Multilevel Modeling

LIVES Doctoral Program
September 10-11 2026
Workshop Syllabus
Anthropole 4078, Unil

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Course materials are available on OSF: link to be provided

Overall workshop goal: By the end of the workshop, participants should be able to specify, estimate, and interpret multilevel linear models for hierarchical and longitudinal data.

Day 1: Multilevel Modeling for Hierarchical Data

Learning goal	Understand and apply multilevel modeling to two-level cross-sectional data
Software	R or Stata preferred; SPSS also supported
Material	Participants should bring a laptop with their preferred software installed
Prerequisite	Good knowledge of single-level linear regression

The first day of the course will focus on using multilevel models to analyze two-level cross-sectional data. We will begin with a ~~silly~~ playful example in which singers (level-1 units) are nested in boy bands (level-2 units). This example will introduce three core principles of multilevel modeling:
(1) Two levels imply two types of residuals: participant-level and cluster-level residuals.
(2) Two levels imply two types of predictors: participant-level and cluster-level predictors.
(3) Two levels imply two types of level-1 effect parameters: fixed and random slopes.

We will then introduce a three-step procedure for specifying and interpreting multilevel linear models, preceded by a preliminary centering step.

Step 0. Choose between grand-mean and cluster-mean centering for level-1 predictors, depending on the research question and the effect to be estimated.

Step 1. Estimate an empty model and calculate the intraclass correlation coefficient (ICC) and design effect (DEFF) to assess the extent of clustering and the relevance of multilevel modeling.

Step 2. Add level-1 and level-2 predictors, as well as within-level interactions, and evaluate whether the effect of a level-1 predictor should be allowed to vary across clusters.

Step 3. Add cross-level interactions and interpret the relevant coefficient estimates to test the associated hypotheses.

The dataset and script used in the examples will be provided so that participants can reproduce each step as it is presented. The slides will display R code, but equivalent materials will be available for R, Stata, and SPSS.

The day will conclude with an exercise using Integrated Values Surveys data, with participants nested within countries, to test two hypotheses. Alternatively, participants may use the exercise session to apply the methods introduced in class to their own data.

Schedule for Day 1: Thursday, September 10

Times are approximate and may be adjusted depending on the pace of the course.

09:30–11:00 Three Principles of Multilevel Modeling

11:00–11:15 Break

11:15–12:45 Three-Step Procedure

12:45–14:00 Lunch

14:00–16:00 Exercise

16:00–16:15 Break

16:15–17:00 Exercise Solution and Discussion

Recommended Readings (Optional)

The course is based on:

Sommet, N., & Morselli, D. (2021). Keep calm and learn multilevel linear modeling: A three-step procedure using SPSS, Stata, R, and Mplus. *International Review of Social Psychology, 34*(1), Article 24. https://doi.org/10.5334/irsp.555

Additional references include:

Aguinis, H., Gottfredson, R. K., & Culpepper, S. A. (2013). Best-practice recommendations for estimating cross-level interaction effects using multilevel modeling. *Journal of Management*, *39*, 1490–1528. https://doi.org/10.1177/0149206313478188

Snijders, T., & Bosker, R. (2011). *Multilevel analysis: An introduction to basic and advanced multilevel modeling* (2nd edition). Thousand Oaks, CA: Sage.

Day 2: Multilevel Modeling for Longitudinal Data

Learning goal	Understand and apply multilevel modeling to longitudinal data
Software	R or Stata preferred; SPSS also supported.
Material	Participants should bring a laptop with their preferred software installed
Prerequisite	Basic knowledge of two-level linear regression

The second day of the course will focus on using multilevel models to analyze longitudinal data. We will extend multilevel modeling to situations in which repeated observations (level-1 units) are nested in participants (level-2 units). Using an illustrative dataset on the association between physical activity and depression, we will revisit the three core principles of multilevel modeling, this time as they apply to longitudinal data:
(1) Two levels imply two types of residuals: within-participant and between-participant residuals.
(2) Two levels imply two types of predictors: time-varying and time-invariant predictors.
(3) Two levels imply two types of level-1 effect parameters: fixed and random slopes.

We will then introduce the Mundlak specification for distinguishing within-participant and between-participant associations. In this specification, the outcome is regressed simultaneously on the participant mean of a time-varying predictor and its participant-mean-centered value. This makes it possible to estimate the between-participant and within-participant associations in the same model.

As on the first day, the dataset and script used in the examples will be provided so that participants can reproduce each step as it is presented. The slides will display R code, but equivalent materials will be available for R, Stata, and SPSS.

The day will include an exercise using Swiss Household Panel data in which participants will apply the Mundlak specification to longitudinal data. Alternatively, participants may use the exercise session to apply the methods introduced in class to their own data.

If time permits, the final part of the course will introduce three additional topics: effect sizes, statistical power, and more complex multilevel designs, including three-level and cross-classified models.

Schedule for Day 2: Friday, September 11

Times are approximate and may be adjusted depending on the pace of the course.

09:30–11:30 Multilevel Modeling for Longitudinal Data

11:30–11:45 Break

11:45–12:45 Exercise

12:45–14:00 Lunch

14:00–15:30 Exercise and Solution

15:30–15:45 Break

15:45–17:00 Effect Sizes, Statistical Power, and Complex Multilevel Designs

Recommended Readings (Optional)

The course is based on (see p. 14):

Sommet, N., & Lipps, O. (2025). A Primer on Fixed Effects and Fixed-Effects Panel Modeling Using R, Stata, and SPSS. *Advances in Methods and Practices in Psychological Science*, *8*(4). https://doi.org/10.1177/25152459251392843

Additional references include:

Mundlak, Y. (1978). On the pooling of time series and cross section data. *Econometrica*, 46(1), 69–85. https://doi.org/10.2307/1913646

Hamaker, E. L., & Muthén, B. (2020). The fixed versus random effects debate and how it relates to centering in multilevel modeling. Psychological Methods, 25(3), 365–379. https://doi.org/10.1037/met0000239