**Exercise 7**

A. Using the data provided (exercise-7.sas), fit a 2-time, 5-status latent transition model of delinquency over time using 6 indicators of the latent class variable. Use the provided starting values instead of a random seed. Be sure to impose measurement invariance across time. Interpret all parameters in the model.

The variables in exercise-7.sas are shown on the next page.

B. Add a grouping variable for biological sex to the model fit in (A). Be sure to impose measurement invariance across time and groups. What are the main group differences you notice?

C. Add a covariate for frequency of alcohol use to the model fit in (A) as follows:

1. First, use the covariate to predict only the deltas. Specify non-delinquents as the reference status.
2. Second, use the covariate to predict both the deltas and the taus. Specify a multinomial logistic regression model with non-delinquents as the reference status for the deltas, and specify a binary logistic regression model with the diagonal elements of the tau matrix as the comparison statuses for the taus.

Interpret all parameter in the model, focusing on the odds ratios.

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| --- | --- | --- | --- |
| LIED1 | Lied to parents about where/whom with at time 1  1 = no  2 = yes | LIED2 | Lied to parents about where/whom with at time 2  1 = no  2 = yes |
| ROWDY1 | Publicly loud/rowdy/unruly at time 1  1 = no  2 = yes | ROWDY2 | Publicly loud/rowdy/unruly at time 2  1 = no  2 = yes |
| DAMAGE1 | Damaged property at time 1  1 = no  2 = yes | DAMAGE2 | Damaged property at time 2  1 = no  2 = yes |
| STL\_STR1 | Stolen something from a store at time 1  1 = no  2 = yes | SLT\_STR2 | Stolen something from a store at time 2  1 = no  2 = yes |
| STL\_SM1 | Stolen something worth < $50 at time 1  1 = no  2 = yes | STL\_SM2 | Stolen something worth < $50 at time 2  1 = no  2 = yes |
| FGHTGRP1 | Taken part in a group fight at time 1  1 = no  2 = yes | FGHTGRP2 | Taken part in a group fight at time 2  1 = no  2 = yes |
| BIO\_SEX | Biological sex  1 = male  2 = female | ALC\_W1 | Frequency of alcohol use  0 = once per month or less often  1 = more than once per month |