



Steps to Complete a Meta-Analysis

A practical reference guide to statistical decision-making, reporting standards, and reviewer expectations.

- GRADE & reviewer-ready reporting
- Effect size & model selection
- Heterogeneity & publication bias



Written from practitioner experience across published systematic reviews and meta-analyses, including network meta-analyses registered on INPLASY.

For educational and personal reference use.



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HOW TO USE THIS GUIDE

Work through this guide sequentially before running your first pooled analysis, or jump straight to the statistical decision you're facing. Each section states the defensible default, what reviewers actually check, and where each analysis is really run: RevMan or RStudio.



SCOPE LIMITATION

This guide covers **pairwise meta-analysis only**. Network meta-analysis introduces its own assumptions, software, and reporting requirements (network geometry, transitivity, SUCRA rankings) and is covered in a separate companion guide.

1 What a Meta-Analysis Requires

The decision chain that shapes everything reviewers will check

A meta-analysis is not a default add-on to a systematic review. It is a distinct statistical undertaking with its own assumptions, and every decision made before the first pooled estimate is calculated shapes how defensible the results will be at peer review. This guide walks through that decision chain in the order reviewers expect to see it justified: effect measure, statistical model, estimator, pooling threshold, heterogeneity handling, bias assessment, and certainty rating.

★ KEY LESSON: THE CORE PRINCIPLE

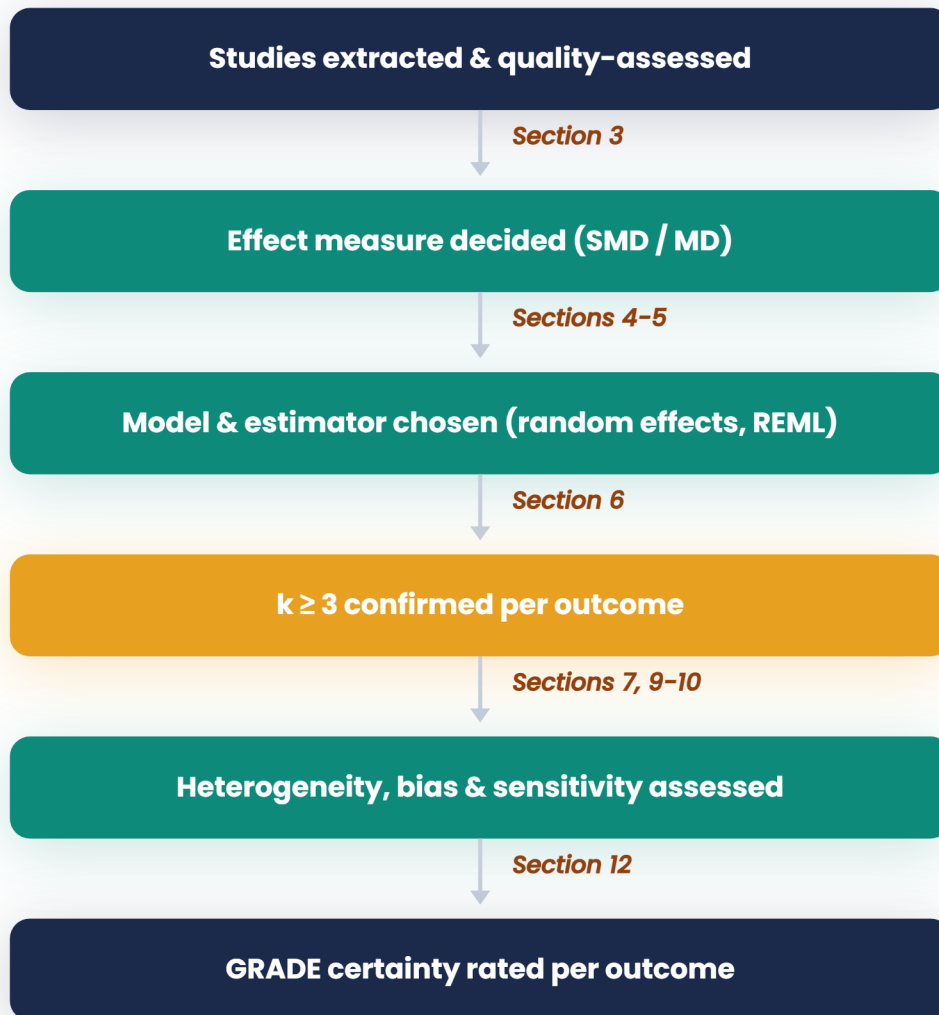
A meta-analysis should never be run opportunistically because the data happen to allow it. Every statistical decision below should be pre-specified in the registered protocol, before outcome data are extracted, not chosen after seeing which approach produces a cleaner result. You work with the studies and data your predefined protocol actually yields, not a target number of studies decided in advance.

This Guide Assumes

- ✓ You have already completed study selection, data extraction, and risk of bias assessment for the studies you intend to pool.
- ✓ Your protocol was registered (INPLASY or PROSPERO) before data extraction began.
- ✓ You have confirmed a pairwise comparison is the right approach for your review question (see Section 2).

The Statistical Decision Pathway

Every methodological decision, in the order reviewers expect to see it justified



A reference map for the decision chain covered in full across this guide.

2 Choosing Your Approach

Confirm the right tool before any statistical decision is made

Before any statistical decision is made, confirm that a pairwise meta-analysis is actually the right tool for your review question. Meta-analyses are classified by how many groups or treatments are being compared, and the two are not interchangeable.

Table 2.1: Pairwise vs Network Meta-Analysis

FEATURE	PAIRWISE META-ANALYSIS	NETWORK META-ANALYSIS (NMA)
What it compares	Exactly two groups at a time: one experimental arm against one control or comparator arm	Three or more interventions simultaneously, including treatments never directly compared
Typical outcome data	Binary (yes/no) or continuous (mean difference) data from direct comparisons	Direct and indirect comparisons combined through a shared comparator
Key assumption	Studies are estimating a comparable effect for the same two-arm comparison	Transitivity and consistency across the treatment network: a critical, testable assumption
When to choose it	Your review question is a single head-to-head comparison	Your review question requires ranking or comparing several interventions



SCOPE OF THIS GUIDE

This guide covers pairwise meta-analysis only. Network meta-analysis introduces its own additional assumptions, software, and reporting requirements (network geometry, transitivity, inconsistency checks, SUCRA rankings) and is covered in full in a separate companion guide. If your review question genuinely requires comparing three or more interventions where not all were tested head-to-head, that is your signal to move to NMA rather than pairwise.

FURTHER READING

- Konstantinidis, M., Stratton, C., Tsokani, S., Elliott, J., Simmonds, M., McGowan, J., Moher, D., Tricco, A. C., & Veroniki, A. A. (2025). Conducting pairwise and network meta-analyses in updated and living systematic reviews: a scoping review protocol. *JB1 evidence synthesis*, 23(3), 527–535. <https://doi.org/10.11124/JBIES-24-00279>
- Rokkas T, Hold GL. A systematic review, pairwise meta-analysis and network meta-analysis of randomized controlled trials exploring the role of fecal microbiota transplantation in irritable bowel syndrome. *Eur J Gastroenterol Hepatol*. 2023 Apr 1;35(4):471-479. doi: 10.1097/MEG.0000000000002519
- Rücker, G., Cates, C. J., & Schwarzer, G. (2017). Methods for including information from multi-arm trials in pairwise meta-analysis. *Research synthesis methods*, 8(4), 392–403. <https://doi.org/10.1002/jrsm.1259>