5 Class Model - Delinquency

Data Summary, Model Information, and Fit Statistics (EM Algorithm)

There were no missing data in this example, so the number of subjects in the dataset and analysis are the same.

Number of subjects in dataset: 3000

Number of subjects in analysis: 3000

Number of measurement items per time: 6

The program echoes back some information so that you can check the number of indicators, response categories, times, groups, and statuses. It also reminds you that you used a dataset to provide starting values.

Response categories per item: 2 2 2 2 2 2

Number of occasions (times): 2

Number of groups in the data: 1

Number of latent statuses: 5

Starting values were provided via a dataset.

Parameter restrictions: Rho (measurement) parameters were constrained to be equal across time.

The model converged in 349 iterations.

The program reminds you that you constrained the rho parameters to be equal across time in the model. For this model, the EM algorithm converged in 349 iterations. Finally, it also reminds you the settings for the convergence criteria. Be sure to check the SAS log to make sure your model converged!

Maximum number of iterations: 5000

Convergence method: maximum absolute deviation (MAD)

Convergence criterion: 0.000001000

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Fit statistics:

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Log-likelihood: -19437.82

G-squared: 2276.57

AIC: 2384.57

BIC: 2708.91

Degrees of freedom: 4041

Model fit and selection criteria and the degrees of freedom are listed. When models with different numbers of latent statuses are compared, this information helps you select the optimal model for interpretation and further analysis.

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Estimated prevalences of latent statuses, also known as status membership probabilities. These are the proportions of the population expected to be members of the statuses at each time point. For example, only 7.46% of the population are expected to be in Status 1 at Time 1. By Time 2, 24.15% of the population are expected to be in Status 1. At both time points, Status 3 is the largest.

Parameter Estimates

Delta estimates (status membership probabilities):

Status: 1 2 3 4 5

Time 1 : 0.0746 0.2081 0.3088 0.1788 0.2297

Time 2 : 0.2415 0.1990 0.2994 0.1220 0.1382

Tau estimates (transition probabilities):

Time 1 latent status (rows) by

Time 2 latent status (columns)

1 2 3 4 5

1 : 0.8569 0.0892 0.0411 0.0127 0.0000

2 : 0.1301 0.6390 0.0608 0.1190 0.0511

3 : 0.1691 0.0515 0.6593 0.0902 0.0298

4 : 0.4040 0.1564 0.0545 0.2935 0.0915

5 : 0.1134 0.0675 0.3060 0.0693 0.4439

Estimated transition probabilities. These are the proportions of the population expected to be members of the statuses at Time *t*+1 (columns) conditional on membership at Time *t* (rows).

As an example, among those who started off in Status 1 at Time 1, 4.11% transitioned to Status 3 at Time 2. (Found by following the 1st row to the 3rd column.)

Entries along the diagonal of this matrix can sometimes be thought of as “stability” parameters, because they represent the proportions of the population expected to be in the same status at Time *t*+1 as at Time *t*.

Rho estimates (item-response probabilities):

(All times)

Response category: 1:

Status: 1 2 3 4 5

LIE1 : 0.8291 0.1136 0.3087 0.2485 0.1527

ROWDY1 : 0.8731 0.5985 0.2251 0.5104 0.1484

DAMAGE1 : 0.9522 0.9358 0.7200 0.9033 0.3286

STL\_STR1 : 0.9382 0.9632 0.9497 0.0610 0.0870

STL\_SM1 : 0.9421 0.9771 0.9167 0.2776 0.1706

FGHTGRP1 : 0.9640 0.9756 0.6050 0.8970 0.5113

Response category: 2:

Status: 1 2 3 4 5

LIE1 : 0.1709 0.8864 0.6913 0.7515 0.8473

ROWDY1 : 0.1269 0.4015 0.7749 0.4896 0.8516

DAMAGE1 : 0.0478 0.0642 0.2800 0.0967 0.6714

STL\_STR1 : 0.0618 0.0368 0.0503 0.9390 0.9130

STL\_SM1 : 0.0579 0.0229 0.0833 0.7224 0.8294

FGHTGRP1 : 0.0360 0.0244 0.3950 0.1030 0.4887

Estimated item-response probabilities, also known as “rho parameters.” They are conditional on status membership and time, but here they are constrained to be equal across time. They indicate how likely status members are to give particular responses to the items.

For example, because response category 1 means “no” for the item asking about whether they had lied to their parents about where they were (see the codebook provided in the LTA-TC-Exercise document), participants in Status 1 had an 82.91% chance of responding that they had not lied to their parents about where they were or whom they were with. The rho parameters are used to interpret the classes.

Note: PROC LTA *does not* provide standard errors.

Each latent status is interpreted based on the pattern of responding, as indicated by the item-response probabilities. Here are some suggested class labels:

Class 1 = No Delinquency. This status has low probabilities of reporting any of the delinquent behaviors.

Class 2 = Lying to Parents. This status has a high probability of reporting lying to their parents about where they were and with whom. They also have an elevated probability of reporting being loud/rowdy/unruly in public.

Class 3 = Lying to Parents & Publicly Rowdy. This status has high probabilities of reporting lying to their parents and being loud/rowdy/unruly in public. They also have elevated probabilities of reporting damaging property and taking part in a group fight.

Class 4 = Lying to Parents & Stealing. This status has high probabilities of reporting lying to their parents and stealing something either from a store or worth less than $50. They also have an elevated probability of reporting being loud/rowdy/unruly in public.

Class 5 = Generalized Delinquency. This status has high (or elevated) probabilities of reporting all of the delinquent behaviors.