**LTA Exercise in SAS**

Data are provided in the file LTA-TC-Exercise-FOR-STUDENTS.sas. The variables are listed in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| 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 |

Exercise:

1. Using PROC LTA in SAS and the data provided, fit a 2-time, 5-status latent transition model for 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.
2. Add a grouping variable for biological sex to the model fit in (1). Be sure to impose measurement invariance across time and groups. What are the main group differences you notice?
3. [advanced] Add a covariate for frequency of alcohol use to the model fit in (1) as follows:
   1. First, use the covariate to predict only the latent statuses at time 1. Specify “non-delinquents” as the reference status.
   2. Second, use the covariate to predict both the latent statuses at time 1 and the transitions from time 1 to time 2. Specify a multinomial logistic regression model with “non-delinquents” as the reference status for the latent statuses at time 1, and specify a binary logistic regression model with the diagonal elements of the transition matrix as the comparison statuses for the transitions. Interpret all parameters in the model, focusing on the odds ratios.