Impossible generalisations: meta-analyses of education interventions

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Meta-analysis of education studies

- They tell ‘what works’ in education
- But find different results
  - because looking at different studies
  - because the evidence base in heterogeneous

Krishnaratne et al. (2013), Sniltsveit et al. (2016), McEwan (2013)
Misunderstandings of meta-analyses

• 1st misconception: meta-analyses identify a universal effect applicable to all contexts
• 2nd misconception: the mean of a meta-analysis predicts the effect to be observed by a future study
Fixed-effect meta-analysis

- Assume that all interventions have the same effect
- The mean is converging to the ‘true’ universal effect
- The confidence interval is the result of sampling variation
Sources of heterogeneity

• Sources of heterogeneity in education
  o Differences in populations
  o Differences between interventions
  o Differences in outcomes, biases and measurement error
Random-effects meta-analysis

• Assume that interventions have different effects
• The mean is simply our estimate of the mean effect
Confidence intervals and prediction intervals

• Confidence intervals describe the accuracy of the mean

• The impact of a new intervention similar those included studies is given by a prediction interval

• Prediction intervals rarely used, overstating impacts in meta-analyses
Education systematic reviews

- 3ie systematic review: 238 studies, 216 programmes, 20 intervention categories
- CCT have largest impact on participation outcomes, while SF is ‘promising’
- Structured pedagogy have largest impact on learning, while merit-based scholarships, SF, extra time and remedial education are ‘promising’
- Some interventions have zero impact
School attendance

School attendance confidence intervals

Intervention
- Multi-component
- Hygiene infrastructure interventions
- Cash transfers
- School feeding
- Construction of new schools
- CAL
- Community-based monitoring
- SBH- Deworming
- Merit-based scholarships
- Pedagogy
- Teacher incentives
- User fee reduction

School attendance Predicted intervals

Intervention
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School completion

School completion confidence intervals

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School completion prediction intervals

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Reading test scores

Reading test scores
confidence intervals

Intervention

Pedagogy
Extra time
Remedial education
Community-based monitoring
Tracking
School feeding
Teacher hiring
Merit-based scholarships
Multi-component
PPP
SBH - Malaria control
Construction of new schools
CAL
Diagnostic Feedback
School-based management
SBH - Deworming

-0.5 -0.2 0 0.2 0.5 1

Reading test scores
prediction intervals

Intervention

Pedagogy
Extra time
Remedial education
Community-based monitoring
Tracking
School feeding
Teacher hiring
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What works in education?

- No intervention is predictably more effective or more promising
- Heterogeneity is very high for all outcomes
- Heterogeneity is underestimated by prediction intervals:
  - New studies likely to be different from those included
  - Publication bias
Conclusions for education meta-analyses

• More studies will not reduce heterogeneity
  ➢ Heterogeneity likely to increase with number of studies

• Redefining intervention categories:
  ➢ More precise categories will make more homogeneous groups
Addressing heterogeneity

• The grand mean is not very useful, can be misleading

• Analyse heterogeneity
  o extent by category
  o sources of heterogeneity

• Lessons for single studies: explore mechanisms do not just estimate effect sizes
Thank you