

More research ^{not} is needed

Assessment of whether a new study is likely to change the aggregate evidence: Introducing the Stability Threshold

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The Problem

There is always a degree of uncertainty in observational studies. Such uncertainty is an obstacle to achieving scientific consensus, which consequently impedes action. Certain types of uncertainty, such as study heterogeneity should not preclude an evidence-based response e.g., action on climate change, intervention to reduce air pollutant emissions, and adoption of the precautionary principle.

Definition

Stability: the degree to which a new study is likely to change the aggregate evidence to date.

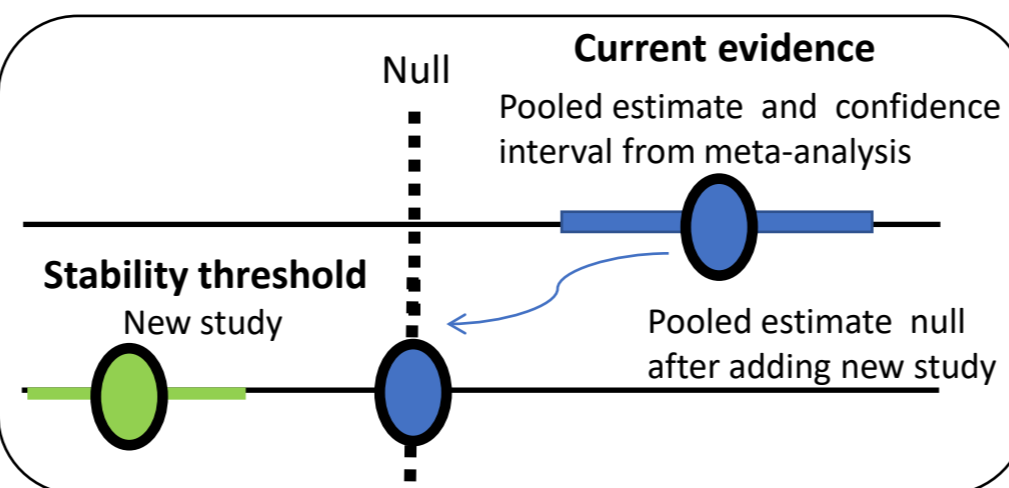
The Solution

The Stability Threshold is the effect needed for a future study to move the current pooled estimate to the null effect. It's confidence limit is the effect needed for a future study to move the confidence interval of the current pooled estimate to the null effect.

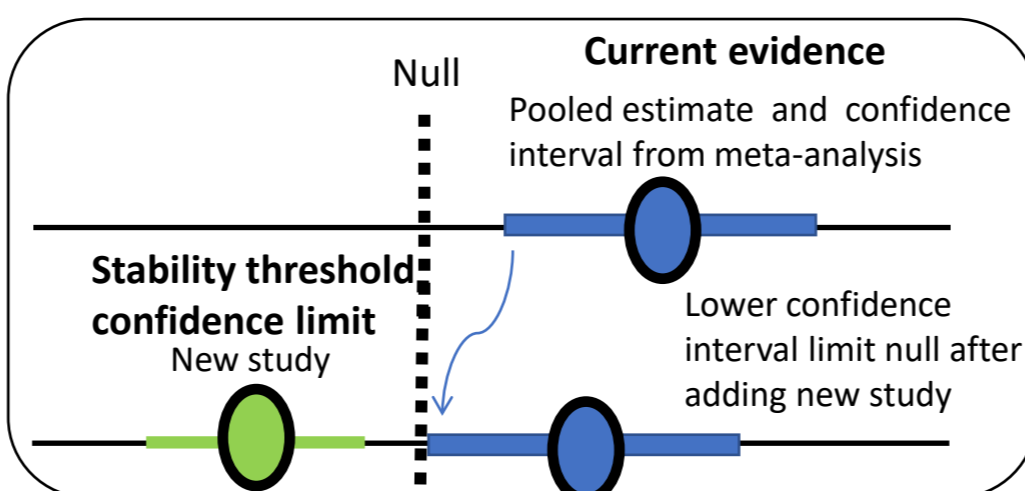
Three Ingredients

1. Pooled point estimate from current meta-analysis.
2. Variance or confidence interval of pooled estimate.
3. Variance of estimate from a new future study.

Stability Threshold



Its Confidence Interval Limit



Reference

Pereira G. A Simple Method to Establish Sufficiency and Stability in Meta-Analyses. IJERPH. 2022; 19(4)

Conclusion

The Stability Threshold can be calculated easily from a meta-analysis. It provides a metric to complement a comprehensive evidence assessment to identify when the aggregate evidence to date is stable enough to justify a public health response. **More research is not necessarily needed.**

Example

The cumulative meta-analysis below shows the effect of particulate matter air pollution (PM_{2.5}) on preterm birth has not changed since 2015. The stability threshold (Relative Risk) of 0.93 (95% CI limit 1.02) shows that a new study would need to observe an unusually precise and protective effect to change current conclusions.

