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BMJ Open

Home modification interventions for fall prevention and activities of daily living among community dwelling older adults- A Scoping review protocol

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Title: Home modification interventions for fall prevention and activities of daily living among community dwelling older adults- A Scoping review protocol

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Abstract

Introduction: Falls are the leading reason for incidental or unexpected deaths worldwide (Chase, Mann, Wasek, & Arbesman, 2015). Many older adults, who fall regardless of whether they are not injured, tend to experience fear of fall and thus leading to decreased participation in everyday activities (ADLs) (CDC, 2016; Kaur, Kaur, Devgun, & Sharma, 2018; Deshpande et al., 2008). This subsequently leads to weakness, decline in physical functioning and further chances of falling (CDC, 2016) and negative impact on the BADLs and IADLs (Kaur, Kaur, Devgun, & Sharma, 2018; Deshpande et al., 2008). Here, we present our scoping review protocol to appraise literature describing various home-modification interventions focusing on fall prevention and ADL participation among community dwelling older adults.

Methods and analysis: This scoping review protocol follows existing guidelines for scoping reviews in occupational therapy with particular attention on Arksey and O'Malley's (2005) scoping review framework. We developed a search strategy using the following databases: Scopus, Web of Science, PubMed, ProQuest, Cumulative Index to Nursing and Allied Health Literature and Google Scholar. Two reviewers will independently screen eligible studies for inclusion. Bibliographic data, aspects of the study design and findings will be extracted and thematically analyzed.

Ethics and dissemination: As secondary analysis, this scoping review does not require ethics approval. Results will summarize existing research related to home modification interventions for fall prevention and activities of daily living among community dwelling older adults. It will

describe various assessments and intervention used by occupational therapists in community settings. We will disseminate the results through peer-reviewed journals and conferences targeting clinicians, academics and researchers.

Key Words: modification, Fall Prevention, Activities of Daily Living (ADLs), Community, Home, Older adults, Occupational Therapy

Article summary

Strengths and limitations of this study

- The breadth of interventions and assesments focusing on fall preventions and improving ADL participation make the scoping review a useful research methodology.
- The study uses a rigorous methodological framework.
- This will include recent articles from multiple databases.
- The studies will be screened by all four authors to ensure the quality of the study, however, we may miss data from other professional backgrounds which may have included occupational therapy intervention.

Introduction

As people age, they experience a considerable decline in functional abilities. Older adults are prone to multiple debilitating chronic conditions that increases their vulnerability to falls. By 2050, the number of people over the age of 65 will increase from one in 11 to one in six (United Nations 2019), thereby increasing the number of falls in older adults. A fall is an event that results

1
2
3 in a person coming to rest inadvertently on the ground or floor or other lower levels (WHO 2018).
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5 About 20-55% of all inadvertent falls and injuries in older adults occur within the home. Of these
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7 falls, 75% occur during the performance of the routine daily activity and 44% in the presence of
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9 environmental hazards (Population Health Learning Network 2019).
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12

13 Falls are the leading reason for incidental or unexpected deaths worldwide (Chase, Mann,
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15 Wasek, & Arbesman, 2015). Globally, there were around 646,000 deaths caused due to falls, of
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17 which 80% were in low-and middle-income countries (WHO, 2018). Falls are the prevalent cause
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19 of head injuries, fractures of the wrist, arms, legs, and hips. Annually a minimum of 300,000 older
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21 adults seek medical help for hip fracture, out of which 95% are caused by falling (CDC Injury
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23 Center, 2016). In 2015, the total medical expenses due to falls accounted for more than \$50
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25 billion. Many older adults, who fall regardless of whether they are not injured, tend to experience
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27 fear of fall and thus leading to decreased participation in everyday activities such as Activities of
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29 Daily Living (ADLs) (CDC, 2016; Kaur, Kaur, Devgun, & Sharma, 2018; Deshpande et al.,
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31 2008). This subsequently leads to weakness, decline in physical functioning and further chances
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33 of falling (CDC, 2016) and negative impact on the Basic ADLs (BADLs) and Instrumental ADLs
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35 (IADLs) (Kaur, Kaur, Devgun, & Sharma, 2018; Deshpande et al., 2008). The consequences of
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37 accidental falls can worsen the quality of life, resulting in absenteeism, increased medical
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39 expenses, dependency, and early admission to a helped living or long term care (Population
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41 Health Learning Network 2019). Therefore, falls among community-dwelling older adults are a
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43 significant public health issue worldwide.
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51 Management of falls should focus on creating a safer environment, education, training,
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53 research, and establishing policies to reduce risk of falls (WHO 2019). Home modifications are
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changes made to adapt living spaces to increase usage, safety, security, and independence (McCullagh, 2006; Home Modifications and Occupational Therapy - AOTA). Occupational therapy as a profession provides tools to modify the home environment concerning the individual’s abilities and enable participation in all meaningful occupations of daily living. Home modifications play an essential factor in enabling individuals to “Age in place.” Occupational therapists provide client-centered, context-specific interventions to adapt to the living environment, fall-prevention, and health promotion, thus increasing the quality of life. Some examples of home modifications are installing grab bars in the toilet, installing ramps, and increasing the door width.

The available literature till 2008 emphasized the use of a multimodal approach, including the use of physical therapy and medical management in addition to occupational therapy. They had concluded its effect on older adults in fall prevention and ADL performance as high. A systematic review published in 2012 emphasizes the need for further research on the impact of home modifications on fall prevention and performance in all areas of occupation. To update the knowledge on the available home modification interventions for fall prevention and ADL performance, there is a need to follow through the review. This review will guide the current occupational therapy practice, examine the extent of research and identify the gaps in the existing literature.

Methods

The proposed scoping review will use the methodology that was informed by Colquhoun *et al.* (2014) and Arksey and O’Malley’s (2005). The Preferred Reporting Items for Systematic Reviews and Meta-analyses Protocols (PRISMA-P) is followed to report this protocol.

The research question is: What is known from the recent existing literature about various home-modification interventions focusing on falls and ADL performance among community-dwelling older adults?

Study identification

In consultation with a subject expert, we selected the following databases for electronic search; Scopus, Web of Science, PubMed, ProQuest, CINAHL, and Google Scholar. We will search the reference lists of included items to search for any missing studies in the database search. Two independent reviewers (AU, GMG) will manually search the reference list of all added primary and relevant review articles to identify studies that are missed in the electronic search. Articles published in English within the last two decade (2000-2020) will be considered, with cut-off date for the last search as 30 April 2020. We will search the databases using keywords such as 'Home modification', 'fall', 'ADLs', 'performance', and 'older adult' with appropriate Boolean operators.

Study selection criteria

Study design: We will consider intervention as well as observation studies that have assessed / observed the effectiveness or association of home modification intervention on prevention or control of falls among older adults. For this scoping review, we will consider home modification interventions that are targeted to adapt living spaces of older adults to increase usage, safety, security and independence (McCullagh, 2006; Home Modifications and Occupational Therapy - AOTA, 2016.). We have not imposed any restriction on comparator and it can be usual care or any multidisciplinary intervention which focuses on home modification. Articles having at least one author as an occupational therapist will be included as the interventions to be considered in this study will be occupation-based. We will be verifying the

author’s details during the initial screening. We will consider journal publications and doctoral thesis and will exclude conference proceedings and articles, of which full text is not available. We will include older adults who are living in community dwellings, aged 60 and above. We will exclude older adults who have comorbid conditions such as Parkinson, dementia, Alzheimer, stroke, low vision and individuals who are on medications that causes giddiness. We will exclude mixed population if there is no subgroup available for older adults. We have imposed this restriction because, these conditions increase the chance of falls and have a separate sets of home modifications combined with other interventions. Outcomes of our interest are ADL (using any standard tool), falls, and factors associated with falls. ADLs are the actions oriented toward taking care of one’s own body, such as bathing, showering, toileting, dressing, swallowing/eating, feeding, functional mobility, personal device care, personal hygiene and grooming and sexual activity (Occupational Therapy Practice Framework: Domain and Process – 3rd Edition, 2014).

Study selection

We will upload all imported literature citations onto the Mendeley citation manager and duplicates will be removed. The two reviewers (AU, GMG) will blindly review all captured titles and abstracts to determine its eligibility for selection in the review. In any disagreement, a third reviewer (PND) will be approached. Full-texts of included articles will be uploaded and screened similarly. We will document the reasons for excluding the studies in Excel spreadsheet. The Preferred Reporting Items for Systematic Reviews and Meta-analyses Protocols (PRISMA) flow diagram will be used to document and visually represent the number of studies identified in each

step of the study selection process. Those articles which match our inclusion criteria, irrespective of the level of study will be reviewed independently by all the reviewers.

Collation, summarizing, and reporting the results:

The scoping review will present a descriptive and narrative summary of the study findings. Summary tables will describe the elements of each study, such as design of the study, study identifiers, and year of publication. We will abstract details of population, details of intervention or exposure and findings. To determine the extent of available literature, we will provide a tabular representation, including country and study design. Effect estimate such as risk ratio or odds ratio for categorical variable mean difference with 95% confidence interval of the outcome of our interest will be extracted and summarized. Key ideas and themes from qualitative studies will be extracted to describe home modification and ADL interventions among community-dwelling older adults.

Charting the data

The 'descriptive-analytical' method will be used to chart the data. It will ensure that the authors collect standard information to disseminate the findings in a concise format further. Qualitative data will be analyzed to identify the factors that influence the falls and ADL related interventions for community-dwelling older adults. Two reviewers will identify the sub-themes from the sources included in the study. This method will assist in identifying gaps in the existing literature. In this scoping review we will not assess methodological quality of the study.

Discussion

Because the literature on this topic is scattered across a range of journals, it is challenging to determine how much research is there, what is known and where the gaps lie. A scoping review

will be beneficial in examining the extent of available literature, identifying possible research gaps, and in synthesizing the findings. The researchers anticipate that the results of this scoping review will have an application in research, policy development as well as in a clinical context.

We will not require ethics approval as the scoping review will include only published existing literature. Exploring the knowledge of home modifications and ADL on fall prevention among community-dwelling older adults, can assist occupational therapists and researchers who are addressing the concerns of older adults in the community. It is useful to identify the strategies or interventions employed by occupational therapists.

Author Statement

SM conceived the idea of this research, followed by discussion which contributed to finalizing the research idea. All four authors contributed to the conceptualization of research title, aim and objectives, followed by investigation through different electronic databases to know the background of the research. This was supervised by the corresponding author, SM. The methodology was drafted by AU and NKT. It was further revised by GMG and PND.

Patient and public involvement

The scoping review protocol does not include the participation of any patients or the general public.

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Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	4-5
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	4-5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	-
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	5-6
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	5
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6-7
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	7
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	7
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	-
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	7

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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	-
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	-
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	-
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	-
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	-
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	7-8
Limitations	20	Discuss the limitations of the scoping review process.	8
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	7-8
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	1

JB1 = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

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Home modification interventions addressing falls and participation in activities of daily living among older adults- A Scoping review protocol

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Primary Subject Heading:	Rehabilitation medicine
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The authors do not have any conflict of interest.

Abstract

Introduction: Falls are the second leading reason for incidental or unexpected deaths worldwide. Many older adults who fall, regardless of whether they are injured or not, tend to experience fear of fall and thus leading to decreased participation in Activities of Daily Living (ADLs). Subsequent falls lead to weakness, a decline in physical functioning, increased chances of falling and a negative impact on the Instrumental Activities of Daily Living (IADLs). Here, we present our scoping review protocol to appraise literature to describe and explain the home modification interventions used by occupational therapists to address falls and participation in ADLs among community-dwelling older adults. We are aiming to review the available home modification intervention protocols, facilitators, and barriers to such interventions, and the experiences of occupational therapists and clients after receiving these interventions.

Methods and analysis: This scoping review protocol follows existing guidelines for scoping reviews with a particular attention on Arksey and O'Malley (2005) and Colquhoun et. al., (2014). We will include the following databases: Scopus, Web of Science, PubMed, ProQuest, Cumulative Index to Nursing and Allied Health Literature, and Google Scholar. We plan to collect data from August 16, 2020- September 15, 2020. Two reviewers will independently screen eligible studies for inclusion. We will extract the bibliographic data, study design, details of the intervention provided, outcomes, and experiences of occupational therapists and clients, and further organize them for better understanding.

Conclusion: We plan to organize the data and summarize the existing literature related to home modification interventions provided by occupational therapists addressing falls and participation in activities of daily living among community-dwelling older adults. We plan to present the home modification interventions, assessments, and factors that influence occupational therapists to use these.

Key Words: Accidental falls, Fall Prevention, Activities of Daily Living, Frail elderly, Environment design, Occupational Therapy

Article summary

Strengths and limitations of this study

- The breadth of home modification interventions addressing falls and improving ADL participation make the scoping review a useful research methodology.
- The study uses a rigorous methodological framework.
- This will include recent articles from multiple databases.
- We may fail to gather data from other professional backgrounds, which would have addressed similar concerns.

Introduction

As people age, they experience a considerable decline in functional abilities. Older adults are prone to multiple debilitating chronic conditions that increase their vulnerability to falls. By 2050, the number of people over 65 years will increase from one in 11 to one in six ⁽¹⁾, thereby increasing the number of falls in older adults. A fall is an event that results in a person coming to rest inadvertently on the ground or floor or other lower levels ⁽²⁾. Falls are the second leading reason for incidental or unexpected deaths worldwide ⁽²⁾. Annually across the globe, there were around 646,000 deaths caused due to falls, of which 80% were in low-and middle-income countries ⁽²⁾. Falls are the prevalent cause of head injuries, fractures of the wrist, arms, legs, and hips. Annually a minimum of 300,000 older adults seeks medical help for hip fracture, out of which 95% are caused by falling ⁽³⁾. In the year 2015, in the United States of America, the total medical expenses due to falls accounted for more than \$50 billion. Many older adults who fall, regardless of whether they are not injured, tend to experience fear of fall and thus leading to decreased participation in everyday Activities of Daily Living (ADLs) ⁽³⁻⁵⁾. A fall subsequently leads to weakness, a decline in physical functioning, and further chances of falling⁽³⁾ and negative impact on the Basic Activities of Daily Living (BADLs) and Instrumental Activities of Daily Living (IADLs) ^(4,5). The consequences of accidental falls can worsen the quality of life, resulting in increased medical expenses, dependency, and early admission to a helped living or long term care ⁽²⁾. Therefore, falls among community-dwelling older adults are a significant public health issue worldwide. Management of falls should focus on creating a safer environment, education, training, research, and establishing policies to reduce the risk of falls ⁽²⁾.

Home modifications are defined as the changes made to adapt living spaces to increase usage, safety, security, and independence ^(6,7). For this review, we will include the studies that involve any minor or significant modification in the built environment of the client's home. Occupational therapy as a profession provides strategies to modify the home environment considering the individual's abilities and enable participation in all meaningful occupations of daily living. Home modifications play an essential factor in allowing individuals to "Age in place." Occupational therapists provide client-centered, context-specific interventions to adapt the living environment to the elderly for fall-prevention, and health promotion, thus increasing the quality of life ⁽⁷⁾. Some examples of home modifications are installing grab bars in the toilet, installing ramps, and expanding the door width.

Activities of Daily Living are the actions oriented toward taking care of one's own body, such as bathing, showering, toileting, dressing, swallowing/eating, feeding, functional mobility, personal device care, personal hygiene, and grooming and sexual activity ⁽⁸⁾. For this review, we will include any study focusing on one or more of the ADLs.

The available literature ^(9,10) emphasized the use of a multimodal approach, including the use of physical therapy and medical management in addition to occupational therapy. The study had concluded its effect on older adults in fall prevention and ADL performance as high. A systematic review ⁽¹¹⁾ emphasizes the need for further research on the impact of home modifications on fall prevention and performance in all areas of occupation. Previous studies convey that older adults with a history of falls have a higher chance of recurrence. It impacts their participation in Activities of Daily Living, which can be addressed through home modification interventions ⁽³⁾. To update the

knowledge on the available home modification interventions addressing falls and participation in ADLs, there is a need to follow through the review. This review will guide the current occupational therapy practice, examine the extent of research and will help to identify the gaps in the existing literature.

Methods

Due to the diversity of existing literature, we propose a scoping review design to achieve our aim.^(12,13) A scoping review is a form of evidence synthesis that addresses on an exploratory research question rather than a highly focused question as in systematic review⁽⁵⁾. It aims to map critical concepts, types of evidence, and gaps in research related to defining areas by systematically searching, selecting, and synthesizing existing knowledge^(11,13, 14).

This scoping review protocol follows a scoping review framework^(12,14) and guidelines for scoping reviews in occupational therapy⁽¹⁵⁾. We will follow the five stages as follows:

Stage 1: identifying the research question

Stage 2: searching for relevant studies

Stage 3: selection of studies

Stage 4: charting the data.

Stage 5: collating, summarizing, and reporting the results.

Stage 1: identifying the research question

A constant process of refining the research question as a team was followed to generate the research question. To facilitate a comprehensive review of the literature, a somewhat broad question was required. Based on the terminology, current trends, and our understanding of home modification interventions addressing falls and participation in ADL, we finalized the following research question:

What are the various home modification interventions used by occupational therapists that address the frequency of falls and participation in ADLs among community-dwelling older adults?

Subsequently, the following aim and objectives were identified:

Aim: To review and appraise the methodology of home-modification interventions, facilitators, and barriers for occupational therapists, experiences of clients utilizing these interventions.

Objectives:

- To identify existing research that utilized home-modification interventions addressing falls and participation in ADLs among older adults.

- To describe the methods of research related to home-modification interventions
- To identify any facilitators and barriers for occupational therapists in implementing these interventions.
- To determine potential areas for further application of these concepts in occupational therapy practice.

Stage 2: identifying relevant studies

Although the aim of the scoping review can be broad, parameters must still be selected to guide the search strategy ⁽⁵⁾. With the help of a subject expert, the first and corresponding author developed provisional eligibility criteria, exclusion criteria, and identified databases to be searched.

Selection criteria

The literature search will use the following inclusion criteria to guide the identification of articles to be reviewed. For this scoping review, we will consider home modification as interventions that are targeted to adapt living spaces of older adults to increase usage, safety, security, and independence ^(6,7).

- We will consider intervention as well as observation studies that have assessed or observed the effectiveness or association of home modification intervention on prevention or control of falls among older adults and participation in ADLs.
- Articles having at least one author as an occupational therapist will be included as we plan to include interventions that are designed or implemented only by an occupational therapist.
- We will include studies involving any older adults who are living in the community, aged 60 and above.
- Studies from any country.
- Literature published in the last two decades (January 2001- September 2020).
- Studies using both quantitative and qualitative study designs.
- We will exclude the mixed population if there is no subgroup available for older adults. Outcomes of our interest are participation in ADLs, frequency of falls, facilitators, and barriers for interventions, and experiences of clients.

Databases

The following databases will be searched: Scopus, Web of Science, PubMed, ProQuest, Cumulative Index to Nursing, and Allied Health Literature. These databases were selected to capture a comprehensive sample of literature.

Search strategy

The search strategy was formulated during the development of the provisional eligibility criteria of the scoping review. We focused on home-modification intervention/falls/ADLs/older adults with operational search terms. The first and last authors (GMG, SM), together with a research officer, in a repeated process, developed a list of primary and secondary search terms with acceptable filters. The initial search terms focused on concepts of home-

modification, falls, and ADLs. The secondary terms included broader terms of experiences, facilitators, and barriers. The primary filter will be kept for date range, which is within the last 20 years (2001-2020). All the search strategies will be modified to comply with the different databases we will search. The suggested Boolean phrases, MESH terms, and filters are listed below (Table 1).

Table 1: General search strategy:

Keyword	Alternative words
Accidental Falls	Falls OR Falling OR Slip
Activities of Daily Living	ADL OR Daily Living Activities OR Living Activities
Frail Elderly	Elderly, Frail OR Frail Elders OR Functionally-Impaired Elderly OR Frail Older Adults OR Older Adult OR Aged
Environment Design	Design, Environment OR Designs, Environment OR Environment Designs OR Healthy Places OR Healthy Place
Occupational Therapy	Occupational rehabilitation

Stage 3: Study selection

This scoping review will follow a three-step article selection process. Article titles will be reviewed first, and two reviewers (AU, GMG) will blindly review all captured titles and abstracts to determine its eligibility for selection in the review. In any disagreement, a third reviewer (PND) will be approached. However, where there is uncertainty about the title, especially about the focus of research, the article will not be eliminated until it is examined in more depth in stage 2.

In stage 2 of article selection, the third and fourth author (PND, NKT) will screen the abstract of articles included from step 1 using the inclusion and exclusion criteria. Any differences arising between the two reviewers will be resolved with the help of the third reviewer (GMG). What is vital in our scoping review is to include the abstracts that demonstrate the subject area that is home-modification addressing falls and participation in ADLs among community-dwelling older adults.

In the third stage, the two independent reviewers (GMG, AU) will each screen the full-text articles to determine if they meet the inclusion/exclusion criteria. Any disagreement will be resolved through discussion with a third reviewer (SM) until a full consensus is achieved.

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Stage 4: Charting the data

We will extract the key information about the study using the framework designed (Table 2). Study objectives will guide us to develop categories in data and organize it. It will ensure that the authors collect standard information to disseminate the findings in a concise format.

Table 2: Framework for data extraction

Bibliometric Information	Characteristics of the study	Proposed categories of data
<ul style="list-style-type: none">Title of the studyAuthorsSource/JournalYear of publicationCountryAffiliation of the authorType of study	<ul style="list-style-type: none">Research Question/aim(s)Objectives(s)Intervention(s)Outcome(s)Patient populationKey findings	<ul style="list-style-type: none">Description of home-modification interventionFacilitators and barriers to interventionExperiences of clients undergone intervention

Stage 5: Collation, summarizing, and reporting the results:

This scoping review will present a narrative summary of the study findings in two ways. First, a numerical analysis of the bibliometric information will be presented. This will describe the extent, nature, and distribution of studies through tables and charts mapping the bibliometric information, design of the study, study identifiers, and year of publication. We will abstract details of population, details of intervention or exposure, and findings. Second, the extracted key ideas from qualitative studies will be thematically organized to different groups. With this, we aim to summarize the experiences of clients and occupational therapists. The development of a framework to present the summary will be a repetitive process that will emerge as we examine the studies.

Discussion

To our knowledge, this scoping review, which examines the concepts of fall prevention and participation in ADLs, is first of its kind. This review has the potential to improve the understanding of occupational therapists practicing with older adults. In this review, we aim to review and appraise the home-modification interventions addressing falls and ADL participation among older adults, facilitators and barriers to interventions, experiences of occupational therapists and clients receiving the intervention. This will give us a better understanding which will inform further research, practice and training.

Ethics and dissemination: As a secondary analysis, this scoping review does not require ethics approval. Results will summarize existing research related to home modification interventions for fall prevention and activities of daily living among community-dwelling older adults. It will describe various interventions used by occupational therapists in community settings. We will disseminate the results through peer-reviewed journals and conferences targeting clinicians, academics, and researchers.

Patient and public involvement

The scoping review protocol will not require the participation of any patients or the general public.

Author Statement

All authors have made substantive intellectual contributions to the development of this protocol. SM conceived the idea of this research, followed by a discussion that contributed to finalizing the research idea. AU and NKT drafted the methodology. GMG and PND further revised it. GMG and SM worked on preparing the draft of this protocol.

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For peer review only

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	4-5
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	4-5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	-
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	5-6
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	5
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6-7
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	7
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	7
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	-
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	7

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	-
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	-
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	-
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	-
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	-
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	7-8
Limitations	20	Discuss the limitations of the scoping review process.	8
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	7-8
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	1

JB1 = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

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Home modification interventions addressing falls and participation in activities of daily living among older adults- A Scoping review protocol

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Primary Subject Heading:	Rehabilitation medicine
Secondary Subject Heading:	Rehabilitation medicine
Keywords:	GERIATRIC MEDICINE, PUBLIC HEALTH, REHABILITATION MEDICINE

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Title: Home modification interventions addressing falls and participation in activities of daily living among older adults- A Scoping review protocol

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Abstract

Introduction: Falls are the second leading reason for incidental or unexpected deaths worldwide. Many older adults who fall, regardless of whether they are injured or not, tend to experience fear of fall and this can lead to decreased participation in Activities of Daily Living (ADLs). Subsequent falls lead to weakness, a decline in physical functioning, increased chances of falling and a negative impact on the Instrumental Activities of Daily Living (IADLs). Here, we present our scoping review protocol to appraise literature to describe and explain the home modification interventions used by occupational therapists to address falls and participation in ADLs among community-dwelling older adults. We are aiming to review the available home modification intervention protocols, facilitators, and barriers to such interventions, and the experiences of occupational therapists and clients after receiving these interventions.

Methods and analysis: This scoping review protocol follows existing guidelines for scoping reviews with a particular attention on Arksey and O'Malley (2005) and Colquhoun et. al., (2014). We will include the following databases: Scopus, Web of Science, PubMed, ProQuest, Cumulative Index to Nursing and Allied Health Literature, and Google Scholar. We plan to conduct literature search from August 16, 2020- September 15, 2020. Two reviewers will independently screen eligible studies for inclusion. We will extract the bibliographic data, study design, details of the intervention provided, outcomes, and experiences of occupational therapists and clients, and further organize them for better understanding.

Ethics and dissemination: As secondary data analysis, this scoping review does not require ethics approval. Results will summarize and disseminate the existing literature related to home modification interventions provided by occupational therapists addressing falls and participation in activities of daily living among community-dwelling older adults. We plan to disseminate the results through peer-reviewed journals and conferences, targeting occupational therapists, other rehabilitation workers, researchers and policy makers.

Key Words: Accidental falls, Fall Prevention, Activities of Daily Living, Older adults, Environment design, Occupational Therapy.

Article summary

Strengths and limitations of this study

- The breadth of home modification interventions addressing falls and improving ADL participation make the scoping review a useful research methodology.
- The study uses a rigorous methodological framework.
- This will include recent articles from multiple databases.
- We may fail to gather data from other professional backgrounds, which would have addressed

similar concerns.

Introduction

As people age, they experience a considerable decline in functional abilities. Older adults are prone to multiple debilitating chronic conditions that increase their vulnerability to falls. By 2050, the number of people over 65 years will increase from one in 11 to one in six ⁽¹⁾, thereby increasing the number of falls in older adults. A fall is an event that results in a person coming to rest inadvertently on the ground or floor or other lower levels ⁽²⁾. Falls are the second leading reason for incidental or unexpected deaths worldwide ⁽²⁾. Annually across the globe, there were around 646,000 deaths caused due to falls, of which 80% were in low-and middle-income countries ⁽²⁾. Falls are the prevalent cause of head injuries, fractures of the wrist, arms, legs, and hips. Annually a minimum of 300,000 older adults seeks medical help for hip fracture, out of which 95% are caused by falling ⁽³⁾. In the year 2015, in the United States of America, the total medical expenses due to falls accounted for more than \$50 billion. Many older adults who fall, regardless of whether they are not injured, tend to experience fear of fall and thus leading to decreased participation in everyday Activities of Daily Living (ADLs) ⁽³⁻⁵⁾. A fall subsequently leads to weakness, a decline in physical functioning, and further chances of falling⁽³⁾ and negative impact on the Basic Activities of Daily Living (BADLs) and Instrumental Activities of Daily Living (IADLs) ^(4,5). The consequences of accidental falls can worsen the quality of life, resulting in increased medical expenses, dependency, and early admission to a helped living or long term care ⁽²⁾. Therefore, falls among community-dwelling older adults are a significant public health issue worldwide. Management of falls should focus on creating a safer environment, education, training, research, and establishing policies to reduce the risk of falls ⁽²⁾.

Home modifications are defined as the changes made to adapt living spaces to increase usage, safety, security, and independence ^(6,7). For this review, we will include the studies that involve any minor or significant modification in the built environment of the client's home. Occupational therapy as a profession provides strategies to modify the home environment considering the individual's abilities and enable participation in all meaningful occupations of daily living. Home modifications play an essential factor in allowing individuals to "Age in place." Occupational therapists provide client-centered, context-specific interventions to adapt the living environment to the older adults for fall-prevention, and health promotion, thus increasing the quality of life ⁽⁷⁾. Some examples of home modifications are installing grab bars in the toilet, installing ramps, and expanding the door width.

Activities of Daily Living are the actions oriented toward taking care of one's own body, such as bathing, showering, toileting, dressing, swallowing/eating, feeding, functional mobility, personal device care, personal hygiene, and grooming and sexual activity ⁽⁸⁾. For this review, we will include any study focusing on one or more of the ADLs.

The available literature about the effect of environmental modification intervention and role of occupational therapists for fall prevention ^(9,10) emphasized the use of a multimodal approach, including the use of physical therapy

and medical management in addition to occupational therapy and also recommended further research in this field. In a systematic review⁽¹¹⁾ of the effect of home modification and fall prevention programs on falls and performance in community-dwelling older adults, the authors emphasized the need for further research on the impact of home modifications on fall prevention and performance in all areas of occupation. Previous studies convey that older adults with a history of falls have a higher chance of recurrence. It impacts their participation in Activities of Daily Living, which can be addressed through home modification interventions⁽³⁾. To update the knowledge on the available home modification interventions addressing falls and participation in ADLs, there is a need to follow through the review. This review will guide the current occupational therapy practice, examine the extent of research and will help to identify the gaps in the existing literature.

Methods

Due to the diversity of existing literature, we propose a scoping review design to achieve our aim.^(12,13) A scoping review is a form of evidence synthesis that addresses on an exploratory research question rather than a highly focused question as in systematic review⁽⁵⁾. It aims to map critical concepts, types of evidence, and gaps in research related to defining areas by systematically searching, selecting, and synthesizing existing knowledge^(11,13, 14).

This scoping review protocol follows a scoping review framework^(12,14) and guidelines for scoping reviews in occupational therapy⁽¹⁵⁾. We will follow the five stages as follows:

Stage 1: identifying the research question

Stage 2: searching for relevant studies

Stage 3: selection of studies

Stage 4: charting the data.

Stage 5: collating, summarizing, and reporting the results.

Stage 1: identifying the research question

A constant process of refining the research question as a team was followed to generate the research question. To facilitate a comprehensive review of the literature, a somewhat broad question was required. Based on the terminology, current trends, and our understanding of home modification interventions addressing falls and participation in ADL, we finalized the following research question:

What are the various home modification interventions used by occupational therapists that address the frequency of falls and participation in ADLs among community-dwelling older adults?

Subsequently, the following aim and objectives were identified:

Aim: To review and appraise the methodology of home-modification interventions, facilitators, and barriers for occupational therapists, experiences of clients utilizing these interventions.

Objectives:

- To identify existing research that utilized home-modification interventions addressing falls and participation in ADLs among older adults.
- To describe the methods of research related to home-modification interventions
- To identify any facilitators and barriers for occupational therapists in implementing these interventions.
- To determine potential areas for further application of these concepts in occupational therapy practice.

Stage 2: identifying relevant studies

Although the aim of the scoping review can be broad, parameters must still be selected to guide the search strategy ⁽⁵⁾. With the help of a subject expert, the first and corresponding author developed provisional eligibility criteria, exclusion criteria, and identified databases to be searched.

Selection criteria

The literature search will use the following inclusion criteria to guide the identification of articles to be reviewed. For this scoping review, we will consider home modification as interventions that are targeted to adapt living spaces of older adults to increase usage, safety, security, and independence ^(6,7).

- We will consider intervention as well as observation studies that have assessed or observed the effectiveness or association of home modification intervention on prevention or control of falls among older adults and participation in ADLs.
- Articles having at least one author as an occupational therapist will be included as we plan to include interventions that are designed or implemented only by an occupational therapist.
- We will include studies involving any older adults who are living in the community, aged 60 and above.
- Studies from any country.
- Literature published in the last two decades (January 2001- September 2020).
- Studies using both quantitative and qualitative study designs.
- We will exclude the mixed population if there is no subgroup available for older adults. Outcomes of our interest are participation in ADLs, frequency of falls, facilitators, and barriers for interventions, and experiences of clients.

Databases

The following databases will be searched: Scopus, Web of Science, PubMed, ProQuest, Cumulative Index to Nursing, and Allied Health Literature. These databases were selected to capture a comprehensive sample of literature.

Search strategy

The search strategy was formulated during the development of the provisional eligibility criteria of the scoping review. We focused on home-modification intervention/falls/ADLs/older adults with operational search terms. The first and last authors (GMG, SM), together with a research officer, in a repeated process, developed a list of primary and secondary search terms with acceptable filters. The initial search terms focused on concepts of home-modification, falls, and ADLs. The secondary terms included broader terms of experiences, facilitators, and barriers. The primary filter will be kept for date range, which is within the last 20 years (2001-2020). All the search strategies will be modified to comply with the different databases we will search. The suggested Boolean phrases, MESH terms, and filters are listed below (Table 1).

Table 1: General search strategy:

Keyword	Alternative words
Accidental Falls	Falls OR Falling OR Slip
Activities of Daily Living	ADL OR Daily Living Activities OR Living Activities
Older adults	Elderly, Frail OR Frail Elders OR Functionally-Impaired Elderly OR Frail Older Adults OR Older Adult OR Aged
Environment Design	Design, Environment OR Designs, Environment OR Environment Designs OR Healthy Places OR Healthy Place
Occupational Therapy	Occupational rehabilitation

Stage 3: Study selection

This scoping review will follow a three-step article selection process. Article titles will be reviewed first, and two reviewers (AU, GMG) will blindly review all captured titles and abstracts to determine its eligibility for selection in the review. In any disagreement, a third reviewer (PND) will be approached. However, where there is uncertainty about the title, especially about the focus of research, the article will not be eliminated until it is examined in more depth in stage 2.

In stage 2 of article selection, the third and fourth author (PND, NKT) will screen the abstract of articles included from step 1 using the inclusion and exclusion criteria. Any differences arising between the two reviewers will be resolved with the help of the third reviewer (GMG). What is vital in our scoping review is to include the abstracts

that demonstrate the subject area that is home-modification addressing falls and participation in ADLs among community-dwelling older adults.

In the third stage, the two independent reviewers (GMG, AU) will each screen the full-text articles to determine if they meet the inclusion/exclusion criteria. Any disagreement will be resolved through discussion with a third reviewer (SM) until a full consensus is achieved.

Stage 4: Charting the data

We will extract the key information about the study using the framework designed (Table 2). Study objectives will guide us to develop categories in data and organize it. It will ensure that the authors collect standard information to disseminate the findings in a concise format.

Table 2: Framework for data extraction		
Bibliometric Information	Characteristics of the study	Proposed categories of data
<ul style="list-style-type: none">Title of the studyAuthorsSource/JournalYear of publicationCountryAffiliation of the authorType of study	<ul style="list-style-type: none">Research Question/aim(s)Objectives(s)Intervention(s)Outcome(s)Patient populationKey findings	<ul style="list-style-type: none">Description of home-modification interventionFacilitators and barriers to interventionExperiences of clients undergone intervention

Stage 5: Collation, summarizing, and reporting the results:

This scoping review will present a narrative summary of the study findings in two ways. First, a numerical analysis of the bibliometric information will be presented. This will describe the extent, nature, and distribution of studies through tables and charts mapping the bibliometric information, design of the study, study identifiers, and year of publication. We will abstract details of population, details of intervention or exposure, and findings. Second, the extracted key ideas from qualitative studies will be thematically organized to different groups. With this, we aim to summarize the experiences of clients and occupational therapists. The development of a framework to present the summary will be a repetitive process that will emerge as we examine the studies.

Discussion

To our knowledge, this scoping review, which examines the concepts of fall prevention and participation in ADLs, is first of its kind. This review has the potential to improve the understanding of occupational therapists practicing with older adults. In this review, we aim to review and appraise the home-modification interventions addressing falls and ADL participation among older adults, facilitators and barriers to interventions, experiences of occupational therapists and clients receiving the intervention. This will give us a better understanding which will inform further research, practice and training.

Ethics and dissemination: As a secondary analysis, this scoping review does not require ethics approval. Results will summarize existing research related to home modification interventions for fall prevention and activities of daily living among community-dwelling older adults. It will describe various interventions used by occupational therapists in community settings. We will disseminate the results through peer-reviewed journals and conferences targeting clinicians, academics, and researchers.

Patient and public involvement

The scoping review protocol will not require the participation of any patients or the general public.

Author Statement

All authors have made substantive intellectual contributions to the development of this protocol. SM conceived the idea of this research, followed by a discussion that contributed to finalizing the research idea. AU and NKT drafted the methodology. GMG and PND further revised it. GMG and SM worked on preparing the draft of this protocol.

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Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	4-5
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	4-5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	-
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	5-6
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	5
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6-7
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	7
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	7
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	-
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	7



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SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	-
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	-
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	-
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	-
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	-
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	7-8
Limitations	20	Discuss the limitations of the scoping review process.	8
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	7-8
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	1

JB1 = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med*. 2018;169:467–473. doi: 10.7326/M18-0850.