

# Prehabilitation interventions for patient undergoing Primary Replacement Arthroplasty: Protocol for scoping review

Prithi Jayaraman-Pillay (✉ [prithijoy80@gmail.com](mailto:prithijoy80@gmail.com))

University of KwaZulu-Natal College of Health Sciences <https://orcid.org/0000-0002-9546-3854>

Verusia Chetty

University of KwaZulu-Natal College of Health Sciences

Stacy Maddocks

University of KwaZulu-Natal College of Health Sciences

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## Protocol

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# Abstract

## Background

Osteoarthritis ranks fifth among all forms of disability worldwide <sup>1</sup> and it is estimated that 30.8 million adults have osteoarthritis <sup>2</sup>. Primary replacement arthroplasty is the surgical treatment of choice to decrease pain and improve quality of life in late-stage OA <sup>5</sup>. The current situation in South Africa, which is a lower- and middle-income countries LMICs, is that the waiting lists for arthroplasty is extensive with steep costs involved in the management of these patients in public sector hospitals which serves most of the population <sup>7</sup>. Physiotherapist can have an impact on this situation by implementing measures to reduce length of stay postoperatively in the hospital by prehabilitation (Prehab). Hence a need to conduct a scoping review to identify the trends in literature regarding the content as well as the gaps.

## Methods

The methodology will involve a literature search as *described by Arksey and O'Malley*<sup>19</sup>. The scoping review methods will adopt the framework proposed by the Joanna Briggs Institute guidelines. Literature searches will be conducted in the following electronic databases PubMed/MEDLINE, Cochrane Library, and Google Scholar and peer-reviewed journal papers will be included based on predetermined inclusion criteria. Quantitative, qualitative, and mixed-method studies will be included to consider different aspects of measuring the effects of physical activity and exercise. Two reviewers will screen all citations and full-text articles and the main reviewer will abstract data, organize them into themes and sub-themes, summarize them, and report the results using a narrative synthesis. The study methodological quality will be appraised using a Mixed Methods Appraisal Tool.

## Discussion

*The proposed scoping review will map the breadth of knowledge available on topic of Prehab interventions in patients scheduled to undergo joint arthroplasty in terms of exercise prescription principles and other ways to implement pre-operative optimisation. The scoping review is the first part of a study that aims to design a prehab program suitable for a resource constrained LMICs health care system wherein the demographic and physical characteristics of its health users are unique and independent to the context.*

Systematic review registration: Open Science Framework <https://osf.io/9fdsh/>

## Background

Osteoarthritis ranks fifth among all forms of disability worldwide <sup>1</sup> and it is estimated that 30.8 million adults have osteoarthritis <sup>2</sup> with musculoskeletal disorders representing a global threat to healthy ageing. In terms of data on prevalence of arthritis most of the studies have been conducted in developed countries. However, data from the 2010 global burden of disease study provides some evidence that lower- and middle-income countries (LMICs) like India and South Africa may have greater arthritis prevalence than higher income countries. Data reports that LMICs have 90% of the global burden of disease but only 12% of global health spending <sup>3</sup>. In South Africa, a meta-analysis done on the overall prevalence of arthritis reported that osteoarthritis was the most common form of arthritis with 55.1% prevalence in the urban setting and ranged between 29.5% and 82.7% in adults over 65 years of age in rural settings. There is a paucity of further data which is recent in South Africa <sup>4</sup>.

When conservative management of Rheumatoid Arthritis (RA) and Osteoarthritis (OA) has failed and the overall quality of life continues to decline for an individual, primary replacement arthroplasty is the surgical treatment of choice to alleviate joint destruction, decrease pain, and improve quality of life. Arthroplasty is also recommended as a successful

treatment option for late-stage OA <sup>5</sup>. Replacement arthroplasties have excellent functional results and total hip replacement has been referred to as the “operation of the century” as more than 95% of patients have been entirely satisfied with the functional results <sup>6</sup>. High patient satisfaction is due to the marked decrease in pain and improvements in function with patients being able to participate in activities of daily living that they were previously unable to do within approximately two months of the operation <sup>6</sup>.

The current situation in South Africa, which is a LMICs, is that the waiting lists for arthroplasty is extensive with steep costs involved in the management of these patients in public sector hospitals which serves most of the population <sup>7</sup>. This long waiting period can be attributed to discrepancies between available resources, costs of the replacement arthroplasty and the necessary prioritisation of trauma related procedures leaving very few beds and operating theatres for elective surgeries. This results in patients having to wait for years for arthroplasty procedures, which is a situation unique not only to South Africa <sup>5</sup>.

In the light of the above information, one of the ways in which a physiotherapist can impact the situation of high costs and long waiting times is to implement measures to reduce length of stay postoperatively in the hospital. As per literature, length of stay can be impacted by intensive physiotherapy sessions post-operatively and this will directly assist with early discharge creating more beds in the unit for these patients and therefore the waiting times for arthroplasty<sup>8</sup>. Literature searches around the topic revealed that most studies stipulate bi-daily physiotherapy to assist with early discharge<sup>8</sup>.

Another measure that must go hand in hand with the above is to adequately prepare, educate, support a patient while waiting for the surgery by physical and psychosocial measures with a contextually relevant prehabilitation (Prehab) program. A quick literature search on the topic of physiotherapy in reducing waiting lists and decreasing length of stay have shown that Prehab as well as pre-operative education have a significant impact on improving outcomes <sup>9-16</sup>. A meta-analysis of 49 published and unpublished studies showed that the average hospital stay was reduced by 12% and there was a mean reduction of 1.25 days when pre-operative education is incorporated as a part of the package of care <sup>17</sup>. A study by Crowe et al <sup>18</sup> also reported that pre-habilitation program of exercises and education had a direct impact in reducing the length of stay.

There was only one South African based study on prehab done by Saw et al <sup>13</sup> in 2016. The intervention included six physiotherapist-led group-based sessions that included two hours a week of education, exercise, and relaxation in a private health setup. This was the one of the few studies done by physiotherapists that incorporated patient education as a part of the prehab and the components of education included education about the condition, self-management of pain and other symptoms, stress management and lifestyle education. In terms of other studies that described the content of patient education, Clode et al <sup>9</sup> concluded that group education talks on what to expect benefitted the patients and had a direct bearing on positive outcomes that were also statistically significant. In a study by Montin et al <sup>20</sup> it was concluded that patients felt that they received most knowledge on the biophysiological dimension and least on the financial dimension however any education irrespective of content had a positive impact on the perception of care. In literature the types of exercises included were resistance training using resistance bands or weights, flexibility training and functional training like step training. Some studies did not elaborate on the exact regime followed but the studies that did describe the regime followed the routine of warm-up exercises followed by resistance training exercises and step training ending with cool-down exercises and static stretching. Most studies had their patients come for therapy three times a week four to eight weeks prior to the operation <sup>9-16</sup>.

This preliminary review of literature has in broad terms identified the trends in literature regarding the content and type of exercises to include in a prehab program as well as the areas that are traditionally not included as a part of the

prehab program and provides a justification for conducting a scoping review. The scoping review will allow for a thorough, systematic, and in-depth review of literature to inform the researcher on the topic at hand and allow for all relevant literature to be exhaustively analysed and critiqued and described prior to constructing the tenets of the prehab program that will be contextually relevant to a resource constrained health system. Therefore, the objective of this systematic scoping review will be to identify and map the new reported Prehab interventions for patients with arthroplasty (between December 2010 and 2020). It is anticipated that the results of this study will provide consensus on the identification and mapping of key aspects of care to include in a prehab exercise program prior to arthroplasty. The review will attempt to locate and report on all available studies that have examined prehab in the above population as well as the gaps in this area.

## Methodology

The present protocol has been registered within the Open Science Framework platform <https://osf.io/9fdsh/> and the study protocol is being reported in accordance with the reporting guidance provided in the PRISMA extension for scoping reviews (PRISMA-ScR) (Appendix A)

The methodology will involve conducting scoping review to map, explore and study the breadth of information available on the topic of prehab and identify gaps in the literature. *A scoping review methodology will be best suited as it will allow for a rapid review of a comprehensive range of literature which includes all levels of evidence which can then be described in a detailed manner. It will, however, exclude opinion papers, review papers and commentaries. The scoping review strategy as described by Arksey and O'Malley<sup>19</sup> which details five stages will be used. The five steps in the following sequence will guide the manner in which the scoping review will be conducted: (1) defining the research question, (2) identifying the relevant studies, (3) selecting the main theme for this study, (4) charting and collecting the data and (5) summarising and reporting the results<sup>19</sup>.*

### Defining and pinpointing the research question

The main *research question for the scoping purpose will be "Prehabilitation interventions for patients undergoing Primary Joint Arthroplasty."*

*The areas of consideration and the sub-questions under the umbrella research question will include the following:*

- 1. What are the types of exercises included in prehabilitation programmes?*
- 2. In the exercise prescription of the prehabilitation intervention what is intensity, frequency, duration of the program?*
- 3. What other aspects are considered in a prehabilitation program?*

### Information Sources and Search Strategy

Identification of studies relevant to this review will be achieved through the utilization of the search strategy as recommended by the Joanna Briggs Institute. In the search for literature computer databases like google scholar, CINAHL, Medline, Pubmed, Ebsco, and Cochrane Library will be used. Any studies done between 2009 to 2020 will be included in the search strategy. The Boolean terms "AND"; "OR"; "NOT" will be used to separate keywords. Additional potentially relevant studies will be identified by conducting a search of the references of the included articles, and further searches on websites such as the World Health Organization (WHO) and the Directory of Arthroplasty. Relevant grey literature will be identified through targeted searches of dissertations/theses on ProQuest Dissertations and Theses Global, and conference abstracts on EMBASE Conference Abstracts and Conference Proceedings Citation Index-Science, Social Science and Humanities. Search terms that will be included will be knee, hip, joint replacement, arthroplasty, physiotherapy, physical therapy, exercise, rehabilitation, prehabilitation, preoperative, level of knowledge, patient

education, foot deformities, osteoarthritis and patient compliance. Reference lists of retrieved articles will also be screened. Inclusion criteria for the scoping review will include exercise or education about prehab and studies will be *selected based on how appropriate it is to the study question at hand however ensuring that the selection process will be iterative and inclusive* of grey literature and diverse study designs <sup>20</sup>.

### *Selection of eligible studies*

*The Population Concept Context (PCC) framework will guide the process of study selection and its link with the research question. To be included in the review, papers will need to have a sample population of adults 50 years and older as this is the common age for arthroplasty, whose participant in the study have had a lower limb joint replacement or are scheduled to have one, measure or focus on functional outcomes pre and post arthroplasty, interventions and exercise that incorporate pre-operative optimisation which may or may not include education as a preparation for joint arthroplasty as is contained in the proposed conceptual framework. The paper should describe the type of exercises prescribed such as aerobic exercise, anaerobic exercise, strengthening, flexibility, resistance, balance and functional activities and if any educational interventions were incorporated. The studies will also be scrutinised for the principles of exercise prescription used in terms of repetitions and frequency of interventions and its correlation to efficacy if described. Peer-reviewed journal papers will be included if they are written in English, involved human participants, and described measures for physical, psychological, and functional status of patients and contain physical activity/exercise and/or the recommendations prior to arthroplasty and post arthroplasty. Quantitative (e.g., randomized controlled trials, observational studies, cohort, case-control), qualitative, and mixed-method studies will be included if they consider the above aspects as the purpose of the study. Papers will be excluded if aims and the study population did not fit into the conceptual framework of the study or did not include any aspect of pre-operative optimisation.*

### *Inclusion criteria*

*All articles or studies eligible for selection must meet the following inclusion criteria:*

- *Articles that include pre-operative optimisation in arthroplasty patients*
- *All published peer-reviewed research articles*
- *Articles written in English*

### *Exclusion criteria*

*Articles or studies will be excluded if they have any of*

*the following criteria:*

- *Studies where full-text articles cannot be obtained*
- *Commentaries or opinion pieces*

*Eligible articles will be uploaded into Mendeley software for Windows 10 to ensure the identification and removal of all duplicated articles. Three reviewers who are familiar with the study proposal will be involved in the scoping review process. Title, abstract, and key words screening of all eligible articles will be conducted by the main author (PP) and second reviewer (HE). The process entails that the two reviewers (PP and HE) will initially screen the citations by title, abstract, and key words to ensure that the selected studies fall within the paradigm of the conceptual framework. Excluded citations will be reviewed and confirmed by a third reviewer (VC). The next step will consist of obtaining full texts of all selected articles by undertaking a thorough and exhaustive search of the web. In those instances where the full text cannot be obtained from the web a concerted effort will be made to obtain these full-text articles by engaging*

with the University subject librarian and or contacting the author/s as necessary. Full-text screening as to whether the selected articles meet the inclusion criteria will be conducted by both reviewers independently (PP and HE). Major discrepancies and lack of agreement in the inclusion for the scoping review between both reviewers will be resolved through discussion. However, should there still be no resolution, a third reviewer (VC) will be employed to ensure consensus. The degree of agreement between reviewers will be calculated and reported using Cohen's kappa coefficient. A pilot study of the search and its result are depicted in Table 1.

**Table 1:** Results of a Pilot Search

| Keywords Searched   | Date of Search | Data Base | Number of Publications Retrieved |
|---|----------------|-----------|----------------------------------|
| ("Adult" OR " Aged +" OR " Middle Aged") AND ( "Arthroplasties" OR "Replacement" OR" Knee" OR "Arthroplasty" OR" Knee Replacement" OR "Knee Replacement Arthroplasties " OR "Knee Replacement Arthroplasty " OR "Replacement Arthroplasties" OR "Knee Arthroplasty " OR "Total Arthroplasty" OR "Total Knee" OR "Total Knee Arthroplasty" OR "Replacement, Total Knee" OR "Total Knee Replacement " OR "Knee Replacement, Total" OR "Replacement Arthroplasty", Knee)) AND ( "Arthroplasties, Replacement, Hip " OR "Arthroplasty, Hip Replacement " OR "Hip Prosthesis Implantation" OR "Hip Prosthesis Implantations " OR "Implantation, Hip Prosthesis" "Prosthesis Implantation, Hip" OR "Hip Replacement Arthroplasty" OR "Replacement Arthroplasties, Hip" OR "Replacement Arthroplasty, Hip" OR "Hip Replacement, Total" OR "Total Hip Replacement" OR "Total Hip Arthroplasty" OR "Total Hip Replacements")) AND (• "Exercise, Preoperative" OR "Preoperative Exercises" OR "Pre-operative Conditioning "OR "Conditioning, Pre-operative" OR "Pre operative Conditioning" OR "Pre-operative Conditionings" OR "Pre-operative Rehabilitation" OR "Pre operative Rehabilitation" OR "Pre-operative Rehabilitations" OR "Rehabilitation, Pre-operative" OR "Preoperative Rehabilitation" OR "Preoperative Rehabilitations" OR "Rehabilitation, Preoperative" OR "Preoperative Conditioning" OR "Conditioning, Preoperative" OR "Preoperative Conditionings" OR "Pre-operative Exercise " OR "Exercise, Pre-operative" OR "Pre operative Exercise" OR "Pre-operative Exercises" OR "Prehabilitation") | 18/01/2021     | PubMed    | 37 Results                       |

### Charting the data

A standardized data charting table will be used to categorise and summarise the extracted information (Table 2). The tool will capture the relevant information on study design and other detailed information on the metrics used to describe pre-operative optimisation in arthroplasty patients. Information of interest will include the following:

- Demographic study characteristics: Authors, Year of publication, Journal, Topic, Setting, Country of origin
- Study characteristics: Study design, Aim/objective of the study, Sampling strategy, Sample Size
- Participant characteristics: Population, Sample, age (e.g., mean with standard deviation, range), Gender (e.g., percentage of male/female participants)
- Assessment tools: Anthropometric data, Outcome Measures used, Intervals of Assessment,
- Interventions: Exercise Prescription (e.g., type and duration or intensity), Types of Exercises, Education component, Intervals of exercises, Model of delivery
- Outcome results (e.g., findings relevant to study objectives).

- Key relevant findings and conclusions
- Other fields to capture data relevant to the assessment of study validity
- Scoping review authors analysis

Table 2: Data Extraction Table

| Author | Topic | Methods | Sampling and size | Assessment tools | Outcomes | Conclusion | Scoping Authors Comments | Gaps | Other |
|--------|-------|---------|-------------------|------------------|----------|------------|--------------------------|------|-------|
|        |       |         |                   |                  |          |            |                          |      |       |

*The data-charting form will be jointly updated by the two reviewers to capture all permutations and combinations possible of the research question and to determine which variables to extract for example study design, population, sample characteristics etc. The two reviewers will independently chart the data and any disagreements will be resolved through discussion between the two reviewers or further adjudication by a third reviewer.*

#### *Collation, summarization, and reporting of the results*

The data collection and extraction will be guided by the main research questions with the assimilation of the secondary questions within it. The data will be presented in a narrative format with the main categories like physical and psychological interventions and containing subcategories like for instance, physical intervention, will be further described as exercise prescription strategies and will comprise description of exercises used to improve strength, flexibility, balance, function and other similar intervention. The psychological interventions subcategories will explore the contents of the education components of pre-optimisation like health, pain, lifestyle education. The review will also try to identify if the literature alludes to or describes the anecdotal challenges faced from clinical and experiential practice like the impact of concurrent joint deformities on post-operative recovery and if pre-operatively it can be addressed and mitigated yielding and allowing for further exploring of unknow concepts and gap identification. In summary all the information will be synthesised, and the information will be presented in a narrative format which will include numerical information, thematically information on the various types of interventions used and finally the gaps that were identified.

#### *Quality appraisal*

*The quality of the studies selected from the search strategy will be appraised using the Mixed Methods Appraisal Tool (MMAT) version 2018. Categories within the MMAT allows for the inclusion of qualitative studies in category one, category two includes quantitative randomized control trial, category three comprises non-randomized trials, category four includes quantitative descriptive studies, and category 5 mixed methodologies studies. Three reviewers (PP, HE and VC) will be involved in the quality appraisal process. Two reviewers (PP, HE) will capture the methodological quality of the selected studies as per the criteria outlined in the MMAT, while a third reviewer (VC), who has vast experience in the application of MMAT in the quality appraisal process, will oversee the process. Prior to performing a comprehensive charting process a trail of methods will be done to enhance the methodology of a scoping study as recommended by<sup>21</sup>.*

## **Discussion**

*The proposed scoping review will map the breadth of knowledge available on topic of Prehab interventions in patients scheduled to undergo joint arthroplasty in terms of exercise prescription principles and other ways to implement pre-operative optimisation and the effects of this on specified outcomes. The scoping review is the first part of a study that aims to design a prehab program suitable for a resource constrained LMICs health care system wherein the*

demographic and physical characteristics of its health users are unique and independent to the context. It will allow the researcher to thoroughly introspect by evidence-based paradigm, the feasibility and applicability of the information available in literature to the context of a LMICs health care system. It will also allow for identification and pinpointing of areas that have not been considered thus far based on the clinical presentation and contextual elements inherent to LMICs thereby allowing to create a program that will best suit the needs and challenges of these health care users. It is envisaged that once a suitable program is developed it can be used as a template for basic standard of care that is incorporated as the package of service delivery for arthroplasty. The scoping review will also allow for identification of future research needs that will allow for streamlining of care and perhaps even put in early intervention measures to delay the need for arthroplasty surgery reducing the burden of care. This will highlight the potential for cost cutting and reduced health care expenditure to the stakeholders, health care managers and policy makers. A potential limitation of the scoping review methodology is the fact that only English language papers will be considered, however with the use of translation software which is freely available such bias can be limited.

## Abbreviations

Lower- and middle-income countries (LMICs)

Prehabilitation (Prehab)

*Rheumatoid Arthritis (RA)*

*Osteoarthritis (OA)*

*World Health Organisation (WHO)*

*Population Concept Context (PPC)*

## Declarations

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*HE and LC*

*Authors' contributions*

*P.P was the project facilitator and main author and V.C, S.L all contributed towards the background, research design, and discussion. All authors read and approved the final manuscript.*

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*Availability of data and materials*

*Not applicable*

*Ethics approval and consent to participate*

*Not applicable*

*Consent for publication*

*Not applicable*

*Competing interests*

*The authors declare that they have no competing interest*

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## Appendix

### Appendix A

#### **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 #   |
|-----------------------------------|------|--|--|
| <b>TITLE</b>                      |      |  |  |
| Title                             | 1    | Identify the report as a scoping review.   | Page 1   |
| <b>ABSTRACT</b>                   |      |  |  |
| 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.  | Page 2,3   |
| <b>INTRODUCTION</b>               |      |  |  |
| 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.   | Page 3,4   |
| 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.                                  | Page 5   |
| <b>METHODS</b>                    |      |  |  |
| 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.   | Page 6<br><br>Systematic review registration: OSF Center for Open Science: <a href="https://osf.io/9fdsh/">https://osf.io/9fdsh/</a> |
| 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.   | Page 7   |
| 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.  | Page 7   |
| Search                            | 8    | Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.  | Information included and on Page 10  |
| Selection of sources of evidencet | 9    | State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.  | Included in the methodology<br><br>To be done in the review  |
| 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. | Data charting is included on Page 9,10   |
| Data items                        | 11   | List and define all variables for which data were sought and any assumptions and simplifications made.   | N/A  |

| SECTION   | ITEM | PRISMA-ScR CHECKLIST ITEM   | REPORTED ON PAGE #   |
|---|------|---|--|
| 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). | N/A  |
| Synthesis of results                                  | 13   | Describe the methods of handling and summarizing the data that were charted.  | N/A at this stage but plan included in methodology   |
| <b>RESULTS</b>  |      |   |  |
| 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.                          | N/A at this stage but we will include in final write up  |
| Characteristics of sources of evidence                | 15   | For each source of evidence, present characteristics for which data were charted and provide the citations.   | Data chart has been provided in methodology but at this stage the final review is not complete |
| Critical appraisal within sources of evidence         | 16   | If done, present data on critical appraisal of included sources of evidence (see item 12).  | MMAT will be used as described in methodology on the final review                              |
| 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.   | N/A at this stage  |
| Synthesis of results                                  | 18   | Summarize and/or present the charting results as they relate to the review questions and objectives.  | N/A at this stage  |
| <b>DISCUSSION</b>                                     |      |   |  |
| 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.       | N/A at this stage  |
| Limitations   | 20   | Discuss the limitations of the scoping review process.  | N/A at this stage  |
| 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.   | N/A at this stage  |
| <b>FUNDING</b>  |      |   |  |
| 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.                       | N/A at this stage  |

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.* ;169:467–473. doi: 10.7326/M18-0850