created a sense of not wanting to let people down [27,32].

4. Discussion

This review of reviews set out to identify the modifiable capability, opportunity and motivational barriers and facilitators to physical activity in people with a musculoskeletal condition to support intervention development.

4.1. Using the barriers and facilitators to drive action

With an understanding of the capability, opportunity and motivational barriers and facilitators to physical activity in people with a musculoskeletal condition, intervention designers can work through the steps of the Behaviour Change Wheel to identify intervention functions, behaviour change techniques and implementation strategies to bring about change [39]. A checklist to support intervention designers in this process has been created and is included as Supplementary File 1.

The findings reveal a complex interplay between the identified factors influencing physical activity. It is, therefore, not possible to rank the individual barriers and facilitators from the included reviews in terms of importance. Intervention designers should decide upon which of the identified factors they feel are changeable and are likely to have the biggest impact on physical activity. Intervention designers must ensure that they monitor physical activity to measure change with comparison, where possible, to a control group [40,41].

4.2. The wider determinants of physical activity

The wider determinants of physical activity should also be considered when designing and evaluating interventions, aiming to reduce any identified inequalities with interventions delivered with universal proportionalism. The wider determinants of physical activity in the UK general population include low-levels of health literacy, declining physical activity with age, English not as a first language, gender differences (males more active than females), socio-economic status, geographical differences, differences by ethnic group (Black people and Asian people are more likely to be inactive), and education level (with those less educated more likely to be inactive) [38]. These factors are likely to be relevant in those with a musculoskeletal condition [25,32] and therefore are included in the checklist provided as Supplementary File 1 for consideration by intervention designers.

The wider environmental determinants of physical activity such as having safe and welcoming spaces in which to be active, the provision of cycle lanes and the pedestrianisation of town centres, should also be considered in strategies to improve physical activity where change is possible in these areas [42].

4.3. The importance of healthcare professionals

The findings point strongly to the considerable influence of healthcare professionals. Lack of information, advice and support on physical activity from healthcare professionals may install negative beliefs, whereas positive encounters may facilitate physical activity by establishing positive attitudes and beliefs. Dobson et al. [25], conclude that healthcare professionals should proactively facilitate and reinforce physical activity and not expect people to overcome barriers on their own. Understanding the capability, opportunity and motivation of healthcare professionals to give physical activity support and advice should be investigated so that strategies can be developed to influence this behaviour.

4.4. Strengths and limitations

A strength of this review of reviews is the use of the COM-B model to synthesise the barriers and facilitators to physical activity allowing for progression to intervention development using the Behaviour Change Wheel [39]. A further strength of this review of reviews is the inclusion

of knowledge users within the research team to ensure knowledge exchange.

The major limitation of this review of reviews is that the searches were not fully systematic. As a rapid review, the search process was streamlined and the search highly defined which may have led to the omission of some relevant reviews. As is usual practice in reviews of this nature, a quality appraisal was not conducted, however, this may have resulted in the inclusion of low-quality evidence. It is acknowledged that the rapid review method does not offer the rigour of a systematic review and is subject to a greater degree of bias and error. However, despite these limitations, this rapid review of reviews has utility in evidence-based decision making to support physical activity improvement in people with musculoskeletal conditions.

5. Conclusion

This rapid review of reviews has identified the complex nature of physical activity in people living with a musculoskeletal condition. Using the COM-B model to frame the identified barriers and facilitators provides intervention designers with a range of potential factors amenable to change to improve physical activity in this population group.

Funding

UK Charity Versus Arthritis funded this review of reviews using a National Lottery Grant received from Sport England.

Author contributions

JW was the principal investigator for this rapid review of reviews; DS and RH provided input into the design. JW conducted the search, screening, coding and analysis of the identified reviews and wrote the final manuscript. TP, AB, AH, AA, JD, and VO supported the coding and analysis of the identified reviews. All authors read and approved the final manuscript.

Declaration of competing interest

RH, AH, AA, JD and VO are members of staff at Versus Arthritis. No other conflicts of interest are declared.

Acknowledgements

This review of reviews forms part of a wider evaluation of the Versus Arthritis physical activity programme. An independent steering group was established as part of this wider evaluation. The authors of this review of reviews would like to thank the members of the evaluation steering group for their time, knowledge and expertise in support of this work. The members of the steering group are Aneika Cummings, Angel Chater, Benjamin Ellis, Caroline Aylott, Clare Fletcher, James Steele, Mark Batt, Melvin Hillsdon, Robin Brittain, Sarah Worbey, and Suzanne Verstappen.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.puhip.2022.100250>.

References

- [1] Versus Arthritis, The state of musculoskeletal health 2021, Available from: <https://www.versusarthritis.org/about-arthritis/data-and-statistics/the-state-of-musculoskeletal-health/>, 2021. (Accessed 9 February 2022).
- [2] World Health Organisation, Musculoskeletal conditions [updated 8 February 2021]. Available from: <https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions>. (Accessed 9 February 2022).

- [3] B. Ellis, A. Garrett, T. Marshall, Providing Physical Activity Interventions for People with Musculoskeletal Conditions, Department of Health, Public Health England, Arthritis Research UK, NHS England, 2016.
- [4] Versus arthritis. The state of musculoskeletal health 2019, Available from: <https://www.versusarthritis.org/media/14594/state-of-musculoskeletal-health-2019.pdf>, 2019. (Accessed 9 February 2022).
- [5] D.S. Buchan, S. Ollis, N.E. Thomas, S. Baker, Physical activity behaviour: an overview of current and emergent theoretical practices, *Journal of Obesity* 2012 (2012), e546459, <https://doi.org/10.1155/2012/546459>.
- [6] M. Hillsdon, C. Foster, M. Thorogood, A. Kaur, T. Wedatilake, Interventions for promoting physical activity, *Cochrane Database Syst. Rev.* CD003180 (2005). <https://doi/10.1002/14651858.CD003180.pub2/full>.
- [7] G.W. Heath, D.C. Parra, O.L. Sarmiento, L.B. Andersen, N. Owen, S. Goenka, et al., Evidence-based intervention in physical activity: lessons from around the world, *Lancet* 380 (2012) 272–281, [https://doi.org/10.1016/S0140-6736\(12\)60816-2](https://doi.org/10.1016/S0140-6736(12)60816-2).
- [8] K. Glanz, B.K. Rimer, K. Viswanath (Eds.), *Health Behavior and Health Education: Theory, Research and Practice*, fourth ed., John Wiley & Sons, San Francisco, CA, 2008.
- [9] A.E. Bauman, J.F. Sallis, D.A. Dzawaltowski, N. Owen, Toward a better understanding of the influences on physical activity: the role of determinants, correlates, causal variables, mediators, moderators, and confounders, *Am. J. Prev. Med.* 23 (2002) 5–14, [https://doi.org/10.1016/s0749-3797\(02\)00469-5](https://doi.org/10.1016/s0749-3797(02)00469-5).
- [10] S. Michie, M.M. van Stralen, R. West, The behaviour change wheel: a new method for characterising and designing behaviour change interventions, *Implement. Sci.* 6 (2011) 42, <https://doi.org/10.1186/1748-5908-6-42>.
- [11] A.C. Tricco, E.V. Langlois, Rapid Reviews to Strengthen Health Policy and Systems: a Practical Guide, World Health Organisation, 2017. Available from: <http://www.who.int/alliance-hpsr/resources/publications/rapid-review-guide/en/>. (Accessed 5 July 2021).
- [12] M.J. Grant, A. Booth, A typology of reviews: an analysis of 14 review types and associated methodologies, *Health Inf. Libr. J.* 26 (2009) 91–108, <https://doi.org/10.1111/j.1471-1842.2009.00848.x>.
- [13] S. Khangura, K. Konnyu, R. Cushman, J. Grimshaw, D. Moher, Evidence summaries: the evolution of a rapid review approach, *Syst. Rev.* 1 (2012) 10, <https://doi.org/10.1186/2046-4053-1-10>.
- [14] A.C. Tricco, J. Antony, W. Zarin, L. Striffler, M. Ghassemi, J. Ivory, et al., A scoping review of rapid review methods, *BMC Med.* 13 (2015) 224, <https://doi.org/10.1186/s12916-015-0465-6>.
- [15] A. Watt, A. Cameron, L. Sturm, T. Lathlean, W. Babidge, S. Blamey, et al., Rapid versus full systematic reviews: validity in clinical practice? *ANZ J. Surg.* 78 (2008) 1037–1040, <https://doi.org/10.1111/j.1445-2197.2008.04730.x>.
- [16] J. Webb, J. Foster, E. Poulter, Increasing the frequency of physical activity very brief advice for cancer patients. Development of an intervention using the behaviour change wheel, *Publ. Health* 133 (2016) 45–56, <https://doi.org/10.1016/j.puhe.2015.12.009>.
- [17] J. Webb, J. Hall, K. Hall, R. Fabunmi-Alade, Increasing the frequency of physical activity very brief advice by nurses to cancer patients. A mixed methods feasibility study of a training intervention, *Publ. Health* 139 (2016) 121–133, <https://doi.org/10.1016/j.puhe.2016.05.015>.
- [18] J. Webb, J. Stockwell, Y. Chavez-Ugalde, The reach, adoption, and effectiveness of online training for healthcare professionals, *Publ. Health* 153 (2017) 107–110, <https://doi.org/10.1016/j.puhe.2017.08.016>.
- [19] J. Peel, J. Webb, A.W. Jones, A remote behaviour change service for increasing physical activity in people with chronic lung conditions: intervention development using the Behaviour Change Wheel, *Perspect Public Health* 140 (2020) 16–21, <https://doi.org/10.1177/1757913919880928>.
- [20] T. Palmer, Professional Doctorate in Health Psychology, *Thesis Portfolio*. London Metropolitan University, 2021. Available from: http://repository.londonmet.ac.uk/6936/1/Palmer-Tiffany_Prof-doc.pdf. (Accessed 22 February 2022).
- [21] N.D. Pallin, J. Webb, L. Brown, N. Woznitza, A. Stewart-Lord, L. Charlesworth, Online training resources to aid therapeutic radiographers in engaging in conversations about physical activity and diet: a mixed methods study, *Radiography* 28 (2022) 124–132, <https://doi.org/10.1016/j.radi.2021.09.004>.
- [22] J. Webb, S. Moxon, A study protocol to understand urban rewilding behaviour in relation to adaptations to private gardens. <https://doi.org/10.1080/23748834.2021.1893047>, 2021, 1–9.
- [23] N. Pallin, A. Fisher, R. Beeken, N. Woznitza, L. Charlesworth, J. Webb, A systematic review of digital education interventions for healthcare professionals to promote physical activity and healthy eating among adult patients, Available from: https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=211712, 2021. (Accessed 22 February 2022).
- [24] E. Vangeli, S. Bakhshi, A. Baker, A. Fisher, D. Bucknor, U. Mrowietz, et al., A systematic review of factors associated with non-adherence to treatment for immune-mediated inflammatory diseases, *Adv. Ther.* 32 (2015) 983–1028, <https://doi.org/10.1007/s12325-015-0256-7>.
- [25] F. Dobson, K.L. Bennell, S.D. French, P.J.A. Nicolson, R.N. Klaasman, M.A. Holden, et al., Barriers and facilitators to exercise participation in people with hip and/or knee osteoarthritis: synthesis of the literature using behavior change theory, *Am. J. Phys. Med. Rehabil.* 95 (2016) 372–389, <https://doi.org/10.1097/PHM.0000000000000448>.
- [26] A.M. Kanavaki, A. Rushton, N. Efstathiou, A. Alrushed, R. Klocke, A. Abhishek, et al., Barriers and facilitators of physical activity in knee and hip osteoarthritis: a systematic review of qualitative evidence, *BMJ Open* 7 (2017), <https://doi.org/10.1136/bmjopen-2017-017042>. Epub ahead of print 26 December.
- [27] M. Hurley, K. Dickson, R. Hallett, R. Grant, H. Hauari, N. Walsh, et al., Exercise Interventions and Patient Beliefs for People with Hip, Knee or Hip and Knee Osteoarthritis: a Mixed Methods Review, *Cochrane Database Syst Rev*, 2018, <https://doi.org/10.1002/14651858.CD010842.pub2>.
- [28] A.M. Ezzat, K. MacPherson, J. Leese, L.C. Li, The effects of interventions to increase exercise adherence in people with arthritis: a systematic review, *Muscoskel. Care* 13 (2015) 1–18, <https://doi.org/10.1002/msc.1084>.
- [29] P.J.A. Nicolson, K.L. Bennell, F.L. Dobson, A.V. Ginckel, M.A. Holden, R. S. Hinman, 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, *Br. J. Sports Med.* 51 (2017) 791–799.
- [30] Veldhuijzen van Zanten JJCS, P.C. Rouse, E.D. Hale, N. Ntoumanis, G.S. Metsios, J. L. Duda, et al., Perceived barriers, facilitators and benefits for regular physical activity and exercise in patients with rheumatoid arthritis: a review of the literature, *Sports Med.* 45 (2015) 1401–1412, <https://doi.org/10.1007/s40279-015-0363-2>.
- [31] T. Davigerne, R.H. Moe, B. Fautrel, L. Gossec, Development and initial validation of a questionnaire to assess facilitators and barriers to physical activity for patients with rheumatoid arthritis, axial spondyloarthritis and/or psoriatic arthritis, *Rheumatol. Int.* 40 (2020) 2085–2095, <https://doi.org/10.1007/s00296-020-04692-4>.
- [32] R. Marks, Knee osteoarthritis and exercise adherence: a review, *Curr. Aging Sci.* 5 (2012) 72–83, <https://doi.org/10.2174/1874609811205010072>.
- [33] M.T. McDonald, S. Siebert, E.H. Coulter, D.A. McDonald, L. Paul, Level of adherence to prescribed exercise in spondyloarthritis and factors affecting this adherence: a systematic review, *Rheumatol. Int.* 39 (2019) 187–201, <https://doi.org/10.1007/s00296-018-4225-8>.
- [34] J. Jordan, M. Holden, E. Mason, N.E. Foster, Interventions to improve adherence to exercise for chronic musculoskeletal pain in adults, *Cochrane Database Syst. Rev.* 1 (2010) 1–59, <https://doi.org/10.1002/14651858.CD005956.pub2>. Epub ahead of print.
- [35] L.B. Meade, L.M. Bearn, L.H. Sweeney, S.H. Alageel, E.L. Godfrey, Behaviour change techniques associated with adherence to prescribed exercise in patients with persistent musculoskeletal pain: systematic review, *Br. J. Health Psychol.* 24 (2019) 10–30, <https://doi.org/10.1111/bjhp.12324>.
- [36] N.A. Beinart, C.E. Goodchild, J.A. Weinman, S. Ayis, E.L. Godfrey, Individual and intervention-related factors associated with adherence to home exercise in chronic low back pain: a systematic review, *Spine J.* 13 (2013) 1940–1950, <https://doi.org/10.1016/j.spinee.2013.08.027>.
- [37] R. West, S. Michie, A brief introduction to the COM-B Model of behaviour and the PRIME Theory of motivation, *Qeios*. Epub ahead of print 9 April, <https://doi.org/10.32388/WW04E6.2>, 2020.
- [38] J. Varney, M. Brannan, G. Aaltonen, Everybody Active, Every Day: Framework for Physical Activity, Public Health England; Crown copyright, London, 2014. Available from: <https://www.gov.uk/government/publications/everybody-active-every-day-a-framework-to-embed-physical-activity-into-daily-life>. (Accessed 16 February 2022).
- [39] S. Michie, L. Atkins, R. West, *The Behaviour Change Wheel. A Guide to Designing Interventions*, Silverback publishing, London, 2014.
- [40] National Institute of Health and Care Excellence, *Behaviour Change: Individual Approaches*, NICE, London, 2014.
- [41] Public Health England, Identifying what Works for Local Physical Inactivity Interventions, Crown copyright, London, 2014. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/374560/Whatworks1_2.pdf. (Accessed 14 January 2022).
- [42] M. Kärmeniemi, T. Lankila, T. Ikäheimo, H. Koivumaa-Honkanen, R. Korpelainen, The built environment as a determinant of physical activity: a systematic review of longitudinal studies and natural experiments, *Ann. Behav. Med.* 52 (2018) 239–251, <https://doi.org/10.1093/abm/kax043>.