ADVANCED DATA ANALYSIS FOR PSYCHOLOGICAL SCIENCE

Part 2. Introduction to multivariate modeling

Luca Menghini Ph.D.

luca.menghini@unipd.it

***

Master degree in Developmental and Educational Psychology

University of Padova

2023-2024

Outline of Part 2

- **`sem()` intro**: Gentle introduction to the world of structural equation modeling (SEM)
- **Path analysis**: Introduction to path analysis (aka SEM with observed variables) and focus on *mediation models*
- **Data structure**: How to approach a multivariate data structure, how to manipulate and pre-process multivariate data
- **Model fit & evaluation**: How to fit a path analysis in R, to evaluate model fit, compare multiple models, and interpret model results
- **`cfa()`**: How to conduct a confirmatory factor analysis (CFA) and to interpret its results
- **Related topics**: In-depth topics related to multivariate modeling (e.g., cross-lagged panel models, multilevel and Bayesian SEM)

= not for the exam

= exercises with R (bring your laptop!)

Factor analysis: rationale

Exploratory vs. Confirmatory factor analysis

Exploratory factor analysis 

Principal component analysis vs. Common factor analysis(?)

Confirmatory factor analysis

Case study: Validation of AMMSA Scale in Mexican University Students

https://osf.io/pkm4f/

Credits

The present slides are partially based on:

- Altoè, G. (2023) Corso Modelli lineari generalizzati ad effetti misti - 2023. https://osf.io/b7tkp/
- Beaujean, A. A. (2014) Latent Variable Modeling Using R. A Step-by-Step Guide. New York: Routledge
- Finch, W. H., Bolin, J. E., Kelley, K. (2014). Multilevel Modeling Using R (2nd edition). Boca Raton: CRC Press
- Pastore, M. (2015). Analisi dei dati in psicologie (e applicazioni in R). Il Mulino.

Useful resources

- Baayen, R. H., Davidson, D. J., & Bates, D. M. (2008). Mixed-effects modeling with crossed random effects for subjects and items. *Journal of memory and language, 59*(4), 390-412.

- Bliese, P. (2022). Multilevel modeling in R (2.7). https://cran.r-project.org/doc/contrib/Bliese_Multilevel.pdf

- McElreath, R. (2020). Statistical rethinking: A Bayesian course with examples in R and Stan. Chapman and Hall/CRC.

- Pinheiro, J., & Bates, D. (2006). Mixed-effects models in S and S-PLUS. Springer science & business media.
  see also Bates, D. (2022). lme4: Mixed-effects modeling with R. https://stat.ethz.ch/~maechler/MEMo-pages/lMMwR.pdf