

Homework Exercise 5: Longitudinal mixed-effects models

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April 4, 2016

For the following questions, use the National Longitudinal Survey of Youth dataframe '`nlsy`' which is available in the `LukeMLM` package. The focus will be on developing a longitudinal model of `satot`, which is the total number of 'substance using days' - or simply the total of `smkday`, `alcdays`, and `mrjday`. (Many of these models may result in convergence or rescaling warning messages. Most of these can be fixed by centering and/or standardizing the time variables. This is not necessary to do for the homework. Will discuss in more detail in class.)

1. Build a generalized linear change model of `satot` (number of substance use days). Build a generalized cubic polynomial change model of `satot`. Which model do you prefer? Explain your reasoning. Compute the dispersion index for the cubic model. What does this tell you?
2. Add `sex97` and `nonwhite` as level-2 predictors to the cubic change model of `satot`. Include all the interactions between `sex97`, `nonwhite`, and your linear time variable. (Hint, there are four of them.) So, don't include any interactions with the quadratic or cubic time variable. Produce a table and a prediction graph for this model. The prediction graph should include four growth curves: white male, white female, nonwhite male, and nonwhite female. Interpret your results.
3. Starting with the linear change model of `satot` that you built in #1, examine the time-varying effects of high school and college transitions on substance use. Use the `schlclg` and `schlhigh` variables to see how transitions shift the growth line up or down. (See Lab #13 for code necessary to create the appropriate transition variables.) For this model, which transition appears to have a larger effect on substance use?