Determinants of physical activity in older adults: an umbrella review protocol

Cassandra D’Amore1, Neera Bhatnagar2, Renata Kirkwood2, Lauren E. Griffith3, Julie Richardson1, Marla Beauchamp1,4

1School of Rehabilitation Science, McMaster University, Hamilton, ON, Canada, 2McMaster University, Hamilton, ON, Canada, 3Department of Health Research Methods, Evidence, and Impact, McMaster University, Hamilton, ON, Canada, and 4Research Institute at St Joseph’s Healthcare, Hamilton, Canada; Department of Medicine, McMaster University, Hamilton, ON, Canada

ABSTRACT

Objective: The aim of this review is to summarize the evidence for determinants of physical activity in older adults.

Introduction: Physical activity is an important predictor of multi-morbidity, falls, and cognitive decline in older adulthood. Understanding what influences older adults’ physical activity behavior is an important first step for guiding effective interventions for promoting physical activity in this population.

Inclusion criteria: This umbrella review will include systematic reviews (including scoping reviews) reporting on the relationship between determinants (also referred to as correlates or factors), measured by either self-report or direct measurement, and physical activity in adults ≥60 years.

Methods: A systematic search of six databases will be completed in MEDLINE, Embase, CINAHL, Cochrane Library, PsycINFO, and AgeLine. Two independent reviewers will screen titles, abstracts, and full-text articles, and perform data extraction and quality assessment. Evidence for determinants of physical activity will be synthesized using the socio-ecological model. If possible, evidence will be compared by study design, type of physical activity, outcome measure used, setting, and sex.

Systematic review registration: PROSPERO CRD42020159332

Keywords: aging; exercise; influences; overview; review of reviews


Introduction

Low levels of physical activity are among the top 10 risk factors for mortality globally.1 Survey data from the World Health Organization showed that in 2010 the number of people not meeting physical activity guidelines increased with age, reaching nearly half of the population for those ≥80 years.2 This trend is particularly concerning given the demonstrated benefits of physical activity with respect to chronic disease, cognitive decline, and injurious falls.3–5 Consequently, a large variety of interventions targeting physical activity have been developed and evaluated.6–8 However, a report assessing physical activity throughout the world from 2001 to 2016 showed only stable to declining levels of physical activity, particularly in high-income Western countries.9 Thus, identification of factors affecting physical activity behavior in older adults is important for guiding the development of targeted strategies to influence physical activity in this population.

It is becoming increasingly accepted when studying health behaviors (eg, physical activity and mental health) to look beyond individual influences.10,11 When examining physical activity, the socio-ecological model (SEM) is commonly used among researchers for examining both individual and environmental influences.11–13 The SEM considers influences of and interactions between factors at the individual level, and multiple environmental levels including social, organizational, community, and public policy.11 In a review by Fleury and Lee14 in 2006, evidence for factors affecting physical activity in African American
women were reported at multiple levels of influence including: intrapersonal (perception of health, socioeconomic status), interpersonal (support of family and friends), and community (access to safe, affordable facilities). A comprehensive understanding of the determinants of physical activity specific to older adults will allow for the implementation of more effective interventions at multiple levels.

The term “factor” used in the SEM is referred to as a determinant in this review. A determinant, also commonly referred to as a correlate or predictor, is a variable that has demonstrated an association with physical activity in either a cross-sectional or prospective study, respectively. In keeping with the SEM, determinants will be made up of: i) intrapersonal variables such as, age, socioeconomic status, or comorbidities; ii) social variables, such as perceived support for physical activity or marital status; and iii) environmental variables, such as weather, space to walk, or transportation accessibility. This framework allows for the consideration of all health determinants, described by the WHO as including both the individual and their environment, which has been identified as critical for assessing health or health behaviors.\textsuperscript{15}

After completing a preliminary search in PubMed, we found that several umbrella reviews, or reviews of systematic reviews, have been published to effectively summarize determinants of physical activity in various populations of children and adults; however, to our knowledge there is currently no umbrella review specific to older adults. Umbrella reviews provide a comprehensive description of a broad topic by summarizing systematic reviews, rather than primary studies. This can strengthen the understanding of a topic by identifying when there is consistency in conclusions or by highlighting the presence of contradictory evidence.\textsuperscript{16} In 2015, a group of researchers investigated different types of determinants across the life course in a series of reviews. Their findings suggest that determinants of physical activity tend to change with age.\textsuperscript{17-21} However, in these reviews, adults were typically examined in subgroups under and over the age of 40 or 55 years.\textsuperscript{17-21} Categorizing adults in this way likely resulted in a loss of information specific to older adults who tend to be more heterogeneous in presentation (eg, disease presentation, physical activity type and amount), with very different needs than their younger counterparts.\textsuperscript{2,22,23}

In addition to providing a more accurate synthesis of determinants of physical activity specific to older adults, we aim to provide a more complete description of the evidence. We hope to further understand the strength of the relationship between physical activity and its determinants in older adults by comparing the available evidence presented in prospective study designs to that of cross-sectional study designs, as well as the evidence from direct measures versus self-reported physical activity questionnaires. By utilizing the function of umbrella reviews to highlight conflicting and complimentary findings on multiple contributing factors (eg, study design, outcome measures, setting, or sex) for the same topic (ie, determinants of physical activity), we can come to a much stronger conclusion about the overall evidence for each determinant. For example, if results from cross-sectional analyses and longitudinal analyses present conflicting evidence for a relationship, this may raise questions about the direction of the relationship. Similarly, our interpretation of findings may also change if we only see relationships with self-report versus direct measures of physical activity. Previous work has shown that sex has a large influence on both the amount and type of physical activity, however, other determinants that could influence these subgroups independently have not been thoroughly explored.\textsuperscript{17,21-25} For this reason we will also try to summarize the evidence for each determinant by sex.

Specifically, the aim of this umbrella review is to summarize the evidence for determinants of physical activity in older adults using a socio-ecological model. Secondary aims include examining the evidence for different determinants (categorized by the SEM) by subgroups based on type of outcome measure, study design, setting and sex. This review uses the World Health Organization’s definition\textsuperscript{26} of physical activity and focuses on reviews of studies conducted in people aged 60 years and older.

**Review question**

What are the determinants of physical activity in older adults?

**Inclusion criteria**

**Types of participants**

Reviews will be included if they are explicitly targeted to older adults. For this umbrella review, older adults are classified as being \( \geq 60 \) years. Reviews

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including a mixed population will only be included if the data synthesized related to older adults can be extracted and this data has not been captured in another included review. There are no setting restrictions applied to the eligibility criteria (eg, community, hospital, or long-term care).

Phenomena of interest
This umbrella review is focusing on the concept of physical activity defined according to the World Health Organization definition, “any bodily movement produced by skeletal muscle that requires energy expenditure.” This definition can include activities such as household chores, traveling, recreation, and exercise. Reviews must include a measure of physical activity (including both self-reported and direct measures) that determines amount, level, or intensity of physical activity to be considered for inclusion. Examples of potential measures are the Physical Activity Scale for the Elderly, International Physical Activity Questionnaire, activity diaries, fitness trackers, or accelerometers.

Outcomes
In order to be considered, the reviews must include a synthesis related to determinants of physical activity. Determinants are characteristics that influence an outcome, which for our review is physical activity, and could be described as predictors, correlates, or variables that have a relationship with physical activity. For this review, we will use the SEM to critically examine and categorize these characteristics by their level of influence. We will be adapting the model by McLeroy et al., which presented individual/intrapersonal influences (eg, socio-demographic, biological, and psychosocial characteristics) plus four levels of environmental influences: i) social/interpersonal (eg, relationships, social network, and support), ii) organizational (eg, facilities, incentives, rules and regulations), iii) community (eg, allocation of resources, relationships among organizations, and norms), and iv) public policy (eg, government funding, behavior restrictions and enforcement). With this wide variety of potential determinants, the number and type of outcome measures expected is equally large (eg, self-report questionnaires, physical performance measures, environmental measures). In order to facilitate the inclusion of as many different types of determinants as possible, both self-reported and objective measures will be included.

Context
This review will include all older adults from any setting, including community dwelling, assisted living, or inpatient.

Types of studies
Studies will be included in this review if they are a systematic review, scoping review, or meta-analysis. Literature reviews, narrative reviews, and books will be excluded from this review along with reviews on effectiveness or interventions.

Methods
This review will follow JBI guidelines for umbrella reviews. An umbrella review summarizes systematic reviews rather than primary studies, providing a broad synthesis of existing research on the chosen topic. This methodology creates the opportunity to determine if findings around a specific question complement or contrast each other. This protocol has been registered with PROSPERO (CRD42020159332).

Search strategy
Search terms were developed around four major themes: i) older adults, ii) physical activity, iii) systematic reviews, and iv) determinants. The term “determinant” and its synonyms (eg, predictor, correlate, relationship) were included in order to reduce search results to a manageable number. The search strategy has been designed and executed by one of the co-investigators who is a librarian (NB). Appendix I includes the full search strategy created for MEDLINE (Ovid).

The following online databases will be searched with unique strategies for each: Cochrane Library, CINAHL (EBSCO), MEDLINE (Ovid), Embase (Ovid), PsycINFO (Ovid), AgeLine (EBSCO). There will be no restrictions placed on publication date and each database will be searched from time of inception to the present. References for all included reviews will be searched by hand for citations relevant to this umbrella review. Registries for systematic reviews, including Cochrane Library and the JBI Systematic Review Register, will be searched for protocols.

Study selection
All study screening will be carried out using Covidence (Veritas Health Innovation, Melbourne, Australia), an online software program for
systematic review management. Two independent reviewers will screen all abstract/titles and full-text articles. If there is disagreement during abstract screening, the review will automatically be retrieved for full-text evaluation. During full-text evaluation, any disagreement that cannot be resolved by discussion between reviewers will be brought to a third member of the team for a final decision. An initial pilot phase where each reviewer independently reviews, then discusses their decisions (10 abstracts, up to three full texts) with the group and addresses conflicts will be carried out.

Assessment of methodological quality
A critical appraisal of the quality of each review will be carried out using JBI’s critical appraisal checklist for systematic reviews and research synthesis. This will assess the validity of the methods used by each review, including inclusion criteria, search methods, and steps taken to reduce bias. We will be using this tool to assess the quality of all reviews, including scoping reviews. We recognize that the main goal for scoping reviews is not to synthesize but to present a range of evidence on a topic, and that they do not undergo an assessment of methodological quality of included studies. These differences will result in specific items on the JBI critical appraisal checklist to be designated as not applicable, specifically items five, six, and eight. All other items on the checklist are appropriate for the assessment of a scoping review in accordance with JBI’s methodological requirements for scoping reviews. Prior to assessment, two independent reviewers will meet to determine the criteria for indicating a “yes,” “no,” “unclear,” or “not applicable” in the context of this review, for each of the 11 items.

Assessment of quality of evidence
We will assess the quality of evidence for each determinant/subgroup of determinants in each review using the GRADE approach. Factors used to determine quality include inconsistency, risk of bias, imprecision, indirectness, publication bias, magnitude of effect, dose-response, and confounding variables. Overall confidence for each determinant from each review will be given a quality rating from high to very low as described by this approach.

We acknowledge that scoping reviews included in this analysis will receive lower quality ratings due to their methodological framework. In the case of low-quality evidence, a discussion comparing results of studies with and without low-quality evidence will be carried out and the potential impact of low-quality evidence on results will be discussed.

Corrected covered area
When conducting an umbrella review, a new risk of bias is introduced into the analysis. This bias results from a primary study being included in more than one of the included systematic reviews. The corrected covered area (CCA) measures the extent to which this overlap is present by analyzing the number of repeated occurrences of unique primary studies in other reviews divided by the product of unique primary studies and number of systematic reviews minus the number of unique primary studies. The resulting score ranges from zero to 100% if all reviews included the same primary studies, the CCA will equal 100%. In order to assess the impact this may have on our umbrella review, we will calculate the CCA for each determinant and use the ratings slight to very high, as suggested by Pieper et al.

Data collection
Two independent reviewers will extract relevant data using a standardized data extraction form created using the standardized JBI data extraction form with direction from the JBI Manual for Evidence Synthesis (Appendix II). Information on review details (e.g., term definitions and outcome measures), searches conducted (e.g., databases used and number of included studies), appraisal (e.g., tools/instruments used), and, if applicable, analysis completed (e.g., methods and results) will be collected. Reviewers will pilot one full article and address any questions or concerns before beginning full extraction. Any disagreements that arise will be resolved through discussion.

Data summary
All data extracted will be presented in tables and accompanied by a narrative summary. In accordance with the aim of this umbrella review, the summary will be organized into categories determined by the SEM levels; the SEM levels that can be examined will depend on the determinants reported in the included literature. Where possible, we will address our secondary aims by synthesizing and examining the evidence for different subgroups within SEM levels: study design, type of physical activity measure,
setting, and sex. Results from JBI’s critical appraisal checklist will also be used to guide a comparison of low- and high-quality reviews and the potential impact on the interpretation of the results from this umbrella review.

**Funding**

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**References**


Appendix I: Search strategy

OVID Medline Epub ahead of print, in-process and other non-indexed citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R)

1946 to Present

The initial search returned 5448 results in December 2019 and an additional 397 results were found when search was updated in June 2020.

Search strategy:
1  exp Exercise/
2  exp Physical Fitness/
3  exp sports/
4  exp Recreation/
5  running/ or swimming/ or walking/
6  Motor Activity/
7  (physical$ adj5 (fit$ or train$ or activ$ or endur$)).tw,kf.
8  (exercis$ adj5 (train$ or physical$ or activ$)).tw,kf.
9  (sport$ or walk$ or bicycle$).tw,kf.
10  (exercise$ adj aerobic$).tw,kf.
11  ((lifestyle or life style) adj5 activ$).tw,kf.
12  Yoga/
13  exp yoga/ or exp fitness centers/
14  (fitness adj (regime’ or program’)).ti,ab,kf.
15  ((cardiorespiratory fitness or aerobic capacity or (led walk’ or health walk’))).ti,ab,kf.
16  ((moderate or vigorous’ or low) adj activ’).ti,ab,kf.
17  ((exercise’ or physical) adj5 (fit’ or train’ or activ’ or endur’)).ti,ab,kf.
18  ((leisure or fitness) adj5 (centre’ or center’ or facilit’)).ti,ab,kf.
19  ((promot’ or uptak’ or encourag’ or increas’ or start’ or adher’ or sustain’ or maintain’) adj5 (circuit’ or aqua’ or gym’ or physical active’)).ti,ab,kf.
20  ((decreas’ or reduc’ or discourag’) adj5 (sedentary or deskbound or “physical” inactiv’’ or physical activit’’)).ti,ab,kf.
21  ((cycle or cycling) adj5 (travel$ or facilit$ or park$ or friendly or infrastructure)).ti,ab,kf.
22  (bicycl’ or (bike’1 or biking) or (swim’1 or swimming) or (exercis’3 adj5 aerobic’)) or rollerblading or rollerskating or skating or strength training or weight lift’ or weightlift’).tw,kf.
23  (“use” adj3 stair’).ti,ab,kf. or recreation’1.ti,kf.
24  (exercis$ adj5 physical$).mp.
25  (leisure’ adj5 activ’).mp.
26  Sedentary behavior/
27  Sedentary.tw,kf.
28  Leisure Activities/
29  Exercise’,tw,kf.
30  (sport’3 or walk’3 or running or jogging or pilates or yoga).ti,ab,kf.
31  ((cycle or cycling) adj5 (travel$ or facilit$ or park$ or friendly or infrastructure)).ti,ab,kf.
32  (recreation’1 or (“use” adj3 stair’)).ti,ab,kf.
33  healthy lifestyle/ or healthy aging/
34  (active lifestyle’ or activity guideline’).mp.
35  ((resistance or strength’ or resilience) adj5 train’).mp.
36  or/1-35
37  Health Behavior/
38 Health Status/
39 Sedentary.tw,kf. or Sedentary behavior/
40 exp self efficacy/
41 exp Socioeconomic Factors/
42 leisure*.mp.
43 exp life style/
44 Patient Dropouts/ or dropout*.mp.
45 exp Residence Characteristics/
46 (life style or lifestyle).mp.
47 exp health promotion/
48 Motivation/ or motivation*.mp.
49 (motivat* or proactivit* or predict* or retire* or determinant* or correlate* or (neighbourhood* or neighborhood*) or barrier*).mp.
50 (adher* or adherence* or underadher* or under adher*).mp.
51 Environment/ or environment*.mp.
52 (facilit* or walkabil* or bikeabil* or aesthetic* or greenness or park or parks or open space*).mp.
53 Social Support/
54 Automobile Driving/ or driving status.mp.
55 (promot* or attribute* or behavior* or behaviour*).tw,kf.
56 (socioeconomic* or (socio ecology* or socioecologic*) or moderator* or enable* or factor*).mp.
57 Environment Design/
58 relationship.tw,kf.
59 participat*.tw,kf.
60 attitude to health/
61 exp social behavior/
62 (uptak* or encourag* or increas* or start* or sustain* or maintain*).tw,kf.
63 (decreas* or reduce* or discourag*).tw,kf.
64 (active adj (travel* or transportation or commut$)).tw,kf.
65 ((cycle or cycling) adj5 (commut$ or travel$ or facilit$ or park$ or friendly or infrastructure)).ti,ab,kf.
66 recreation‘1,ti,ab,kf.
67 psychology/ or exp cognitive science/ or psychology, social/
68 mobility.mp. or Mobility Limitation/
69 psychosocial.tw.
70 exp Cognition/
71 cognition.tw,kf.
72 exp Executive Function/ or executive function*.mp.
73 exp social support/
74 social network*.mp.
75 exp Social Networking/
76 exp Biological Factors/
77 exp Health Risk Behaviors/
78 (socio demograph* or sociodemograph*).tw,kf.
79 or/37-78
80 exp Aged/
81 (retirement or retired).mp.
82 (late* life or aged).mp.
83 old age*.mp.
84 (old* adj3 (person* or people or adult* or wom#n or man or men or female* or male* or individual*)).mp.
85 frail*.ti,ab,kf.
(geriatr* or elder* or gerontol* or senior* or frail).mp.
(young old or old old or oldest old or centenarians).ti,ab,kf.
Aging/ or aging.mp.
senesence.ti,ab,kf.
or/80-89
meta analysis.pt.
meta anal$.mp.
metaanal$.mp.
metanal$.mp.
systematic review$.mp.
systematic overview$.mp.
((pool: or combined or combining) adj (data or trial* or studies or results)).mp.
((hand adj2 search:) or handsearch:).mp.
cochrane.mp.
((quantitative or systematic: or methodologic: or integrative:) adj2 (review: or overview: or synthes: or survey:)).mp.
(peto or der simonian or dersimonian).mp.
(or/91-101
(pooled analys: or pooling or mantel haenszel:).mp.
fixed effect:.mp.
(extraction or medline or embase or pubmed or cinahl).ab.
103 103 or 104 or 105
(review: or cochrane).mp.
106 105 and 106
107 102 or 108
animals/ not humans/
not 110
(scoping review*).mp.
110 (meta synthesis* or metasynthesis* or meta regression or metaregression).mp.
112 112 or 113
114 not 110
116 111 or 115
36 and 79 and 90 and 116
### Appendix II: Data extraction instrument

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<td>Description of outcome (definition and instrument used)</td>
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<td>Description of phenomena (definition of determinants)</td>
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<td><strong>Search details:</strong></td>
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<td>Sources searched</td>
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CI, confidence interval; OR, odds ratio; RR, risk ratio.