



# Reproducibility-related Reporting Practices in Meta-analyses on the Effectiveness of Psychological Interventions

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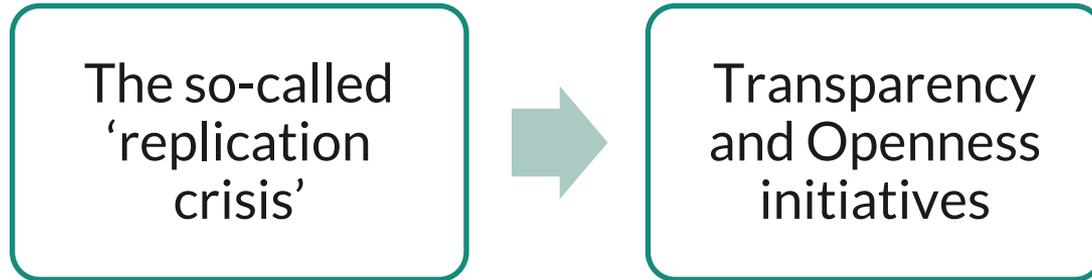
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## Age of Open Science





# Reproducibility of meta-analyses

## Different concerns on reproducibility of meta-analyses

- Primary effect sizes computations and multiplicity (Gøtzsche et al. 2007; Massen et al., 2020; Tendal et al., 2007;2011)
- Lack of primary data availability and ambiguity in reported methodology (Lakens et al., 2017)
- Multi-lab RRR projects vs. Published Meta-analyses (Kvarven et al., 2020)

## Reproducibility as a core component of meta-analyses

- Meta-analyses as a 'gold standard' of evidence.
- Reusability and updating
- Robustness analysis with novel techniques



## Purpose

- Empirical assessment of the reproducibility-related reporting practices in published meta-analyses on clinical psychological interventions
- Identify the key point that could be improved
- Produced some recommendations accordingly



# Method

- Meta-review:
  - Inclusion criteria:
    - At least one meta-analysis focused on the effectiveness of psychological intervention/s was reported
    - publication year after 1999
    - the effect size index was a mean difference or a standardized mean difference
    - written in English or Spanish
      - Individual participant data meta-analyses and network meta-analyses were excluded from this study



# Method

- Meta-review:
  - Databases:
    - PubMed
    - Scopus
    - Core collection of Web of Science



# Method

- Meta-review:
  - Databases:
    - PubMed
    - Scopus
    - Core collection of Web of Science
  - Search strategy:
    - (meta-analy\*[Title] OR "quantitative review" OR "systematic review"[Title]) AND (psychotherap\*[Title] OR "cognitive behavioral therapy"[Title] OR "behavior therapy"[Title] OR "cognitive behavioural therapy"[Title] OR "behaviour therapy"[Title] OR "CBT"[Title] OR "psychological treatments"[Title] OR "psychological interventions"[Title] OR "psychological treatment"[Title] OR "psychological intervention"[Title])



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- Measured indicators:
  - Structured coding form:
    - Systematic review methods: searching/screening procedures and data collection process (16 items)
    - Meta-analysis methods: effect measures and statistical methods (17 items)



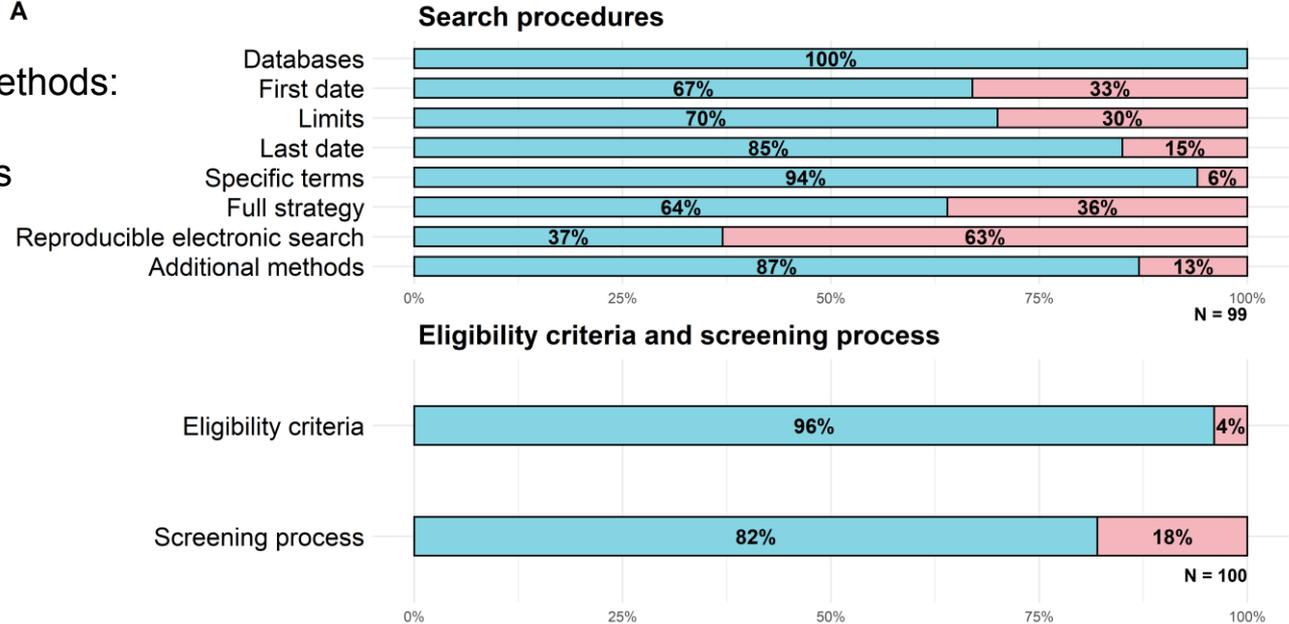
# Method

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- Measured indicators:
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    - Systematic review methods: searching/screening procedures and data collection process (16 items)
    - Meta-analysis methods: effect measures and statistical methods (17 items)
- Analysis: Reporting rates of each indicator

# Results

A

Systematic review methods:  
Searching and  
screening procedures

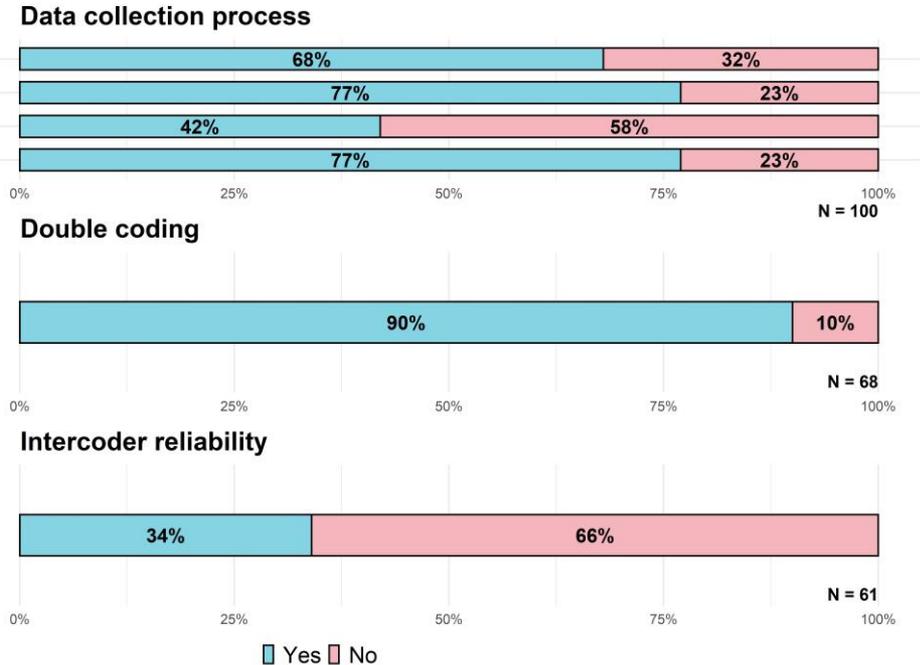


# Results

Systematic review methods:  
Data collection process

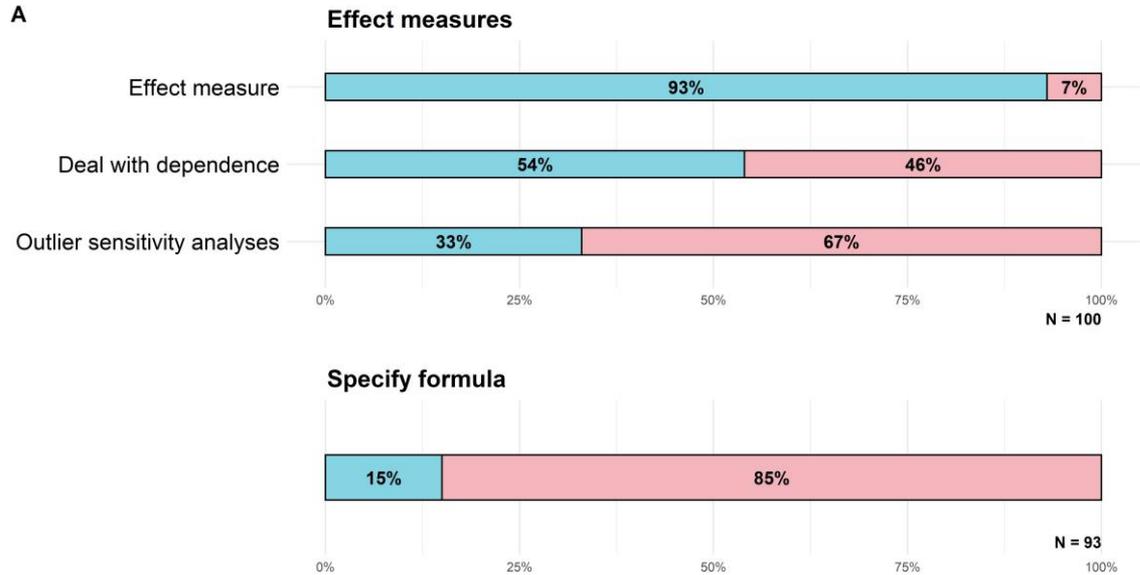
B

- Gives details
- List of coded variables
- Deal with missing data
- Risk of bias assessment



# Results

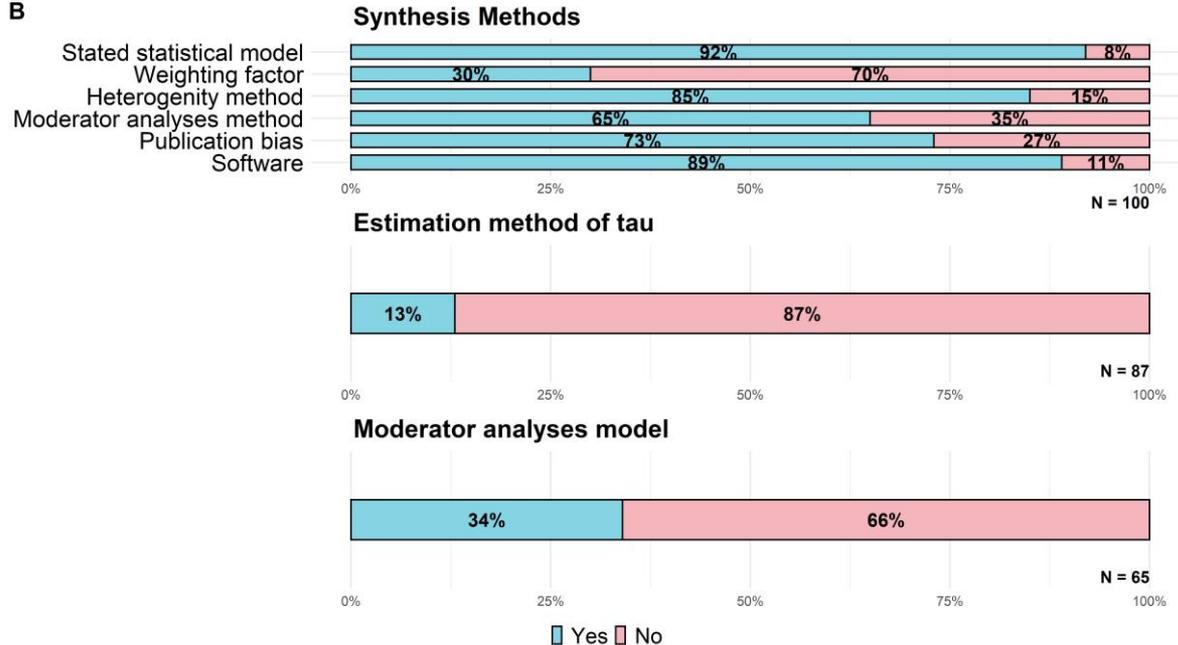
Meta-analytic methods:  
Effect measures



# Results

Meta-analytic methods:  
Statistical methods

B





# Discussion

- Completely reproducible electronic search:
  - only 37% reported all details combined for at least one database, allowing full reproducibility of electronic search
    - Due to space limitations, these details could be reported as supplementary materials (hosted by the journal, online repositories...)
      - PRISMA 2020 (Page et al., 2021): Full strategies for ALL databases used.
      - PRISMA-S (Rethlefsen et al., 2021)



# Discussion

- Effect measures:
  - only 15% reported the specific method to compute de primary effect measures
    - Approaches variety to compute standardized mean differences (Rubio-Aparicio et al., 2018)
    - Different concerns about reproducibility of the primary effect measures computation (Gøtzsche et al. 2007; Massen et al., 2020; Tendal et al., 2007)
    - Commonly, general references to handbooks were observed.
      - The equation number and/or the book/article page where the formula can be found should be included



# Discussion

- Statistical methods:
  - Although the majority of the papers reviewed stated the statistical model assumed (92%), only a few stated details such as estimation method of between-studies variance (13% of the papers that assumed random-effects model) or the weighting scheme (30%)
  - These details may have an impact on the results and therefore compromise the analytical reproducibility.



# Discussion

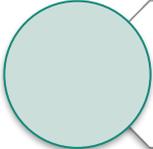
- Statistical methods:
  - Clearly report of the analytical choices is a key aspect of the analytical reproducibility
    - Sharing the analysis code is one of the best ways to guarantee analytic reproducibility (only 1% of the papers reviewed shared their analysis script code)
    - `reporter()` function of the metafor R's package returns a very helpful draft report of the analysis methods that may be used as a starting point



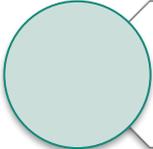
## Conclusion



Meta-analysis is widely considered as one of the best sources of scientific evidence



Standards of research quality, transparency, and reproducibility-related practices of meta-analysis need to be high



New tools or tutorials to help researchers with this task when carrying out a meta-analysis are available (e.g., Lakens et al., 2016; Moreu & Gamble, 2020; Page et al., 2021)



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