

# Modeling approaches for cross-sectional integrative data analysis

Evaluations and recommendations

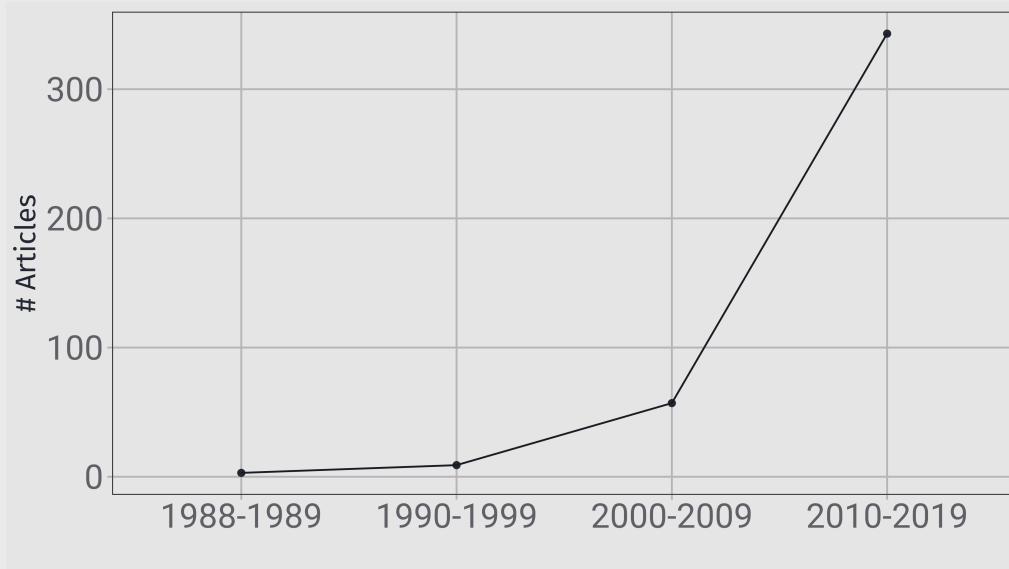
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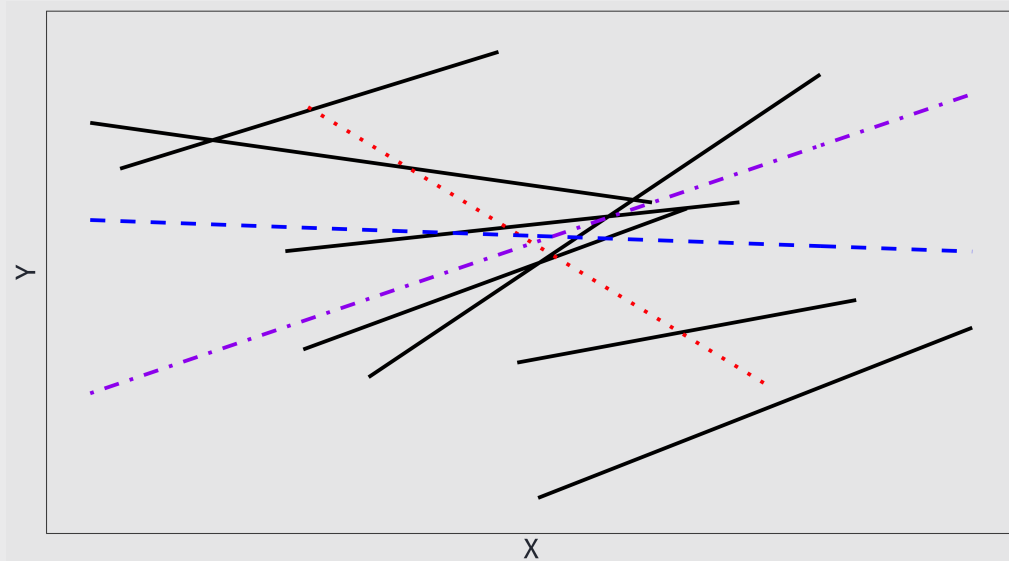
# Integrative Data Analysis (IDA)

Integrative data analysis (IDA) simultaneously analyzes the *participant-level* data from multiple studies (Curran & Hussong, 2009)



- 91% used fixed-effects models
- Minimal disaggregation
- But what are we estimating and testing?

# Participant-Level and Study-Level Effects



- Average participant-level effect of  $X$  on  $Y \rightarrow \gamma_W$  (dot-dashed/purple line)
  - Variability of intercepts  $\rightarrow \sigma_{u_0}^2$
  - Variability of slopes  $\rightarrow \sigma_{u_1}^2$
- Study-level effect of  $\bar{X}$  on  $\bar{Y} \rightarrow \gamma_B$  (dotted/red line)

- Aggregated effect:  $\gamma_A$  (dashed/blue line)

"An uninterpretable blend" of  $\gamma_W$   
and  $\gamma_B$   
(Raudenbush & Bryk, 2002, p. 138)

# Research Questions

1. What Models Can Disaggregate Participant- and Study-Level Effects?
2. How Do We Account for Between-Study Heterogeneity?
3. What Methods Work in IDA Small Sample Scenarios?

# Recommendations

- Disaggregate participant-level and study-level fixed effects
- Carefully consider and model sources of between-study heterogeneity
  - Failing to do so can yield incorrect type I error rates for one or both levels of fixed effects
- With a small number of studies, random-slopes MLM can yield accurate estimates and well-controlled type I error rates for both types of fixed effects
  - Appropriate degrees of freedom methods are critical
    - Kenward-Roger (1997) DF for study-level fixed effect
    - Containment DF for participant-level fixed effect
- Overall, MLM can be a viable option for IDA with even as few as six studies

# Thanks!

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<https://www.ktylerwilcox.me/slides/2021imps-wilcox-wang-slides.pdf>

## Paper:

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