

Welcome

Understanding Research & Critical Appraisal

Part 5: Meta-Analysis

Jan. 9/08, 1:30-2:30

*For everyone's sake, please be quiet!
Keep your phone on mute
until you are ready to ask questions.*

How?

- Press the "mute" button on your phone
- If your phone does not have a mute button, then press *6 to mute your phone, and *6 to un-mute.



SENIORS HEALTH RESEARCH TRANSFER NETWORK

Linking Caregivers, Researchers & Policy Makers

Meta-Analysis

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Meta-analysis is ...

- A. A rigorous method for objectively combining the results of many different studies to arrive at a better estimate of 'truth'
- B. The greatest boon to humanity since the invention of the double bed
- C. A way of combining the results of many inadequate studies to arrive at an inadequate answer
- D. A new growth industry, allowing people to build up their CVs
- E. All of the above

Objectives:

- To learn more about meta-analyses
 - The rationale
 - A soupçon of history
 - Embarking on a 12-step program

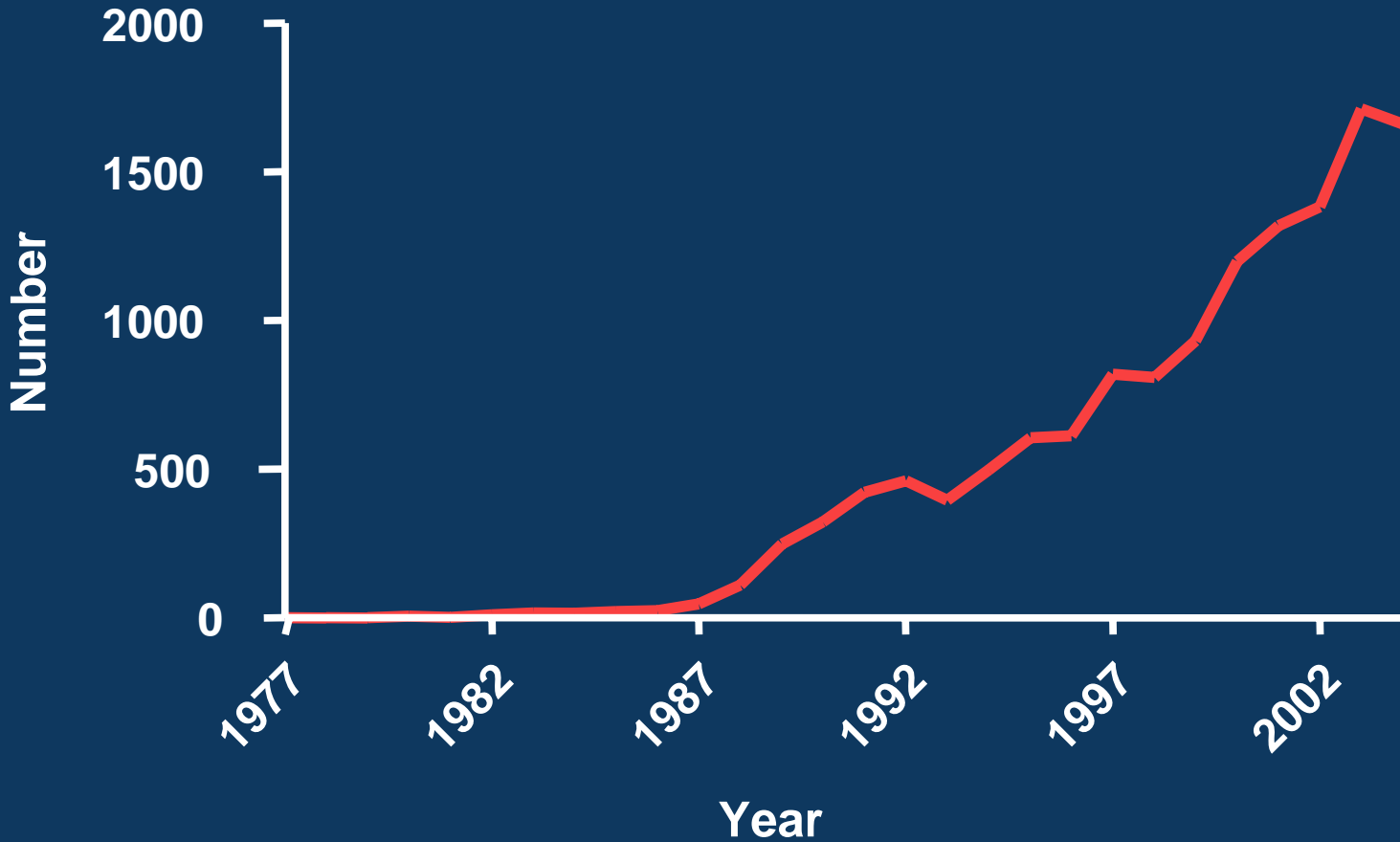
Rationale:

- Two main sources:
 - Dissatisfaction with conventional review articles and chapters
 - Possibility of bias
 - Incompleteness
 - Articles with conflicting findings

A Bit of History:

- Before meta-analysis:
 - Subjective interpretations
 - “Vote counting”
- First meta-analysis
 - Smith, M. L., & Glass, G. V. (1977). Meta-analysis of psychotherapy outcome studies. *American Psychologist*, 32, 752-760.

“Meta-Analysis” as Keyword



Meta-Analysis: A 12-Step Program

1. How Was The Question Defined?

- Question should include:
 - Specific intervention
 - Target population
 - Definite outcome

1. How Was The Question Defined?

- Poor question:

“How can I reduce the number of accidents in hospital?”

- Better question:

“Does a balance training program provided by occupational therapists reduce the number of falls among mildly demented patients in a complex continuing care setting?”

1. How Was The Question Defined?

- The trade-off:
 - Too broad a search may produce many dissimilar studies
 - Too narrow a search may produce nothing

2. What Were The Selection Criteria?

- Criteria spelled out before search
- Should focus on:
 - Population
 - Methods
 - Interventions
- Should *not* use outcome as a criterion

3. How Was The Search Done?

- Much easier now, but ...
 - Shouldn't be limited to any one database (such as Medline, PsycINFO, EMBase, CINAHL)
 - Many articles will still be missed
 - Publication bias
 - Submitting negative findings
 - Publishing negative findings

3. How Was The Search Done?

- Should be supplemented by:
 - Hand searching
 - Checking reference lists
 - Checking Cochrane and Campbell databases
 - Writing to authors

4. How Were The Articles Selected?

- *Must* have been selected using content and methodological criteria
- No suspicion of having been chosen because of results
- Ideally, two independent raters of each article
- Avoidance of duplicate publications

5. How Were The Articles Appraised?

- Internal consistency (how well was the study done?)
 - Drop-outs
 - Outcome measures
 - Matching of groups
 - Fidelity of intervention
 - Blinding of raters
 - Proper data analysis

5. How Were The Articles Appraised?

- External validity (can the results be generalized?)
 - Strictness of inclusion/exclusion criteria
 - Applicability of intervention in home setting

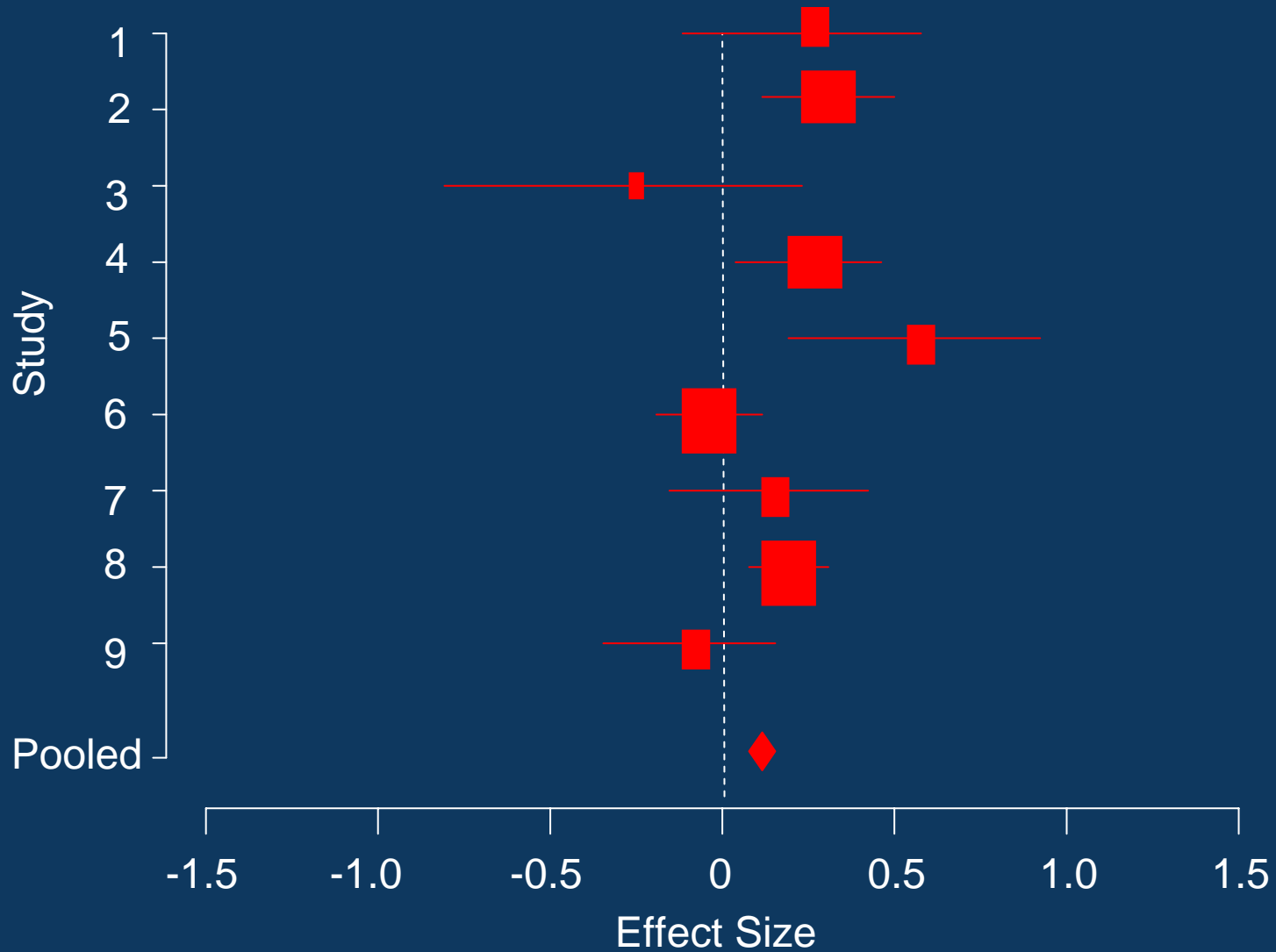
6. How Were They Abstracted?

- Should be done by independent raters
- Completeness of data
 - Only 13 percent of reviewed articles included final sample size, means, and SDs (Streiner *et al.*, 1998)

7. How Were ESs Calculated?

- Ideally based on continuous data (such as means, proportions)
- For dichotomous outcomes, usual to use log OR or log RR

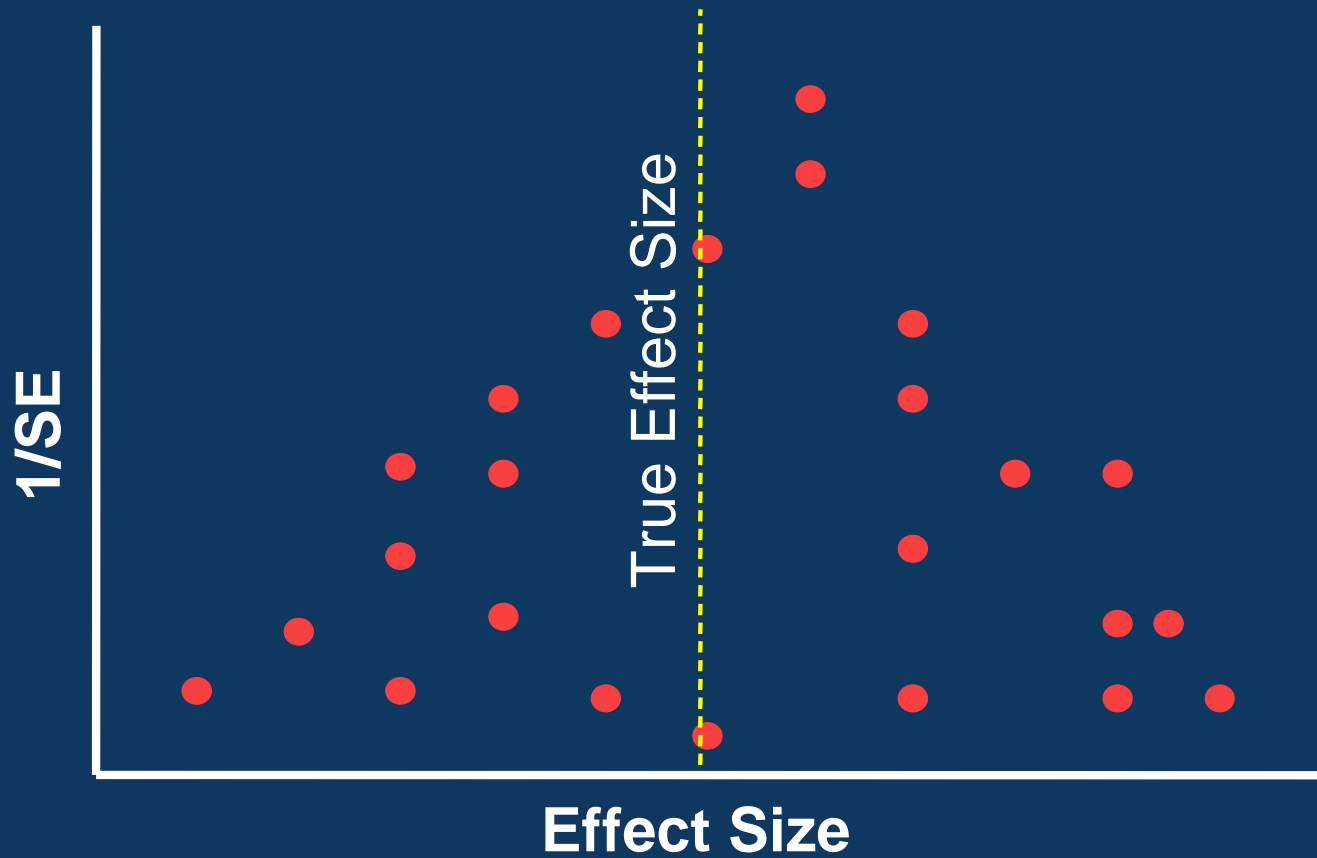
A Forest Plot of ESs



8. Was Publication Bias Present?

- Should calculate “file drawer” number
- Should do funnel plot
 - Assume a “true” ES
 - As sample size increases, estimates of ES should be within narrower range

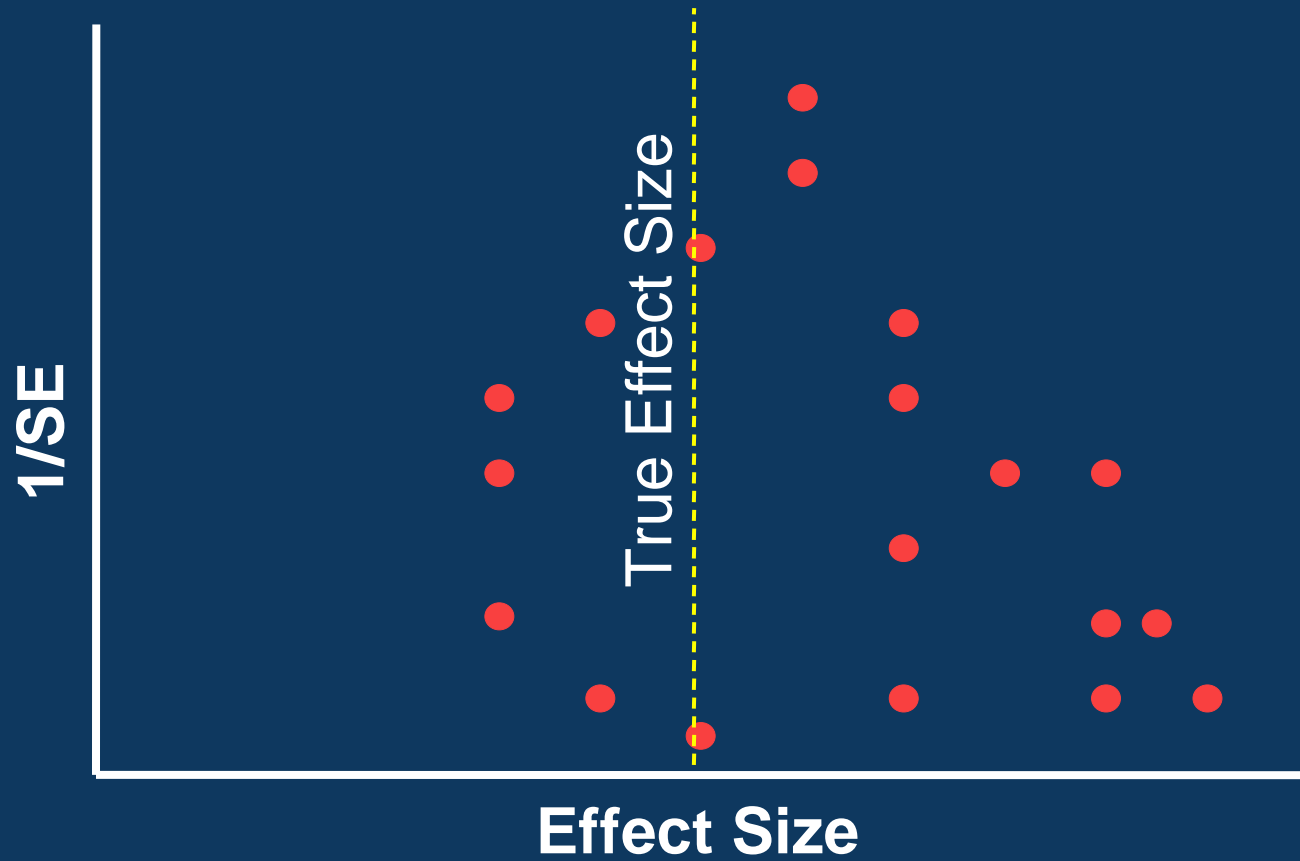
No Bias



8. Was Publication Bias Present?

- Should calculate “file drawer” number
- Should do funnel plot
 - Assume a “true” ES
 - As sample size increases, estimates of ES should be within narrower range
 - If publication bias, funnel truncated where small ESs should be

Suspicion of Bias



9. How Similar Were The ESs?

- If dissimilar ('heterogeneous'), may be trying to compare apples with oranges
- No consensus regarding what to do about it:
 - Eliminate heterogeneous studies
 - Analyse to determine reasons for heterogeneity

10. How Were ESs Combined?

- Easiest is to use average of all ESs
 - Gives equal weight to large and small studies, good and bad studies
- Better to weight each study
 - Usually weighted by sample size or reciprocal of squared standard error
 - Sometimes weighted by methodology score

11. Influential Factors?

- Did the authors look to see what may have affected the magnitude of the ESs?
 - Characteristics of the sample
 - Elements of the intervention
 - Methodology of the study

12. How Were Data Analysed?

- Fixed effects model
 - Used to draw conclusions about this particular set of articles
 - Yields more significant results
 - Usually inappropriate
- Random effects model
 - Can generalize results
 - Smaller effects
 - Usually right approach

Summary

- Can be very powerful tool for synthesizing literature
- Do not eliminate need for judgment and decision-making
- As with all tools, use judiciously

Thank you

Please complete an evaluation of today's session. Open the following URL in your browser.

https://www.surveymonkey.com/s.aspx?sm=_2b57bisUabL5SfGfrjAJWNg_3d_3d

And don't forget, next session:

Part 6: Qualitative Studies

Mon. Jan. 28/08 10:00–11:00 am



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