LOW CARBON LIVING CRC

Rapid reviews for the built environment

Methodology and guidelines

Milestone Report Activity4

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V1.0

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ML, GS, SN declare no conflicts of interests.

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The author(s) confirm(s) that this document has been reviewed and approved by the project's steering committee and by its program leader. These reviewers evaluated its:

- originality
- methodology
- rigour
- compliance with ethical guidelines
- conclusions against results
- conformity with the principles of the Australian Code for the Responsible Conduct of Research (NHMRC 2007),

and provided constructive feedback which was considered and addressed by the author(s).

Contents

List of Figures

Executive Summary

Background

Systematic reviews and meta-analyses (based on systematic reviews) are considered “gold standard” for knowledge and evidence synthesis.

However, their main limitation is the significant amount of time and resources that are usually required to produce a high-quality comprehensive systematic review or meta-analysis. Thus, they may not be feasible when evidence or knowledge summaries are required within a relatively short timeframes or on a limited budget.

We propose rapid reviews as an alternative synthesis method suitable for the field of built environment. Rapid reviews are, basically, “systematic reviews with shortcuts”. In rapid reviews, sacrifices are made to the synthesis process, for example, comprehensiveness of the data search and / or the depth of assessment of the found evidence. However, the key principles of the systematic review approach should be followed, especially the ones safeguarding transparency of the review methods and findings. In this sense, the rapid review methodology is universal and transferable across the disciplines. However, most systematic review and rapid review guidelines are written for the medical and social sciences and are tailored to the question and data types encountered in theses disciplines. Built environment research is cross-disciplinary, and while for some topics the available guidelines may provide a good fit, a more general plain-language guidelines are also needed.

Well-conducted rapid reviews can provide evidence inventories and assessments of evidence that can inform downstream investigation and decision-making. They help deciding whether to proceed with a full systematic review, re-focus on specific aspects of the evidence or direct future primary research. Rapid reviews can be useful for guideline development and form the evidence basis for urgent policy changes within specific settings.

Objectives

We aim to provide the reader with an understanding of what rapid review is, when rapid reviews might be useful, and the core concepts of the systematic review process, in a way that is accessible to people with various backgrounds. We include tips on how to conduct rapid review efficiently and list references to useful resources, e.g. software and more specialised reading.

This guide is aimed for the teams who conduct rapid reviews on topics and questions not just for their own use (or publication in an academic journal), but also for stakeholders (or “end users of reviews”; usually policy-makers or practitioners). Thus, we consider the stakeholders and fulfilling their requirements as an important and integral aspect of a rapid review process. However, we do not cover rapid review commissioning and dissemination stages (Figure 1).

> “Brief [=rapid] reviews must use techniques that ensure replicability and objectivity within the constraints of time and money.” (Abrami et al. 2010)

Limitations

This document is not a comprehensive tutorial on how to conduct a rapid review and we do not provide an exhaustive coverage of all aspects of the method. Following these guidelines will not shield you from going over time or over the budget with your rapid review, but it can forewarn you as where to expect complications and delays and how to try to avoid them. All information provided here should only be used as guidance on the best practices, not a recipe.

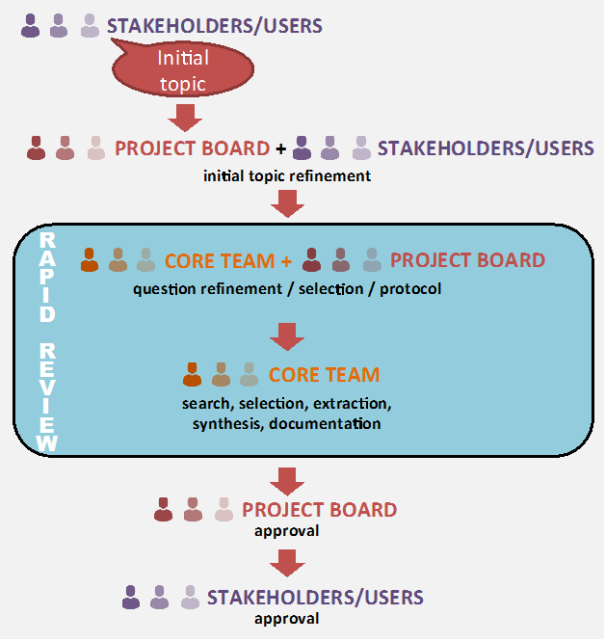

Figure 1. Rapid review as one of the stages of evidence-commissioning and delivery process, as covered in this guide.

Abbreviations and symbols

CoI – Conflict of Interest
MA – meta-analysis
SR – systematic review (type of research synthesis method or document)
QA – quality assessment
RoB – risk of bias
RR – rapid review

Other notes

grey boxes – figures

green-blue boxes – tips

green boxes – quotes

Introduction

Why we need rapid reviews?

In the face of rapidly changing society and the world, policymakers need scientific evidence to guide decisions on urgent issues from overpopulation to new technologies. Closing the gap between the growing body of evidence, practice and policy requires addressing the key challenges to the use of scientific evidence, such as skills and time needed to locate and synthesize good quality and relevant research.

While full comprehensive systematic reviews of evidence are considered to be “the gold standard”, there is an increasing demand for accelerated forms of evidence synthesis. To meet this demand, rapid reviews were introduced in medical and social sciences, where they are recognized as a viable alternative to full systematic reviews (1).

Rigorous and comprehensive methods for synthesising evidence are already established firmly in medicine and social sciences, from where they are being adopted to other scientific fields, including built environment. Research synthesis in the built environment, however, poses some specific challenges that need to be addressed.

Why we need a guide?

The main challenge for research synthesis in built environment comes from the fact that most existing methodological guidance on research synthesis was written either for the medical or social sciences audience. Thus, they use discipline-specific terminology and examples, and present synthesis methods that are tailored to the types of data and questions typical to their discipline, but that may be different from these commonly encountered in the built environment research.

Thus, there is a need to translate and adjust the methodological guidance from medical and social sciences to a format and language that is more understandable for the built environment users.

What is in this guide?

- In this document we focus on introducing systematic review and its accelerated version, rapid review.
- We aim to provide a brief and practical overview of the key definitions, review and synthesis process, and basic reporting requirements (Figure 2).
- We list useful resources including diagrams, templates, software, links and references.
- We share some practical tips from our experience.

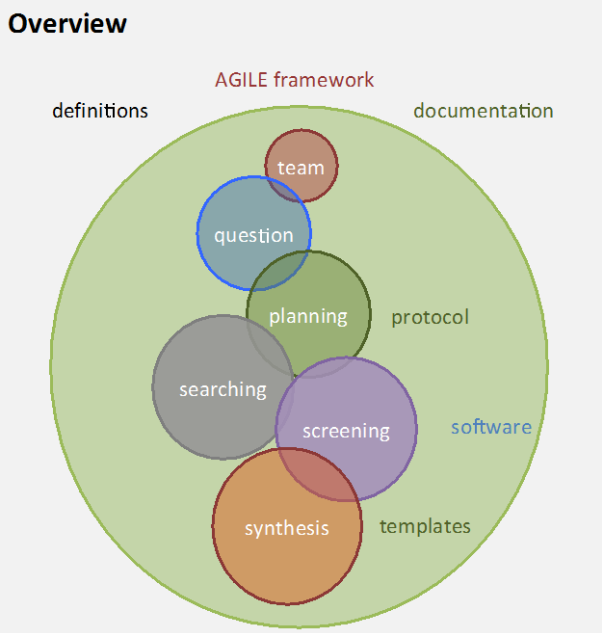

Figure 2. Overview of the contents of this guide.

Why and how we wrote it

Guidance provided in the document is aligned to existing research synthesis methodology literature. It is also based on the experience of our team conducting literature synthesis projects in the fields of biological, medical and social sciences, and built environment research. The latter includes following evidence synthesis reviews:

- “A visualised overview of systematic reviews and meta-analyses on low-carbon built environments: an evidence review map”
- “Digital services and communication platforms for residential energy customer engagement: Rapid meta-review”
- “Digital services and communication platforms for residential energy customer engagement in Australia: Rapid review”
- “Do green-rated office buildings save operational energy? Rapid review of comparative evidence”

The full reports and short summaries (briefs) of our methods and findings from these syntheses are available from CRCLCL.

Any tips?

- Research synthesis is neither quick nor easy, but greater efficiency can be achieved.
- Each synthesis project is unique.
- Be critical and use common sense, ask for help.

Definitions and the overview of the systematic review process

Why we need definitions?

People often assume that there is one fixed definition of each type of research synthesis. In fact, there is no consensus and people tend use many different definitions that usually converge on a few key points. This often leads to confusion and disagreements on what a given type of research synthesis should look like and what constitutes "high quality". In attempt to clarify the confusion and avoid disagreements, we define the key terms we use. We note why our definitions may differ in details from definitions used in other sources.

Most current definitions seem to define a systematic review by emphasizing the process (or approach) that leads to evidence synthesis (aggregation of multiple studies). That process aims to be comprehensive, transparent and minimize the biases, resulting in a detailed and reliable summary of the relevant evidence.

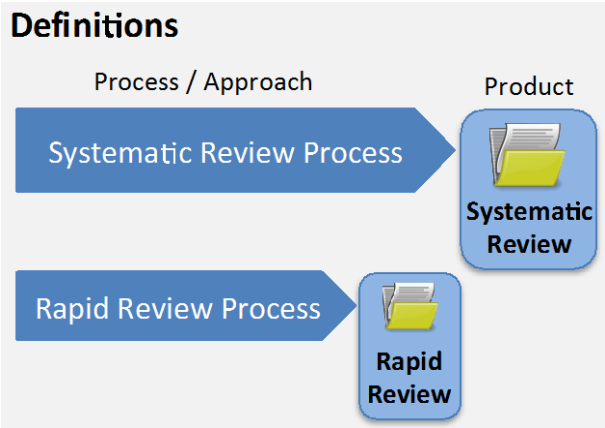

Figure 3. Definitions used in this guide.

What is a systematic review?

For our use, we define a **systematic review as a product of a systematic review process**. Such product could be a report, published peer-reviewed paper, or more generally the body of information gathered as a result (Figure 3**)**. Thus, systematic review is a study that followed (or it claims so) the systematic review process, which we will define next. Not every study that claims to be a systematic review actually is comprehensive, transparent and unbiased, for various reasons.

Existing systematic reviews come in many flavours. The classical ones review evidence from (quasi) randomized controlled trials rigorously testing if some type of intervention has measurable effect on some measurable outcomes. However, systematic review approach can be also applied to primary observational and diagnostic studies, to compare multiple treatments, case studies, qualitative research, but also secondary studies (reviews, meta-analyses) and populating systematic review maps (collections of evidence / literature). They take several months or even years to complete (2).

What is a systematic review process?

The general characteristic of the process leading to a systematic review is that it is planned, structured and following a logical sequence. The main steps of this process include: defining the question, searching and screening literature and other sources, data extraction and coding, synthesis of findings. However, there is no global consensus on all the details of these steps. These would often depend on the discipline, type of question synthesised, data collected, synthesis method, etc.

We outline the steps of a systematic review process in more detail in the following sections. Importantly, the main idea behind the required methods and procedures is to ensure transparency, replicability and minimize the bias in the included evidence and its synthesis, allowing for drawing reliable conclusions from the evidence base (and assessing how robust it is).

What is a rapid review?

There is no standard definition of rapid review or a fixed way to conduct them (3). The main difference between full systematic reviews and rapid reviews is that the latter allow gathering information on specific research topic much quicker than the former (1). Thus, **rapid review process is similar to a systematic review process, but it has "shortcuts" allowing it to be completed in a shorter timeframe and with less resources** (Figure 3**)**. Medicine-related rapid reviews take on average 3 months to complete (range: 0.5 to 12 months) (4). They are sometimes called as: brief, responsive, accelerated, scoping reviews (5).

What is a rapid review process?

General principles of conducting rapid reviews are aligned with the methods used for systematic reviews to maintain their transparency, replicability and minimize the bias in the evidence and its synthesis. Almost every step of the process offers opportunities for greater efficiency. We highlight these opportunities in the following sections of this guide.

Are rapid reviews reliable?

Usually, systematic reviews and rapid reviews on comparable topics reach similar conclusions, but the certainty of conclusions can be reduced, especially if a rapid review sacrificed the comprehensiveness of the literature searches (reviewed in (4), but see (6)). Also, the depth of the analyses and insights can be compromised. Thus, although the findings from rapid reviews are less likely to be biased compared with non-systematic reviews, conclusions should be formulated with care and limitations acknowledged.

Any tips?

- Be very clear about your terminology.
- Be careful with terminology used by others, they might understand it differently.
- If unsure, look critically at the methods used.

Can rapid reviews be AGILE?

The main purpose of a rapid review is to deliver evidence quickly, while trying to maintain as much of the rigour of a systematic review process as possible. Efficiency and flexibility are the two characteristics of the rapid review process that are surprisingly similar to the AGILE framework.

What is the AGILE approach?

AGILE is an overarching approach to project management, originally designed to make software development quicker and more responsible to changing requirements of the customers. AGILE projects are divided into short phases of work and tasks are frequently and collaboratively reassessed and adapted to maximise efficiency (7).

Traditionally, the systematic review process is depicted as a waterfall process (see Figure 4), composed of discrete and sequential tasks. However, rapid reviews fit better into the AGILE process model, with the tasks that are iterative and adjustable, but also showing the influence of earlier tasks on the subsequent tasks.

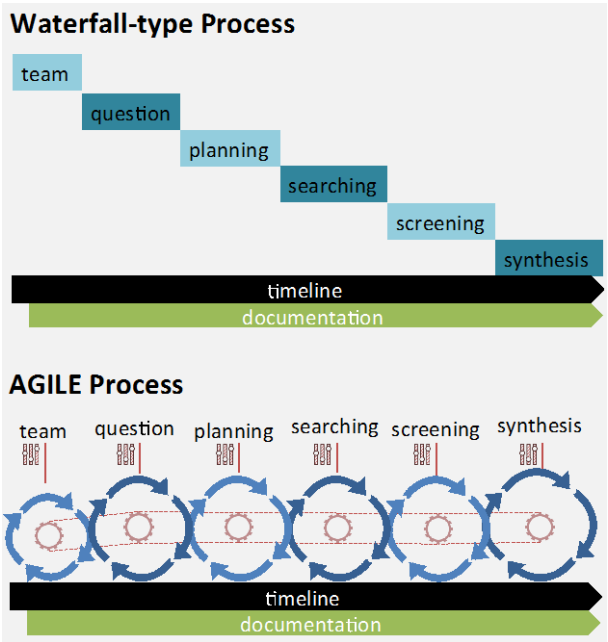

Figure 4. Two ways of depicting a rapid review project.

The goal of AGILE approach is to align project management with customer needs – and the goal of most rapid reviews is to provide timely and quality evidence for the stakeholders. This can be achieved via **stakeholder guidance and participation, as far as practicable**, but also by following other AGILE practices outlined in the AGILE Manifesto.

The original AGILE Manifesto was created in 2000 and it outlines **Four Key Values and Twelve Principles**. We, thus, briefly discuss the values, and their applicability of the AGILE approach to rapid reviews.

Key AGILE values

1. Individuals and Interactions Over Processes and Tools. In the rapid review process, **skills of the team member, communication within team and communication with the stakeholders are critical for the success.** Also, rapid reviews are quite flexible with the process (in contrast to full systematic reviews), allowing adjustments of the tasks as review progresses, depending on the findings and the timeline.

2. Working Software Over Comprehensive Documentation. In the rapid review process, ”working software” is equivalent to an answer to the review question. However, the answer can often be inconclusive and indicating that more evidence is needed. Comprehensive documentation is necessary for the transparency and replicability of the review process.

3. Customer Collaboration Over Contract Negotiation. In the rapid review process, the stakeholders should be involved in the process of review planning and throughout the review process, making it easier for the review team to meet the needs of the stakeholders.

4. Responding to Change Over Following a Plan. Although the rapid review process starts with a detailed plan, but many aspects of it can be adjusted as review progressed. Such adjustments are necessary to improve the quality of the answer and fit within the review timeframe. Still, care should be made to be able to justify these changes and avoid introducing bias in the review.

Any tips?

- A good plan and frequent revisions will help the team to maintain the pace and to constantly improve the emerging answer to the review question.
- Dividing review steps into smaller tasks will make it easier to manage the process and help to keep the team motivated. Making improvements to the process, as issues appear, rather than complete overhaul if you have to go back and fix things later, will save time.
- In the rapid review process, staying focused on what is important means always keeping in mind finding the best (most precise and unbiased) answer to the stakeholders’ question. But do not overdo the tasks. Cut out unnecessary complexities and get just the right level of details.
- Topic experts and review methodology experts have to work closely together by frequently meeting key team members in person, if possible, and/or using collaboration software (e.g. Slack), to facilitate communication in real-time. Both spontaneous and scheduled communication may be needed.
- Keep the stakeholders updated on the review progress, as far as agreed / practical.
- Good documentation is what brings rapid review closer to full systematic review; so do not cut corners on this. Run tasks as short iterations, and keep documentation continuously updated.

Documentation

Documentation is a critical aspect of every systematic evidence review process. It is a proof that the evidence has not been "cherry picked". It distinguishes studies that actually used a systematic review approach from narrative reviews – and also good quality from poor quality systematic / rapid reviews. For this reason, we have separate section to emphasize documentation.

A rapid review consists of a three key interlinked documents (Figure 5), but there are other documents to consider. Below, we briefly elaborate on these three main documents and also on other types of documents that is relevant to the systematic / rapid review process.

Protocol

It is recommended that detailed description of the review protocol (plan) is written and archived. This is probably the most often omitted piece of documentation in systematic and rapid reviews. We will cover it in more detail in the section "Planning and protocol".

Report

A full report contains actual methods that were used to conduct the review (noting deviations from the original protocol) and the findings. Academic publications would be generally similar to the full report format, often with supplementary materials presenting details of the review process and data. The report aims to not only present the review findings in detail, but also to demonstrate that practical care was taken to minimize bias and maximize objectivity in collecting and summarising the evidence. It generally follows all the methodological steps of the systematic review process. We cover the report in more detail in the "Synthesis" section.

Summary / Brief

Since stakeholders may not be always interested in the methodological details, separate summary of the main review findings (a brief) can be also written. It is usually short and written in plain language. It should mention that the evidence was collected and synthesised via the systematic / rapid review process, but it does not provide details (it can refer the readers to the full report). We cover the rapid review summary document in more detail in the "Synthesis" section.

References

References collected from the searches can be stored in reference manager software and / or exported as bibliographic data files.

Data and code

Versioned data and code files should be stored; the final version made available upon request or shared publicly via an online repository or with the full report.

Documentation – Sections:	PROTOCOL	REPORT	BRIEF
Acknowledgements, funding, CoI		☑	
Disclaimer		☑	
Peer review statement	☑	☑	
Abbreviations and acronyms	☑	☑	
Contents	☑	☑	
List of tables		☑	
List of figures		☑	
Executive summary		☑	☑
Introduction:			
Rationale	☑	☑	
Objectives	☑	☑	
Methods:			
Eligibility criteria	☑	☑	
Information sources	☑	☑	
Literature search and study records	☑	☑	
Data items	☑	☑	
Outcomes and prioritisation	☑	☑	
Risk of bias of individual studies	☑	☑	
Data synthesis	☑	☑	
Meta-bias(es)	☑	☑	
Results and discussion:			
Overview of the included studies		☑	
Quantitative summary		☑	
Quality, risk of bias		☑	
Overview of the excluded studies		☑	
Review limitations		☑	
Summary and conclusions		☑	
References	☑	☑	☑
Resources, workload and timeline		☑	
Supplementary information	☑	☑	

Figure 5. Contents of the three main documents produced in a rapid review.

Checklists

Checklists are created to inform and enforce reporting standards and transparency. There are a few established ones, especially in the medical field (PRISMA (8) and its variations, AMSTAR (9), ROSES (10)), but not for rapid reviews and not for built environment. Journal "Environmental International" provides modified PRISMA checklists for reviews of interventions in environmental research.

Any tips?

- Use templates and record all tasks as they are done.
- Justify deviations from full systematic review process and from the protocol.

Review team

The people on the review team matter just as much, if not more, as the methodology and documentation. The core review team will usually benefit from having additional people involved (Figure 6). These non-core people can enhance the review process and outcomes.

Core review team

The minimum number of people to perform a rapid review is two, but is good to have a team of several people. Ideally, these are experienced reviewers from an established research organization. There should be at least one methodologist comfortable with the systematic and rapid review process and one expert on the topic of the review. The team needs a designated leader responsible for coordinating the review and the final outcomes. The leader could also have other roles within the review team (methodologist, expert, helper, knowledge broker).

Helpers

The helpers can save time of the core team members by contributing to search, screening and data extraction. They need to be trained, monitored and supported in performing these tasks.

Project Board

The review / project board can initiate the review, help assemble the core team and subsequently supervise, support and guide the team during the review process. The board can contribute to the review process by defining the work that needs to be done, clarifying the objectives, and setting the expectations for quality. It reviews the protocols, final reports and summaries before they are delivered to the review stakeholders or users, if applicable.

The board can also ensure continuous improvement of the rapid review methods used by the core teams by revising the guidelines and supporting training up of the core team members. The board members can act as knowledge brokers, interacting with stakeholders and review users.

Stakeholders / Users

The definitions of stakeholders vary between the fields and review question types. For the purpose of this guideline document, we define them as the group of people, external to the core review team, who provided the review question (often also fund the review) and are likely to use the findings of the review, e.g., for further research, advocacy, policy or decision-making.

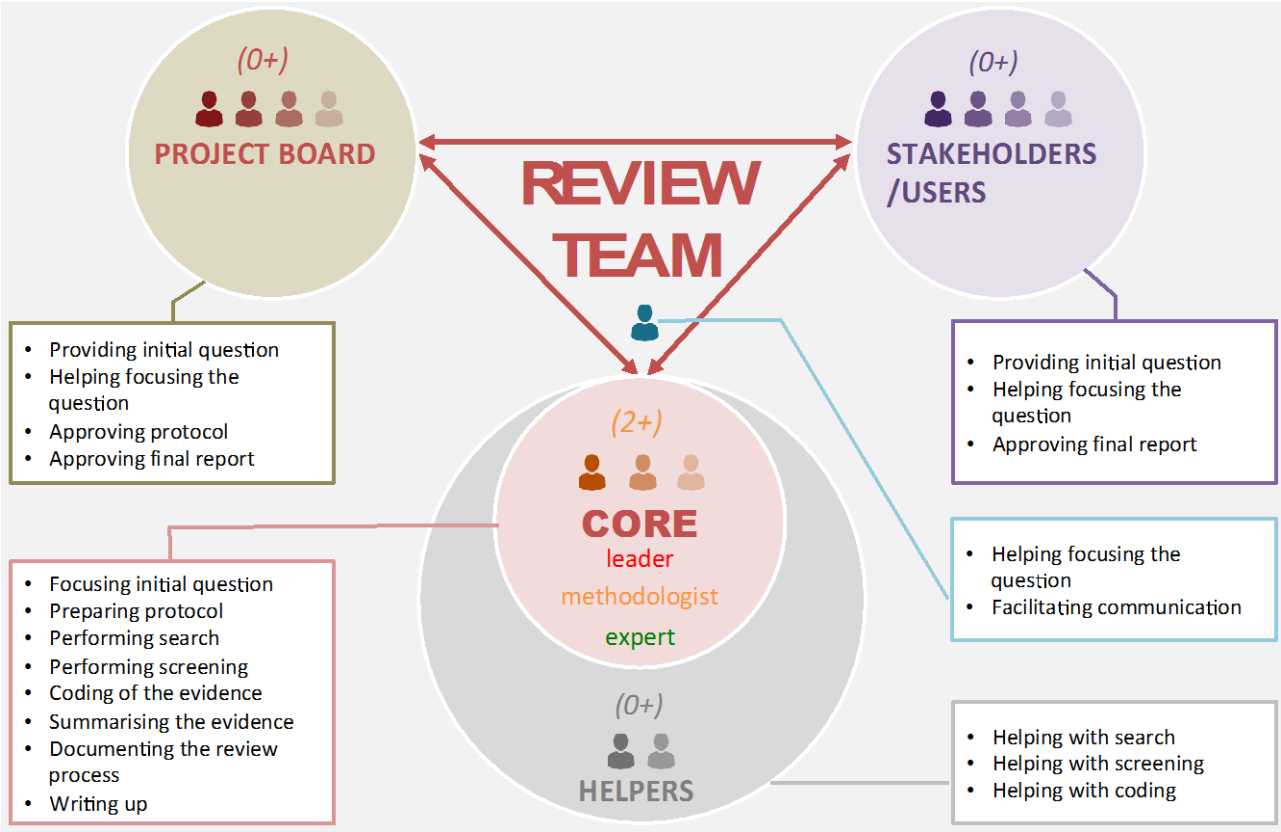

Figure 6. Suggested composition and contributions of the rapid review team.

It is essential for the core review team (and project board) to communicate with the stakeholders to prioritize review questions, ensure question relevance, plan review activities, and improve adoption of research evidence. Thus, the stakeholders' input is especially valuable at the initial stages and at the end of the review process. However, stakeholder engagement necessitates additional time and resources, and thus should be carefully planned and managed to avoid delays in the review.

Knowledge Brokers

These can have different roles in different settings, but for the rapid reviews considered here, knowledge brokers can be responsible for ensuring efficient communication between the core team, the project board and the stakeholders. They connect and build relationships with and between stakeholders facilitating knowledge transfer and uptake of the evidence summarised via systematic / rapid review process, as well as the review speed and quality (11).

Other useful people

The core research team may not have all the necessary skills and knowledge ensuring the timely review completion and high quality of the produced documents. Therefore, involving additional specialists in the review process may be highly beneficial. However, their involvement should be planned at early stages to avoid delays, e.g., difficulty locating suitable specialists or them having prior commitments.

Other potentially useful people include:

- **Topic experts** (additional experts can help greatly with question refinement, data extraction and summaries, assuring scientific quality)
- **Librarians** (to help up setting up literature searches)
- **Review methodologists** (to help troubleshooting and find efficiencies in the systematic / rapid review process, also ensuring best practice in conducting the systematic review and resulting documentation)
- **Statisticians** (to help with interpretation of the analyses reported in primary studies and with statistical analyses if quantitative summary of the extracted data is required)
- **Writers and editors** (to help writing up protocol, full report and the findings summary in a clear and accessible way)
- **Designers** (to help making the produced documents visually attractive)
- **Proof-readers** (to make sure the final documents do not contain any errors)

Some of these can offer they services for free (e.g., university librarians, academics), while other may need to be hired. It is necessary to consider (and report) whether any team members, or any people that may influence the review process, may have any conflict of interests or a stake in the review conclusions (12).

Any tips?

- The team composition and size needs to be adapted to the review questions and timeline: too small team may lack some critical skills, while too large may lack coherence and effective communication.
- From the start, explicitly assign the roles for the team members and hold them accountable for these roles.
- Ensure that the core team members are able to treat a given review project as their work priority, getting distracted by other jobs at critical times will cause delays for the whole team.
- The workloads for different team members will vary over time, planning in advance the responsibilities and timing of the review stages will allow using the people time and other resources more effectively.
- Some tasks can be done as a group or in parallel, e.g., searching and screening can be split between sub-teams.
- Team co-location would be ideal for enabling daily face-to-face interactions, otherwise try to have team members physically as close as possible and make regular use of other means of communication.
- Use communication platforms designed for project teams (e.g., Slack) and document and data sharing platforms (e.g., OSF, GitHub).
- Brief daily updates, planning and brainstorming are highly valued in AGILE approach; so try to mimic these to keep all team members up to date and engaged.
- Keep involvement of stakeholders to the necessary minimum, and make it quick and efficient (they are usually very busy people).

Review questions

Rapid reviews are usually conducted to answer a practice or policy question that was commissioned by a stakeholder. However, the initial question is often too vague and broad to be answered within a short timeframe. Such questions should be treated as an **initial review topic** that needs focusing and refinement.

What is a good question?

- It is relevant, timely, focused and aligned with key needs of the stakeholders.
- It is an open question and not a statement (e.g., "What is effect of A on B?" not "A causes B"). Also avoid questions that are vague (e.g., "What do we know about A?), or can be answered with just "yes" or "no" (e.g., "Does A affect B?").
- It need detail, with many elements that will guide review's inclusion criteria, search keywords and strategy, data extraction and synthesis.
- It could be answered within an agreed timeframe (estimate based on pilot searches and similar reviews available).

Why to refine a question?

A good question is critical to conducting a rapid review:

- Questions have downstream effects on the time and resources needed to conduct searches, screening, data extractions and summaries.
- It gives you a head start and reduces the likelihood of making substantial changes later on in the systematic review process, saving time and money.

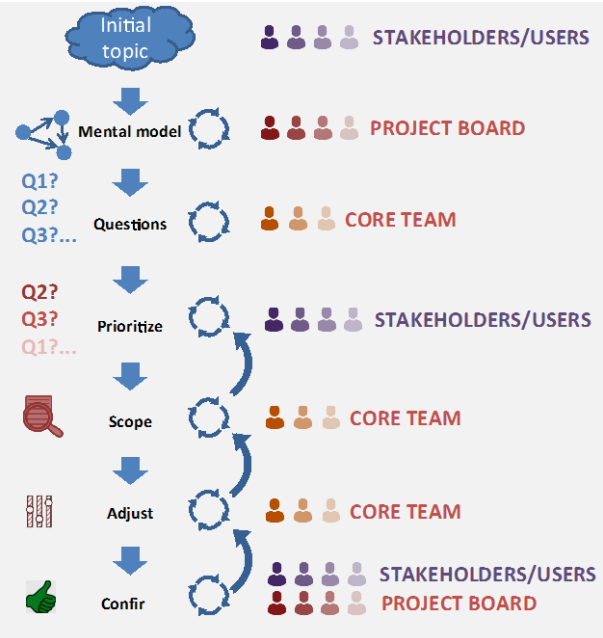

Figure 7. Main steps of the question formulation process.

How to refine a question?

1. In partnership with stakeholders, define the problem, why it is important, what is the current practice and whether there are some proposed ways to change this practice, if relevant.
2. Make the conceptual model of the problem: what are the key elements, relationships and mechanism? What is already known and what evidence is needed?
3. For a broad topic, split it into many smaller focused questions that fit into the conceptual model's knowledge gaps, with feedback from stakeholders.
4. If many questions were identified, prioritise them according to their relevance.
5. Perform scoping searchers for the top questions on the list using one broad interdisciplinary database, e.g., Google Scholar. Check whether the proposed questions / topic are already covered by available good quality systematic reviews and whether any or too many relevant studies exist on this topic.
6. If too few relevant studies are expected (0), broaden the scope. If too many, narrow the scope, split into sub-questions or consider reviewing systematic reviews only (i.e., meta-review). Also, match your question to the appropriate research designs. Reassess the feasibility of the adjusted questions.
7. Check whether stakeholders are happy with the final question formulation.

Each of the above steps is iterative. Also, it may be necessary to go back to the earlier steps, e.g., to change priority or scope of the questions, re-adjust question elements (Figure 7**)**.

Is it a final question?

Even after writing the protocol and performing the search the question is not set in stone. It can still be adjusted, e.g., by broadening or narrowing down the scope or further splitting into sub-questions. These changes need to be justified, documented (as deviations from the protocol) and approved by the board or stakeholders.

Any tips?

- This is a very difficult stage of the review and can take lots of time and multiple iterations.
- Question formulation structures established in the health and social sciences literature can be useful, depending on the type of question.
- Why? What? Who? Where? When? How? – these are universal questions to ask, but they need to really focus on deeper details, so use them with care.
- Consider writing the topic refinement summary report to understand decisions made during this process.
- Always bear in mind whether rapid review is feasible for a given question within the expected timeframe.
- Aim for having 5-15 most relevant and high quality studies on the final inclusion list. Plan how you are going to achieve this (next section).

Planning and protocol

Detailed planning helps in delivering a timely answer to the review question. However, such plan does not preclude using AGILE principles, as the elements of the plan should be revised and modified on the go. A protocol is the main output of the planning stage and it should be written down once the focused question is set.

What time, people, resources?

A typical rapid review takes under 3 months. However, the actual time spent by all (paid) review team members determines the cost of performing a rapid review. Thus, it is advisable to also report the review duration in the units of actual work hours. **From our experience, a rapid review process can take 120-150 focused work hours. Assuming cost of labour of AUS $70 per hour, the total cost of a rapid review would be AUS $8,400 – 10,500.** This cost will vary depending on the type and scope of the question, expertise of the review team, available help, effective work management and communication, etc.

Other resources to be considered early are: access to academic and grey literature, software to be used (reference managers, screening tools, analytic and graphing tools, etc.).

Why we need a protocol?

It outlines the work to be done, but also acts as a safeguard against "cherry-picking" the evidence by the reviewers (i.e. making arbitrary decisions). Later, it enables the review users to assess whether the review could be affected by selective reporting, and shows that all the care was taken to such bias (Figure 8).

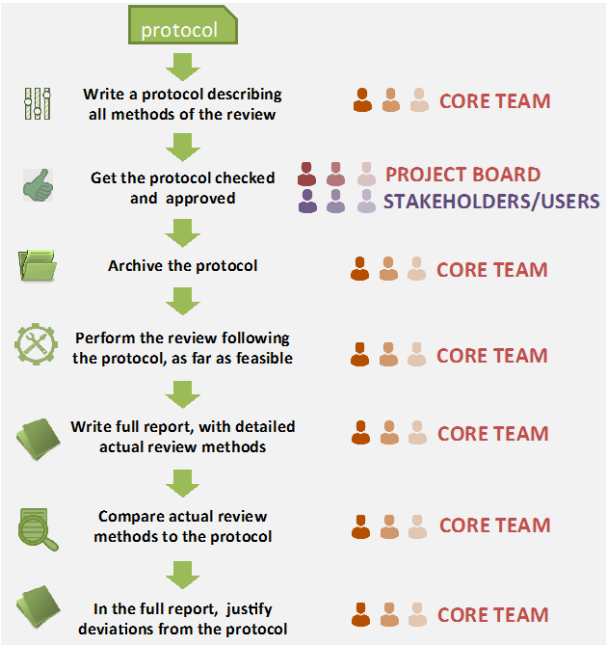

Figure 8. Review protocol creation and use.

What goes into a protocol?

The key components of a protocol are listed in Figure 5 in the "Documentation" section. The protocol should start with the review question, as agreed by the stakeholders, project board (as applicable) and the core review team.

The pre-determined review strategy is the core of the protocol. It is based on the prescribed systematic review structure, but the details should come from the expertise and the pilot searches conducted by the core review team. The planned searches, selection, extraction and appraisal process have to be tailored carefully to the specific review question.

The protocol outlines how the information will be searched, including the sources to be searched and any limits that will be applied to the search strategies, e.g., publication date, language, study design. It states the inclusion criteria for selecting relevant studies and how many people will be involved in screening and data extraction. Finally, it outlines evidence assessment and synthesis methods (e.g., if meta-analysis will be used).

Does the protocol need to be registered?

Full systematic review guidelines often require publication of a protocol or its registration in a specific database. A rapid review protocol can be versioned and archived by the review team / board, using free online platforms, such as OSF and Zenodo.

The review protocols could also be included as appendices to the rapid review report. The authors should describe any changes made to a protocol in the course of the review.

Any tips?

- It is essential to consider the trade-offs between comprehensiveness and timeliness. Experienced reviewers are in the best position to find the best balance between these, while minimizing any potential biases.
- Think how to best incorporate AGILE principles for a given rapid review. Plan how to efficiently communicate within the core team and with the stakeholders.
- Depending on the review question, refine you team composition and seek any additional people that might be needed down the line.
- Allow plenty of time buffers. There will be waiting times, e.g., when feedback is needed from other busy people. Try to schedule some activities (e.g., reading, scoping searches, writing documentation) in these "waiting" slots.
- Consider where further shortcuts can be made, if some of the review stages take too long.
- If grey literature has to be included in the review, allow lots of extra time and plan how to access it.

Searching

Rapid reviews do not aim to perform a comprehensive search for all available evidence relevant to the review question. However, the search needs to find the key representative evidence, without introducing bias.

Acceptable trade-offs to increase efficiency of a review process at this stage can be achieved by limiting:

- **Number of databases** (minimum of 2, including at least one cross-disciplinary) and **other sources** of references (it is recommended to look at cited and citing studies, i.e. snowballing).
- **Search years** (e.g., limit to most recent X years)
- **Language** (usually to papers published in English)
- **Not searching extensively for grey literature** unless there are very few academic studies.

People involved

Review methodologist and topic experts should work closely together to refine the search strategy. Librarians can be asked for advice about the databases.

Data sources

1. Recommended cross-disciplinary literature databases and search engines: Scopus, Web of Science and Google Scholar (the latter includes grey literature, but is not transparent and tricky to use).
2. Specialist databases (pick a few most representative to the review question).
3. Snowballing (forward and backward reference screening) from the included studies using online databases and search engines.

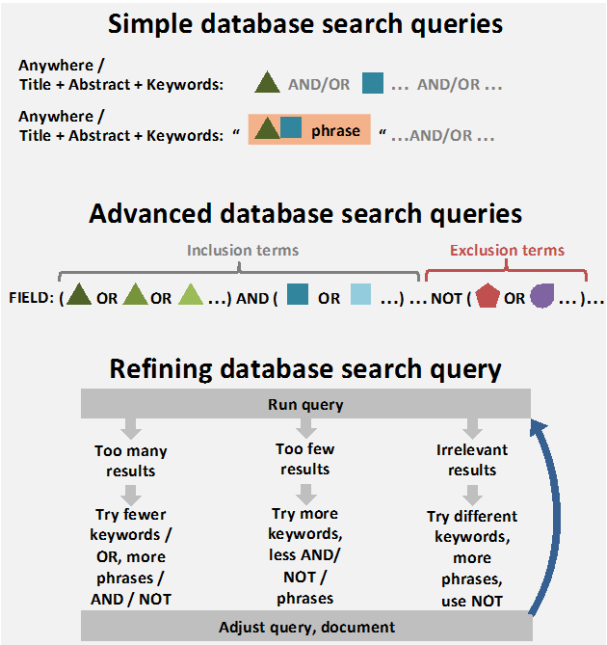

Figure 9. Query types, syntax, and query refinement.

Search strings

Search strings are used in online search engines and can differ between different databases. They are made from search terms that could be separate words or phrases. Search terms initially reflect the key concepts from the review question. The **search term list** should be then expanded to include alternative terminology, concepts and synonyms.

For **advanced search queries** (Figure 9), search terms are arranged into groups of related terms (using brackets). The search query needs to be iteratively refined to find the right balance between its relevance (finding many and mostly useful studies) and reasonable number of returned references (aim for 100 – 1000).

Different databases have different syntax and fields, and search queries need to be adjusted accordingly. The most common and useful database fields include:

- Topic (Title + Abstract + Keywords)
- Subject Area/ Discipline
- Document Type
- Language
- Year / Timespan

Useful syntax (availability and exact form can vary among databases):

- Boolean: AND / OR / NOT
- Exact phrase: "…"
- Wildcards/truncation: ?/$/#/./*

Record management

From most online databases records can be exported in the format of bibliographic information files (e.g., bib, .ris) and uploaded into reference management software. Such software can be used to pool references obtained from different databases and other sources, and to remove duplicated references (Figure 9).

Documentation

Keep a record of the search term list, search query development for each database, the final queries with the number of records retrieved for screening, and the search dates (13,14). Also, keep a record of snowballing (see a template). The search record will form the top part of the PRISMA diagram, which presents a workflow of search and screening process (see a template).

Any tips?

- This is a very subtle stage of the review (14), it needs experience and it can take lots of time and many iterations of query refinement.
- If possible, use advance queries and take advantage of the syntax tools tailoring each query to return a few hundred highly relevant records.
- Use snowballing from the most relevant studies (both primary and reviews) to find studies that have been missed in the database searches.

Screening

Screening gets rid of the irrelevant studies and potentially also the studies considered as low quality, leaving a subset of studies that can best answer the review question. This should be done using a predefined set of inclusion criteria (see the "Planning and protocol" section") to minimize selection bias ("cherry-picking") and transparently documented. **Acceptable trade-offs** to increase efficiency of a review at this stage can be achieved **by not performing full parallel screening**.

Stages

Screening is usually broken into two stages:

1. Reference screening (titles + abstracts + keywords, quite often just titles are sufficient to exclude obviously irrelevant studies)
2. Full-text screening (key information is searched for in the full text and appendices). This screening is performed only for the studies that passed Stage 1.

Ideally, all the found references are pooled together, de-duplicated and then Stage 1 screened (removing duplicated records can significantly reduce the number of records to be screened). In practice, it is often not possible or feasible to export and upload to reference managers all references found from different sources.

In such case, references can be Stage 1 screened at their origin, and only the ones deemed relevant downloaded and pooled with the other studies for full-text (Stage 2) screening and de-duplication (Figure 10). Mixing of these two approaches is possible and acceptable, as long as the reviewers follow the general screening principles and document their workflow.

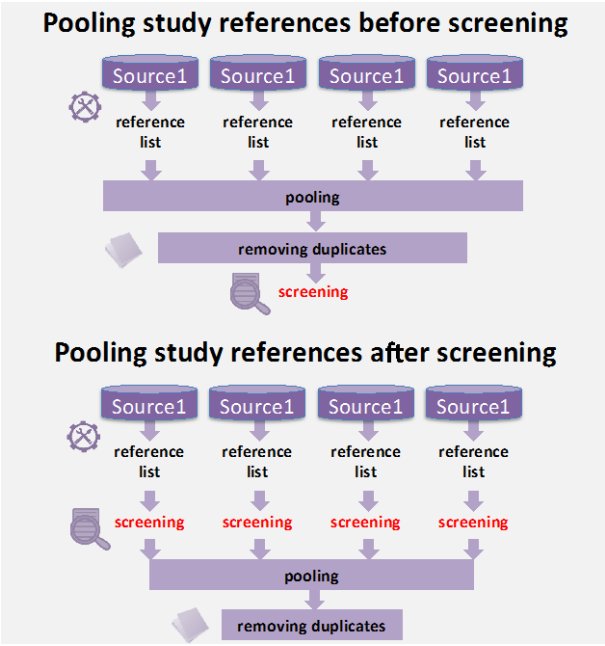

Figure 10. Screening timing - two extreme cases.

People and time involved

Ideally, screening should be performed by at least two independent reviewers (or trained helpers) in parallel (double-screening). However, it is acceptable to have one person screening and the other checking, especially at the full-text stage. At the Stage 1 screening, it may not always save much time (unless screening thousands of references), especially if screening is done using dedicated software tools. **Around 100 titles with abstracts can be screened per hour (many studies can be rejected based just on the title); full texts can take 5 – 30 minutes to screen per study.**

Eligibility criteria

The inclusion criteria are initially specified in the review protocol. They can include:

- Scope (type of problem tackled/setting)
- Reported outcomes/measures
- Study design
- Geographic location of study
- Language of a publication
- Publication year / Study timing
- Publication type

For ease of use, they can be formulated as questions and assembled into a decision tree. For the inclusion of a record at Stage 1 screening, the answer to the screening question should be "**yes / probably yes**", while for Stage 2 (full-text) screening it should be "**yes**". Also ask: "**Is the full text available?**"

Documentation

The final Inclusion criteria and additional exclusion criteria need to be recorded. Report how many reviewers participated and they roles in the screening process. The full report should also contain the numbers of references screened at Stage 1 (from each source or pooled totals; for sources other than searches in online databases, approximate numbers are acceptable) and number of full-texts screened at Stage 2. These numbers are usually represented visually in the PRISMA diagram. The papers excluded at Stage 2 should be listed in a table, with main reasons for exclusion (see a template).

Any tips?

- If too many studies qualify for inclusion, additional, more stringent, criteria can be added (objectively justified and transparently documented), e.g., the time limit or geographic scope can be narrowed, or more robust study designs required.
- If too few studies qualify for inclusion, the inclusion criteria can be relaxed e.g., the time limit or geographic scope can be increased, or less robust study designs allowed.
- Use a reference screening software, such as Rayyan or Abstractr. Carefully manage records in the reference managing software – keep well-labelled and updated folders, notes, etc.

Synthesis

Synthesis of the included studies aims to come to conclusions about what is known about the review question. For a rapid review, synthesis is performed for a selected set of studies that were deemed most relevant to the review question, and/or also high quality. **The depth of the synthesis will depend on the type of the question asked, types of the studies / evidence, available expertise and time**.

People involved

Topic experts in collaboration with methodologists should perform synthesis. Statisticians may be needed for the quantitative analyses. Ideally, data extraction and analysis should is done by at least two independent reviewers (or trained helpers) in parallel (double-extraction). However, **it is acceptable to have one person extracting and summarising data and another person checking the extractions to speed things up**.

Data extraction

The review protocol outlines the minimum of what and how should be extracted. However, not all the pre-defined items may be feasible to extract once the actual studies are collected or there may be some new aspects identified as being important. At this stage it is still possible to **make adjustments to the extracted variables, as long as these changes are justifiable and clearly documented**.

Extract key bibliometric, study-level and outcome-level information (Figure 11). **Only variables relevant to the review question need to be extracted**, including those that could explain potential differences in the results of the included studies, as relevant. Data can be qualitative and/or quantitative. Record the location in the original paper the data was extracted from (e.g., page, figure or table number).

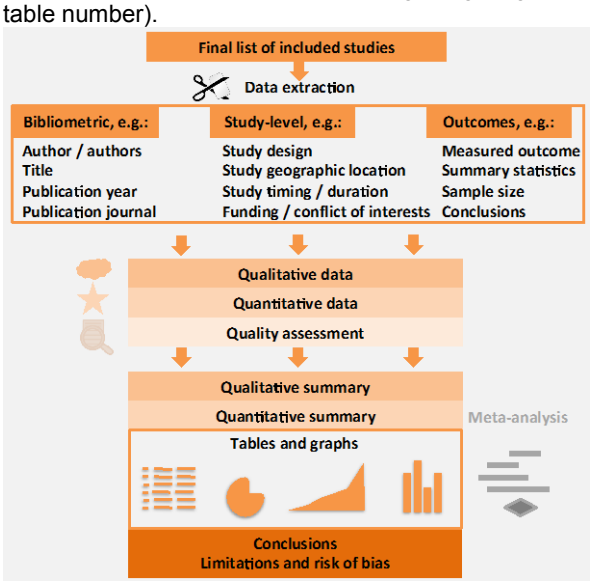

Figure 11. Main elements of data extraction and summary.

Documentation

Good practice is to record how the data is extracted and summarised as these steps are performed. This way, most of the documentation will be ready for the full report. Use templates, with adjustments to specific projects. **Extracted data should be made available, as well as calculations and analysis code.**

Quality assessment

Assessing quality of the included studies is generally recommended in order to determine whether their findings are robust and meaningful. However, in-depth analyses of the quality of the studies are very time consuming, require significant expertise and can be reliably performed only for studies that report all relevant methodological detail.

Available detailed assessment tools (usually checklist) are specific to study designs and comparable only within and not between study designs. Thus, **simplified and more general quality assessment methods can be acceptable alternatives for use in rapid reviews**.

It may be feasible to categorise studies by their type (e.g., publication type, observational / experimental, qualitative / quantitative), design type / evidence level, and key methodological detail, such as sample sizes, duration, and setting, as relevant (Figure 12).

For example, when a final list of included studies contains different publication types (peer-reviewed journal articles and different grey literature: theses, government reports, industry publications, blogs, etc.), peer-reviewed published studies can be given the highest rank, followed by peer-reviewed grey literature (theses, some reports) and then the other grey literature in order of authority (e.g., government and research organisations, recognised experts).

When all included studies have same study design (e.g., all claim to be systematic reviews or cohort studies), then appropriate critical appraisal tool may be already available (check in 15). If the included studies have different study designs (i.e. they represent different evidence type / level), study design can be used as an approximation of study quality (Figure 12).

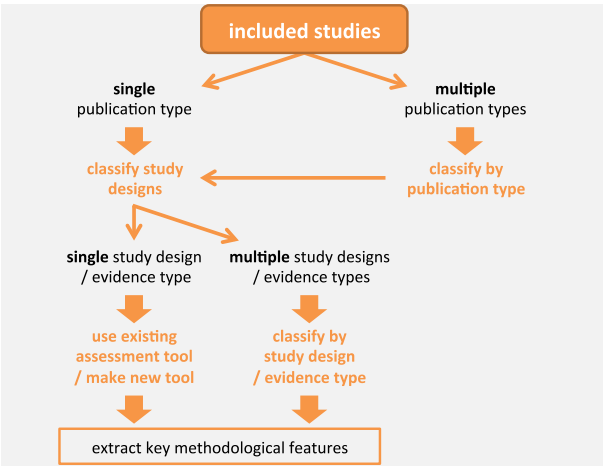

Figure 12. Initial decision tree for quality assessment of studies.

For empirical studies, a so-called “pyramid of evidence” has been established (Figure 13). Study designs deemed to be highest quality / least biased are positioned on higher hierarchy levels. Such **evidence hierarchy can be used as a simple “rule of thumb” for raking quality of studies by their design** when studies of multiple types are present in the dataset.

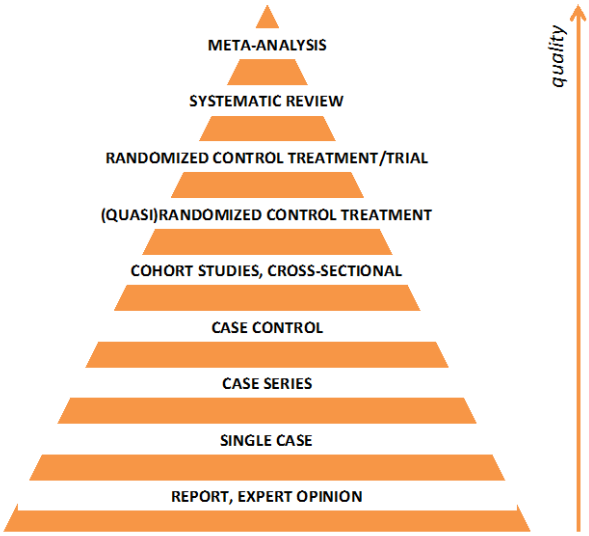

Figure 13. An idealistic hierarchy of empirical evidence.

It has to be noted that this classification does not include theoretical studies, simulations, and mixed-design studies. Even more importantly, such clear hierarchy works only for “ideal “ studies, ones that were performed to the highest possible standard. In reality, **within each evidence level a large variation in quality is present** (Figure 14). Thus, claiming that the evidence from the higher levels is always more reliable than that from the lower levels, is not valid. This applies also to systematic reviews and meta-analyses. These syntheses aggregate evidence of variable quality from other study types, and their strength can also vary accordingly.

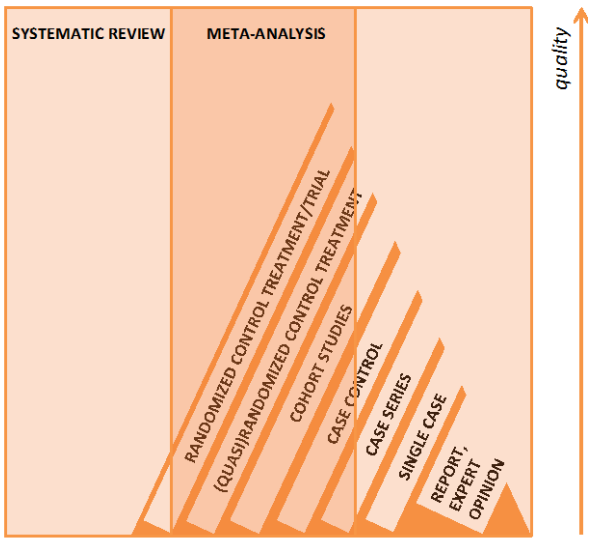

Figure 14. A more realistic "tipped" pyramid of evidence.

Different types of study design are most suitable to answer different types of research questions (Appendix A2). Thus, **depending on the questions asked, different research designs may be close to the top of evidence hierarchies**. Quality assessment should consider the appropriateness of the used study design for a given question and consider key relevant methodological factors (e.g., sample size, location, duration) that will affect the validity, generalizability and applicability of the study results.

Qualitative summary

It is not good practice to lump all studies together regardless of their methodological quality, if such assessment can be performed. When study quality can be assessed, excluding low quality studies, reporting separately findings of low and high quality studies, or including quality in statistical analyses is recommended.

For the summary, organize collected data in a way to make drawing conclusions easier and quicker, e.g., by grouping them by study type, setting, location, duration, and measurement type, as relevant. Findings can be concisely and clearly summarised in words, tables, graphs and conceptual figures. Final implications should consider all included evidence.

Quantitative summary

Statistically combining finding from independent studies, puts a number on the overall effect, considers sample sizes and variances, and also provides increased statistical power. Formal meta-analysis is optional and its best kept simple and is done by an experienced person. Simple vote counting is not considered an acceptable way to quantitatively summarise the evidence (and definitely its not a meta-analysis).

Reporting

The full final report for the stakeholders will include all findings and conclusions presented in clear and precise way. Always acknowledge shortcuts, limitations and uncertainties of the rapid review process performed.

Details of the review methods and analyses can be provided as appendices. Abbreviated main review findings can be presented as a separate document (brief / summary), as outlined in “Documentation” section.

Any tips?

- Don't extract more data than really needed and curtail the analyses to the minimum if time is pressing.
- Aim for a final set of 5 – 15 most relevant and best quality studies.
- It is fine to give inconclusive answer, identify the lack of suitable evidence or poor quality of the found one.

Appendices

A1. Templates

List of the files containing semi-blank editable templates of tables and diagrams (with some examples filled in) provided as separate files:

Template for	File name	File type
Review team	*T01_Review_team_diagram.pptx*	PowerPoint slide
Review timeline	*T02_Review_timeline_diagram.pptx*	PowerPoint slide
Editable PRISMA diagram	*T03_Prisma_diagram.pptx*	PowerPoint slide
Table of review team workloads	*T04_Table_team_workloads.docx*	Word file
Table of metadata	*T05_Table_metadata.docx*	Word file
Table of included study characteristics	*T06_Table_included_studies_main.docx*	Word file
Table of included study outcomes and conclusions	*T07_Table_included_studies_conclusions.docx*	Word file
Table of database searches	*T08_Table_database_search_record.docx*	Word file
Table of snowballing searches	*T09_Table_snowballing_search_record.docx*	Word file
Table of excluded studies	*T10_Table_excluded_studies_main.docx*	Word file
Table of extracted quantitative data for 2 groups	*T11_Table_quantitative_data_2_groups.docx*	Word file

A2. Evidence typology

Initial typology of evidence with hypothetical questions being asked about intervention A and stakeholders X, adapted from (16) and (17). The table match a few common forms of research questions to selected main types of research study designs. Number of "+" per cell indicates relative suitability of given study design to answer given question. Note that systematic reviews, ie. the whole family of syntheses using systematic review approach, are secondary study designs aggregating data from existing studies (including meta-analyses), while the other designs are primary studies. The table could be further expanded by adding more questions (rows) and study designs (columns), as needed.

	Qualitative research	Survey	Case-control studies	Cohort studies	Non experimental evaluations	Quasi-experimental studies	Randomised control Trials (RCTs)	Systematic reviews
Does A work? Does doing A work better than doing B?				+		+	++	+++
How does A work?	++	+			+			+++
Does A matter?	++	++						+++
Will A do more good than harm?	+		+	+	+	+	++	+++
Will X be willing to or want to do / adopt A?	++	+			+	+	+	+++
Is it worth buying A is it cost-effective)?							++	+++
Is A the right practice for X?	++	++						++
Are X satisfied with A?	++	++	+	+				++

A3. Software and tools

Some examples of the useful software we found useful for performing cross-disciplinary rapid reviews.

Software/tool for	Usage	Link
Rayyan	Deduplication and reference screening via online platform and an app.	https://rayyan.qcri.org/welcome
Abstrackr	Deduplication and reference screening via online platform and an app.	http://abstrackr.cebm.brown.edu/account/login
Colandr	Assists finding relevant citations and extracting data from PDF articles.	https://www.colandrapp.com/signin
R *metaphor* package	Most comprehensive R package for statistical meta-analysis.	http://www.metafor-project.org/doku.php
Many more tools can be found at Systematic Review Toolbox (http://systematicreviewtools.com/). This is an extensive online catalogue of software tools for conducting systematic reviews, including guidelines, quality checklist (i.e. Critical Appraisal), reporting standards and search tools. However, most of these tools were designed for very specific projects within specific discipline (usually medical sciences), some may lack comprehensive documentation, other may no longer be developed or supported, require subscriptions or work on specific computer platforms.		

A4. Further reading

Useful reading materials on rapid reviews and related issues (mostly health-related; some of these are also in the reference list).

Overall guidelines for rapid reviews:

Reference	Comments
Dobbins, Maureen. Rapid Review Guidebook. Steps for Conducting a Rapid Review. National Collaborating Centre for Methods and Tools. http://www.nccmt.ca/uploads/media/media/0001/01/a816af720e4d587e13da6bb307df8c907a5dff9a.pdf	Short guidelines for (health-related) rapid reviews.
Tricco AC, Langlois EV, Straus SE, editors. Rapid reviews to strengthen health policy and systems: a practical guide. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO. http://www.who.int/alliance-hpsr/resources/publications/rapid-review-guide/en/	Detailed guidelines for (health-related) rapid reviews.
Williams J, Weightman AL, Weaver N, Temple M, Palmer S, Kitcher H, Jones P, Sander L. Built environment and health of the public systematic review methodology. Pilot edition. HANAH: Housing and Neighbourhoods and Health. 2001. Cardiff, UK http://www.cardiff.ac.uk/archi/research/hanah/images/meth0901.pdf	Pilot proposal, including evidence classification and critical appraisal checklists for some types of evidence.
McGowan J, Sampson M, Salzwedel DM, Cogo E, Foerster V, Lefebvre C. PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement. J Clin Epidemiol. 2016;75:40–6 http://dx.doi.org/10.1016/j.jclinepi.2016.01.021	Detailed recommendation on search strategies for systematic reviews; includes checklist and practical advice.
Kable AK, Pich J, Maslin-Prothero SE. A structured approach to documenting a search strategy for publication: A 12 step guideline for authors. Nurse Educ Today. 2012;32(8):878–86 http://dx.doi.org/10.1016/j.nedt.2012.02.022	Recommendations on systematic documenting the search strategy
Weaver N, Williams JL, Weightman AL, et al Taking STOX: developing a cross disciplinary methodology for systematic reviews of research on the built environment and the health of the public Journal of Epidemiology & Community Health 2002;56:48-55. https://jech.bmj.com/content/56/1/48	Provides recommendations on search strategy and evidence type classification for studies at the intersection of health and built environment.
Dicks LV, Haddaway N, Hernández-Morcillo M, Mattsson B, Randall N, Failler P, Ferretti J, Livoreil B, Saarikoski H, Santamaria L, Rodela R, Velizarova E, Wittmer H. Knowledge synthesis for environmental decisions: an evaluation of existing methods, and guidance for their selection, use and development – a report from the EKLIPSE project. 2017 http://www.eklipse-mechanism.eu/apps/Eklipse_data/website/EKLIPSE_D3-1-Report_FINAL_WithCovers_V6.pdf	Provides recommendations on a broad variety of knowledge synthesis methods for environmental decision making.

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