Systematic Reviews.

Reviews.

Reviews (or overviews) are a drawing together of material to make a case.

These may, or may not, be critical and can be used to support one side of an argument as opposed to a critical evaluation of both sides of the argument.

Systematic review.

A review in which evidence on a topic or research question has been systematically identified, appraised and summarised according to predetermined criteria.

Systematic review.

A systematic review should:

- Contain a statement of objectives, materials and methods.
- Be conducted according to explicit and reproducible criteria.
- Results may be combined using meta-analysis, if it is appropriate to do so.

Meta-analysis.

A statistical technique.

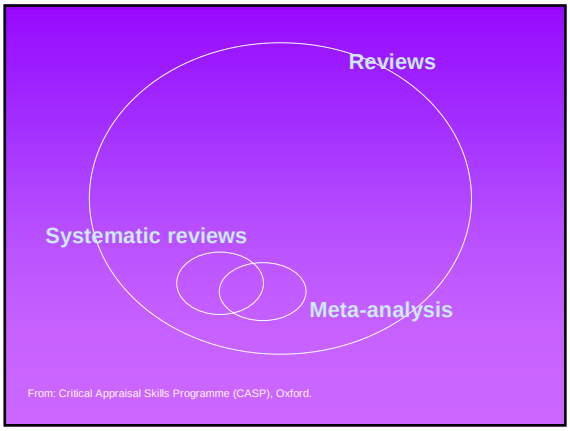
Summarises the results of several studies into a single estimate.

Gives more weight to larger studies.

Don't be fooled!

Meta-analysis is only a statistical tool. It does not produce good results if the review itself is biased.

Meta-analyses should be conducted as part of a systematic review.



From: Critical Appraisal Skills Programme (CASP), Oxford.

What kind of studies are included in a systematic review?

This depends on the question.

Many systematic reviews are concerned with questions of effectiveness e.g. does nicotine replacement therapy help people stop smoking? The best study design to answer these questions is the randomised controlled trial.

Thus, looking at systematic reviews of RCTs. The best example of these are found in the Cochrane Library.

http://www.nelh.nhs.uk/cochrane.asp

The Cochrane Collaboration.

Preparing, maintaining and disseminating systematic reviews of the effects of health care

What if my question doesn't have RCT evidence?

For many questions, RCTs are not an appropriate study design to answer the question e.g. community-based interventions. Systematic reviews increasingly include other types of evidence as well e.g. observational sudies (case-control, cohort).

For examples of such work, see the Campbell Collaboration.

http://www.campbellcollaboration.org/

The Campbell Collaboration.

Reviews randomised and non-randomised studies in the areas of:

- Education.
- Crime & Justice.
- Social Welfare.
- Methods.

Combining data.

Results from studies are reported in a SR either:

- Qualitatively in a narrative review.
- Quantitatively in a meta-analysis.

Meta-analysis.

A statistical technique.

Summarises the results of several studies into a single estimate.

Gives more weight to larger studies.

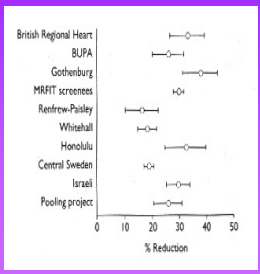
Was this appropriate?

You need to decide if it was appropriate to combine the results of several studies.

Two ways of assessing this:

- Look at the data.
- Test of heterogeneity.

Example 1.



From:

Thompson SG. Why sources of heterogeneity in meta-analysis should be investigated. *BMJ* 1994;309:1351-1355.

The confidence intervals from these trial are not overlapping.

e.g. Gothenburg trial doesn't overlap with Renfrew-Paisley, Whitehall or Central Sweden results.

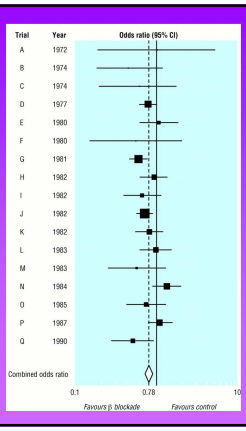
These trials are heterogenous i.e. too different, to combine.

Meta-analysis would be inappropriate.

Example 2.

From:

Egger M, Davey Smith G, Phillips AN. Meta-analysis: Principles and procedures. *BMJ* 1997;315:1533-1537.



The confidence intervals of all the trials are overlapping.

Direction of effect is very similar in each.

These trials look similar, so combining them is appropriate.

Test for heterogeneity.

A statistical test to test the assumption that the included trials are all similar.

Null hypothesis: All the included trials are similar.

Want a non-significant result.

If the result is significant, have to reject the null hypothesis – assume that the trials are different (heterogeneous).

Example 1.

Test for heterogeneity: Chi-square=127, p<0.001.

Example 2.

The test for heterogeneity gives a non-significant P value of 0.2.

Rule of thumb:

A chi square value much greater than the number of trials in the meta-analysis indicates that the trials are different to each other.

Models.....

What are fixed effect models and random effect models?

Underlying assumptions for two types of meta-analyses.

Fixed effect models.

Assumes every study is estimating the same unknown effect.

That the underlying treatment effects are identical.

Random effects models.

Assumes that studies are are estimating different, but related, unknown treatment effects.

Differences between these studies are due to random variation.