Synthesis
METHODS MICRO-REPORT (E156)

Modern random-effects methods change the significance judgement of Cochrane pairwise meta-analyses in 8.2% of cases

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Primary estimand: Tier-1 significance-flip rate (DerSimonian–Laird → REML+HKSJ+PI) across Cochrane pairwise meta-analyses.

Abstract

Does modernising RevMan's random-effects defaults from DerSimonian–Laird to REML+HKSJ with a prediction interval change the significance judgement of Cochrane pairwise meta-analyses? We re-analysed 6,386 loadable pairwise meta-analyses from 582 Cochrane reviews in the Pairwise70 corpus via the MetaAudit loader. For each meta-analysis we compared DL against REML+HKSJ+PI with a Q*/(k–1) floor and classified three flip tiers (significance, direction, clinically-important). Across the full corpus 8.2% of comparable meta-analyses flipped significance, 0.6% flipped direction, and 3.9% of the MID-available subset exceeded the clinically-important threshold. The effect concentrated in small-k and non-reproducible reviews; non-reproducible meta-analyses were approximately twice as method-sensitive as reproducible ones at every stratum examined. Method choice alone changes the significance judgement in roughly one in twelve Cochrane pairwise reviews, with the largest effect in continuous small-k analyses. Findings apply to aggregate pairwise data only; network meta-analyses, IPD reanalysis, and publication-bias methods are out of scope for v0.1.

FIGURES

Figure 1. DL → REML+HKSJ+PI flip rate by tier (comparable-MA denominator).

Figure 2. Tier-1 significance-flip rate by number of studies k.

Figure 3. Tier-1 flip rate, reproducible vs non-reproducible MAs.

METHODS NOTE

Random-effects pooling used REML τ² estimation; HKSJ inference with a max(1, Q*/(k–1)) multiplier floor so the interval is never narrower than the REML+Wald reference; HKSJ critical value t■■■; and a 95% prediction interval (k≥3) from metafor::predict.rma using t■■■ per Cochrane Handbook v6.5. Baseline: DerSimonian–Laird τ² with Wald (z) intervals (RevMan default). Reproducibility labels merged from the companion repro-floor-atlas. A Tier-1 flip is a change in whether the 95% interval includes the null.

DATA & CODE AVAILABILITY

Analysis derived exclusively from publicly available aggregate records (Cochrane Database of Systematic Reviews, via the Pairwise70 corpus extracted by the MetaAudit pipeline). No patient-level data. Code at https://github.com/mahmood726-cyber/cochrane-modern-re. Ethics not required. Funding: none. M.A. is a former Editor-in-Chief and current honorary member of the Synthesis editorial board; he had no role in the editorial handling or peer review of this article.

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