

THE DEPARTMENT OF EDUCATIONAL PSYCHOLOGY'S RESEARCH METHODS,  
MEASUREMENT, & EVALUATION (RMME) PROGRAMS AND THE DEPARTMENT OF  
STATISTICS AT THE UNIVERSITY OF CONNECTICUT PRESENT:

# THE MANY CHOICES FOR ESTIMATING TREATMENT EFFECTS IN BLOCKED, CLUSTER-RANDOMIZED TRIALS

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Blocked, cluster-randomized controlled trials are a common tool in education and other fields due to the natural nested structure of data (e.g., students in schools, in districts). Such trials present unique challenges in estimating overall average treatment effects, especially in the face of possible impact heterogeneity and variation in block and cluster sizes. Researchers must decide whether to target the average effect across individuals or clusters and, given that choice, select from a wide range of estimators (we have identified more than 30) that make different bias-variance tradeoffs and rely on various assumptions. These choices are further complicated by degrees-of-freedom constraints and the instability of nominally unbiased estimators. To assess the consequence of these choices in practice, we examine over 30 field trials in the social sciences, applying 32 estimators, including various design-based estimators, aggregation approaches, linear models, and random-effects models to each associated dataset for all primary outcomes. We then evaluate the extent to which different methodological choices impact estimated effects and estimated standard errors. Point estimates can vary substantially, and estimated standard errors can easily differ by a factor of 3 or more. We supplement our findings with a calibrated simulation and theoretical inquiry to identify what drives found differences. We close with practical guidance to researchers navigating these issues.



Dr. Luke Miratrix is a Professor at the Harvard Graduate School of Education and an affiliate faculty member in the Department of Statistics. His work focuses on the use of modern statistical methods in applied social science, with an emphasis on causal inference, transparency, and rigor. His research centers on analyzing data in ways that support engagement by diverse stakeholders while maintaining methodological rigor. He has particular interests in causal inference, treatment effect heterogeneity, multilevel and randomized trial designs, effective use of machine learning and LLM tools, and text-as-data approaches, including the use of text in causal settings. Although much of his work is in education—ranging from early childhood evaluations to community college risk detection—he has also conducted research in elections, media analysis, regulatory policy, criminal justice, and human-computer interaction. Miratrix received his PhD in Statistics from the University of California, Berkeley in 2012. His background includes an MS in Computer Science from MIT, a BS in Computer Science from Caltech, and a BA in Mathematics from Reed College.

## Colloquium Access Information:

Friday, 1/30/2026, 11am ET

**In Person:** Gentry 144

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