Updated methodological guidance for the conduct of scoping reviews

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ABSTRACT

Objective: The objective of this paper is to describe the updated methodological guidance for conducting a JBI scoping review, with a focus on new updates to the approach and development of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (the PRISMA-ScR).

Introduction: Scoping reviews are an increasingly common approach to informing decision-making and research based on the identification and examination of the literature on a given topic or issue. Scoping reviews draw on evidence from any research methodology and may also include evidence from non-research sources, such as policy. In this manner, scoping reviews provide a comprehensive overview to address broader review questions than traditionally more specific systematic reviews of effectiveness or qualitative evidence. The increasing popularity of scoping reviews has been accompanied by the development of a reporting guideline: the PRISMA-ScR. In 2014, the JBI Scoping Review Methodology Group developed guidance for scoping reviews that received minor updates in 2017 and was most recently updated in 2020. The updates reflect ongoing and substantial developments in approaches to scoping review conduct and reporting. As such, the JBI Scoping Review Methodology Group recognized the need to revise the guidance to align with the current state of knowledge and reporting standards in evidence synthesis.

Methods: Between 2015 and 2020, the JBI Scoping Review Methodology Group expanded its membership; extensively reviewed the literature; engaged via annual face-to-face meetings, regular teleconferences, and email correspondence; sought advice from methodological experts; facilitated workshops; and presented at scientific conferences. This process led to updated guidance for scoping reviews published in the *JBI Manual for Evidence Synthesis*. The updated chapter was endorsed by JBI's International Scientific Committee in 2020.

Results: The updated JBI guidance for scoping reviews includes additional guidance on several methodological issues, such as when a scoping review is (or is not) appropriate, and how to extract, analyze, and present results, and provides clarification for implications for practice and research. Furthermore, it is aligned with the PRISMA-ScR to ensure consistent reporting.

Conclusions: The latest JBI guidance for scoping reviews provides up-to-date guidance that can be used by authors when conducting a scoping review. Furthermore, it aligns with the PRISMA-ScR, which can be used to report the conduct of a scoping review. A series of ongoing and future methodological projects identified by the JBI Scoping Review Methodology Group to further refine the methodology are planned.

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Introduction

Along with the increased production of primary research, the conduct and publication of evidence syntheses (reviews) has also increased and evolved over time.[1] The need to synthesize diverse types of evidence underpins the design and evolution of new approaches intended to rigorously identify and synthesize data to answer a range of pressing questions for end users in policy, research, and practice. In 2009, Grant and Booth identified 14 different types of reviews.[2] By 2016, this variety had increased to 25 evidence synthesis methods,[3] and by 2019, this reached 48 review types.[4]

The scoping review, also sometimes referred to as "mapping review" or "scoping study," is one approach to evidence synthesis that is increasingly being utilized internationally.[5-8] Although it is unclear when the first scoping review was conducted, the first methodological guide for these reviews was published by Arksey and O'Malley in 2005.[9] Arksey and O'Malley observed and reflected on the early appearance of scoping studies in the literature, noted similarities and a lack of uniformity, and proposed a seminal framework for their conduct.[9] They also noted the necessity for others to continue their work to further improve guidance for authors to conduct and report scoping reviews. This has occurred over the years and included extensions proposed by Levac and colleagues.[10]

In 2014, the JBI International Scientific Committee convened a Scoping Review Methodology Group from members of JBI and the JBI Collaboration (JBIC).[11] This group extensively reviewed the literature; engaged via annual face-to-face meetings, regular teleconferences, and email correspondence; sought advice from methodological experts; facilitated workshops; and presented at scientific conferences. This process led to the publication of JBI's first chapter and peer-reviewed paper describing guidance for authors of scoping reviews.[12,13] As with guidance for the more traditional systematic reviews for which JBI is known, the guidance for scoping reviews explicitly addressed the need for scoping reviews to be rigorously conducted, transparent, and trustworthy. The chapter underwent minor updates in 2017,[14] and overall, the JBI guidance has since been used and cited by many review groups around the world from a range of disciplines, academic fields, and professional backgrounds.[15] In 2018, the Preferred Reporting Items for Systematic Reviews extension for Scoping Reviews (PRISMA-ScR) was developed by an international team of experts in scoping reviews and evidence synthesis,[16] including members of the JBI/JBIC working group, to be consistent with JBI's scoping review methodology and to provide reviewers with a reporting checklist for their reviews.[14]

This methodological paper provides an overview of scoping review methods and highlights the most recent updates to JBI's guidance for the conduct of scoping reviews, which was recently published in the *JBI Manual for Evidence Synthesis*.[17] This updated guidance primarily takes into account the launch of the PRISMA-ScR,[16] which is recommended for use in tandem with the latest JBI guidance. The major areas of update include:

- inclusion of the PRISMA-ScR reporting guideline and checklist throughout the chapter;
- advice on when a scoping review is (or is not) appropriate, and how to extract, analyze, and present results;
- updates to many of the examples used throughout the chapter and the use of clearer language to remove ambiguity;
- discussion on the term "systematic" in relation to scoping reviews, and clarifying that the preferred terminology for this evidence synthesis approach is "scoping reviews" (while they still remain systematic);
- updated section on indications for conducting a scoping review;
- further discussion on the role of methodological appraisal in scoping reviews;
- clarification on implications for practice (now called "implications of the findings");
- expanded background to the chapter.

Additionally, as interest in the methodology has grown, it has come to the authors' attention that in addition to adding new sections, there were also areas throughout the guidance that required clarification, updates, and modification. Some of these changes were informed by feedback from scoping review authors using the guidance,[15] while others have been identified by group members themselves or by advances in the methodological literature. In light of this evidence, the authors hope an update to the guidance will support improved consistency and rigor in the undertaking and reporting of scoping reviews.

What are scoping reviews and why conduct a scoping review?

According to the Canadian Institutes of Health Research, scoping reviews are "exploratory projects that systematically map the literature available on a topic, identifying key concepts, theories, sources of evidence and gaps in the research."[18(p.34)] Scoping reviews are conducted for several reasons, with the most common being to explore the breadth or depth of the literature, map and summarize the evidence, inform future research, and identify or address knowledge gaps.[19] Scoping reviews are particularly helpful when the literature is complex and heterogeneous. Scoping reviews can provide useful insight for decision-makers into the nature of a concept and how that concept has been studied in the literature over time. They can be used to develop a research agenda, advance the field, and identify areas for future systematic reviews or other types of evidence synthesis. Decision-makers in particular find that this method of evidence synthesis provides a useful overview of research previously undertaken and reported in the literature, often in regard to the types of programs or interventions that have been examined, informing options for consideration in future research. Indeed, the number of scoping reviews doubled from 2014 to 2017,[19] demonstrating the popularity of this method in the literature.

Need for scoping reviews to remain systematic

Initially, JBI's guidance used the terminology "systematic scoping review."[12,14,17] This was to signpost the similarities between the JBI's guidance for scoping reviews and the JBI's guidance for other evidence syntheses, including systematic reviews, that focus on rigor, reproducibility, and transparency. In this latest update, the nomenclature has been refined to simply "scoping reviews" to recognize that all types of evidence synthesis should be conducted systematically, as well as to reduce the risk of confusion between different types of review.[19,20] In addition, "scoping review" is the most commonly used term to describe a scoping review, so removing the term "systematic" also improves consistency.[19] The authors argue that all types of evidence synthesis should be systematic and follow methodological guidance.

Choosing between a systematic or scoping review approach

Given the array of evidence synthesis methodologies and review types, it is critical that authors assess their objectives and intentions prior to undertaking any review. This is a particularly pertinent consideration when deciding between a systematic or scoping review, as both maintain particular, but separate, value for given aims or outcomes. Broadly speaking, if the intention of the review is to inform clinical decision-making (eg, determining the feasibility, appropriateness, meaningfulness, or effectiveness of a particular intervention), then a systematic review is more appropriate.[21] Scoping reviews, however, are more appropriate to assess and understand the extent of the knowledge in an emerging field or to identify, map, report, or discuss the characteristics or concepts in that field. For example, Harfield and colleagues' scoping review identified the characteristics of Indigenous primary health care service delivery models.[22] Subsequently, they were able to develop and describe a new Indigenous Primary Health Care Service Delivery Model that focused on the local cultural values, customs, and beliefs of Indigenous people.[22]

The value of scoping reviews to evidence-based health care and practice lies in their ability to incorporate various types of literature that are not limited specifically to research studies. For example, scoping reviews can be useful in developing policy maps. Mapping policy documents and research studies has been previously undertaken by Anderson and colleagues[6] in 2008 and Watson and colleagues[23] in 2011. Both authors used scoping reviews to examine research papers and policy documents to map complex topics.

In general, systematic reviews have more focused research questions than scoping reviews, which are

much broader. Furthermore, scoping reviews are exploratory and descriptive in nature, whereas systematic reviews, those with meta-analysis or network meta-analysis, can be explanatory or analytical in nature.[24] An online tool exists to assist authors with selecting between a systematic review and a scoping review.[25] By providing general indication of the objective and topic to be reviewed, a user can generate a recommendation towards the most appropriate method of review. Results of scoping reviews can identify further areas for subsequent research and clarify whether a systematic review can be conducted to address a specific question as a consequence of mapping the literature. In general, the indications for scoping reviews can be summarized as follows[17,21]:

- as a precursor to a systematic review;
- to identify the types of evidence available in a given field;
- to identify and analyze knowledge gaps;
- to clarify key concepts and definitions in the literature;
- to examine how research is conducted on a certain topic or field;
- to identify key characteristics or factors related to a concept.

Although scoping review methodology has evolved, there is still some confusion of terms with other evidence synthesis approaches such as "evidence gap maps."[4] Evidence gap maps share similarities to scoping reviews in terms of identifying a research question, conducting a systematic search, and providing descriptive analysis[26]; however, evidence gap maps tend to limit the inclusion of evidence to systematic reviews and primary research studies, but may also include critical appraisal.

Methodological updates

As is characteristic of rigorous evidence synthesis approaches, scoping reviews should be well planned and driven by a protocol. Protocols are important for predefinition of the objective, question(s), and method, and they support transparent and unbiased reporting. The protocol should detail the review's inclusion and exclusion criteria and identify which and how data will be extracted and presented. Deviations from the protocol should be clearly highlighted and explained in the ensuing scoping review. Currently, scoping reviews are not able to be registered with the International Prospective Register of Systematic Reviews (PROSPERO). However, authors conducting a scoping review should consider publishing, registering, or making their protocol available via platforms such as Figshare, Open Science Framework, ResearchGate, Research Square, or similar so that it is freely available. The JBI journal *JBI Evidence Synthesis* is one avenue for publishing scoping review protocols (and their subsequent reviews) that follow the JBI methodology.

Title and review questions

The title of the protocol and corresponding review should give a clear indication of the topic and identify the manuscript as a scoping review protocol or review. It is also useful to ensure that key elements of the inclusion criteria are reflected in the title to enable easy identification by readers. The "PCC" mnemonic (population, concept, and context) is recommended as a guide to construct a clear and meaningful title and inclusion criteria for a scoping review. Use of the PCC mnemonic clearly identifies the focus and context of a review, further enabling utility for the reader. Specific outcomes, interventions, or phenomena of interest do not need to be stated for a scoping review, although these details might be helpful for some scoping review topics. There should be congruence between the title, review question(s), and inclusion criteria.

A clear scoping review question that incorporates the elements of the PCC guides the development of specific inclusion criteria, facilitates the literature search, and provides a robust structure for the development of the scoping review. A scoping review will generally have one primary question, for example:

> *What quality-of-life questionnaires are available for pediatric patients following tonsillectomies with or without adenoidectomies for chronic infections or sleep disordered breathing?*

Some scoping reviews may also have one or more subquestions that delve into particular attributes of population, context, or concept. Subquestions can be useful in outlining how the evidence is likely to be mapped, for example:

> *What are the ages of the pediatric patients where quality-of-life questionnaires have been or could*

be used within the sources of evidence identified for the primary review question?

Inclusion criteria

A scoping review's inclusion criteria should be detailed in the protocol and should also provide information regarding the types of sources of evidence that will be considered for inclusion. Because scoping reviews are amenable to the inclusion of all methodologies as well as non-research sources, such as policy documents or websites, the protocol should state which sources will be examined. It is important to note that sources of evidence do not refer to the locations of where evidence will be sought (eg, online databases). These should be stated in the search strategy. The inclusion criteria aid the reader's understanding of the scope of the review and provide a guide for the reviewers themselves to make decisions regarding which sources to include or exclude.

Participants

The inclusion criteria should specify important characteristics of the review's participants (population). This may include age, sex, and other relevant factors appropriate to the review's objective and review question(s). Defining participants per se is not always necessary. For example, a scoping review with the objective of describing the details of research designs used in a specific area of study may not need to detail the types of participants involved in that research.

Concept

The scoping review's main concept(s) should be explained. Depending on the objective and question(s), the concept may include details similar to the elements detailed in a traditional systematic review, such as interventions, phenomena of interest, or outcomes. For example, the principal concept of interest in the example questions above is quality-of-life questionnaires used following tonsillectomies. Additional elements of this concept may also be of interest, such as the format (eg, paper or web-based), contents (ie, assessment domains) of the included instruments, and validity and reliability (ie, if and how they have been psychometrically tested). Outcomes may also be a component of a scoping review's concept and should be linked to the objective review question(s). For example, this scoping review could also identify and map any reported outcomes addressed within quality-of-life assessments. In other examples, the concept may relate to definitions (ie, which definitions have been used to define low-value care) or elements of research design (ie, methodological details and conduct).

Context

A scoping review's context will vary depending on the objective and question(s), and may include details regarding geographic location (eg, a particular country or region) and/or specific social, cultural, or sex-based factors. Context may also include setting specifics (eg, acute care, primary health care, the community). The context in the example above has not been stated explicitly (ie, it is ''open'') because sources of evidence from any contextual setting would be eligible for inclusion. Specifying the context will aid in refining the scope of the review, such as by focusing only on specific countries or particular health care settings.

Types of evidence sources

A scoping review can include any and all types of literature (eg, primary research studies, systematic reviews, meta-analyses, letters, guidelines, websites, blogs). However, reviewers may wish to impose limits based on the knowledge that particular types of sources would be most useful and appropriate. The example scoping review above sought certain quantitative studies only; qualitative studies, reviews, and conference abstracts were excluded because these were deemed by the reviewers not to be likely to contain relevant information to answer the review questions.

Search strategy

The search strategy for a scoping review should ideally aim to be as comprehensive as possible within the constraints of time and resources in order to identify published and unpublished (ie, gray literature) primary sources of evidence, as well as reviews. Any limitations in terms of the breadth and comprehensiveness of the search strategy should be detailed and justified. A complete search strategy for at least one major database should be included as an appendix to the protocol and in the subsequent review. The input of a research librarian or information scientist can be invaluable in designing and refining the search. McGowan and colleagues[27] developed an evidence-based guideline for Peer Review of

Electronic Search Strategies (PRESS) for systematic reviews, health technology assessments, and other evidence syntheses, and recommended the main search be conducted by a librarian and subsequently peer-reviewed by another librarian. It is essential to keep clear and detailed documentation of the search strategy undertaken, including search dates and key terms used, sufficient to enable repetition of repeating searches (if required by other researchers). Other additional sources such as hand searching of specific journals should be detailed, including journal names and years searched. If authors were contacted for additional data, it must be stated in the review. The search for a scoping review may be quite iterative as reviewers become more familiar with the evidence base, additional keywords, and sources, and potentially useful search terms may be discovered and incorporated into the search strategy. If this is the case, it is crucial that the entire search strategy and results are transparent and auditable.

The language of sources of evidence that will be considered in the review must be pre-specified in the protocol. It is recommended that authors do not apply language restrictions to their protocols unless there is reasonable justification, such as feasibility or limitation of resources.

Evidence screening and selection

Study selection must be pre-specified in the protocol and based on the inclusion and exclusion criteria. Study selection starts with a review of both titles and abstracts using the inclusion criteria followed by full-text retrieval of potentially relevant evidence for further review against the inclusion criteria. This process is usually conducted by a minimum of two reviewers, and any disagreements should be resolved by either consensus or with a third reviewer. Description of the study selection process must be presented in both a narrative and flow diagram format as indicated in the PRISMA-ScR statement.[16] Details of excluded sources at full-text review must be appended to the review with reasons for their exclusion. It is recommended that pilot testing of this process be undertaken by the review team to ensure consistency of the approach taken in the study selection process.

Critical appraisal or risk of bias assessment is generally not recommended in scoping reviews because the aim is to map the available evidence rather than provide a synthesized and clinically meaningful answer to a question. For this reason, an assessment of methodological limitations or risk of bias of the evidence included within a scoping review is generally not performed (unless there is a specific requirement due to the nature of the scoping review aim).[11,12,16]

Data extraction

Data that are extracted from the evidence sources should align with the objectives and research question of the scoping review. In scoping reviews, the data extraction process may be referred to as ''data charting,'' although to be consistent with other evidence synthesis approaches, the authors have used the term ''data extraction'' in the updated guidance. A draft charting table or form should be developed and piloted at the protocol stage to record the key information of the source, such as author, reference, and results or findings relevant to the review question(s). This may be further refined at the review stage and the charting table updated accordingly.

The scoping review protocol should include information about the potential data that could be extracted from the included evidence sources to allow for transparency and clarity. The process of data extraction should involve at least two reviewers to reduce the chance of errors and bias. Careful record keeping should be kept either through a standardized form or table. JBI offers an example of a standardized data extraction form that can be utilized by all authors to minimize potential bias.[17] However, these forms should be individualized to meet the needs of each scoping review. It is recommended that the standardized data extraction form be piloted with two or more members of the team on at least two to three studies prior to use to ensure that all necessary data will be captured appropriately. Data extraction in scoping reviews can be an iterative process, often requiring multiple refinements to be able to best meet the objectives and research question(s) of the scoping review. For example, an initial list of research characteristics may have been noted as important (eg, year of research, location, outcomes). However, once reading several articles, authors may want to list how those outcomes were measured to gain an in-depth understanding of how researchers applied them and arrived at the subsequent results.

Data analysis

An additional section in the updated guidance is a discussion on analyzing data in scoping reviews; this was highlighted as an area where additional information was required.[15] Analysis of the data in scoping reviews should be pre-specified within the protocol to ensure transparency and justification of the chosen approach. In most cases, the intention of a scoping review is not to synthesize the results or outcomes of the included sources. As such, for many scoping reviews, the analysis of the extracted data should not involve anything more than basic descriptive analysis (ie, frequency counts of concepts, populations, or location of studies). These descriptive results can then be mapped in various visual presentations, such as tables or graphs. The purpose of a scoping review and the type of data that emerge in answer to the review question are not the type of evidence that lends itself to a meta-analysis, and little value would be gained in performing such an analysis. It is difficult to envisage a case where further, in-depth quantitative analysis is required in scoping reviews, such as performing a meta-analysis. Qualitative data should also be mostly descriptive, and a synthesis utilizing a thematic or meta-aggregative approach is not within the remit of a scoping review. Descriptive qualitative techniques, such as basic coding of data to particular categories, may be a useful approach in some scoping reviews, particularly when the purpose is to identify or clarify concepts or definitions within a field or to identify key characteristics related to a concept.[22,28,29] In summary, the way data are extracted and analyzed in scoping reviews is largely dependent on the purpose of the review and subject to the authors' judgment and creativity. The most important consideration regarding extraction and analysis is that the authors are transparent and explicit in the approach they have taken, including providing a rationale for their approach and clearly reporting extracted data and analyses.

Presentation of results

Data presentation approaches should be pre-specified in the protocol stage. This could be further refined in the review stage upon consideration of the contents of the included evidence. The results section of a scoping review could be considered to contain two broad sections, the first of which describes the results of the search strategy and selection process, including a PRISMA flow diagram. The second section provides the key information or results relevant to the objectives or questions for the scoping review.

There are many options for presenting data in scoping reviews. The results of a scoping review may be presented as a map of the data extracted from the included papers in a diagrammatic or tabular form, and/or in a descriptive format that aligns with the objective(s) and scope of the review. The elements of the PCC inclusion criteria may be useful to guide the best format(s) for presenting the results of the review to the audience. Presenting the results in a suitable and detailed format will allow the reviewers to identify gaps in the literature and map the available evidence.

Conclusion

The update of the JBI scoping review methodology was driven by the need to provide further clarification on when a scoping review is appropriate (and when it is not), and how to extract, analyze, and present results, as well as to align with the development of the PRISMA-ScR. This article has provided an overview of methods and up-to-date guidance for authors that align with the PRISMA-ScR to support reporting of scoping reviews. Further initiatives to develop scoping review methodology are planned by the JBI Scoping Review Methodology Group, with current work focused on producing guidance to appraise risk of bias (if required as an optional element of some reviews), an article identifying key challenges and potential solutions to scoping reviews, and a website to support dissemination and access to core scoping review methods. As with all evidence synthesis methodologies, approaches to conducting and reporting scoping reviews will be gradually enhanced and evolve in response to the needs of knowledge users as well as through the experiences and familiarity of authors using current approaches. The JBI Scoping Review Methodology Group will continue to provide authors with guidance and suggestions for improving scoping review conduct and reporting, and hopes that the latest iterations to the JBI methodology are clear, helpful, and informative.

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