GESIS Summer School in Survey Methodology 2023

Syllabus for course:
“Applied Systematic Review and Meta-Analysis”

Lecturers: Jessica Daikeler Sonila Dardha
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Date: 07-11 August 2023
Time: Mo-Fri: 10:00-17:00
Venue: On-site at GESIS Cologne

About the Lecturers:

Jessica Daikeler is a survey methodologist and works at GESIS in the Survey Operations team in the Survey Design and Methodology department at GESIS. Jessica wrote her dissertation on “The Application of Evidence-Based Methods in Survey Methodology” with Prof. Michael Bosnjak (University of Trier) and Prof. Florian Keusch (University of Mannheim). At GESIS she is involved in the application of evidence-based methods, in particular experiments, systematic reviews, and meta-analyses. She has lots of experience with different systematic review and meta-analysis projects. Her research is currently focused on data quality in digital behavioral data linked to survey data and, of course, methods for the accumulation of evidence.

Sonila Dardha is a survey methodologist with an awarded PhD at City, University of London on the topic of interviewer effects. Currently, she is a Survey Methodologist – Quantitative UX Researcher at Meta in London. Previously, she worked for Kantar Public in Brussels and London running international projects such as the Enterprise Surveys in Africa (World Bank), Eurobarometer Surveys (European Commission), European Elections 2015 (European Parliament), Life in Transition Survey (European Bank for Reconstruction and Development), and Global Attitudes Project (Pew Research Center).

Selected Publications:

Course Description:

"Non-reproducible single occurrences are of no significance to Science." - Popper (1956).

With this quotation, Karl Popper already named in 1956 a highly relevant issue in science – the replicability of scientific studies. The increasing amount of literature makes it difficult for researchers to assess and keep up with new evidence. This is exactly where evidence-based methods, such as systematic reviews and meta-analyses, come into play. In a nutshell, systematic reviews and meta-analyses can be described as a set of methods for aggregating, summarizing, and drawing inferences from collections of thematically-related studies. The key idea is to describe the results and different study design features qualitatively and/or quantitatively.

The aim of this five-day course is to provide participants with an applied introduction to methods for conducting systematic reviews and meta-analyses in the social sciences. This course provides a step-by-step approach and consists of the following:

(I) formulating a research question
(II) defining the eligibility criteria for including and excluding studies
(III) conducting the literature search and screening studies (also with the help of text mining methods)
(IV) coding studies and effect sizes
(V) synthesizing evidence
(VI) presenting and interpreting the results

The course will be interactive and practical, with the delivery of sessions based on lectures and individual/small groups working on their own research projects. Through several exercises, participants will have ample opportunity to directly apply what they have learned in each of the six steps mentioned above onto their own projects. Prior use of R is advantageous but not a prerequisite for this course.

Keywords:
meta-analysis, systematic review, research synthesis, effect size, text mining

Course Prerequisites:

- Participants are expected to have a forthcoming/working project that necessitates knowledge in systematic reviews or meta-analyses.
- Participants are expected to have a good working knowledge of statistics at an undergraduate level, e.g., statistical inference (standard error, confidence interval), bivariate statistics (correlation coefficient, mean differences, odds ratio) as well as a basic understanding of (linear) regression analysis and ANOVA.
- Participants are interested in any sub-topic in social research or survey methodology.
- Participants are expected to install R, and preferably RStudio, as well as the metafor package on their computers. Please see the “Software and Hardware Requirements” section below for more information.

Target Group:
Participants will find the course useful if:

- they are planning to or currently working on a Master/PhD thesis, or a scientific publication in social sciences or survey methodology using research synthesis methods (systematic review or meta-analysis).
- they want to gain a better understanding of the pros and cons of the method when evaluating meta-analytical results. However, in this course participants are encouraged to work on their own projects and perform all the different steps of systematically synthesising evidence for their research problem.
Course and Learning Objectives:
By the end of the course participants will be able to:
- define a review question and understand how to develop a review protocol and the key stages of the systematic review process.
- develop a search strategy to identify relevant studies for a specific review question.
- understand how to conduct a comprehensive literature search.
- apply eligibility criteria to identify relevant studies.
- learn how to use text mining methods to conduct more effective literature search.
- understand how to perform a meta-analysis and how to present meta-analytic results.
- conduct a basic meta-analysis and meta-regression using the metafor package in R.

Organizational Structure of the Course:
The course will consist of four 45-minute lectures as well as two 90-minute hands-on session per day. Participants will spend time applying the course content to their evidence synthesis projects. They can either work individually or in small groups to complete a research project relating to systematic reviews and/or meta-analyses. The instructors will be available during the practical sessions to answer questions, both with regards to course exercises and individual/group projects.

Software and Hardware Requirements:
Participants need to bring a laptop with R and RStudio installed. If you have never worked with R before, an (online) tutorial is advisable to get you started. Due to the short course time, this course cannot provide an introduction into R. During the course, the R package metafor will be used; please install this package and add it into your library using the following instructions: after starting R, type in “install.packages("metafor")”. If you receive the message “package ‘metafor’ successfully unpacked and MD5 sums checked”, then everything works fine. More information on this R package can be found at: [http://www.metafor-project.org/doku.php/installation](http://www.metafor-project.org/doku.php/installation).

Participants will be granted access to ILIAS, the e-learning platform for accessing all the resources of this course, by the GESIS Training team some weeks before the course starts. Participants are encouraged to access the platform to download the material prior to the start of the course. Since we will conduct a literature search during the course, a(VPN)access to the University library of your own institutions would be very helpful.

Day-to-day Schedule and Literature:

<table>
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<tr>
<th>Day</th>
<th>Topic(s)</th>
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| 1   | **Introduction and Study Planning**  
  - Putting the course into context: attention decay in science, the evidence-based movement  
  - Classification of evidence-based methods  
  - Systematic review and meta-analysis: Conceptual overview  
  - The research cycle in the accumulation of evidence  
  - Problem statement: the first step of systematic reviews  
  - Study eligibility: inclusion and exclusion criteria  
  Compulsory reading:  
<table>
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<tr>
<th>1</th>
<th>Systematic Reviews</th>
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<tbody>
<tr>
<td></td>
<td>• Evidence and gap maps (EGMs): <a href="https://campbellcollaboration.org/evidence-gap-maps.html">https://campbellcollaboration.org/evidence-gap-maps.html</a></td>
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<th>2</th>
<th>Systematic Reviews</th>
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<tr>
<td>•</td>
<td>Conducting a literature search and study screening (also by the help of text mining methods)</td>
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<tr>
<td>•</td>
<td>Moderator coding</td>
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<td>•</td>
<td>Intro to effect size types (d, r, OR)</td>
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<tr>
<th>3</th>
<th>Effect sizes</th>
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<tr>
<td>•</td>
<td>Effect size calculation and transformation/unification</td>
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<tr>
<td>•</td>
<td>Introducing metafor and the escalc function</td>
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<tr>
<td>•</td>
<td>Intro to summarizing effect sizes meta-analytically</td>
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<tr>
<td>•</td>
<td>Heterogeneity of effect size distributions</td>
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| **Suggested reading:** | • Ellis, P. D. (2010). *The essential guide to effect sizes: Statistical power, meta-analysis, and the interpretation of research results*. Cambridge University Press. |
| | • Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Introduction; SAGE publications, Inc. (Chapter 4) |

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<th>Meta-analysis modelling</th>
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<td>•</td>
<td>Fixed- and random-effects models</td>
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<td>•</td>
<td>Meta-regressions: mixed-effect models</td>
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**Suggested reading:**

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### Data Quality and Reporting

- **Data quality checks**
  - Publication bias
  - Sensitivity analysis
  - Robustness checks
  - Model diagnostics

- **Reporting and miscellaneous topics**

**Compulsory reading:**

**Suggested reading:**

**Recommended Literature to look at in advance:**
- The Campbell Collaboration: What is a systematic review?: [https://www.campbellcollaboration.org/explore/what-is-a-systematic-review.html](https://www.campbellcollaboration.org/explore/what-is-a-systematic-review.html)

**Additional Recommended Literature:**