MLM Assignment 2

Beth Grandfield

2/25/2022

Assignment 2: General Instructions

The assignments are completed (mainly) outside of class in groups of three and will be graded. It is advised that you complete the assignment 2 in the same group as the exercise 2. **Make sure you are in a different group compared to assignment 1.**

For the assignment, you turn in (1) the completed excel file, (2) your Rmarkdown file (.Rmd), and (3) the pdf or word document created by Rmarkdown containing your organized code and answers to the questions posed. The assignment will be turned in by uploading these 3 files to Blackboard before the next lecture. The titles of the files should include each group members last name and assignment name (e.g., ArtsGrandfieldAssign2.Rmd).

Note 1: In the assignment, please include a sentence stating each student's contribution towards the end product (e.g., which student completed what tasks). For collaborative efforts, tasks can be repeated over multiple students. In the extreme case of very diverging unique contributions, the coordinator has the possibility to differentiate the grading over students within a group.

Note 2: The Rmarkdown file should include the group members names, the necessary organized code (no output) and nicely formulated answers to each of the questions.

Assignment 2 Details

The file Curran_wide.csv holds data for a sample of 221 children who are within the first two years of entry to elementary school. The data consist of four repeated measures of both the child's antisocial behavior and the child's reading recognition skills. In addition, at the first measurement occasion various measures related to mother, child and the home situation are collected (see page 84-88 of the book of Joop Hox). We will use this dataset to predict antisocial behavior over time using the child's reading recognition skills, cognitive stimulation provided at home and the mother's age.

- Elaborate description of the variables:
    - Antisocial behavior. Antisocial behavior was measured using a Behavior Problems Index. The antisocial behavior is measured on a continuous scale and is labeled antit, where t ranges from 1 to 4 to denote the wave of measurement. The higher the score, the more antisocial behavior the child shows.
    - Reading recognition. The child's reading recognition skill was measured using a continuous reading Recognition subtest. The variable is labeled readt, where t ranges from 1 to 4 to denote the wave of measurement. The higher the score for reading recognition, the better the reading cognition of the child.
    - Cognitive stimulation. Cognitive stimulation provided to the child was measured on a continuous scale, only within the first time period. This variable is labeled homecog. The higher the score, the more cognitive stimulation the child received.

– Mother's age. Mother's age was measured in years at Time 1. This variable is labeled momage.

Note that the dataset also includes the variables homeemo and Child's gender, but these will not be used in the current analysis.

1. Convert the wide data file into a long format. Check the data and recode if necessary.

   - Check the linearity assumption, report and include plots.
   - Check for outliers (don't perform analyses, just look in the scatterplots), report.

2. Answer the question: should you perform a multilevel analysis?

   - What is the mixed model equation?
   - Provide and interpret the relevant results (don't just copy the output, report the relevant results in APS style).
   - What is the intraclass correlation?
   - What is your conclusion regarding the overall question regarding the necessity of performing a multilevel analysis?

3. Add the time-varying predictor(s).

   - Provide and interpret the relevant results and provide your overall conclusion.

4. On which level or levels can you expect explained variance?

   - Calculate and interpret the explained variances.

5. Add the time invariant predictor(s) to the model.

   - Provide and interpret the relevant results and provide your overall conclusion.

6. On which level or levels can you expect explained variance?

   - Calculate and interpret the explained variances.

7. For the time-varying predictor(s), check if the slope is fixed or random.

   - What are the null- and alternative hypotheses?
   - Provide and interpret the relevant results.
   - Provide an overall conclusion.

8. If there is a random slope, set up a model that predicts the slope variation.

   - Provide and interpret the relevant results and provide your overall conclusion.

9. Decide on a final model.

   - provide the separate level 1 and 2 model equations, as well as the mixed model equation.
   - Check the normality assumption for both the level-1 and level-2 errors, report