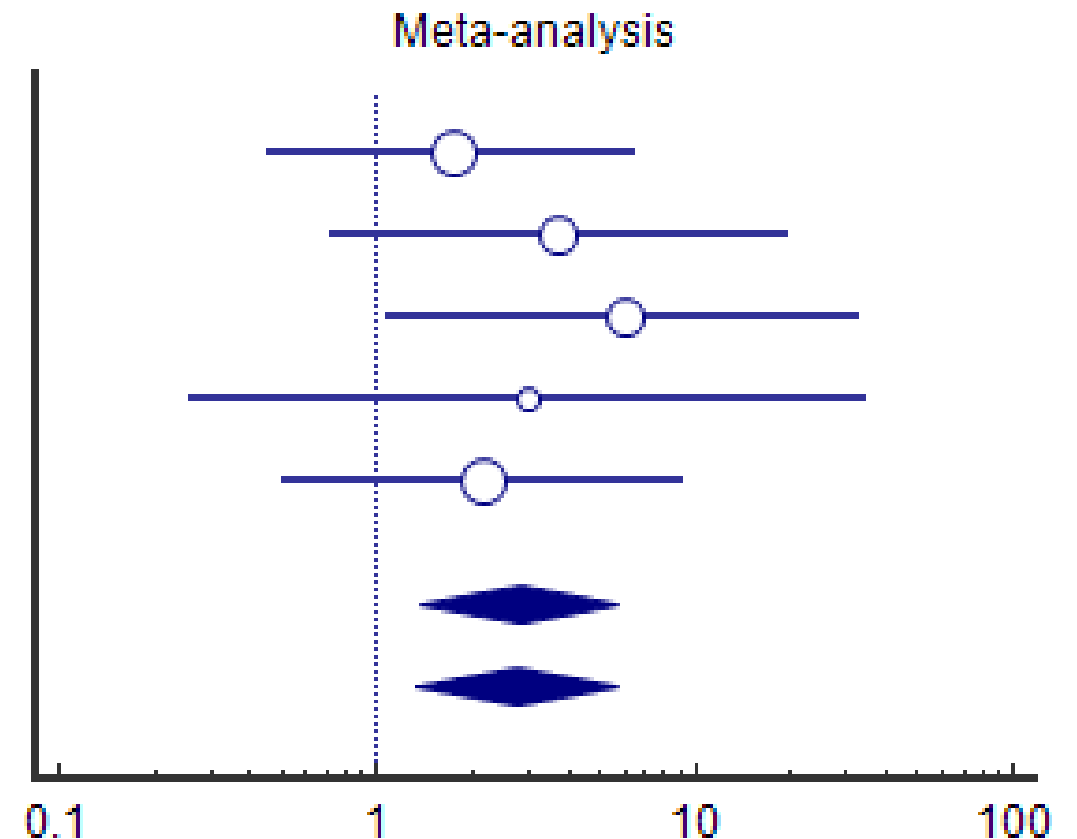
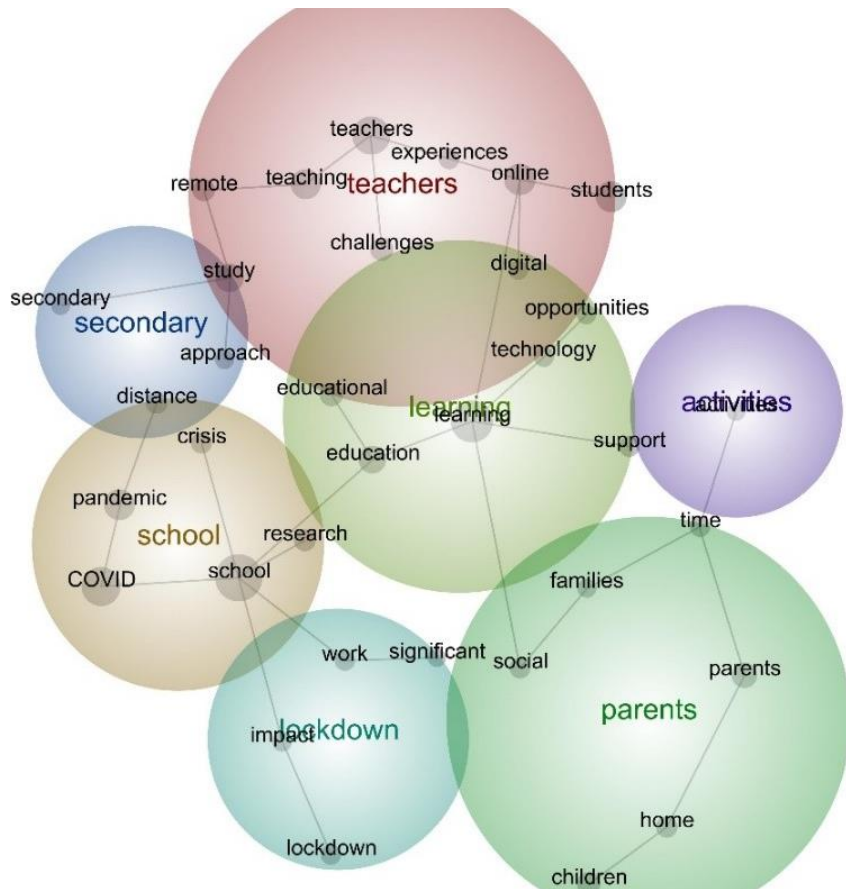


Week 6-7 – Types of Literature Review (III) – Mapping Review and Meta Analysis



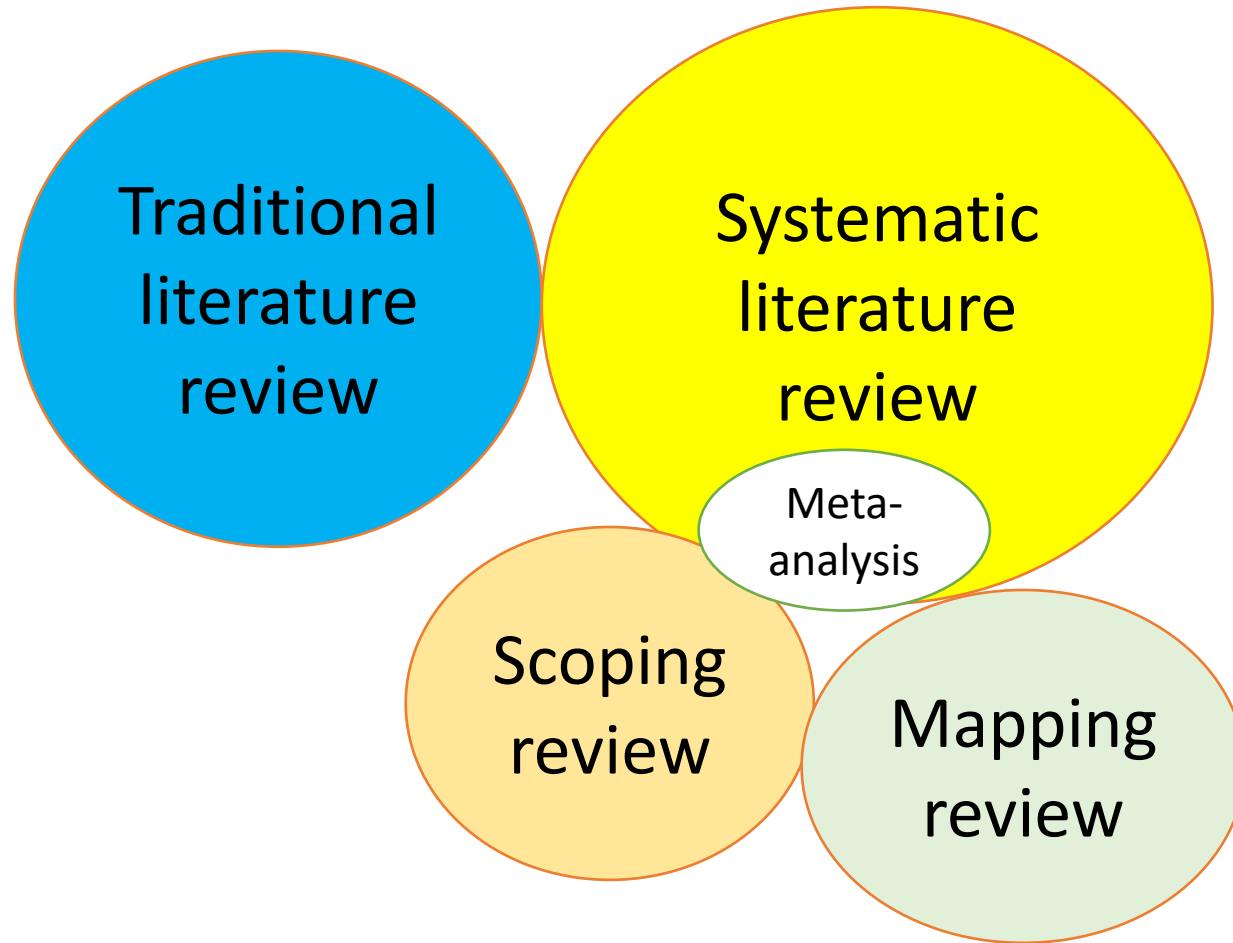
Approaches/methods to Literature review

- Traditional literature review / Narrative literature review
- Systematic literature review
- **Scoping review**
- **Mapping review**
- **Meta-analysis**

Recap of last session

- **Scoping review**
- **Mapping review (I)**

Approaches/methods to Literature review



Overview of approaches to synthesis

- Synthesis of the evidence included in a review relies heavily on pattern recognition.
- The method of synthesis employed should help the reader identify patterns in the data.
- Quantitative approaches should be used for handling quantitative data.
- A quantitative synthesis may, but does not necessarily, involve a meta-analysis, as quantitative findings can be synthesized using a variety of statistical and descriptive approaches. E.g. Frequency analysis, Tribulation of Study Characteristics, Graphical presentation of quantitative data.

Mapping Review

- A **mapping review** (also called a *systematic map*, *evidence map*, or *systematic mapping review*) aims to map out and categorize existing literature in a specific area to identify research gaps and guide decisions about future research or systematic reviews.
- They do not include formal quality appraisal and tend to remain at a **descriptive level**, providing an overview of the characteristics of available studies.
- Originated to help structure evidence for decision-making and future review planning

Mapping Review

Purposes

- To identify gaps in research literature from which further reviews or primary research may be commissioned.
- To contextualize more focused systematic reviews within a broader research landscape.
- To support policy-relevant decision-making by categorizing evidence across variables like population, setting, intervention type, and study design .

Mapping Review

- **Key Features:**
- Driven by specific research questions, often related to intervention effectiveness; uses frameworks like PICO (Population, Intervention, Comparator, Outcome).
- Literature is coded and categorized by characteristics such as methodology, intervention type, population, or setting.
- Results are typically tabular or graphical, enabling visual mapping of evidence.
- Completeness of search is constrained by available time and scope.
- No formal quality assessment is conducted, which limits the depth of analysis.
- Descriptive, not analytical—focused on characterization rather than synthesis

Mapping Review

- **Strengths:**
- Provides a broad overview of a topic.
- Useful for setting research priorities and justifying funding decisions.
- Helps determine whether enough similar studies exist for a focused systematic review.

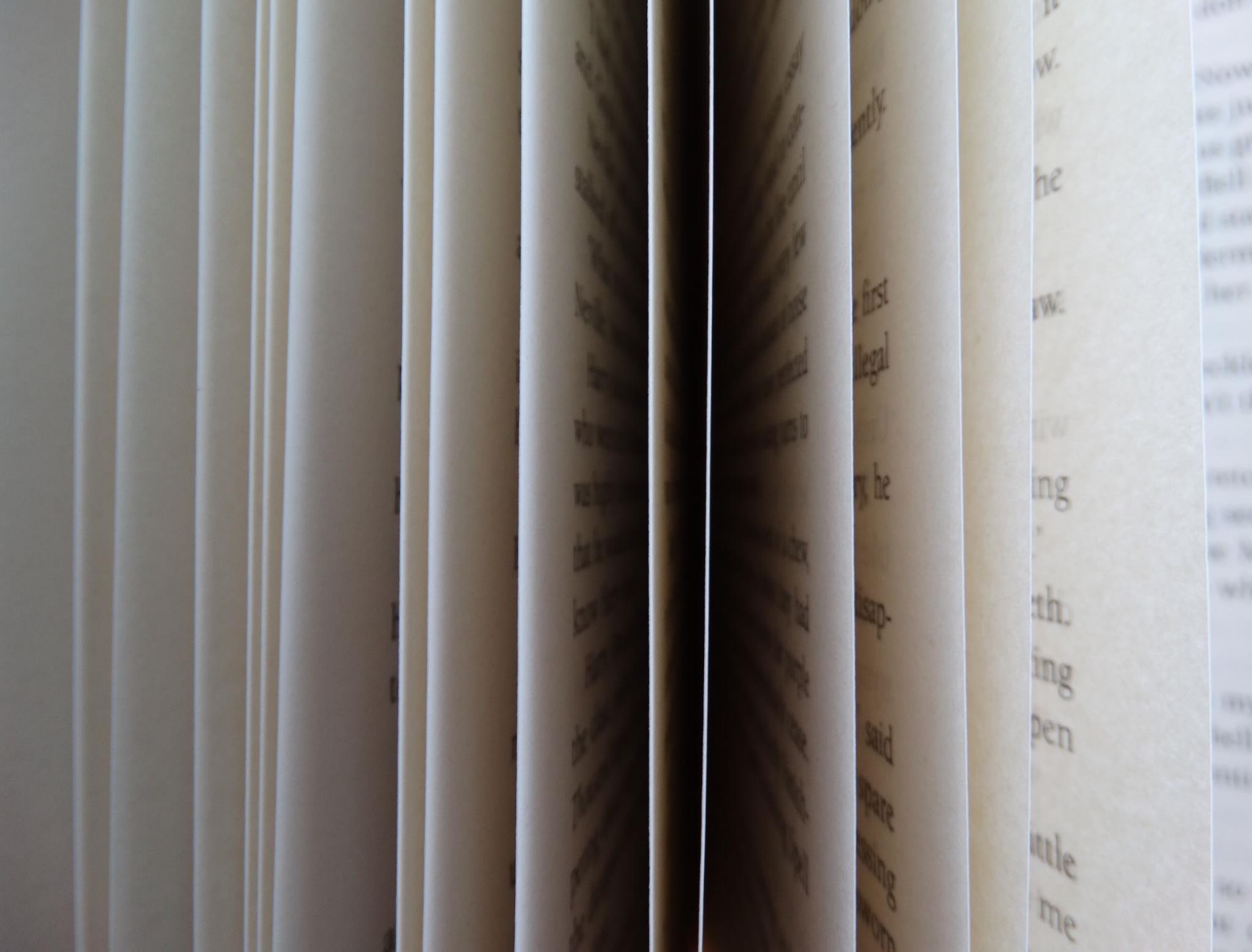
Mapping Review

- **Limitations:**
- Lacks synthesis and quality appraisal, which can lead to oversimplification or masking of study heterogeneity.
- Outcomes are not always clear-cut, as they may or may not lead to additional reviews or primary research.
- Can be time-consuming and resource-intensive, especially if coding schemes are complex.

Exercise 1 - Mapping review

- Follow the procedures as mentioned in the form
- Log your searching strategy.
- List the data inclusion and extraction criteria Summarise your findings
- Adopt the Prisma diagram to frame your logic
- Please adopt a graphical method to present your findings
- Identify your research gap

5 journals per student. Each student input log your own steps before discussion.



Meta Analysis

Meta-analysis

What is a Meta Analysis? (Easy Explanation) ? (3:15 mins)

[What is a Meta Analysis? \(Easy Explanation\)](#)

Meta-analysis

- Quantitative data from include studies can be summarised and synthesised in a narrative, tabular and, sometimes graphical form.
- When planning a meta-analysis, important to consider if the included studies are similar enough to be combined, and justify the decision to present a meta-analysis or not.
- The choice of meta-analysis method is primarily determined by how similar or difference (**heterogeneity**) the included studies are in terms of the populations, interventions, comparators, outcomes and study characteristics (PICOS) to one another.
- Heterogeneity in all PICOS elements, along with any observed statistical heterogeneity, should always be identified and discussed.

Meta-analysis – What is heterogeneity?

- **Clinical heterogeneity** - variability in PICO elements (population, interventions/comparators, or outcomes) among included studies.
- **Methodological heterogeneity** - variability in the design or quality of included studies; for example, the use of double-blinding in some clinical trials but not in others that are included in a meta-analysis.
- **Statistical heterogeneity** - the observation that the observed difference in effects among studies in a meta-analysis is greater than one would expect on the basis of random error.
 - Statistical heterogeneity can be measured with established tools and reported in addition to visual inspection using forest plots.

Meta-analysis

- the statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings” (Shelby & Vaske, 2008 p. 3)(Gurevitch et al. [2018](#))
- defined “meta-analysis as a research synthesis that uses a **quantitative measure, effect size, to indicate the strength** of relationship between the treatments and dependent measures of studies making up that synthesis” (p. 1376).

Meta-analysis

Emphasis of Meta-analysis

1. Research question design - PICO or SPIDER.
 - PICO (Population, Intervention, Comparison, Outcome)
 - SPIDER (Sample, Phenomenon of Interest, Design, Evaluation, Research type) are used mostly in quantitative evidence synthesis. applicable to mixed method.
2. Effect size
3. Heterogeneity

Effect size tells you how meaningful the relationship between variables or the difference between groups is. It indicates the practical significance of a research outcome.

A large effect size means that a research finding has practical significance, while a small effect size indicates limited practical applications.(Bhandari, 2023)

Meta-analysis

TABLE 1 Commonly Used Effect Sizes for Meta-Analysis¹

Effect Size Type	Use	Effect Size Statistic (to be computed for each study)
Strength of Correlation r-family	Describes strength of the relationship between two variables across all studies. For example, Pearson's r is used when each study compared two continuous variables.	$ES_r = r_{xy}$
Strength of Difference d-family	Describes strength of differences between two variables across all studies. For example, Cohen's d is used when each study compared the standardized difference between two group means. Also termed standardized mean difference.	$ES_d = \frac{\bar{X}_{G1} - \bar{X}_{G2}}{s_p} = d$ s_p = pooled standard deviation of group 1 & group 2 scores

Key steps for undertaking a meta-analysis

1. Tabulate summary data (data extraction)
2. Graph the data (synthesis)
3. Check for heterogeneity of study characteristics (PICOS) (synthesis)
4. Perform a meta-analysis if heterogeneity of study characteristics is not a major concern (synthesis)
5. If statistical heterogeneity is found in the meta-analysis identify factors that can explain it (analysis)
6. Consider undertaking further meta-analyses in the form of subgroup or sensitivity analyses to explore sources of heterogeneity (analysis)
7. Explore the potential for publication bias (analysis)

How do you know if an effect size is small or large?

Effect sizes can be categorized into small, medium, or large according to Cohen's criteria.

Cohen's criteria for small, medium, and large effects differ based on the effect size measurement used.

Effect size	Cohen's d	Pearson's r
Small	0.2	.1 to .3 or -.1 to -.3
Medium	0.5	.3 to .5 or -.3 to -.5
Large	0.8 or greater	.5 or greater or -.5 or less

Cohen's d can take on any number between 0 and infinity, while Pearson's r ranges between -1 and 1.

Bhandari, P. (2023)

Meta-analysis

Pitfalls of Meta-Analysis

First, with the mix of studies used in a meta-analysis, differences between studies have been referred to as an apples and oranges problem. For example, it may not be appropriate to meta-analyze studies that use different methodologies (e.g., surveys vs. experiments), sampling designs, and/or variable measurements. Such methodological variables, however, can be coded and used to test for their impact on the overall findings.

Second, the concern with mixing studies also includes the problems associated with mixing studies of different methodological quality (garbage in-garbage out). If studies with poor methodological quality are included, the meta-analysis results may be biased.

Shelby Vaske (2008) Understanding Meta-Analysis: A Review of the Methodological Literature. *Leisure Sciences*, 30(2), 96–110. <https://doi.org/10.1080/01490400701881366>

Meta-analysis

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Systematic Review vs Meta-Analysis (5:01 mins)

<https://youtu.be/pYDAN8MRY-w>

Meta-analyses are usually illustrated using a **forest plot**. An example appears in [Figure 10.2.a](#). A forest plot displays **effect estimates** and **confidence intervals** for both individual studies and meta-analyses (Lewis and Clarke 2001).



Forest Plot

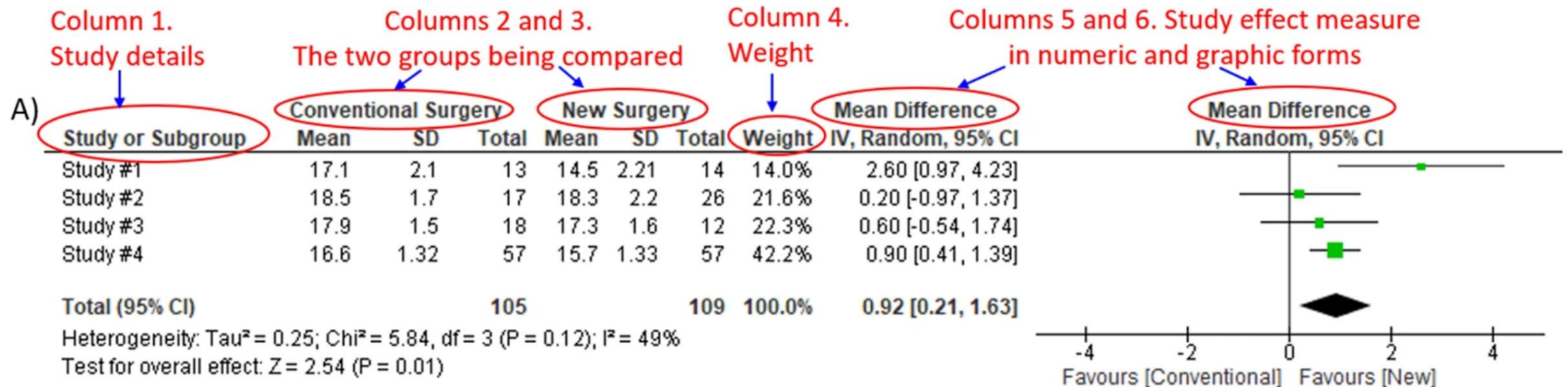


A forest plot is a graph that compares information from individual clinical or scientific studies, studying the same thing.

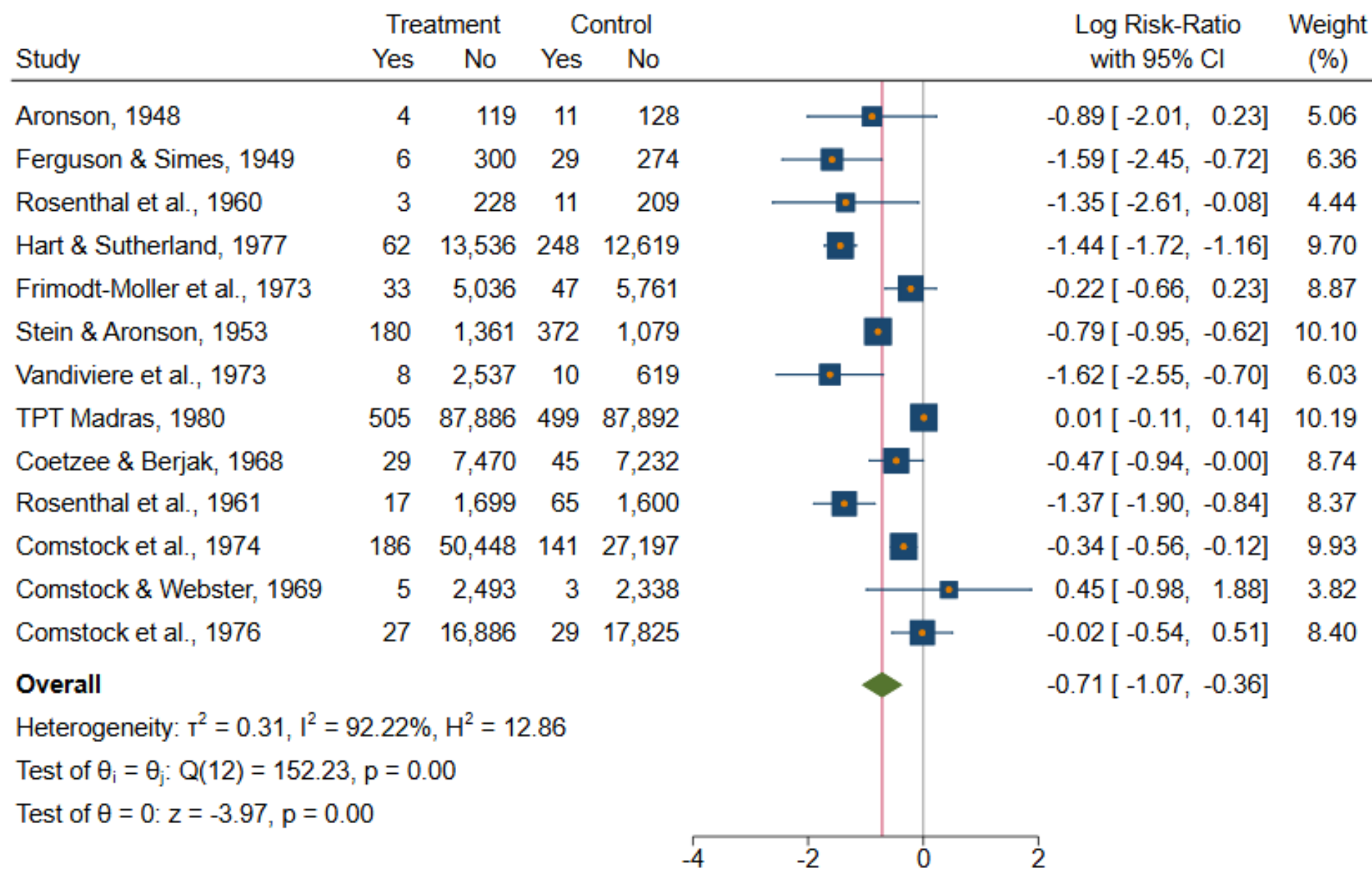
Meta-analysis

Fig. 1: Anatomy of a forest plot.

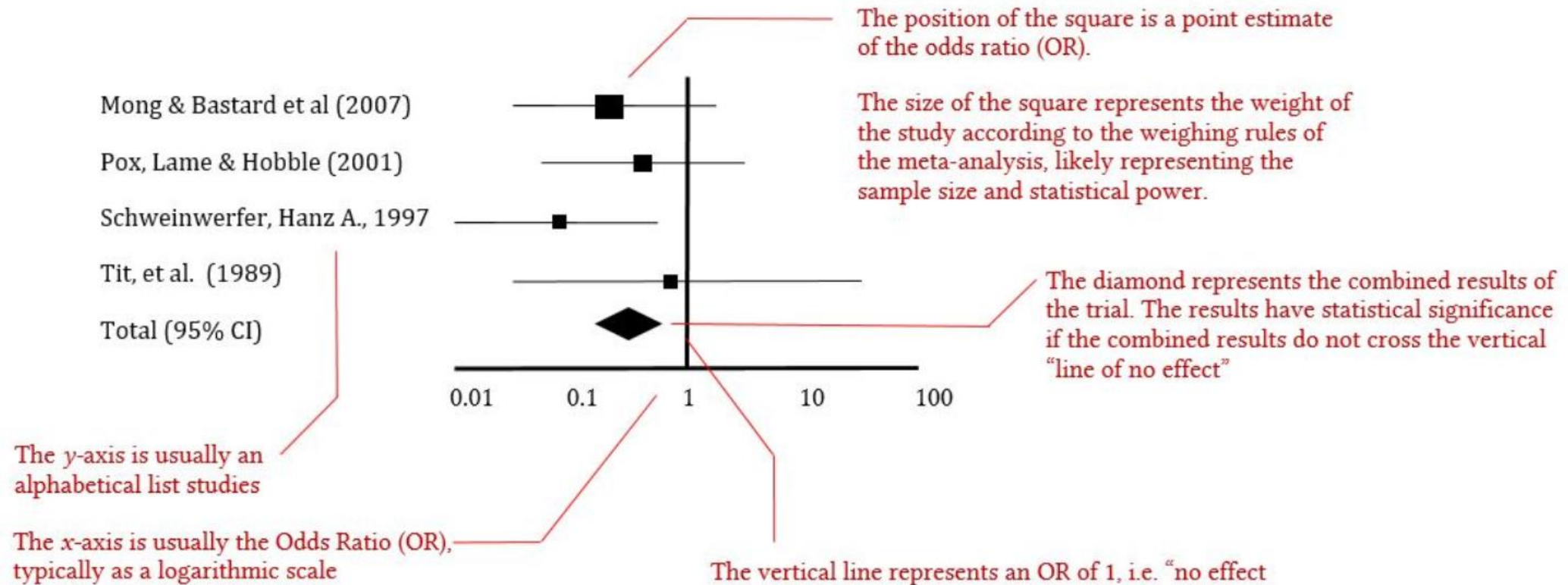
From: [The 5 min meta-analysis: understanding how to read and interpret a forest plot](#)



forest plot - to summarize information on individual studies, give a visual suggestion of the amount of study heterogeneity, and show the estimated common effect, all in one figure.



Random-effects REML model



[The forest plot and the box-and-whisker plot | Deranged Physiology](#)



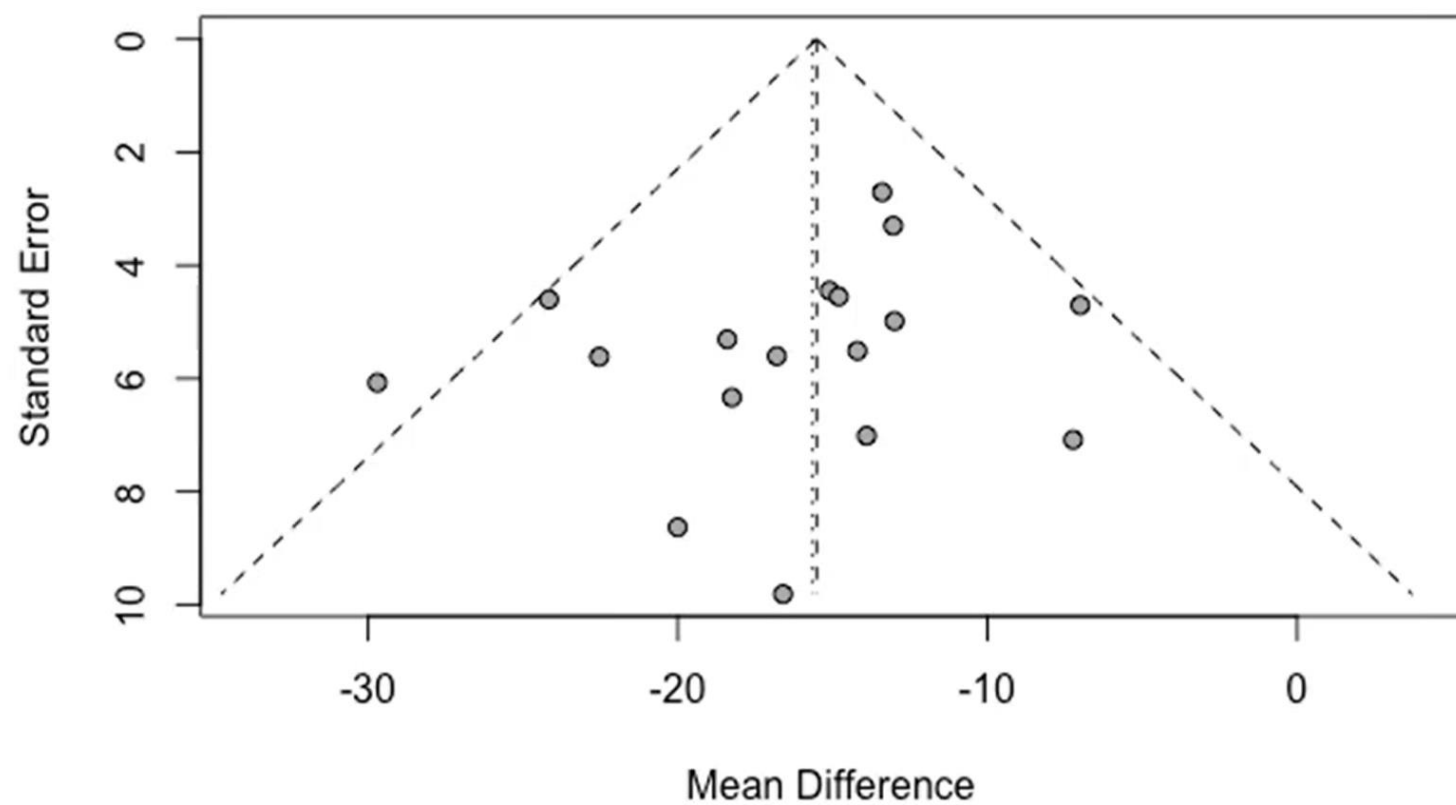
Funnel Plot



What is a Funnel Plot?

- A Funnel Plot is a plot of the variability of the individual studies (standard error) against the mean effect size.
- It is called a funnel plot because as study size increases the standard error approaches zero.
- It assumes that the plot should be symmetrical and there should be as many studies above the mean as there are below the mean.
- It also assumes that there should be a wide distribution of study variabilities.

A Funnel Plot



Explaining The Funnel Plot

- In this case there is a symmetrical scatter of points both sides of the weighted average mean difference.
 - Equal numbers are above or below.
- Unequal scatter indicates bias.
 - Originally this was considered publication bias.
 - Now called small study bias as most often found in small studies region.
- The points are also scattered throughout the funnel.
 - They are no just clustered at the bottom which is large standard error which indicates small sample size.

Meta Analysis

Subgroup and sensitivity analyses (1 of 2)

- Data extraction and coding will have identified different subgroups or 'families' of studies.
- These subgroups can be representative of the average effect or the exception to the rule.
- Study quality assessment might have identified differences in study quality.
- There might be studies whose result is an outlier to other included studies, or the overall findings of the review might be influenced by one particular study.

Meta Analysis

Subgroup and sensitivity analyses (2 of 2)

- Sensitivity analysis involves the removal of studies from the overall analysis, to investigate if results are 'sensitive' to particular studies being included.
- Subgroup and sensitivity analyses can be undertaken narratively or as part of a meta-analysis.

Assessment of potential publication bias (1 of 2)

- Publication bias refers to a family of biases that include **language bias, location bias, database bias**, etc.
- Checks can be taken in the analysis to try to identify whether the review is potentially subject to bias:
 - Are the databases and search sources likely to identify non-English studies/unpublished studies?
 - Does the list of included studies include: a high proportion (>20%) of studies in languages other than English?; a high proportion (>10%) of studies published in the grey literature/fugitive literature?

Assessment of potential publication bias (2 of 2)

- Do the abstracts of non-English studies that would otherwise be included confirm or contradict the included English language studies
- Map sample size versus effect size of the included studies on a graph as a **funnel plot**. Are there similar numbers of small negative studies and small positive studies?

Discussing the limitations of the evidence

- Recognise any limitations of the evidence when placing the review findings in context.
- Recognise the likelihood for bias, both within the included evidence and in the review.
- Highlight how the included studies, and the review as a whole, perform with regard to validity.
- Interpret what errors there are in the evidence and how they may have influenced the review conclusions.
- Highlight aspects that are largely beyond the control of the reviewer, such as the potential for publication bias.

Activity – Mapping Review

Stay with your selected theme

- Please create a PRISMA diagram following the PICO rule
- Then, produce an excel file to summarise your findings
- Based upon the findings of your excel file, you may visualise your findings e.g. mind map.



Synthesis strategy

Planning the synthesis strategy

- The synthesis approach is governed by the review type and its objectives.
 - **Scoping review** will include coding of studies and narrative synthesis.
 - **Mapping review** will include keywording of studies and mapping the evidence.
 - **Systematic review** will include a categorisation of studies, data extraction, quality assessment, tabular presentation, narrative synthesis, and meta-analysis if one is feasible.

Extracting quantitative data for your review

- Allows the reviewer to examine which elements of data are present in each individual study report.
- Elements for the data extraction form will cluster around the PICOS structure.
- The data extraction form can include:
 - Eligibility: an explicit statement of inclusion and exclusion criteria of the included studies
 - Descriptive data: information about study characteristics including setting, population.
 - Results: information about the results of the study in the form of data to be used in your review. Data may be in 'raw' format (directly from the paper) and/or converted into a uniform format for the review.

Narrative and textual presentation

- A narrative review can accommodate differences between the questions, research designs, and contexts of each individual study
- Can be a traditional narrative approach or the more formalised development of narrative synthesis.
- Traditional narrative approach largely involves compiling descriptive data and exemplars from individual studies
- Narrative synthesis characterises studies within multiple groupings and is often presented alongside the tabular presentations of included studies. Grouping studies helps the reviewer and the reader characterise the included studies as a 'body of evidence'.

Processes involved in a narrative synthesis that can serve as reference points to formalise activities

Process

- Developing a theory of change
- Developing a preliminary synthesis
- Exploring relationships in the data
- Assessing the robustness of the synthesis product

Activities

- Used to generate some explanatory theory or to explore or test an existing theory
- Bringing study findings together to tell a plausible story
- Examining the consistencies and inconsistencies in the data
- Using a variety of tools to examine lines of inquiry

Tabular presentation

- Can be used for all included study types.
- Can be used to describe characteristics of the population, intervention, comparator and outcome (measures).
- Can be used to describe study characteristics (eg, study design).
- Can be used to report how individual studies perform with regard to study quality.
- Can be used to indicate whether an effect is positive, negative or neutral and whether a specific effect is statistically significant or not.
- Where meta-analysis is not an option, can be used to present a summary of results.



Numerical presentation

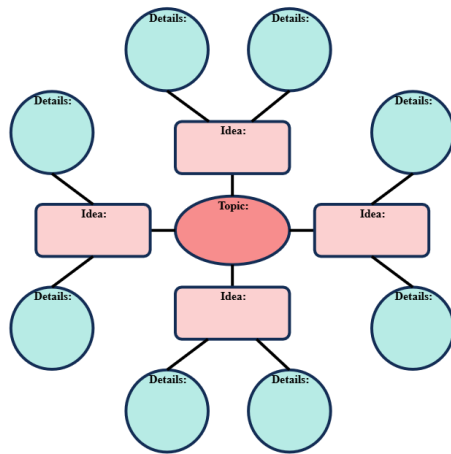
- It is possible to combine multiple similar studies that observe the same effect in a meta-analysis.
- A meta-analysis may help to produce a conclusion about a body of research, for example...
- It may be that there are insufficient large studies to have proved an effect conclusively.
- Alternatively, those studies that do exist may show different patterns of effects.

Graphical methods for exploring data

Method	Description
Concept map	Useful when identifying key concepts in a document collection or research area.
Forest plot	Graphical representation of a meta-analysis depicting the relationship between the success rate of an intervention and its comparator.
Harvest plot	A method for combining research with different study designs and outcomes to give an overall visual effect.
Idea web	Used to conceptualise and explore connections among findings reported by the studies included in a review.
Logic model	Diagrams or flow charts that convey relationships between contextual factors, inputs, processes and outcomes.
Mind map	Diagram used to represent words, ideas, tasks or other concepts linked to, and organised around, a central key word or idea.
Network meta-analysis	Allows visualisation and interpretation of the evidence for specific conditions and multiple interventions.

Graphical methods for exploring data

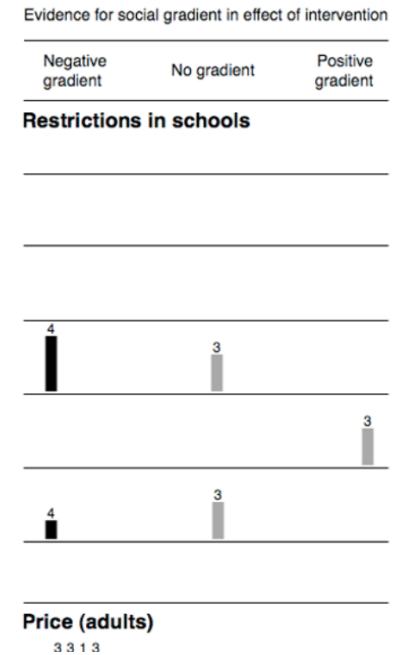
Name: _____ Date: _____
Prewriting Web: Labeled Two-Tier Web W/Subpoints



Idea web

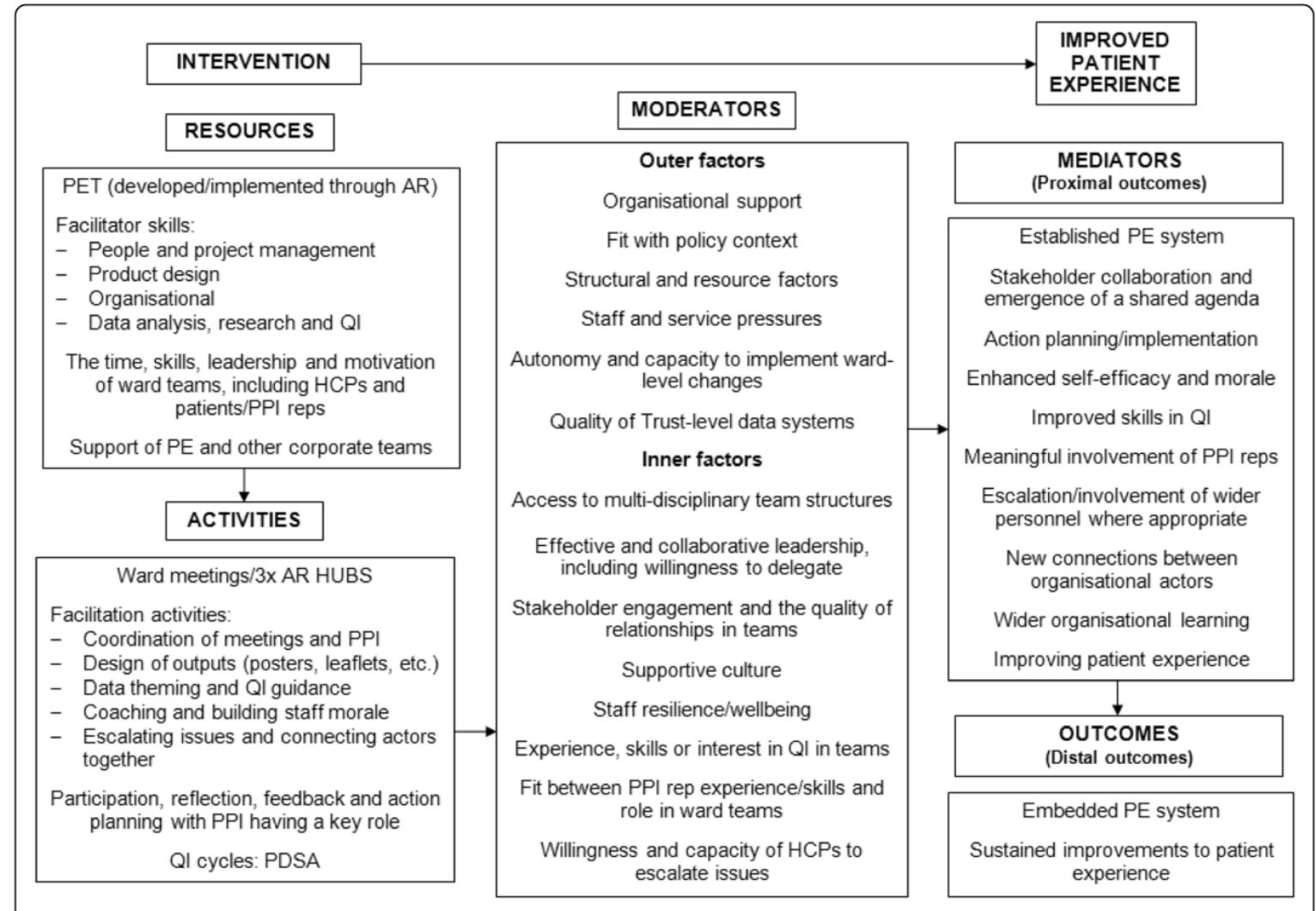


Conceptual map

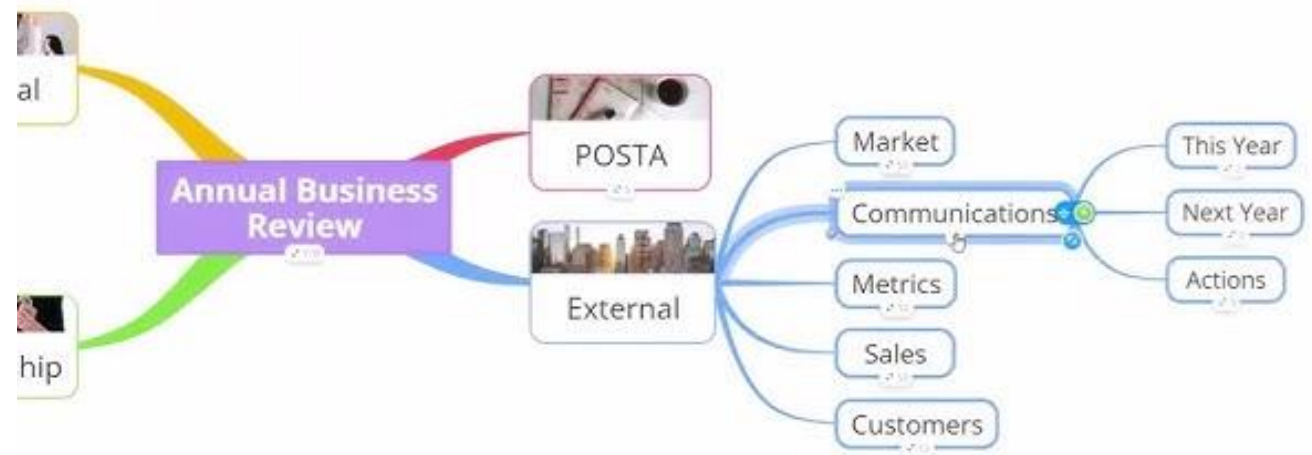


Harvest map

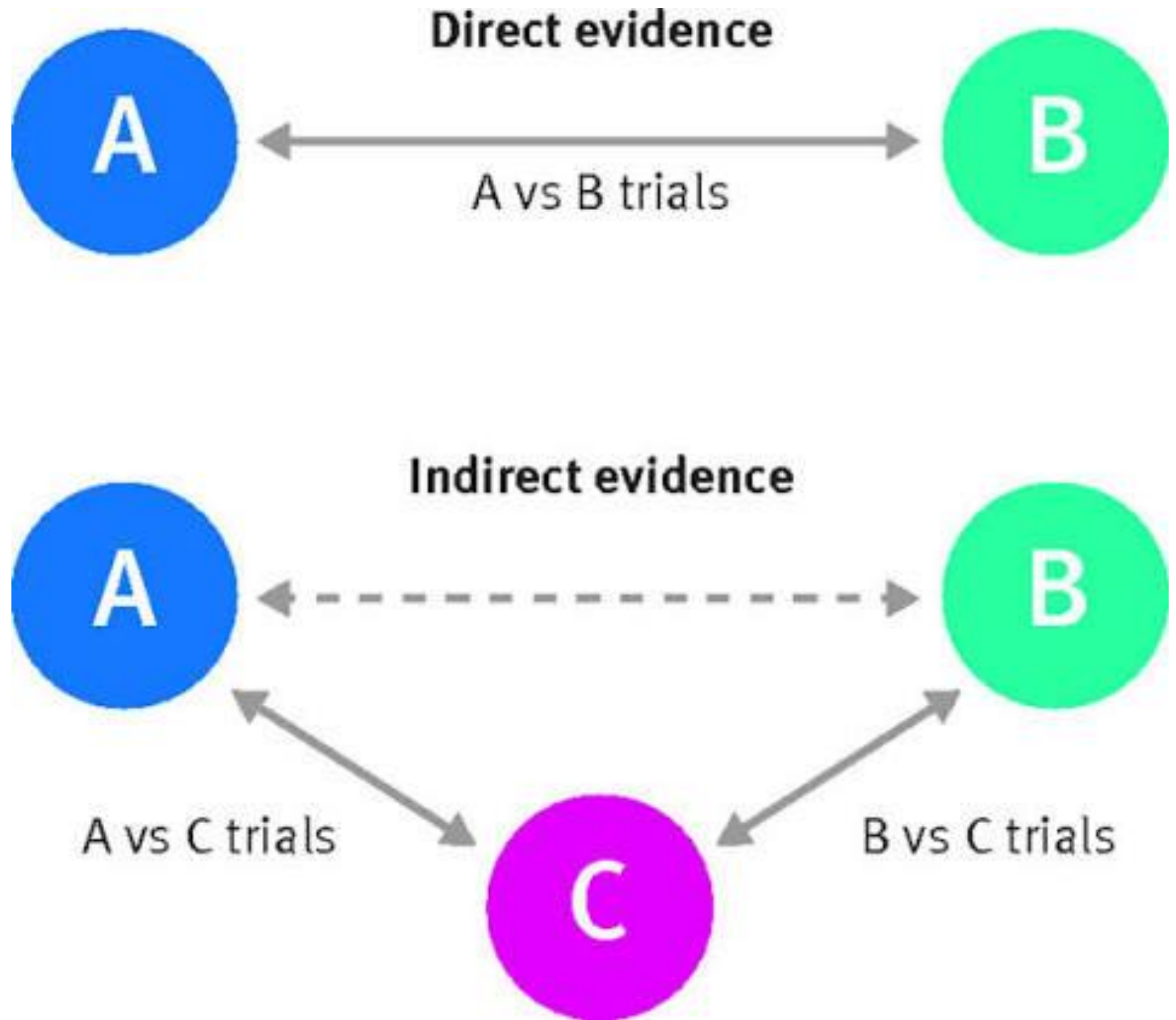
Logic model



Mind map



Network Meta- Analysis



Activity – Meta Analysis

For Meta-analysis, you don't need to stay with your selected theme.

Please identify 5 journals that adapt meta-analysis.

Produce a excel file summarizing their finding using PICO rule.

Reflection – For all types of literature reviews

- What are the similarities and differences among various literature reviews ?
- Could you tell the advantages and disadvantages of each approach ?

'Take homes' (1 of 2)

- Pre-plan your search and design your research question
- Select the most appropriate sources to search.
- Take into account limitations of the literature, such as inconsistent terminology and problematic indexing, and include alternative search terms (including those used in known papers).
- Select the most appropriate search techniques for the sources that you have chosen. Consider whether it is appropriate to use search filters.

'Take homes' (2 of 2)

- Employ supplementary search approaches (for example citation searching as well as traditional database searching).
- Evaluate your search results, modify your search strategies accordingly and be sure to document the search process to allow you to report it accurately when you write up your review.

Please note

- This presentation will introduce you to some aspects of research methods – but it is NOT intended to replace key reading, **such as** Bryman, Crotty, Creswell, Maxwell, Denscombe, Denzin, Guba and Lincoln, Easterby-Smith et al, Collis and Hussey and Cohen.
- You must read key texts and beyond at doctoral level that cover the method and for this you may have to go beyond your modules reading list.
- Again some slides will not be focused on and you are expected at this doctoral level to be motivated, engaged and understand the areas you need to explore.



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

References :

- Bhandari, P. (2023, February 02). *What is Effect Size and Why Does It Matter? (Examples)*. Scribbr. Retrieved 10 March 2025, from <https://www.scribbr.co.uk/stats/effect-sizes/>
- Cano, C. R., Carrillat, F. A., & Jaramillo, F. (2004). A meta-analysis of the relationship between market orientation and business performance: evidence from five continents. *International Journal of research in Marketing*, 21(2), 179-200. <https://doi.org/10.1016/j.ijresmar.2003.07.001>
- Shelby, L. B., & Vaske, J. J. (2008). Understanding Meta-Analysis: A Review of the Methodological Literature. *Leisure Sciences*, 30(2), 96–110. <https://doi.org/10.1080/01490400701881366>
- [Scoping — PRISMA statement](#)

Summary

- Data extraction is a key step towards synthesis.
- There are numerous approaches to synthesis. Looking at existing published methods and examples is recommended.
- There is a variety of types of data presentation, including textual, graphical, numerical and tabular approaches.
- Analysis initially involves testing the robustness of your synthesis in the light of what you know about the quality of included studies.
- The presence of bias, including publication bias, should be considered.

Reference

- Chapter 7 of the Sage Book: Synthesising and analysing qualitative studies In: **Systematic Approaches to a Successful Literature Review**, 3rd ed, 2021.
- Phillips, M.R., Steel, D.H., Wykoff, C.C. *et al.* (2022) A clinician's guide to network meta-analysis. *Eye* **36**, 1523–1526.
<https://doi.org/10.1038/s41433-022-01943-5>

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