Writing a Systematic Literature Review: Resources for Students and Trainees

This resource provides basic guidance and links to resources that will help when planning a systematic review of the literature. It does not replace guidance from your research project supervisors and your university or hospital librarians.

- A systematic literature review is often the first and essential step in the research process.
- A rigorously conducted literature review will help you to:
- Determine what is already known about your proposed research topic /question
- Appraise the quality of the research evidence
- Synthesise the research evidence from studies of the highest quality
- Identify research gaps and priorities for generating new evidence to fill these gaps
- Avoid unnecessarily duplication of research
- Shape your future research project and inform your research plan

Ensure you have a clearly defined question / questions for the literature review
and describe these in terms of
Participants, Interventions, Comparisons, Outcomes, and Study design (PICOS).

What's the difference between a systematic literature review and a meta-analysis?

A systematic review is a review of the literature that addresses a clearly formulated question and uses systematic and explicit methods to:

- identify publications,
- select publications relevant to the question
- critically appraise the publications
- analyse the data reported in the relevant publications
- report the combined results from relevant publications.

Meta-analysis is a statistical method that integrates and summarises results from relevant publications selected in the systematic review. NOT ALL systematic reviews use meta-analysis. Meta-analysis is particularly useful where the systematic review aims to determine the magnitude of quantifiable effects attributable to e.g. a drug, a behavioural intervention, etc.

The above are based on definitions published by the **Cochrane Collaboration**, which is *"...a global independent network of health practitioners, researchers, patient advocates and others, responding to the challenge of making the vast amounts of evidence generated through research useful for informing decisions about health."* To find out more about meta-analysis and Cochrane reviews please go to https://www.cochrane.org/

The Cochrane Collaboration website also provides a link to the Cochrane Register of Reviews which can be searched to determine whether any reviews have been registered or completed.

Some key resources are highlighted in the next few pages – researchers around the world have found these useful – it's worth a look and it might save you a lot of time!

Keep these tips in mind:

1. Define your question clearly (remember PICOS); discuss with your supervisor and colleagues
2. Write a brief protocol according to guidelines for systematic reviews (e.g. PRISMA or Cochrane)
3. Talk with a librarian once you have a draft protocol
4. Search literature databases using agreed MeSH headings and key words
    - **Save all search strategies** and limits used – you will need to report these
    - Use EndNote or similar to manage the references you found, cite as you write
5. **Always ASK YOUR SUPERVISOR OR YOUR UNIVERSITY/HOSPITAL LIBRARIAN for help**

PRISMA: Preferred Reporting Items for Systematic reviews and Meta-Analyses: the PRISMA statement (Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71) https://www.prisma-statement.org/prisma-2020

The PRISMA statement is essential reading before starting a systematic literature review. Editors increasingly expect authors of systematic reviews to use PRISMA or similar guidelines.

The **PRISMA checklist** will guide you on HOW to develop a **systematic review protocol** and WHAT to include when writing up your review. In your protocol you should set down a clear method including:

- Databases to be searched; additional sources used e.g. scanning bibliographies of relevant articles
- MeSH terms or key words to be used in the search strategy
- Limits applied e.g. published between 2004 and 2013; English language; children < 18 years
- Screening process e.g. scanning titles and abstracts for relevance according to inclusion and exclusion criteria
- Data to be extracted from the relevant articles identified
- Summary data to be reported – this must be closely linked with the initial aims or "questions" of the literature review

All systematic reviews should include a **Flow Diagram** to demonstrate how many publications were identified and screened for eligibility, how many publications were excluded and why. The PRISMA website provides excellent resources including a checklist and an example of a flow diagram.

The PRISMA Checklist and Flow Diagram is attached to the end of this guide. You will also find these resources on the PRISMA website (https://www.prisma-statement.org/).

PROSPERO:

University of York Centre for Reviews and Dissemination https://www.crd.york.ac.uk/PROSPERO/

PROSPERO is a register of systematic reviews. It provides links to useful resources about different kinds of reviews. It also provides a searchable database of registered reviews. When embarking on a systematic review, it is wise to search PROSPERO and Cochrane databases for any registered reviews to ensure that you are not duplicating efforts.

EQUATOR Network:

Enhancing the **Q**UAlity and **T**ransparency **O**f health **R**esearch https://www.equator-network.org/

The EQUATOR Network strives to improve the reliability and value of medical research literature by promoting transparent and accurate reporting of research studies. There are useful toolkits for authors reporting on health research including a toolkits on reporting systematic literature reviews https://www.equator-network.org/toolkits/

Searching the literature

Your supervisor should provide guidance regarding access to library services, including access to databases of literature. The most commonly used databases include:

- **MEDLINE/ PubMed** https://www.ncbi.nlm.nih.gov/pubmed (this resource is free)
- **Embase** https://www.embase.com (this resource is free)
- **Scopus** https://www.scopus.com/
- **Clarivate Web of Science** https://clarivate.com/academia-government/scientific-and-academic-research/research-discovery-and-referencing/web-of-science/

MEDLINE, Embase, Scopus and Web of Science are available via your university portal or the Hospital library portal. There are additional databases that may be searched depending on the topic of the systematic review – check with your supervisor or local librarian.

Clinical Information Access Portal (CiAP) https://www.ciap.health.nsw.gov.au/home.html is a portal through which you can access a number of literature databases and other resources (e.g. Medline, BMJ Best practice). CIAP is available to all NSW Health employees.

For systematic reviews, it is recommended that each article is screened by two individuals who have sufficient subject matter expertise to determine if articles should be included or excluded in the review. Conflicts between screeners may be resolved between the screeners or by a third individual.

Managing your references

Using reference management software will enable you to:

- Categorise the articles identified in your search – you can create groups of articles that answer specific questions
- Cite as you write – insert citations in a predetermined format in your report or paper as you write
- Generate a list of references cited in your report according to a predefined format e.g. Vancouver

Commonly used reference management software:

EndNote https://endnote.com/ there is a cost – most universities and possibly some hospital libraries provide access for free – check with your supervisor or local librarian.

A comparison of reference management software is published here:
https://libguides.bodleian.ox.ac.uk/reference-management/comparison-tables

Systematic review software

Covidence systematic review software (https://www.covidence.org/) will enable you to import citations and full-text article from your literature searches into the software from Endote, in order to screen and review them. The software will keep track of the number of articles screened and included/removed at each stage of the systematic review process and can construct the PRISMA flow diagram for you. The software is not free, but some universities/hospital libraries have an institutional subscription – check with your supervisor or local librarian.

Meta-analysis software

Meta-analysis software, e.g., Comprehensive Meta-Analysis (CMA) (https://meta-analysis.com), will enable data included in systematic reviews to be imported, pooled and analysed. The software will construct forest plots of meta-analyses and funnel plots for publication bias. The software is not free but check with your supervisor whether an institutional or departmental subscription is available.

OTHER RESOURCES

Peat J, Mellis C, Williams K, Xuan W. Health Science Research: A handbook of Quantitative Methods. Allen and Unwin, 2001 (especially chapter 1)

Bruce N, Pope D and Stanistreet D. Quantitative Methods for Health Research (2nd ed) John Wiley & Sons, 2018 (chapter 9)

Bernard Becker Medical Library, Washington Medical School of Medicine, St. Louis
https://beckerguides.wustl.edu/SystematicReviews

Duke University https://guides.mclibrary.duke.edu/sysreview

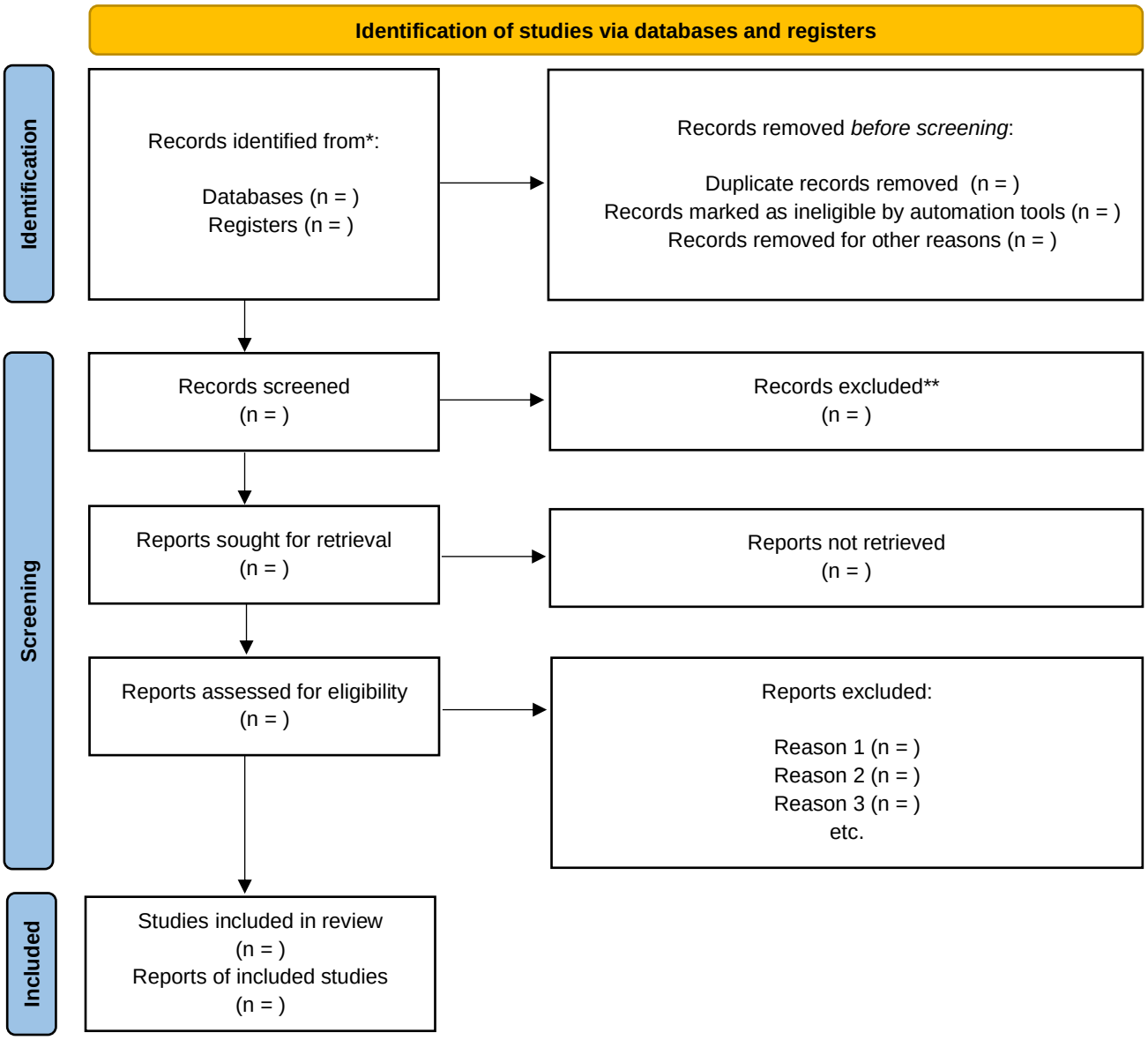
PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	

Section and Topic	Item #	Checklist item	Location where item is reported
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	
Study characteristics	17	Cite each included study and present its characteristics.	
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	

Section and Topic	Item #	Checklist item	Location where item is reported
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	
	23b	Discuss any limitations of the evidence included in the review.	
	23c	Discuss any limitations of the review processes used.	
	23d	Discuss implications of the results for practice, policy, and future research.	
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	
Competing interests	26	Declare any competing interests of review authors.	
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	

PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only



*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).

**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

Source: Page MJ, et al. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.