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Reaching out to behavioral science audiences via meta-analysis

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Abstract
Exposing students to meta-analysis supports ASA Curriculum Guidelines regarding the importance of data science, working with real and unusual data, diverse approaches to statistical models, and building relationships with allied disciplines. This poster present some of the benefits to students from taking an undergraduate meta-analysis course. The course is a 300-level statistics elective (class size: 12-18) that enrolls statistics majors and students from social and allied health science majors who are working on a data science minor. The course assumes one prior statistics course, and is taught using R. Benefits to students include: learning how to read primary research papers in their discipline (or, for statistics majors, a discipline of interest) for effect size statistics and other quantitative concepts that are important for data synthesis, connecting with issues around research reproducibility and credibility in their discipline, and conducting an original meta-analysis in a research literature of interest.

Disciplines
Statistics and Probability

Comments
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Main idea

Meta-analysis is a widely used quantitative method in the behavioral sciences for synthesizing research and informing policy and interventions.

ASA Undergraduate Curriculum Guidelines emphasize:

- Data science and statistical computing
- Working with real data
- Diverse approaches to statistical models
- Communicating complex findings to laypeople
- Building relationships with allied disciplines

Meta-analysis incorporates these goals into a course or module learning experience.

Meta-analysis is a vehicle for statistics programs to intersect with behavioral science programs and audiences.

This poster presents the **learning goals**, **content modules**, and **types of assignments** in an undergraduate meta-analysis course.

Learning goals

What can students learn in a meta-analysis course or module?

1. **Issues around research synthesis and credibility**. The conceptual and statistical justifications for combining results across samples, and the role of meta-analysis in research credibility and reproducibility.
2. **Research literacy**.
   - Learn to read primary research for design and measurement details and effect size statistics.
   - Learn to do primary-study quality assessment.
   - Learn to read published meta-analytic reviews.
3. **Statistical methods and modeling**. Learn and use the statistical methods and models appropriate to meta-analysis.
4. **Disciplinary immersion**.
   - Do focused reading of primary disciplinary research around a research question.
   - Conduct a meta-analytic project in an area of disciplinary interest.
5. **Statistical computing**. Develop working knowledge of R packages and functions for meta-analysis.

Content modules

What can be taught in a meta-analysis course?

Library research tools

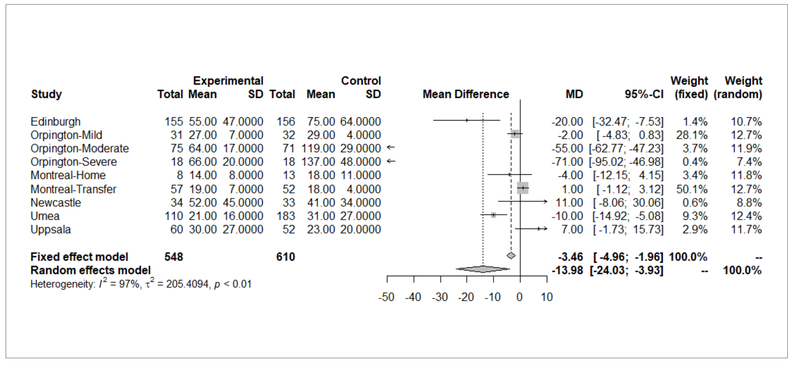
- Databases and search tools for study search and retrieval
- Study quality assessment tools

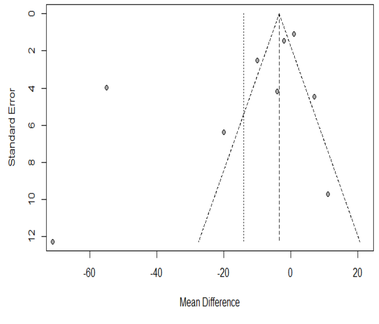
Effect size statistics and their standard error estimates

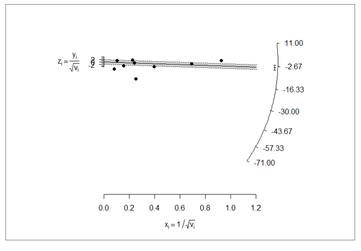
- SMDs
- OR/RR
- Correlation coefficients

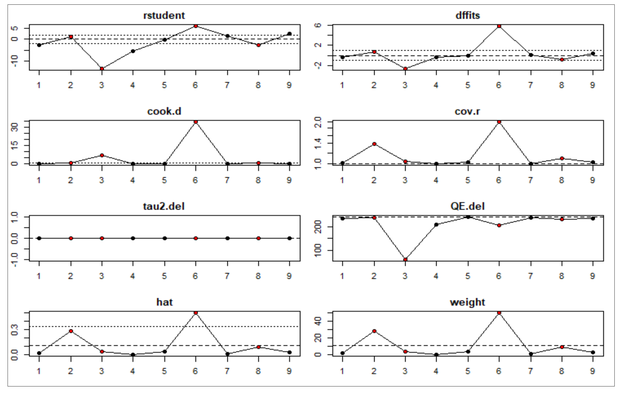
Meta-analytic statistics and methods

- Fixed/random/mixed effects models
- Heterogeneity statistics
- Meta-regression
- Bias and sensitivity analyses
- Graphical tools for meta-analysis









Assignments

What can students do in a meta-analysis course?

Data analytic assignments

- Work with effect size statistics
- Fit and evaluate meta-analytic models
- Meta-regression with quantitative and categorical predictors

Literacy assignments

- PICO, database, and search exercises
- Scraping design and treatment effect data from primary studies.
- Summarize a meta-analytic review
- Assessing primary study quality with Cochrane Collaboration assessment tool

Disciplinary research assignments

- Assignments comprising a meta-analytic project on a disciplinary question of interest