

Systematic Reviews

An overview of how to do them – not the complete manual!

Based upon a presentation by

David Gough

EPPI-Centre

Social Science Research Unit,
Institute of Education,
University of London

Agenda

Systematic reviews:

1. Why be systematic?
2. How to do a systematic review (7 steps)
3. Some issues
4. Questions / discussion

Why be systematic?

“We are, through the media, as ordinary citizens, confronted daily with controversy and debate across a whole spectrum of public policy issues. But typically, we have no access to any form of systematic ‘evidence base’ – and therefore no means of participating in the debate in a mature and informed manner.”

“Policy makers and practitioners who intervene in the lives of other people not infrequently do more harm than good.”

Experts and errors: Dr. Spock

- Spock's 'Baby and Child Care' (1946) was one of the biggest selling books of all time
- Spock recommended (against tradition) that babies should be placed on their stomach to sleep, not on their back
- In the early 1990's, practitioners of evidence-based medicine showed that most research evidence favoured placing babies on their back
- In the UK, the 'Reduce the Risk' Campaign, asking parents to place babies on their back to sleep, produced a sharp drop in Sudden Infant Death Syndrome, from about 2 per thousand live births in the 80s, to about 0.5 per thousand in the 90s

Non-systematic literature reviews

Six reviews of older people and accident prevention:

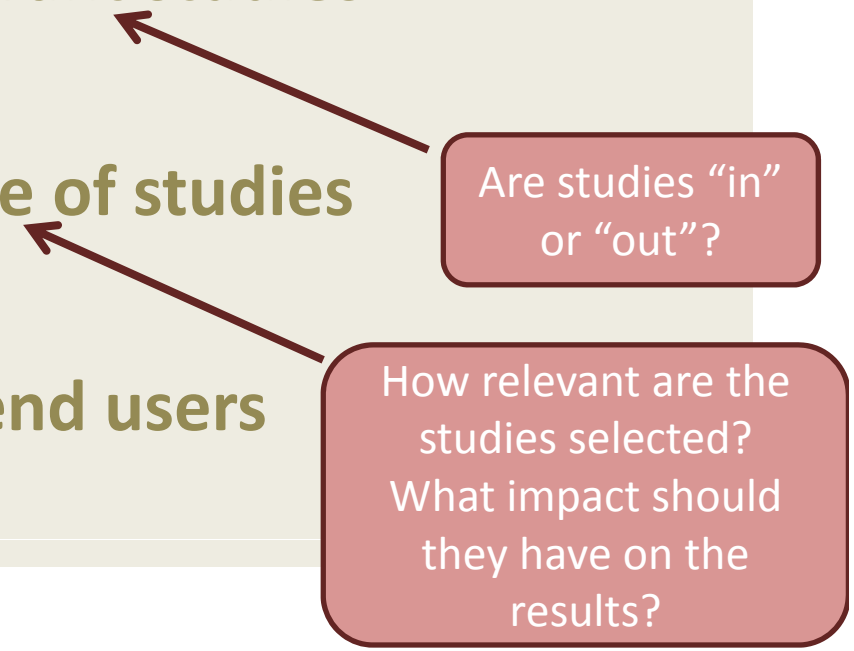
- 137 studies in total
- 104 studies appeared in one review only
- 33 studies appeared in two or more reviews
- only 2 studies were in all the reviews (and only one was treated consistently in all the reviews)

How to do a systematic review

The common stages

1. Form review team and involve 'end users'
2. Create review question, conceptual framework, and inclusion criteria
3. Search for and identify relevant studies
4. Describe (map) studies
5. Assess quality and relevance of studies
6. Synthesise findings
7. Communicate and engage end users

Are studies "in" or "out"?

The diagram consists of two red callout boxes with white text and dark red borders. The top box contains the text "Are studies 'in' or 'out'?" and has a dark red arrow pointing from its top-left corner to the word "studies" in stage 3 of the list. The bottom box contains the text "How relevant are the studies selected? What impact should they have on the results?" and has a dark red arrow pointing from its top-left corner to the words "quality and relevance" in stage 5 of the list.

How relevant are the studies selected?
What impact should they have on the results?

Two types of systematic review

Stage 4: Map

- Basic data to describe what research has been done in a given field of interest, and how it was done

A useful product in its own right

A context to assist interpretation for the synthesis

Stage 6: Synthesis

- Detailed data on methods and results
- Can be statistical, narrative, or conceptual

Need to know findings, method, context, and need to judge the trustworthiness and relevance of studies

Step 1

- 1. Form review team and involve 'end users'**
2. Create review question, conceptual framework, and inclusion criteria
3. Search for and identify relevant studies
4. Describe (map) studies
5. Assess quality and relevance of studies
6. Synthesise findings
7. Communicate and engage end users

Why involve end users?

- A lot of research is not used
- A slight shift in the focus of the question (due to end user input) has huge implications for the review output
- Goal is 'user-control'; not 'user-researcher collaboration' or 'user-consultation'

Step 2

1. Form review team and involve 'end users'
- 2. Create review question, conceptual framework, and inclusion criteria**
3. Search for and identify relevant studies
4. Describe (map) studies
5. Assess quality and relevance of studies
6. Synthesise findings
7. Communicate and engage end users

(a) Review question

- Should be an investigative statement rather than a topic of interest
- Should be clear and answerable
- Might need to be broken down into a series of smaller questions

Types of review question

- Needs
 - what do people want?
- Impact / effectiveness
 - what is the balance of benefit and harm of a given intervention?
- Process / explanation
 - why or how does 'X' work?
- Implementation
 - what is happening?
- Correlation
 - what relationships exist between phenomena?
- 'Experiential'
 - what are peoples experiences of 'X'?

(b) Conceptual framework

- May include a range of sub-questions
- Specifies various ways of measuring the topic of interest
- Defines the meaning of key terms in each question

(c) Inclusion criteria

- Population and setting
 - who and in what context?
- Date of research
 - e.g. after 2000
- Research methods
 - empirical or conceptual, qualitative and/or quantitative, specific designs only, etc.
- Language

Step 3

1. Form review team and involve 'end users'
2. Create review question, conceptual framework, and inclusion criteria
- 3. Search for and identify relevant studies**
4. Describe (map) studies
5. Assess quality and relevance of studies
6. Synthesise findings
7. Communicate and engage end users

Search a range of sources

- Bibliographic databases
 - preferably several rather than a few
- Google scholar
 - getting better all the time – but only use top listed items
- Scan reference lists
- Professional / personal contacts

Use a variety of search terms

Number of terms Searched	Total citations	Number of relevant studies	Sensitivity (%)
31	1048	72	100
11	669	64	89
7	385	47	65

NB: Note diminishing returns

Be aware that

- You are searching for studies that might be relevant
- There will be constraints of
 - time
 - resources
 - limits of the databases used
- You must accept a trade-off between
 - sensitivity (finding all relevant studies)
 - precision (finding only relevant studies)

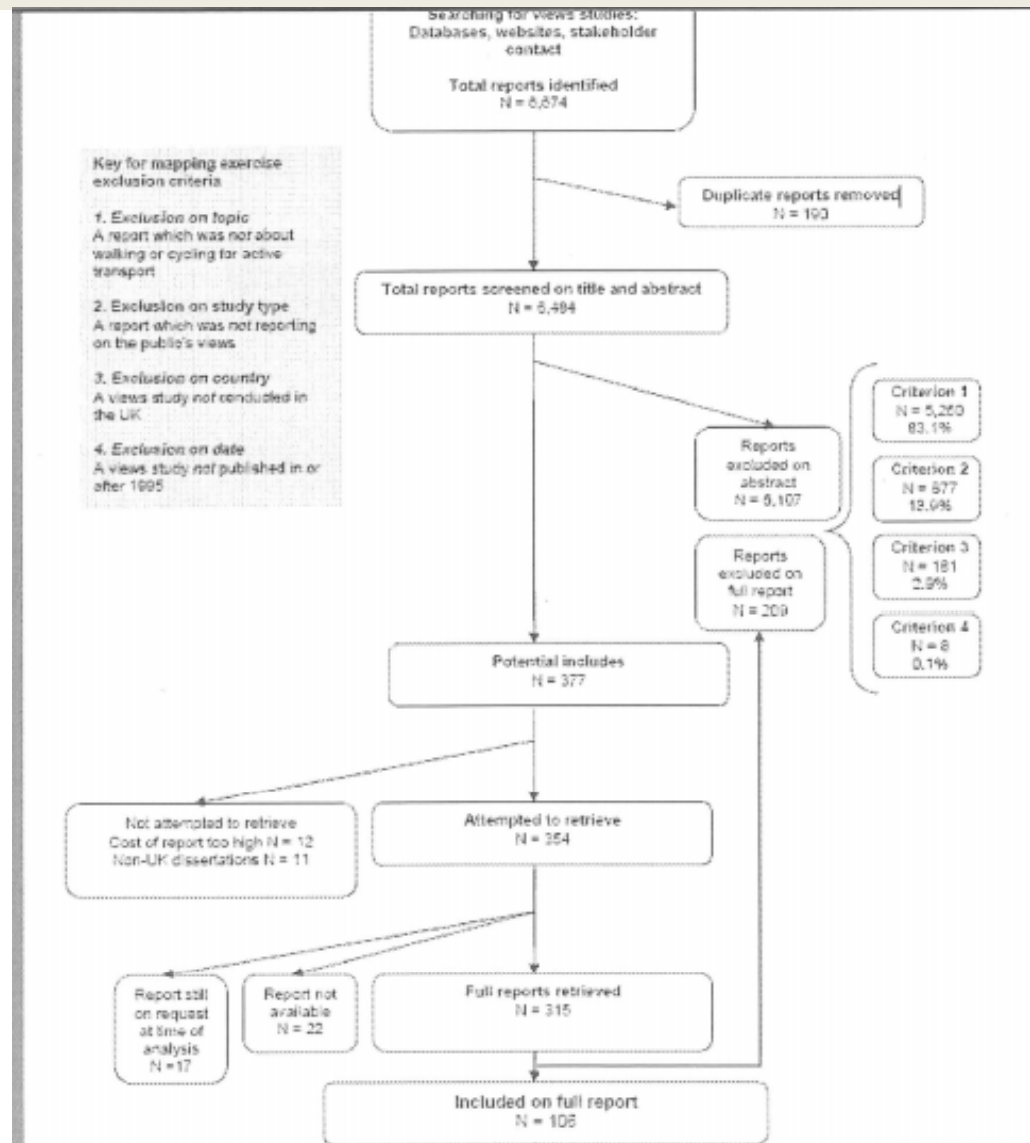
Info management is vital

- Keep a record of
 - searches
 - results of searches
 - what you do with the results (include or eliminate)
- Your study needs an 'audit trail' if it is to be:
 - reproducible
 - defensible
 - updateable

Info management example

- Review question: *“The effectiveness of personal development planning for improving student learning.”*
 - 14,439 references found by searching
 - 982 potentially relevant
 - 813 full reports obtained
 - 158 described in the map
 - 25 in the in-depth review

Detailed info management



The screening process

ENTER all search results into reference management database



SCREEN on title and abstract



TRANSFER to possibly relevant studies database



SCREEN on full report



TRANSFER to relevant studies database

Step 4

1. Form review team and involve 'end users'
2. Create review question, conceptual framework, and inclusion criteria
3. Search for and identify relevant studies
- 4. Describe (map) studies**
5. Assess quality and relevance of studies
6. Synthesise findings
7. Communicate and engage end users

How to produce a map

ENTER all search results into reference management database



SCREEN on title and abstract



TRANSFER to possibly relevant studies database



SCREEN on full report



TRANSFER to relevant studies database



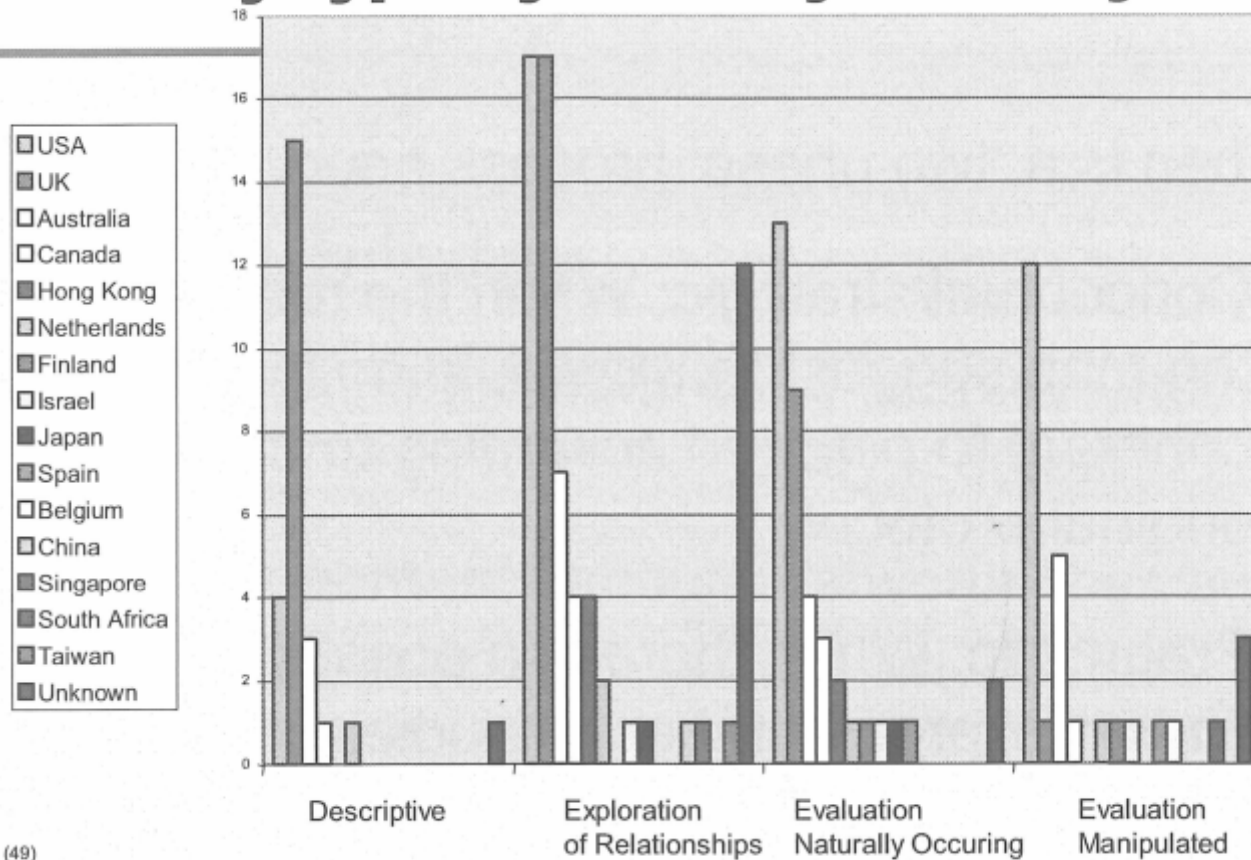
CODE then ANALYSE all relevant studies

What the systematic map is

- Your first “output” (on the way to a systematic synthesis), showing, for example:
 - geographical distribution of studies
 - research questions and objectives
 - research methods used
 - sample characteristics
 - contexts, policies and practices studied
 - etc, etc (you choose!)
 - BUT, *does not usually include findings.*

Map example

PDP map: study type by country of study



Why produce a map?

- An intermediate stage on the way to synthesis
- You might want to only understand the range of research being produced
- You might want to reconsider and change your review question

Coding example (software)

❖ EPPI-Centre data extraction and coding tool for education studies

- A. Administrative details
- B. Study aims and rationale
- C. Study policy or practice focus
- D. Actual sample
 - 1. Who or what is the actual sample in the study?
 - 2. What was the total number of participants in the study (the actual sample)?
 - Not applicable (e.g. Studies of policies, documents, etc.)
 - Explicitly stated (specify)
 - Implicit (specify)
 - Not stated (specify)
 - 3. What is the proportion of those selected for the study who actually participated in the study?
 - 4. Which country/countries are the individuals in the actual sample from?
 - 5. If the individuals in the actual sample are involved in an educational institution, what type of institution is it?
 - 6. What ages are covered by the actual sample?
 - 7. What is the sex of participants?
 - 8. What is the socio-economic status of the individuals within the actual sample?
 - 9. What is the ethnicity of the individuals within the actual sample?
 - 10. What is known about the special educational needs of the individuals within the actual sample?
 - 11. Please specify any other useful information about the study participants
- E. Program or intervention description
- F. Results and conclusions
- G. Study method
- H. Methods – groups
- I. Methods – sampling strategy
- J. Methods – recruitment and consent
- K. Methods – data collection
- Etc, etc, etc!!!

Step 5

1. Form review team and involve 'end users'
2. Create review question, conceptual framework, and inclusion criteria
3. Search for and identify relevant studies
4. Describe (map) studies
- 5. Assess quality and relevance of studies**
6. Synthesise findings
7. Communicate and engage end users

Three dimensions of critical appraisal

1. Methodological quality
2. Relevance of research design for answering the review question
3. Relevance of study focus for answering review question

NB: There are articles and online resources to help you make the right judgment calls for specific types of research.

Methodological quality

Quantitative

- Provision of pre and post data on outcomes
- Provision of data on all outcomes measured
- Employment of equivalent control/comparison groups

Qualitative

- Quality of reporting
- Sufficiency of strategies for reliability / validity
- Extent to which studies are rooted in the perspectives of those studied

Inevitable problems at this stage

- Lack of clarity about the conceptual framework
- Misunderstandings: between user and reviewer; within the review team
- Time and resource needs
- Range of skills demanded

Step 6

1. Form review team and involve 'end users'
2. Create review question, conceptual framework, and inclusion criteria
3. Search for and identify relevant studies
4. Describe (map) studies
5. Assess quality and relevance of studies
- 6. Synthesise findings**
7. Communicate and engage end users

Three types

1. Quantitative
2. Qualitative
3. Conceptual

You might need to combine results from two or more methods

Quantitative synthesis

- 'Integrative' approach
 - Numeric findings translated on a common scale
 - Variation explored
 - Numerical findings pooled
 - Synthesis product displayed graphically

Integrative syntheses

- Calculate the 'effect size' for each study
- Appropriately combine the effect size according to 'weight of evidence'
- Also, weight studies according to sample size

Integrative Synthesis

(a) Effect size

- Binary measures
 - odds ratio
 - risk ratio
 - risk difference (absolute risk)
- Continuous measures
 - mean difference
 - standardised mean difference
 - correlation coefficients

Integrative Synthesis

(b) Weight of evidence

Methodological quality + relevance of design + relevance of focus = weight of evidence

EXAMPLE:

1. How well has the study been executed within that specific type of research design?
Score (say) = 2/5
2. How appropriate is the research design and analysis for addressing the review question?
Score = 5/5
3. How relevant is the focus of the study for addressing the review question?
Score = 1/5

Overall Score (Weight of Evidence) = $2/5 + 5/5 + 1/5 = 8/15$

Qualitative synthesis

- 'Interpretive' synthesis
 - Key concepts in studies translated and integrated into an overall theoretical structure
 - Synthesis product is a new interpretive construct

Conceptual synthesis

For example literature reviews for a thesis

- Studies might not be 'average-able' in the same way
- But, principles of being explicit still apply
 - review question
 - search
 - inclusion and exclusion
 - synthesis

Be wary

- Publication bias
 - studies that show an effect are more likely to get published
- Studies with diverse interventions or population groups
- Diverse outcomes
- Quality of studies
- *Reviewer judgment is necessary*

Step 7

1. Form review team and involve 'end users'
2. Create review question, conceptual framework, and inclusion criteria
3. Search for and identify relevant studies
4. Describe (map) studies
5. Assess quality and relevance of studies
6. Synthesise findings
- 7. Communicate and engage end users**

The EPPI-Centre system

1. One page summary
2. Report (user friendly summary)
3. Technical report
4. Data codings

*Purpose is to ensure that findings are understandable,
and are actually used, by end users*

Some issues

Concerns for policy makers

- Cost
 - a thorough systematic review needs from £70,000 – £100,000
- Time
 - approximate delivery time is nine months
- Relevance
 - some potential for rapid dating / need for updating

NB: Systematic reviews are crucial in medicine, less so in areas like psychology, education, sociology

Compromise?

- Non-systematic 'scoping reviews'
- Systematic but limited maps or syntheses
- 'Rapid' or 'interim' evidence assessments

Questions and discussion