Lecture 8: Bringing everything together: Ten principles of statistical thinking, meta-analysis and effect sizes

Aim: The lecture is based on Brezina (2018), Chapter 8. It brings together the statistical knowledge discussed in this course. It then discusses an important topic of replication and introduces a statistical technique called meta-analysis, which provides statistical (quantitative) summary of studies dealing with the same research question(s) (topic). Finally, common effect size measures are reviewed and a guide for their interpretation is provided.

- Key terms: statistical principles | meta-analysis | effect sizes

Time:

1-hour lecture.

2-hour computer lab session with exercises and Lancaster Stats Tools online (optional).

2-hour individual study (readings).

Statistical tools: Effect size calculator and Meta-analysis calculator

Practical exercises: Chapter 8 Exercises and answers.

Data: Chapter 8 data.

Readings: Brezina 2018 Chapter 8 + Advanced readings recommended in the book (optional).

Outline:

1. Ten principles of statistical thinking
2. Meta-analysis: statistical synthesis of research results
3. Effect sizes: A guide for meaningful use

Main points – 'Things to remember':

- Statistics helps us express quantitative information with precision and rigour.
- Meta-analysis provides statistical summary of multiple studies by combining their effect sizes.
- The results of meta-analysis can be visualised using a forest plot.
- To deal with inconsistent reporting of effect sizes, we can convert one effect size measure into another or extrapolate it.
- Standardised effect size measures can be understood in terms of the Probability of superiority.
- Effect size measures can be interpreted with the help of benchmark points, which show examples of easily imaginable linguistic effects and the corresponding values of common effect size measures.