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**Hierarchical Linear Modeling**

Psyc 741, Spring 2025

**Due Date**: February 3rd (by 11:00 AM)

**Session 2 – In-Class Assignment**

For this in-class assignment, you will be carrying out various data wrangling functions in order to get longitudinal data (i.e., two time points of data) structured in a fashion suitable for a multilevel regression model. This will require implementing specific data wrangling functions (e.g., merging data frames, reshaping a data frame, etc.) that are covered in the Session 2 R tutorial slides.

You will be completing the following questions, some of which involve conducting analyses in R. You will hand in the answers to the questions; enter them into this word document. Some of the answers involve you copying and pasting your R code. However, you also need to submit your *complete* R code too (saved as a .R script file). Submit both this completed document and your R script file to the submission portal for the Session 2 In-Class Assignment on Canvas.

The **session2\_time1** and **session2\_time2** Excel data files on Canvas will be used for this in-class assignment. Imagine these two data files contain scores on an anxiety scale both before and following the delivery of a new anxiety therapy intervention.

1. Import both Excel files into RStudio as separate data frames. Name the session2\_time1 data frame **wave1** and the session2\_time2 data frame **wave2**.

wave1 <- readxl::read\_excel("session2\_time1.xlsx")

wave2 <- readxl::read\_excel("session2\_time2.xlsx")

1. Before merging the two data frames together, you notice that the anxiety columns in the two data frames are labeled exactly the same. Rename the anxiety column to **anxietyT1** in the wave1 data frame and **anxietyT2** in the wave 2 data frame. Copy/paste your R syntax below.

wave1 <- rename(wave1, anxietyT1 = anxiety)

wave2 <- rename(wave2, anxietyT2 = anxiety)

1. Merge the two data frames together into a single data frame called **merged**. Copy/paste your R syntax below.

merged <- left\_join(wave1, wave2, by = "id")

1. Estimate and report the means and standard deviations for the anxiety scores at the two time points.

Mean\_anxietyT1 Sd\_anxietyT1 Mean\_anxietyT2 Sd\_anxietyT2

<dbl> <dbl> <dbl> <dbl>

1 50.4 9.14 44.4 10.1

1. Perform a paired-samples *t* test to contrast the wave 1 and wave 2 scores. Report the test statistics below and the conclusion of the statistical test.

t.test(anxiety\_score ~ wave, data = merged\_long, paired = TRUE, var.equal = TRUE)

A paired-sample t-test revealed a significant difference in anxiety scores between Wave 1 and Wave 2, ***t***(124) = 5.07, ***p*** < .001, 95% CI [3.68, 8.38], with a mean difference of 6.03.

1. Reshape the merged data frame from wide to long format and name the reshaped data frame **merged\_long**. Each participant should have two rows of data after reshaping. Have the key column named **wave** and the value column named **anxiety\_score**. Copy/paste your R syntax below.

merged\_long <- merged %>%

gather(key = "wave", value = "anxiety\_score", "anxietyT1", "anxietyT2")

1. Output the means and standard deviations for the two time points by grouping the data by wave and summarizing the anxiety scores. Report the values below. If done correctly, you should be able to confirm that the means and standard deviations match your answers from Q4 above.

wave Mean SD

<chr> <dbl> <dbl>

1 anxietyT1 50.4 9.14

2 anxietyT2 44.4 10.1