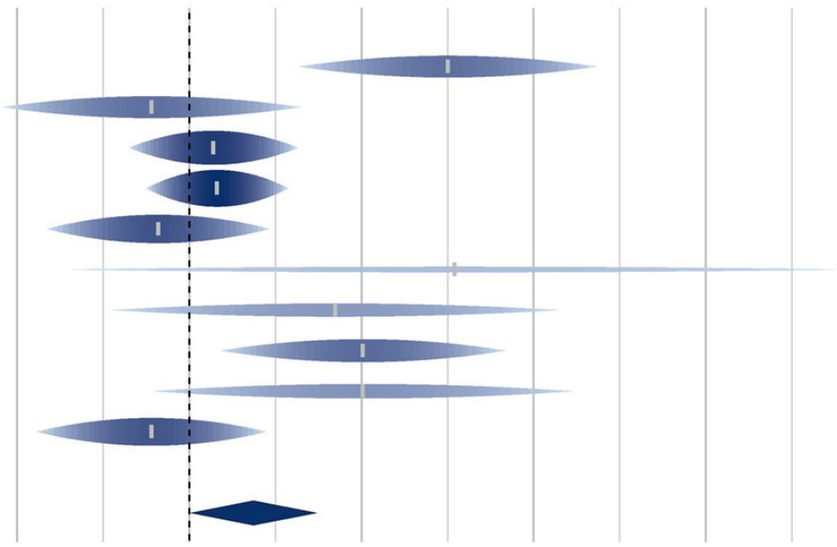

META-ANALYSIS IN R

Dates

7-10 March 2022

Due to the COVID-19 outbreak, this course will be held online

COURSE OVERVIEW

Meta-analysis is an approach to research synthesis that uses quantitative methods to pool and compare results in the literature. As part of the systematic review process, meta-analysis has become a standard approach for synthesizing quantitative research in social and biomedical sciences. This course provides an overview and introduction to modern methods for meta-analysis.

We begin with an overview of the systematic review and meta-analysis process, including problem specification, search methods, data extraction, quality evaluation, statistical analysis, model interpretation, and critique, and results in presentation. Next, we will examine the parameter estimation approach to statistical analysis (effect sizes, confidence/uncertainty intervals) and explore how this approach can be used to quantify the results of individual studies and the whole literature. Next, we will explore how statistical artifacts, such sampling error, measurement error, and bias, can create the illusion of inconsistenc

findings across studies.
Following these basic principles, we will explore methods for statistically cumulating findings across studies to reduce biases using random-effects meta-analysis and meta-regression. We will examine methods for moderator analysis (stratified subgroups, meta-regression), interpretation of average effects and heterogeneity, and corrections for numerous statistical artifacts (sampling error, measurement error, range restriction, and selection effects). Throughout, we will consider examples for how to interpret results and present them using tables and data visualization.

Next, we will examine methods for model diagnostics and sensitivity analyses related to outliers and publication bias. We will explore modern methods for detection and quantification of publication bias, as well as consideration of problems associated with older approaches.
Finally, we discuss meta-analysis as part of the broader systematic review process and introduce principles for planning and carrying a systematic review in a reliable, transparent, and reproducible manner. Resources for planning a systematic review and extracting results from studies will be provided.
This course will include a mix of lectures, hands-on tutorials, and practice exercises with analyzing real meta-analytic datasets. The emphasis throughout the course is on the application of the various methods and the interpretation of the results. Analyses will be conducted using the free software R and packages metafor and psychmeta.

COURSE PREREQUISITES

In general, the course will be fairly self-contained. However, a few things can help you be prepared to get the most out of the class. First, the course will assume a basic familiarity with statistical methods (e.g., regression, hypothesis testing). Although there will be some presentation of formulas and statistical notation, the course will focus on using visualization to understand, present, and interpret meta-analysis models. We will use computer software to do computations, and much of the course will focus on fitting models with software and using software to present results for interpretation.

The course will use R to conduct analyses and prepare results. All of the necessary steps for conducting the analyses in R will be presented in class, but this is not a general R programming course. At least basic familiarity with R will help during the class. If you are new to R, it may be helpful to familiarize yourself a bit ahead of time. Some basic resources on using R enough for this course are available from https://wvbauer.com/doku.php/prep_for_r and https://bookdown.org/MathiasHarrer/Doing_Meta_Analysis_in_R/

HOW TO PREPARE FOR THE COURSE

Before class, please install R 4.1 or higher from the Comprehensive R Archive Network (CRAN). Choose the appropriate "Download R" link depending on your operating system and follow the instructions for downloading and installing R. If you already have R installed, please check that it is the current version (you can check what the 'latest release' of R is by going to CRAN and then compare this with the version shown when you start R). If you do not have the latest version installed, please update.
Although not strictly necessary, it will be useful to also install an integrated development environment (IDE) for R. A popular choice is RStudio. So, unless you already have a different setup, please download and install RStudio.

Once R and RStudio are installed, please also install the following packages by running this code in R:

```
options(repos = c(easystats = "https://easystats.r-universe.dev", getOption("repos"))
install.packages("easystats", "psychmeta", "metafor", "metaviz")
easystats::install_latest()
```

PROGRAM

The start time for each day is fixed, but the end time may flow somewhat (e.g., ±30 minutes,.

Monday– Classes from 2-7 PM Berlin time

Part 1

Lecture: Introduction to systematic reviews and meta-analysis
Lecture: Effect sizes and confidence intervals
Exercise 1
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Part 2

Lecture: Sampling error and meta-analysis models
Lecture: Fitting meta-analysis models in R with metafor and psychmeta
Exercise 2

Read more

INSTRUCTOR

Dr. Brenton M. Wiernik (University of South Florida)

COST OVERVIEW

Should you have any further questions, please send an email to info@physalia-courses.org

Cancellation Policy:

> 30 days before the start date = 30% cancellation fee
< 30 days before the start date= No Refund.

Physalia-courses cannot be held responsible for any travel fees, accommodation or other expenses incurred to you as a result of the cancellation.