Homework 2

Due 11AM Thurs 11/19/26 (email me a pdf please)

Please type your responses, and include the relevant printouts with each answer. Answers should be about one paragraph for each question, and they should be written as if they were part of a research report or journal article. Include the relevant statistical values in the text. **Your answers should be in your own words.**

1. For the head start data set from HW 1 (`headmh.sav`), use SPSS, R, or HLM to test a model with `mhsup` as a level-1 predictor and `size` as a level-2 predictor using `probbeh` as the outcome. Group-mean center `mhsup` and grand-mean center `size` prior to the analysis. Include a test of the cross-level interaction between the two predictors. Be sure to report information about all of the relevant fixed and random effects.

2. Using SPSS, R, or HLM, plot the simple slopes from the interaction using -1 SD, the mean, and +1 SD of the centered `size` (-.827, 0, and .827, respectively). Then test the simple slopes for significance. If using SPSS or HLM, use the values from the appropriate variance-covariance matrix and test the simple slopes for centered `mhsup` at the three values of centered `size` specified above, using Kristopher Preacher's online calculator for Case 3 at http://www.quantpsy.org/interact/hlm2.htm. Or use the `mlmoderator` package in R for the -1 SD, the mean, and +1 SD values of the `size` variable. Report and interpret your results in terms of the research problem.

The next few problems use data from a workplace study of employees nested within workgroups (N=127).[1] There are four primary variables. The first variable, `value`, is the main outcome and is a scale score (potential range is 0-4) of perceptions of the meaningfulness of work tasks (i.e., whether the employee finds the work tasks valuable). Work place demands, `wpdems`, is a work-group-level (level 2) variable that aggregates employees ratings of the demands of their workplace, based on a scale score of several items (potential range is 1-5, e.g, “not enough time to get job done) each, `demands` is the employee-level (level 1) variable using the same scale, work-family conflict measure, `wfc`, an employee-level (level 1) variable from several items rating the extent to which the employee experiences conflict between their home and work life, and perceived stress (`pss`), a scale of several perceived stress items (possible range 4-20). `wgid` is the workgroup variable. Download the `wfh.sav` or `wfh.mdm` data set, from http://web.pdx.edu/~newsomj/data.htm.

3. Use SPSS, R, or HLM to test a model with `demands` as a level-1 group-mean centered variable (`demands` in the data set has not been centered) and `wpdems` as a level-2 (not yet) grand-mean centered variable predicting work task meaningfulness (`value`). Allow the slopes for `demands` to vary across work groups. Do not include a cross-level interaction. Interpret your results in terms of the within- and between-neighborhood effects of the work task meaningfulness variable. Calculate the contextual/compositional effect according to Table 5.11 from Raudenbush and Bryk (2002; see "Overhead: Compositional Effect" from the class website) and interpret its value. Compute the standardized coefficients for the coefficients to assess the relative effects of reported problems at the micro and macro levels. Obtain the Rights and Sterba pseudo-R squared measure provided by R and SPSS (if using HLM, hand calculate the Xu measure). Report and interpret all your results together in a single paragraph, and be sure to mention the relative within and between effects of demands.

4. Use SPSS, R, or HLM to test the same model as above but add perceived stress (`pss`) as a level-1 predictor. Grand-mean center `pss` first. Conduct a likelihood ratio test comparing this model to an empty model. Be sure to use the appropriate p-values for this test. Report and interpret your findings from both tests and be sure to interpret the meaning of the likelihood ratio test.

5. Use SPSS, R, or HLM test a model in which grand-mean centered `demands` is a predictor of perceived stress. Obtain histograms of the level-1 and level-2 residuals and evaluate them for violations of the normality assumption. Generate a scatter plot of the level-1 residuals against values of `demands`. Evaluate the scatter

[1] These data are from the Work, Family, and Health study: Bray, J., Almeida, D., Buxton, M. O., Dearing, J., Kelly, E. L., & King, R. B. (2013). *An Integrative, Transdisciplinary, and Multi-level Research Design: The Work, Family & Health Network*. RTI Press publication No. MR-0024-1302. This data set combines multiple waves and combines control and intervention groups.

plot for homoscedasticity and linearity. Describe what you see in each plot and make an assessment of whether there appear to be serious violations of any of these three assumptions.

For the following question, use **your own data set.** Your data set should have a nesting structure of **individuals nested within groups**, a dependent variable with at least five ordinal values (or interval or ratio scale) and at least one level-1 predictor. If you do not have your own data, use the community survey data set, `abamerged.sav`, available posted on the data page (http://web.pdx.edu/~newsomj/data.htm; see the data page for description of the variables).

6. Use SPSS, R, or HLM to test a model with at least one level-1 predictor allowing slopes to vary. If using the community survey data, use neighborhood rating (`nhrating`) as the outcome and the fear of being attacked as a level-1 predictor (`probs1`). Center the predictor variables. Obtain a histogram of the level-1 residuals and a plot of the residuals by the level-1 predictor. Obtain both nonrobust (usual) standard errors and robust standard errors. Report and interpret your findings in terms of the research problem, including the fixed (using the results for the robust standard errors) and random effects. Provide a one- or two-sentence comment on the plots and the residual assumptions for this data set and the differences between the robust and nonrobust results (be specific by giving examples of particular values, and, if different, say why).