

The design of a methodologically rigorous systematic review: empowering health librarians to support evidence syntheses

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The session overview

Why do we conduct a systematic review?



What method do we employ?



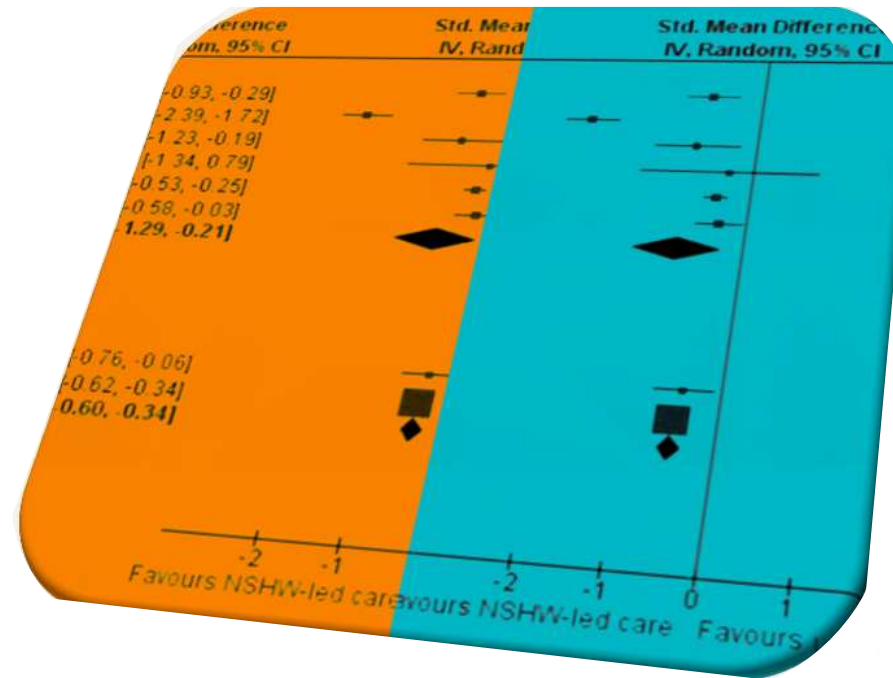
What is the value of Health Librarians contribution to systematic reviews projects? How this contribution would improve transforming scholarly communication?



Activity-Discussing a systematic review publication with a focus on the applied methods



What is a Systematic Review and why do we conduct a SR?



Why do we conduct a systematic reviews?



WHY ARE YOU DOING A
LITERATE REVIEW?



IS SYSTEMATIC REVIEWS A
PROPER METHODOLOGY
FOR YOUR PURPOSE?



WHAT PROBLEM YOU WANT
TO SOLVE?

The purpose of conducting a systematic reviews

The purpose of a systematic review is to sum up the best available research on a specific question. This is done by synthesizing the results of several studies.

provide answers for decisionmakers by using rigorous methods to synthesize evidence, including, where appropriate, statistical meta-analysis of quantitative evidence and theory-based analysis of qualitative evidence.

What is a systematic review?

- Focuses on a specific research question
- Uses transparent, pre-defined, replicable methods
- Aims to find **all** relevant evidence that answers the question
- Involves critical appraisal/quality assessment and synthesis of results
- Attempts to **minimise bias** in answering research questions

Literature Reviews

- Can cover broad topics
- Need not be transparent in methods
- May 'cherry pick' studies supporting a hypothesis
- May not consider study quality



What is required to do a SR



- Time and Cost!
- A team
 - Subject experts
 - Librarian to assist with the search
 - Methodologist/statistician
 - Co-authors to dual screen studies/extract data in standardised way
 - Someone to do the writing for publication

What method do
we employ?

METHODOLOGY



Different types of Systematic Reviews

Quantitative

- Effectiveness/safety of interventions
- Epidemiological studies/prevalence studies
- Prognostic studies
- Diagnostic studies
- Cost-effectiveness/economic evaluation studies

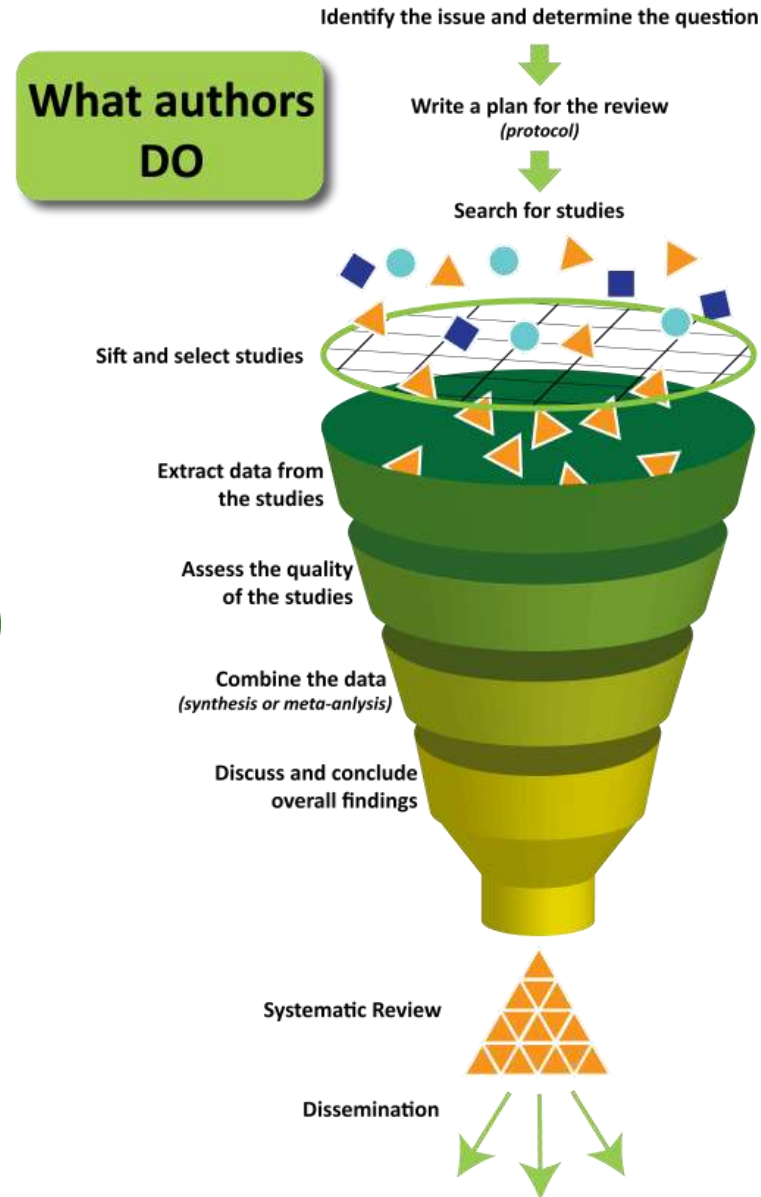
Qualitative

Umbrella reviews



Steps involved

1. Develop the question
 2. Create a protocol (plan)
-
3. Search for studies
 4. Select studies
 5. Assess study quality (validity)
 6. Extract data
 7. Combine the data (synthesis)
 8. Discuss findings and draw conclusions on the totality of the evidence



Steps involved in conducting a SR



The question



...drives everything

- Inclusion/exclusion criteria
- Where you search
- The time you can expect the review to take

The question

Broader

Are antiplatelet agents effective in preventing thrombotic events?

Narrower

Is aspirin effective in decreasing the risks of ischaemic stroke in elderly persons with a previous history of ischaemic stroke?



The question

Narrower

What barriers and enablers exist for rural and remote living Indigenous Australians in accessing specialist cardiology services?

Broader

What barriers and enablers exist for rural and remote living Indigenous Australians and Canadians in accessing specialist health services?



The question

- Setting the **eligibility criteria**
 - Study designs
 - Geographic areas
 - Service models
 - Age groups
 - Gender
 - Publication types: e.g. journal articles
 - Languages of publication
 - Date range – always with justification
 - PICO: Population, Intervention, Comparison, Outcomes of interest



The question - PICO(S)

P Population, Patient, Problem Who are the users, patients or community being affected? What are their symptoms, age, gender etc. Are they in a particular setting?

I Intervention What is being done to/for the population e.g. exposure, screening, surgery, therapy, rehabilitation.

C Comparison(s) Is there a control group or comparison element? e.g. different treatment options, placebos etc.

O Outcome(s) Measurable outcomes likely to be *meaningful* to clinicians, patients, the general public, administrators and policy makers

S Study design What study designs would best answer question? e.g. RCT, cohort, case control, qualitative

The question - PICO(S)

Is aspirin effective in decreasing the risk of ischaemic stroke in elderly persons with a history of ischaemic stroke?

Population	Intervention	Comparison	Outcomes	Study types
Elderly ischaemic stroke patients (65 and over)	Aspirin (minimum dose of 81 mg once a day)	No aspirin	Subsequent ischaemic stroke event (fatal or non-fatal) Harms associated with aspirin use	Systematic reviews of RCTs RCTs or controlled trials

scoping search

- Do a scoping search to test it in at least one database:
 - Is there already a review on the topic?
 - How many studies should you expect to retrieve?
 - Develop and refine your inclusion/exclusion criteria?



The protocol

The detailed plan of how
you will conduct the review



The protocol



a good systematic review can start with a protocol - it can serve as a road map for your review



a protocol specifies the **objectives**, **methods**, and **outcomes** of primary interest of the systematic review



a protocol promotes transparency of methods

Create a protocol

Cochrane Collaboration	<ul style="list-style-type: none">• Human healthcare & policy reviews and protocols• Published online in The Cochrane Library
Joanna Briggs Institute (JBI)	<ul style="list-style-type: none">• Healthcare research reviews and protocols• Available via JBI EBP database
EPPI-Centre	<ul style="list-style-type: none">• Health promotion, public health, international health systems and development• Published in the Centre's Evidence Library
Campbell Collaboration	<ul style="list-style-type: none">• Effects of social interventions in education, crime and justice, social welfare and international development• Published online in The Campbell Library

PROSPERO

International prospective register of systematic reviews



National Institute for
Health Research

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PRISMA

TRANSPARENT REPORTING OF SYSTEMATIC REVIEWS AND META-ANALYSES

PRISMA STATEMENT

EXTENSIONS

TRANSLATIONS

PROTOCOLS

ENDORSEMENT

Equity

Harms

Individual Patient Data

Network Meta-Analysis

Protocols

PRISMA for systematic review protocols (PRISMA-P)

PRISMA-P was published in 2015 aiming to facilitate the development and reporting of systematic review protocols. For more information about review protocols, see [here](#)

Statement paper:

Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 statement. Syst Rev. 2015;4(1):1. doi: [10.1186/2046-4053-4-1](https://doi.org/10.1186/2046-4053-4-1)

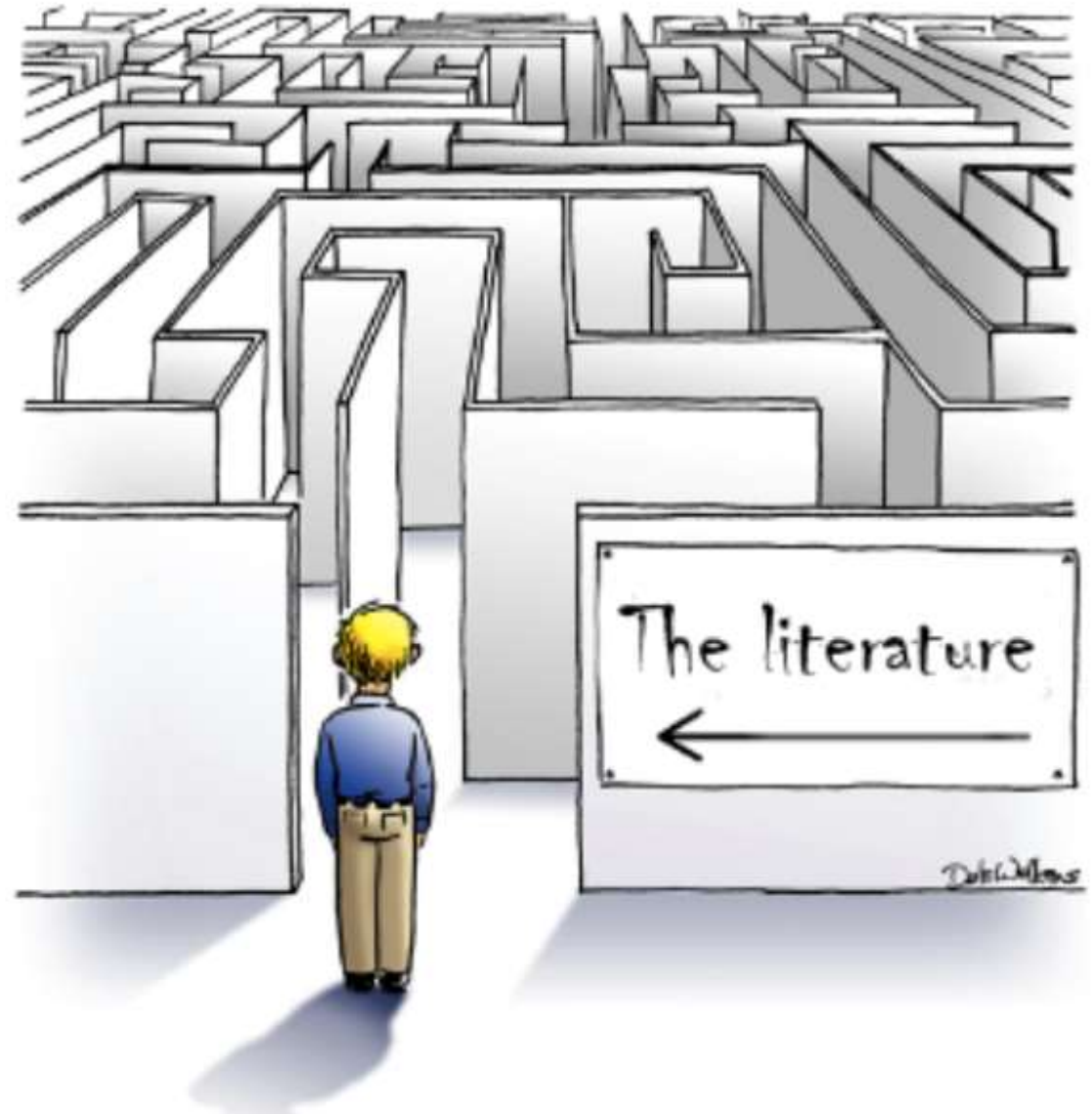
Explanation and Elaboration paper:

Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA, the PRISMA-P Group. Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015: elaboration and explanation. BMJ 2015.349:g7647. doi: [10.1136/bmj.g7647](https://doi.org/10.1136/bmj.g7647)

Key Documents

- Checklist - [PDF](#) | [Word](#)
- [Statement](#)
- [E&E](#)
- [Operationalized Checklist from BMC Systematic Reviews](#)

Plan for comprehensive, highly sensitive and reproducible search strategies for systematic reviews



Systematic search process

Formulating a RQ

- Framing the research subject to a focused Research Question- Break down the RQ to PICO elements

Logic Grid

- Identifying the main concepts/keywords and collecting synonyms/related Subject Headings (MESH) and text words

Designing the search

- Drafting a highly sensitive search strategy in a major database and test the search against key articles

Translation

- Accurately translating the search into relevant databases

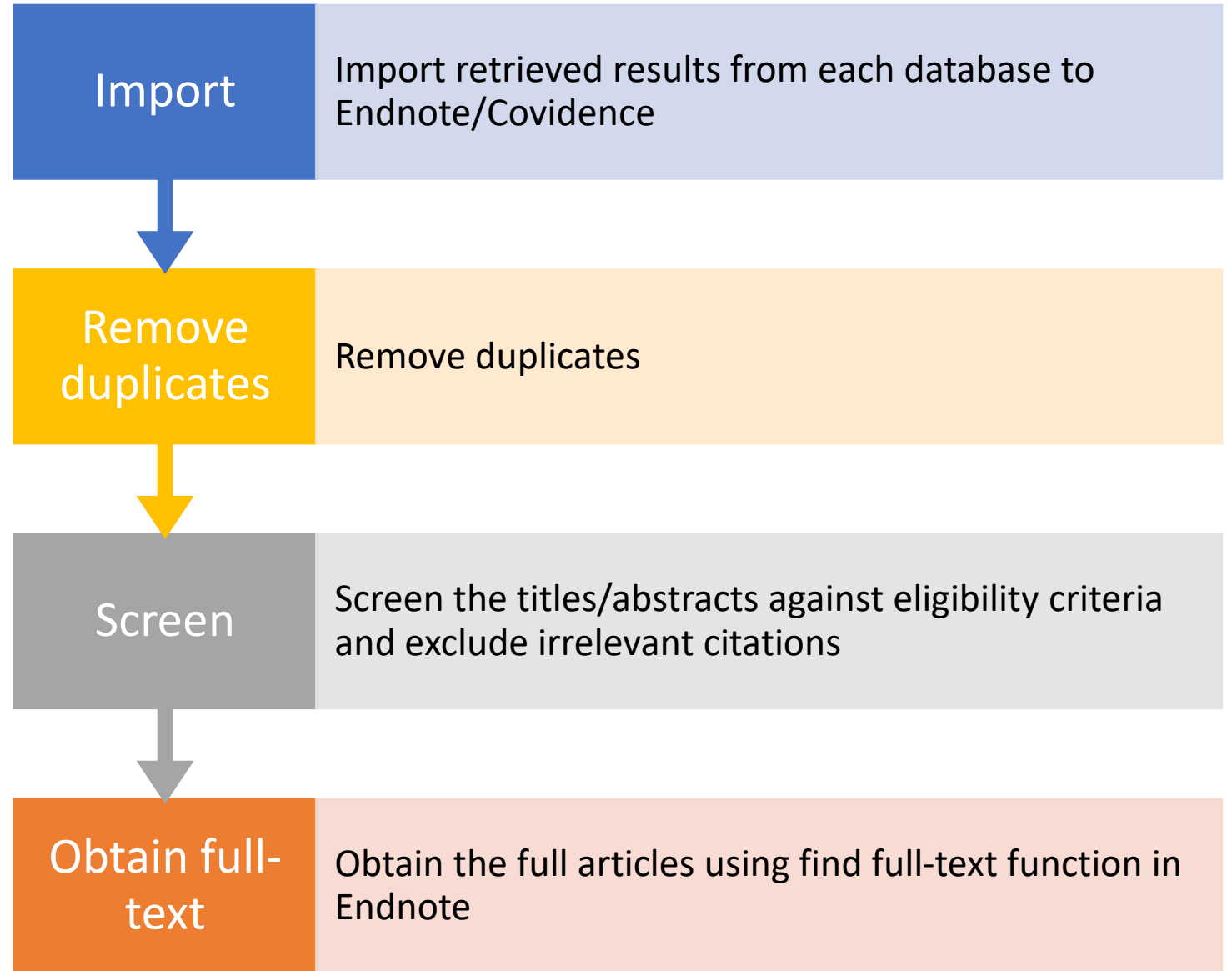
Managing citations

- Exporting citations from each database into Endnote and sharing the dataset

Methodology documentation

- Methodology write up and PRISMA report

Study selection



Appraise
the quality
of studies

- CASP
- CEBM
- JBI
- Cochrane (RoB2) also
embedded in SR tools

Extract the Data

- Extract all relevant data from the included studies:
 - Design (carefully) data collection forms
 - Adapt the data extraction checklist (e.g. JBI, Cochrane)
 - Use data extraction checklist embedded in SR tools
- Organise your data into tables, figures, etc.

Extract the data

Items to be considered:

- Source
- Eligibly (reasons for inclusion)
- Objectives
- Participants
- Methods
- Context
- Outcome
- funds



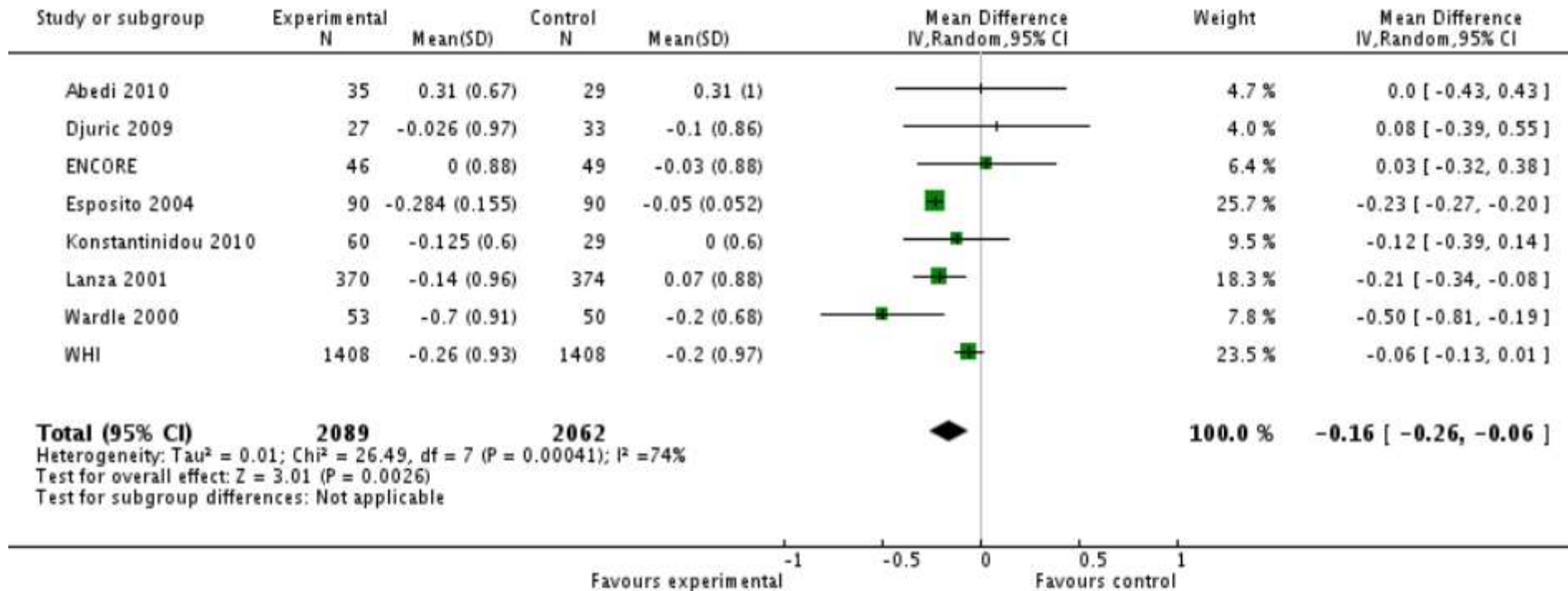
synthesise and interpret the results

- Quantitative syntheses
 - Meta- analysis (statistical analysis) –CMA
 - Network meta analysis
- Descriptive or Narrative synthesis
- Qualitative syntheses
 - Meta- synthesis (JBI QARI)



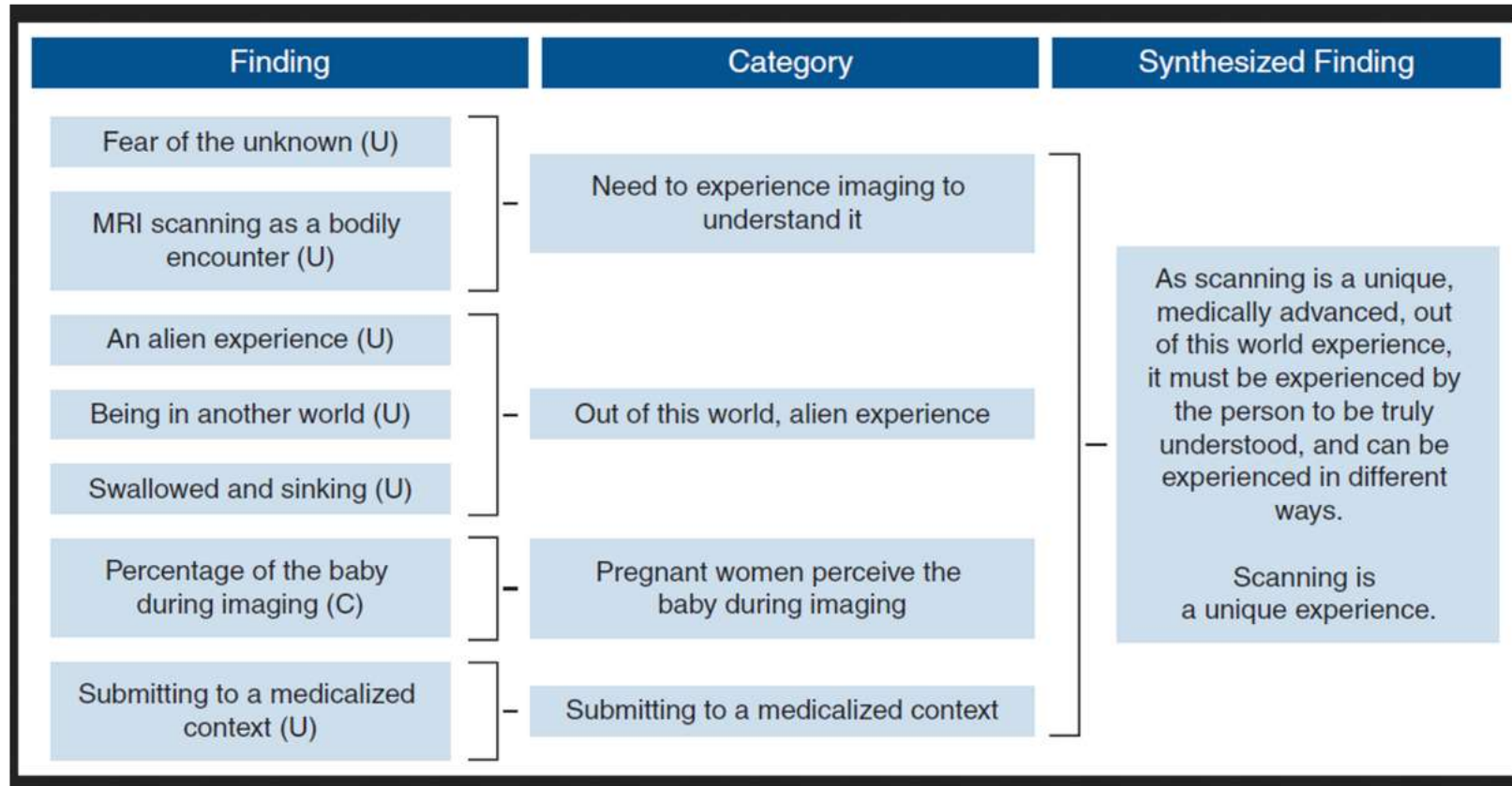
Meta-analysis- Forest Plots

Review: 'Mediterranean' dietary pattern for the primary prevention of cardiovascular disease
 Comparison: 1 Mediterranean dietary intervention versus no intervention or minimal intervention (secondary outcomes - CVD risk factors)
 Outcome: 1 Total cholesterol (mmol/L), change from baseline



Is a Mediterranean diet protective
 against cardiovascular disease?

JBI QARI graph



Source: Munn, Z. et al. **JBI's Systematic Reviews : Data Extraction and Synthesis**, American Journal of Nursing , 2014

<https://oae.ovid.com/article/00000446-201407000-00028/HTML>

Disseminate the results

- Clearly present your findings, search strategies, selection criteria, etc.
- Use of checklist and flow diagram to disseminate your result (PRISMA)
- Provide recommendations for practice and policy making if high quality evidence found
- Oral presentation, poster presentation at a conference
- Manuscript for publication

PRISMA checklist

[PRISMA : Preferred Reporting Items for Systematic Reviews and Meta-Analyses.](#)

A reporting statement and checklist for preparing systematic reviews and meta-analysis of randomized trials and health interventions.

PRISMA checklist



PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria; participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	

		Simplifications made:	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	



PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	

Systematic Reviews Tool Box

Using machine learning system to facilitate conducting a systematic review

[Covidence](#) (Via the Library)

[EPPI-Reviewer](#) (free)

[DistillerSR](#)

[JBI-SUMARI](#) (via the Library)

[Rayyan](#) (free)

[Review Manager \(RevMan\)](#)

What is the value of Health Librarians contribution to systematic reviews projects? How this contribution would improve transforming scholarly communication?



Librarians/information specialists could offer specialised knowledge to :

- Transparently and fully report searches
- Lessen risk of bias

Suggested Actions:

Librarians:

- ✓ Be aware of standardized high quality SR methods- quality assessment and Risk of Bias for systematic reviews
- Peer-review of the search strategies: [PRESS](#) checklist
- ✓ Familiarise themselves with SR methods, [PRISMA-S](#) and [ROBIS](#) (Risk of Bias in Systematic Reviews) specifically [Domain 2 , identification and selection of studies.](#)
 - ✓ Establish and get involvement in Community of Practice for Systematic Reviews

Publishers:

- ✓ Utilising librarians/information specialists as methodological peer reviewers

Activity

1. Go to the Methods section of the paper and look at the plan of approach
2. Can you see the essential systematic reviews elements?

[JBICritical Appraisal Checklist for Systematic Reviews](#)



More readings

- [Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA \(editors\). Cochrane Handbook for Systematic Reviews of Interventions version 6.0 \(updated July 2019\). Cochrane, 2019.](#)
- [Aromataris E, Munn Z. Chapter 1: JBI Systematic Reviews. In: Aromataris E, Munn Z \(Editors\). JBI Manual for Evidence Synthesis. JBI, 2020.](#)
- [Chapter 4: Systematic review of adverse effects. Systematic Reviews. CRD's guidance for undertaking reviews in health care. Centre for Reviews and Dissemination, University of York, 2009.](#)
- [Campbell systematic reviews: policies and guidelines \(version 1.4\)](#)
- Munn, Z., Peters, M.D.J., Stern, C. *et al.* Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Med Res Methodol* **18**, 143 (2018). <https://doi.org/10.1186/s12874-018-0611-x>

[Download citation](#)

- Rethlefsen, M.L., Kirtley, S., Waffenschmidt, S. *et al.* PRISMA-S: an extension to the PRISMA Statement for Reporting Literature Searches in Systematic Reviews. *Syst Rev* **10**, 39 (2021). <https://doi.org/10.1186/s13643-020-01542-z>

[Download citation](#)

*Thank
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