PSY 653 Module 08: Random Coefficient Models

Description of the dataset:

The longitudinal_wide.csv is a repeated measures study in which students were asked their gpas at 6 different timepoints following an intervention. The variables include:

- **student:** Student ID#
- **sex:** student sex (0 = female, 1 = male)
- **job:** Indication as to whether the student has a job or not (0 = No job, 1 = Has job)
- **occas_0 – occas_5:** gpa on its corresponding timepoint (6 occasions total; possible gpa values = 1.0 – 4.0)

1. Download the "longitudinal_wide.csv" dataset from the module 08 lab module on canvas
2. Create a new R notebook from your project file and name it "Random Coefficients modeling notebook"
3. Create a first level header: "Load Libraries"
    a. In a new R chunk load in the lme4, lmerTest, psych, olsrr, & tidyverse packages
4. Create an R-chunk with the first level header: "Import data"
    a. Read in the datafile "longitudinal_wide.csv" save it to an object named "longitudinal_wide"
5. Create an R-chunk with the first level header: "Convert data from wide to long"
    a. Convert the data from a wide format to a long format. Name this new object "longitudinal_long".
        i. To do this you will use the pivot_longer() function, setting it so col = occas_0:occas_5, the name of the new variable = "occas", names_prefix = "occas_" and the name of the new values as "gpa".
        ii. Hint:
            1. pivot_longer(wide_data, cols = time_0:time_5, names_to = "occas", names_prefix = "occas_", values_to = "gpa")
    b. In this same r-chunk, convert "occas" to a numeric variable.
        i. Hint: data_long <- mutate(data_long, var = as.numeric(var))
6. Create a new first level header: "Get variable descriptives"
    a. Use any method to get the dataset descriptives of the longitudinal_long dataset
7. Create a first level header: "Run random coefficient models"
8. Create a second level header: "Run intercept only model"
    a. Run a random coefficient model using the lmer() function so that gpa is regressed on student as a random intercept. Save it to an object named "mod1"
    b. Output the model using the summary() function

    c. In the white space below, interpret this model. What is the random intercept telling you?
9. Create a second level header: “Run fixed slope and random intercept”
    a. Run a random coefficient model using the lmer() function so that gpa is regressed on sex as a fixed slope and student as a random intercept. Save it to an object named “mod2”
    b. Output the model using the summary() function
    c. In the white space below, interpret this model. What is the fixed slope and random intercept telling you?
10. Create a second level header: “Run fixed slope, random slope, and random intercept”
    a. Run a random coefficient model using the lmer() function so that gpa is regressed on sex as a fixed slope, occas as a random slope, and student as a random intercept. Save it to an object named “mod3”
    b. Output the model using the summary() function
    c. In the white space below, interpret this model. What is the fixed slope, random slope, and random intercept telling you?
11. Using hierarchical regression, compare mod1, mod2, and mod3.
    a. Does adding a fixed slope of sex explain significantly more of the variance in gpa? How do you know?
    b. Does adding a random slope of sex explain significantly more of the variance in gpa? How do you know?