Meta-Analysis
ED PSYCH 967 – Spring 2025-26

Lecture	Tues/Thur 1:00 – 2:15 pm
Room	Educational Sciences 1053
Credits	3 credits[1]
Instruction	Face-to-face

Instructor	Dr. James E. Pustejovsky (pronounced "PUHS-tea-UV-ski" or "Pusto" for short)
Pronouns	he/him/his
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Course Description

Meta-analysis is the set of statistical methods and practices for synthesizing evidence collected from multiple sources, such as multiple studies on the same topic. Often conducted as part of a systematic literature review, meta-analyses play an increasingly prominent role in education research, psychology, and many other areas of social and behavior science. This course will introduce the stages of the research synthesis process and the statistical methods used for conducting quantitative syntheses of social-scientific research. The focus of the course is on practical application and interpretation of meta-analytic methods, enriched with discussion of underlying statistical theory. Computational exercises will use the R statistical computing environment. Major topics will include scope of research syntheses, systematic search and screening procedures, effect size calculations, summary meta-analysis, meta-regression, dependent effect sizes, selective reporting and publication bias analysis.

[1] This class meets for two, 75-minute class periods each week over the Spring semester and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc) for about 3 hours out of the classroom for every class period.

Requisites

- Prior training in regression analysis (such as ED PSYCH 763)
- Experience with writing scripts/programming with at least one software platform for data management and analysis (e.g., R, SAS, Stata). You should be comfortable doing the following in your preferred language:
    - Find a subset of a dataset (e.g., in a dataset containing the color preferences of elementary school students, find all rows corresponding to 4th grade students whose favorite color is purple).
    - Calculate summary statistics for subsets of observations (e.g., calculate the proportion of students in each grade whose favorite color is purple; calculate the mean and standard deviation of student heights by grade level).
    - Calculate new variables and add them to a dataset (e.g., create a new variable called "pinkpurple" that is equal to 1 if a student likes pink or purple and equal to 0 if the student does not like pink or purple).
    - Compute and interpret the output of linear regression models, including models with interaction terms.

Course Learning Outcomes

By the end of this course, students will be able to:

- Conduct a systematic, replicable search of literature databases for purposes of identifying studies eligible for a meta-analysis.
- Extract data and calculate effect sizes, along with associated information, from eligible studies.
- Analyze meta-analytic databases using appropriate statistical techniques.
- Interpret and critically evaluate the results of summary meta-analyses, meta-regression analyses, and publication bias analyses.
- Identify limitations and threats to the validity of meta-analytic findings.

Required Textbook

- Cooper, H., Hedges, L. V., & Valentine, J. C. (Eds.). (2019). *The Handbook of Research Synthesis and Meta-Analysis*, 3rd Edition. Russell Sage Foundation.
  This is the definitive desk reference on research synthesis and meta-analysis in the social sciences. It is a great resource and well worth owning if you ever intend to conduct or collaborate on a research synthesis. ***The electronic version is available as an Adobe Digital Editions pdf through the UW Madison library.***

Additional Recommended Resources

- Cooper, H. (2015). *Research Synthesis and Meta-Analysis: A Step-by-Step Approach*. SAGE Publications.
  This is an excellent guide through the full process of conducting a research synthesis, although it is light on the statistical details.
- Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2011). *Introduction to Meta-Analysis*. John Wiley & Sons.
  This textbook covers basic meta-analysis methods at an introductory level suitable for students without prior statistical training. It includes many worked, numerical examples.
- Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. SAGE Publications.
  This is an older guide to conducting a systematic review and research synthesis. It includes lots of great pragmatic advice, but is short (at times even misguided) about the statistical details.
- Higgins, J.P.T., & Green, S. (Eds). (2009). *The Cochrane Handbook for Systematic Review of Interventions.* Chichester (UK): John Wiley & Sons. Online version at https://training.cochrane.org/cochrane-handbook-systematic-reviews-interventions. *This handbook defines the methods used in systematic reviews and meta-analyses of healthcare interventions conducted under the auspices of the Cochrane Collaboration.*
- Online resources from the Campbell Collaboration: *https://campbellcollaboration.org/research-resources/training-courses.html*
- *Research Synthesis Methods* is an interdisciplinary journal sponsored by the Society for Research Synthesis Methodology. It is a leading outlet for new methodological developments related to research synthesis and meta-analysis.

Computing

In-class software demonstrations will use the R environment for statistical computing. In principle, you are welcome to complete the problem sets and exam using your choice of software. However, I am unable to provide examples, debugging help, or technical support for any software not demonstrated in class.

There are many freely available resources for learning R. Here are some:

- R: https://www.r-project.org/
- RStudio: https://www.rstudio.com/
- On-campus R Trainings: https://sscc.wisc.edu/sscc_jsp/training/
- A short online-introduction: https://pubs.wsb.wisc.edu/academics/analytics-using-r-2019
- YaRrr! The Pirate's Guide to R: https://bookdown.org/ndphillips/YaRrr/
- Princeton R tutorials: https://exploringr.princeton.edu/self-learning-resources-for-r/
- D-Lab R training: https://github.com/dlab-berkeley/R-for-Data-Science
- A guide to programming style in R: https://jef.works/R-style-guide/

Evaluation

- Problem sets (70%)
- Final exam (25%)
- Participation (10%)

A tentative rubric for assignment of final grades is listed below. ***The instructor reserves the right to modify this rubric.*** Square brackets correspond to ≤ or ≥; rounded parentheses to < or >.

A	[90, 100]	C	[65, 70)
A/B	[85, 90)	C/D	[60, 65)
B	[75, 85)	D	[50, 60)
B/C	[70, 75)	F	[0, 50)

Problem sets

- Students will complete problem sets involving analysis of real or simulated data. The exercises will typically involve implementing different analytic methods and interpreting the results. Some exercises will involve reading and interpreting published meta-analyses.
- Problem sets will be submitted and graded through Canvas.

Final exam

- The final exam will be cumulative, covering all topics addressed during the semester.
- The exam will be distributed by Friday, May 1, 2026 and will be due by Thursday, May 7th, 2026.
- ***Each student must complete the exam individually***, without talking to other students regarding the exam material.
- Dedicated on-campus spaces with high-speed internet are available for students to reserve for any exam taken during the semester. Computers can also be requested.

Participation

- Students are expected to attend course meetings and to prepare for and participate actively in class activities, including in-class exercises, small-group and full-group discussions, and exit slips.
- Preparation and active participation in class are demonstrated by:
    - Contributing observations about how discussion topics relate to your discipline / research area.
    - Asking questions or offering observations that make connections to assigned readings.
    - Listening to and reflecting upon other students' observations.

- Asking clarifying questions to identify concepts in need of further explanation / discussion.

Respectful Learning Environment

Courses in Educational Psychology are venues for the free, open, and respectful exchange of ideas. Class members are expected to respect others and to contribute to a healthy learning environment in all course activities. Concerns in this regard should be brought to the attention of the course instructor.

Diversity & Inclusion Statement

Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals. The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world.

The School of Education recognizes that our desire to be an anti-racist, unbiased, and inclusive academic community is ongoing and involves shared commitment, responsibility, action, and accountability. We believe that diversity, equity, inclusion, and inclusive excellence, the four essential pillars of our approach to generating positive and lasting change, build upon our scholarship and the School's reputation as a leading educational institution. Read the full statement for values and commitments supporting the School's efforts.

Academic Integrity Statement

By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison. Students are expected to maintain absolute integrity and a high standard of individual honor in scholastic work. Assignments and projects must be completed with the utmost honesty, which includes acknowledging the contributions of other sources to your scholastic efforts; avoiding plagiarism; and completing assignments independently unless expressly authorized otherwise. ***Homework assignments or projects containing any plagiarized material will not be accepted.*** Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these previously listed acts are examples of academic misconduct, which may result in disciplinary action. Examples of disciplinary action include, but are not limited to, failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

Accommodations for Students with Disabilities Statement

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable

accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA. (See: McBurney Disability Resource Center)

Privacy of Student Information & Digital Tools: Teaching & Learning Analytics & Proctoring Statement

The privacy and security of faculty, staff and students' personal information is a top priority for UW-Madison. The university carefully reviews and vets all campus-supported digital tools used to support teaching and learning, to help support success through learning analytics, and to enable proctoring capabilities. UW-Madison takes necessary steps to ensure that the providers of such tools prioritize proper handling of sensitive data in alignment with FERPA, industry standards and best practices.

Under the Family Educational Rights and Privacy Act (FERPA which protects the privacy of student education records), student consent is not required for the university to share with school officials those student education records necessary for carrying out those university functions in which they have legitimate educationl interest. 34 CFR 99.31(a)(1)(i)(B). FERPA specifically allows universities to designate vendors such as digital tool providers as school officials, and accordingly to share with them personally identifiable information from student education records if they perform appropriate services for the university and are subject to all applicable requirements governing the use, disclosure and protection of student data.

Privacy of Student Records & the Use of Audio Recorded Lectures

See information about privacy of student records and the usage of audio-recorded lectures.

Lecture materials and recordings for this course are protected intellectual property at UW-Madison. Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may also take notes solely for their personal use. If a lecture is not already recorded, you are not authorized to record my lectures without my permission unless you are considered by the university to be a qualified student with a disability requiring accommodation. [Regent Policy Document 4-1] Students may not copy or have lecture materials and recordings outside of class, including posting on internet sites or selling to commercial entities. Students are also prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

Course Evaluations

Students will be provided with an opportunity to evaluate this course and your learning experience. Student participation is an integral component of this course, and your confidential feedback is important to me. I strongly encourage you to participate in the course evaluation.

UW-Madison now uses an online course evaluation survey tool, AEFIS. In most instances, you will receive an official email two weeks prior to the end of the semester when your course evaluation is available. You will receive a link to log into the course evaluation with your NetID where you can complete the evaluation and submit it, anonymously.

Quarantine or Isolation Due to Communicable Disease

Student should continually monitor themselves for symptoms of COVID-19 and other resperatory illnesses and get tested if they have symptoms or have been in close contact with someone who is ill. Student should reach out to instructors as soon as possible if they become ill or need to isolate or quarantine, in order to make alternate plans for how to proceed with the course. Students are strongly encouraged to communicate with their Instructor concerning their illness and the anticipated extent of their absence from the course (either in-person or remote). The instructor will work with the student to provide alternative ways to complete the course work.

Academic Calendar & Religious Observances

See: https://secfac.wisc.edu/academic-calendar/#religious-observances