Addressing publication bias in meta-analysis: Empirical findings from community-augmented meta-analyses of infant language development

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Preprint: https://osf.io/preprints/metaarxiv/q5axy
Publication bias ...
Is Developmental Psychology special?

→ What lands in the filedrawer?
  ★ Failed methodological innovation
  ★ "Low quality" studies
Is Developmental Psychology special?

→ What lands in the filedrawer?

★ Failed methodological innovation
★ "Low quality" studies

And/or the "classic" reasons

★ Non-significant results
★ Impopular (counter-theoretical) results
What makes us special: Our participants

- **Difficult to test**
  - Don't respond to questions / instructions
  - Uncooperative, easily distracted
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➢ Difficult to recruit
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Bonus: sensitive population (should we even test 1000 babies?)
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Bonus: sensitive population (should we even test 1000 babies?)

→ Incentive to share (most) results?
Opening the file-drawer

Q0: Are there file-drawer studies?

Q1: Which strategies are most successful?

Q2: Does unpublished literature reduce bias?
The present study

MetaLab

Early Language
How do children learn their native language?

Cognitive Development
What is the nature of children’s understanding?

18 Meta-analyses
404 Papers
1,545 Effect sizes
24,870 Participants

2 Meta-analyses
35 Papers
141 Effect sizes
1,572 Participants
The present study

MetaLab

More tomorrow at 16h
The present study

20 meta-analyses screened

- 2 merged to reflect original protocol
- 8 excluded for insufficient details

10 meta-analyses included

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How much unpublished data do we have?

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Ferguson & Brannick (2011), based on 91 meta-analyses

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Opening the file-drawer

Q1: Which strategies are most successful?
Where do unpublished data come from?
Where do unpublished data come from?

- Database search: 37.3% (SD = 42.9)
- Citation search: 3.3% (SD = 10.5)
- Work known: 31.8% (SD = 35.9)
- Own data: 27.5% (SD = 33.7)

Own data: 9.6% of published & 27.5% of unpublished

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Special case: Author contact

Contacted: 12.7 authors

Responsive: 9.8 / 85.1% (SD = 19.5)

Contributed data: 5.4 / 49.6% (SD = 28.1)

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So, which strategy should I choose?

Low time investment and effective: Database search
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High time investment, but more effective: Networking
So, which strategy should I choose?

Low time investment and effective: Database search

High time investment, but more effective: Networking

Caution with own data
  → Can be source of bias
    ● Uneven sampling
    ● Over-represent one side in contested fields
Opening the file-drawer

Q2: Does adding unpublished literature reduce bias?
   i) effect size estimates
   ii) bias estimates
Are unpublished studies of lower quality?

Study quality: No formal definition
Are unpublished studies of lower quality?

Study quality: No formal definition

Proxy: Sample size
→ No difference
  published: M = 21.7, SD = 9.9
  unpublished: M = 22.5, SD = 10.3
Opening the file-drawer

Q2: Does adding unpublished literature reduce bias?
   i) effect size estimates
   ii) bias estimates
Are unpublished effect sizes smaller?

Publication status

- All $d = 0.22$ (-0.34 - 0.77)
- Published $d = 0.24$ (-0.17 - 0.66)
- Unpublished $d = 0.15$ (-0.34 - 0.77)

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Opening the file-drawer

Q2: Does adding unpublished literature reduce bias?
   i) effect size estimates
   ii) bias estimates
Does adding grey literature counter bias?
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No change in bias
Lessons learned: Include grey literature?

- Unpublished effects tend to be lower
  - BUT: Reverse pattern in some meta-analyses
- No evidence for bias changes *(Note: Small sample)*
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- Unpublished effects tend to be lower
  - BUT: Reverse pattern in some meta-analyses
- No evidence for bias changes (Note: Small sample)

- **Recommendation**: Gather grey literature and report effect of inclusion
Lessons learned: Improving quality appraisal

- Missing: Formal definitions of "study quality" applicable to basic-level (developmental) psychology
  - Key for inclusion / weighting
  - (But possible source of bias)
Lessons learned: Improving meta-analyses

- Documentation and transparency are key
- Improve literature search from both ends
  - Meta-analysis: Provide templates (incentivize with added value)
  - Data providers / search engines: Better indexing, make searches reproducible
Thank you
Does adding grey literature lower effect size?
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