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Updated methodological guidance for the conduct of scoping reviews.

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1 Updated methodological guidance for the conduct of scoping reviews

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38 **Abstract**

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

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

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

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

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

70 Updated methodological guidance for the conduct of scoping reviews

71 Introduction

72 Along with the increased production of primary research, the conduct and publication of evidence
73 syntheses (reviews) has also increased and evolved over time.¹ The need to synthesize diverse types
74 of evidence underpins the design and evolution of new approaches intended to rigorously identify and
75 synthesize data to answer a range of pressing questions for end users in policy, research, and
76 practice. In 2009, Grant and Booth identified 14 different types of reviews.² By 2016, this variety had
77 increased to 25 evidence synthesis methods,³ and 48 review types in 2019.⁴ Scoping reviews, also
78 sometimes referred to as ‘mapping reviews’ or ‘scoping studies’ is one approach to evidence
79 synthesis that are increasingly being utilized internationally.^{5,6,7,8} Although it is unclear when the first
80 scoping review was conducted, the first methodological guide for these reviews was published by
81 Arksey and O’Malley in 2005. Arksey & O’Malley observed and reflected on the early appearance of
82 scoping studies in the literature and noted similarities and a lack of uniformity, and proposed a
83 seminal framework for their conduct.⁹ Arksey and O’Malley also noted the necessity for others to
84 continue their work to further improve guidance for authors to conduct and report scoping reviews.
85 This has occurred over the years and included extensions proposed by Levac and colleagues.¹⁰ In
86 2014, the Joanna Briggs Institute (JBI) International Scientific Committee convened a Scoping Review
87 Methodology Group from members of the JBI and the Joanna Briggs Collaboration (JBC).¹¹ This
88 group extensively reviewed the literature, engaged via annual face-to-face meetings, regular
89 teleconferences and email correspondence, sought advice from methodological experts, facilitated
90 workshops, and presented at scientific conferences. This process led to the publication of the JBI’s
91 first chapter and peer-reviewed paper describing guidance for authors of scoping reviews.^{12,13} Like
92 guidance for the more traditional systematic reviews that the JBI has become known for, the guidance
93 for scoping reviews explicitly addressed the need for scoping reviews to be rigorously conducted,
94 transparent, and trustworthy. The chapter underwent minor updates in 2017,¹⁴ and overall, the JBI
95 guidance has since been used and cited by many review groups around the world from a range of
96 disciplines, academic, and professional backgrounds.¹⁵ In 2018, the Preferred Reporting Items for
97 Systematic Reviews extension for Scoping Reviews (PRISMA-ScR) was developed by an
98 international team of experts in scoping reviews and evidence synthesis,¹⁶ including members of the
99 JBI/JBC working group, to be consistent with the JBI’s scoping review methodology and to provide
100 reviewers with a reporting checklist for their reviews.¹⁴

101
102 This methodological paper provides an overview of scoping review methods and highlights the most
103 recent updates to the JBI’s guidance for the conduct of scoping reviews, which was recently published
104 in the JBI Reviewer’s Manual.¹⁷ This updated guidance primarily takes into account the launch of the
105 (PRISMA-ScR),¹⁶ which is recommended to be used in tandem with the latest JBI guidance. The
106 major areas of update include:

- 107 • Inclusion of the PRISMA-ScR reporting guideline and checklist throughout the chapter.

- 108 • Advice on when a scoping review is (or is not) appropriate, and how to extract, analyze, and
109 present results.
- 110 • Updates to many of the examples used throughout the chapter and the use of clearer
111 language to remove ambiguity.
- 112 • A discussion on the term 'systematic' in relation to scoping reviews and clarifying our
113 preferred terminology for this evidence synthesis approach is 'scoping reviews' (whilst they
114 still remain systematic).
- 115 • Updated section on indications for conducting a scoping review.
- 116 • Further discussion on the role (or not) of methodological appraisal in scoping reviews.
- 117 • Clarification on implications for practice (now called 'implications of the findings').
- 118 • Expanded background to the chapter.

119

120 Additionally, as interest in the methodology has grown it has come to our attention that in addition to
121 adding new sections, there are also areas throughout the guidance which required clarification,
122 updates, and modification. Some of these changes were informed by feedback from scoping review
123 authors using the guidance (Khalil 2019),¹⁵ whilst others have been identified by group members
124 themselves or by advances in the methodological literature. It is in light of this evidence that the
125 authors hope an update to the guidance will support improved consistency and rigor in the
126 undertaking and reporting of scoping reviews.

127

128 ***What are scoping reviews and why conduct a scoping review?***

129 According to the Canadian Institutes of Health Research, scoping reviews are “exploratory projects
130 that systematically map the literature available on a topic, identifying key concepts, theories, sources
131 of evidence and gaps in the research”.^{18(para 1)} Scoping reviews are conducted for several reasons,
132 with the most common being to explore the breadth/depth of the literature, map and summarize the
133 evidence, inform future research, and identify/address knowledge gaps.¹⁹ Scoping reviews are
134 particularly helpful when the literature is complex and heterogeneous. Scoping reviews can provide
135 useful insight for decision makers into the nature of a concept and how that concept has been studied
136 in the literature over time. They can be used to develop a research agenda, advance the field, and
137 identify areas for future systematic reviews or other types of evidence synthesis. Decision makers in
138 particular find this method of evidence synthesis provides a useful overview of research previously
139 undertaken and reported in the literature, often in regard to the types of programs or interventions that
140 have been examined, informing options for consideration in future research. Indeed, the number of
141 scoping reviews doubled from 2014 until 2017,¹⁹ demonstrating the popularity of this method in the
142 literature.

143

144 ***Need for scoping reviews to still be systematic***

145 Initially, JBI's guidance used the terminology 'systematic scoping review'.^{12,14,17} This was to signpost
146 the similarities between the JBI's guidance for scoping reviews and the JBI's guidance for other
147 evidence syntheses including systematic reviews that focus on rigor, reproducibility, and

148 transparency. In this latest update, the nomenclature has been refined to simply 'scoping reviews' in
149 recognition that all types of evidence synthesis should be conducted systematically, as well as to
150 reduce the risk of confusion between different types of review.^{19,29} In addition, 'scoping review' is the
151 most commonly used term to describe a scoping review, so removing the term 'systematic' also
152 improves consistency.¹⁹ We argue that all types of evidence synthesis should be systematic and
153 follow methodological guidance.

154

155 ***Choosing between a systematic or scoping review approach***

156 Given the array of evidence synthesis methodologies and review types, it is critical that authors
157 assess their objectives and intentions prior to the undertaking of any review. This is a particularly
158 pertinent consideration when deciding between a systematic or scoping review as both maintain
159 particular, but separate, value for given aims or outcomes. Broadly speaking, if the intention of the
160 review is to inform clinical decision-making, for example determining the feasibility, appropriateness,
161 meaningfulness or effectiveness of a particular intervention then a systematic review is more
162 appropriate.²⁰ Scoping reviews however, are more appropriate in assessing and understanding the
163 extent of the knowledge in an emerging field, or to identify, map, report or discuss the
164 characteristics/concepts in that field. For example, Harfield and colleagues' scoping review identified
165 the characteristics of Indigenous primary health care service delivery models.²¹ Subsequently, they
166 were able to develop and describe a new Indigenous Primary Health Care Service Delivery Model
167 which was able to place importance on the local cultural values, customs and beliefs of Indigenous
168 people.²¹

169

170 The value of scoping reviews to evidence-based healthcare and practice lies in their ability to
171 incorporate various types of literature that are not limited specifically to research studies. For
172 example, scoping reviews can be useful in developing policy maps. Mapping policy documents and
173 research studies has been previously undertaken by Anderson and colleagues in 2008 and Watson
174 and colleagues in 2011.^{6,22} Both authors used scoping reviews to examine research papers and policy
175 documents to map complex topics.

176

177 In general, systematic reviews have more focused research questions than scoping reviews, which
178 are much broader. Furthermore, scoping reviews are exploratory and descriptive in nature, whereas
179 systematic reviews, those with meta-analysis or network meta-analysis, can be explanatory or
180 analytical in nature.²³ An online tool exists that can be used to assist authors when selecting between
181 a systematic review and a scoping review,²⁴ by providing general indication of the objective and topic
182 to be reviewed, a user can generate a recommendation towards the most appropriate method of
183 review. Results of scoping reviews can identify further areas for subsequent research and clarify
184 whether a systematic review can be conducted to address a specific question as a consequence of
185 mapping the literature. In general, the indications for scoping reviews can be summarized below:^{17,20}

186

- As a precursor to a systematic review.
- To identify the types of evidence available in a given field.

187

- 188 • To identify and analyze knowledge gaps.
- 189 • To clarify key concepts/ definitions in the literature.
- 190 • To examine how research is conducted on a certain topic or field.
- 191 • To identify key characteristics or factors related to a concept.

192

193 Whilst scoping review methodology has evolved, there is still some confusion of terms with other
194 evidence synthesis approaches such as 'evidence gap maps'.⁴ Evidence gap maps share similarities
195 to scoping reviews in terms of identifying a research question, conducting a systematic search and
196 descriptive analysis,³⁰ however, evidence gap maps tend to limit the inclusion of evidence to
197 systematic reviews and primary research studies, and may also include critical appraisal.

198

199 **Methodological updates**

200 As is characteristic of rigorous evidence synthesis approaches, scoping reviews should be well
201 planned out and driven by a protocol. Protocols are important for pre-definition of the objective,
202 question/s and method and they support transparent and unbiased reporting. The protocol should
203 detail the reviews' inclusion and exclusion criteria and identify what and how data will be extracted
204 and presented. Deviations from the protocol should be clearly highlighted and explained in the
205 ensuing scoping review. Currently, scoping reviews are not able to be registered with the international
206 database of prospectively registered systematic reviews/PROSPERO. However, authors conducting a
207 scoping review should consider publishing, registering or making their protocol available via platforms
208 such as Figshare, Open Science Framework, ResearchGate, ResearchSquare or similar so that it is
209 freely available. The JBI journal *JBI Evidence Synthesis* is one avenue for publishing scoping review
210 protocols (and their subsequent reviews) that have followed the JBI methodology.

211

212 ***Title and review questions***

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

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

225 “What quality of life questionnaires are available for pediatric patients following
226 tonsillectomies with or without adenoidectomies for chronic infections or sleep disordered
227 breathing?”

228 Some scoping reviews may also have one or more sub-questions that delve into particular attributes
229 of Context, Population or Concept. Sub-questions can be useful in outlining how the evidence is likely
230 to be mapped. For example:

231 “What are the ages of the pediatric patients where quality of life questionnaires have been
232 or could be used within the sources of evidence identified for the primary review question?”

233

234 ***Inclusion criteria***

235 A scoping review’s inclusion criteria should be detailed in the protocol and should also provide
236 information regarding the types of sources of evidence that will be considered for inclusion. As
237 scoping reviews are amenable to the inclusion of all methodologies as well as non-research sources
238 such as policy documents or websites the protocol should state which sources will be examined. It is
239 important to note that here, sources of evidence do not refer to the locations of where evidence will be
240 sought, i.e. online databases. These should be stated in the search strategy. The inclusion criteria aid
241 the reader’s understanding of the scope of the review and provide a guide for the reviewers
242 themselves to make decisions regarding what sources to include or exclude.

243 ***Participants***

244 The inclusion criteria should specify important characteristics of the review’s participants. This may
245 include age, gender, and other relevant factors appropriate to the review’s objective and review
246 question/s. Defining participants *per se* is not always necessary. For example, a scoping review with
247 the objective of describing the details of research designs used in a specific area of study may not
248 need to detail the types of participants involved in that research.

249 ***Concept***

250 The scoping review’s main concept/s should be explained. Depending upon the objective and
251 question/s, the ‘concept’ may include details similar to the elements detailed in a traditional systematic
252 review, such as ‘interventions’, ‘phenomena of interest’, or ‘outcomes’. For example, the principal
253 concept of interest in the example questions above are quality of life questionnaires used following
254 tonsillectomies. Additional elements of this concept may also be of interest, such as; the format (e.g.
255 paper or web-based), contents (i.e. assessment domains) of the included instruments, and validity
256 and reliability (i.e. if and how they have been psychometrically tested). Outcomes may also be a
257 component of a scoping review’s ‘concept’ and should be linked to the objective review question/s.
258 For example, this scoping review could also identify and map any reported outcomes addressed
259 within quality of life assessments. In other examples, the concept may relate to concepts and
260 definitions (i.e. what definitions have been used to define low-value care’) or elements of research
261 design (i.e. methodological details and conduct).

262 *Context*

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

270 *Types of evidence sources*

271 A scoping review can include any and all types of literature, e.g. primary research studies, systematic
272 reviews, meta-analyses, letters, guidelines, websites, blogs, etc. Reviewers however may wish to
273 impose limits based on the knowledge that particular types of sources would be most useful and
274 appropriate. The example scoping review above sought certain quantitative studies only; qualitative
275 studies, reviews, and conference abstracts were excluded as these were deemed by the reviewers
276 not to be likely to contain relevant information to answer the review questions.

277

278 **Search strategy**

279 The search strategy for a scoping review should ideally aim to be as comprehensive as possible
280 within the constraints of time and resources in order to identify both published and unpublished (i.e.
281 Gray literature) primary sources of evidence, as well as reviews. Any limitations in terms of the
282 breadth and comprehensiveness of the search strategy should be detailed and justified. A complete
283 search strategy for at least one major database should be included as an appendix to the protocol
284 and in the subsequent review. The input of a research librarian or information scientist can be
285 invaluable in designing and refining the search. McGowan and colleagues developed an evidence-
286 based guideline for Peer Review of Electronic Search Strategies (PRESS) for systematic reviews,
287 health technology assessments, and other evidence syntheses and recommended the main search
288 be conducted by a librarian and subsequently peer-reviewed by another librarian.²⁵ It is essential to
289 keep clear and detailed documentation of the search strategy undertaken including search dates and
290 key terms used, sufficient to enable repetition of repeating searches (if required by other researchers).
291 Other additional sources such as hand searching of specific journals should be detailed including
292 journal names and years searched. If author contact for additional data was undertaken, it must be
293 stated in the review. The search for a scoping review may be quite iterative as reviewers become
294 more familiar with the evidence base, additional keywords and sources, and potentially useful search
295 terms may be discovered and incorporated into the search strategy. If this is the case, it is of the
296 utmost importance that the entire search strategy and results are transparent and auditable.
297 The language of sources of evidence that will be considered in the review must be prespecified in the
298 protocol. It is recommended that authors do not apply language restrictions to their protocols unless
299 there are reasonable justification such as feasibility or limitation of resources.

300

301 ***Evidence screening and selection***

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

311
312 Critical appraisal or risk of bias assessment is generally not recommended in scoping reviews as the
313 aim is to map the available evidence rather than provide a synthesized and clinically meaningful
314 answer to a question. Due to this, an assessment of methodological limitations or risk of bias of the
315 evidence included within a scoping review is generally not performed (unless there is a specific
316 requirement due to the nature of the scoping review aim).^{11,12,16}

317
318 ***Data extraction***

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

326
327 The scoping review protocol should include information about the potential data which could be
328 extracted from the included evidence sources to allow for transparency and clarity. The process of
329 data extraction should involve at least two reviewers to reduce the chance of errors and bias. Careful
330 record keeping should be kept either through a standardized form or table. The JBI offer an example
331 of a standardized data extraction form which can be utilized by all authors which can minimize
332 potential bias.²⁶ However, these forms should be individualized to meet the needs of each scoping
333 review. It is recommended that the standardized data extraction form be piloted with two or more
334 members of the team on at least two to three studies prior to use to ensure that all necessary data will
335 be captured appropriately. Data extraction in scoping reviews can be an iterative process, often
336 requiring multiple refinements to be able to best meet the objectives and research question of the
337 scoping review. For example, an initial list of research characteristics may have been initially noted as
338 important i.e. year of research, location, or outcomes. However once reading several articles, authors
339 may want to list how those outcomes were measured to gain an in-depth understanding of how
340 researchers applied them and arrived at the subsequent results.

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Data analysis

An additional section in the updated guidance is a discussion on analyzing data in scoping reviews, as this was highlighted as an area where additional information was required.¹⁵ Analysis of the data in scoping reviews should be prespecified 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, i.e. 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 emerges in answer to the review question is 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/clarify concepts or definitions within a field or identifying key characteristics related to a concept.^{21,27,28} In summary, the way data is extracted and analyzed in scoping reviews is largely dependent on the purpose of the review and subject to the authors' judgement 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 the results

Data presentation approaches should be prespecified 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 will provide the key information or results relevant to the objectives/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 how the data should consider the best format(s) to present the results of the review for their 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.

381 **Discussion and conclusion**

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

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