Latent Transition Analysis of Substance Use Among Adolescents in the National Longitudinal Survey of Youth

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The Methodology Center
Technical Report Series
#00-37

College of Health and Human Development

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Abstract

The present study examines gender differences in substance use onset among 886 adolescents surveyed in the National Longitudinal Survey of Youth (NLSY). Three waves of data on adolescent substance use were analyzed using Latent Transition Analysis (LTA). To test the gateway hypothesis of substance use (Kandel & Yamaguchi, 1993; Collins, 1998a), transition probabilities of adolescent exposure to three substances, alcohol, cigarettes and marijuana, were estimated. In addition, a strategy similar to that employed by Collins, Graham, Long and Hansen (1994) was used to test gender differences in substance use onset among the NLSY adolescents.

Nested models with different degrees of parameter restrictions were fitted to the data. First, a model that represents gender differences in all three sets of parameters (Big Rho's, Delta's, & Tau's) was fitted. Other models that constrained some of these parameters to be equal between gender were fitted subsequently. Model fit statistics were compared among models and the best fitting one was selected for interpretation. The results suggested that the model that represented no gender differences in all three parameter sets fit the data best. This suggests there are no gender differences in the types of substance use patterns (number and types of latent statuses), the proportion of adolescents falling into each latent status and the transition pattern of substance use. In addition, the study supports the gateway hypothesis that cigarette and alcohol usage are precursors to the use of marijuana.

Due to the high percentage of non-response to substance use items in the survey as well as the weak measure of marijuana use, the present findings have to be interpreted with caution.

1. Introduction

The present study examines gender differences in substance use onset among 886 adolescents surveyed in the National Longitudinal Survey of Youth (NLSY). Three waves of data on adolescent substance use were analyzed using Latent Transition Analysis (LTA). To test the gateway hypothesis of substance use (Kandel & Yamaguchi, 1993; Collins, 1998a), transition probabilities of adolescent exposure to three substances, alcohol, cigarettes and marijuana, were estimated. In addition, a strategy similar to that employed by Collins, Graham, Long and Hansen (1994) was used to test gender differences in substance use onset among the NLSY adolescents.

2. Sample

Our sample consists of 886 adolescents participating in the NLSY, which is a national survey conducted by the Bureau of Labor Statistics, U.S. Department of Labor. The mothers of these adolescents were initially enrolled in the study in 1979, using a standard multi-stage, area probability sampling method. Data were collected annually on these young women's education, job training and work experience. The sampling scheme also included an oversampling of Hispanics, African Americans, and disadvantaged non-Hispanic, non-African American youths.

Starting from 1986, offspring of the NLSY young women were surveyed biennially. Our sample consists of these offspring of the NLSY, whose ages were 10 to 14 in 1988, the time when the first wave of data used in our study were collected. One of the reasons for our choice of sample is that in the survey only children aged 10 and older were asked substance-use-related questions. Furthermore, by choosing such an age range, we are restricting our sample to children entering or studying in the middle school at the time of our first wave of measurement. So, children in our sample are expected to be exposed to similar school environments. Our analysis included data from two more waves of data collected in 1990 and 1992. Out of the 886 adolescents, 444 were males; 147 were Hispanic, 355 were Black and 384 were non-Hispanic, non-Black. Many of the mothers of these children gave birth to their first child in their teen years.

There is a relatively high proportion of non-response in the data. The proportion of missing information for the smoking indicator increased from 8.2% to 48% across the three waves of measurement. Similarly, the proportion missing for the drinking indicator increased from 8.4% to 48.1%. Likewise, the proportion missing for the marijuana use indicator increased from 8.4% to 48.1%.

3. Measures

General information on the children's development was collected through standardized assessments and parent interviews. Those children age 10 years and over were also asked to complete questionnaires that measure their family relationships and school experiences. Several items related to substance use were also included in the questionnaire.

Substance use indicators were drawn from the NLSY's Child Self-Administered Supplement (CSAS). (This is a confidential self-report survey given to all children 10 years and older. The procedure was started in 1988. From 1994 onwards, instead of the CSAS, children older than 15 were given the Young Adult Survey (YAS)). Adolescents were asked about their relationships with their parents, the ways they spent their time and their exposure to various substances.

Our study focused on exposure to alcohol, cigarettes and marijuana. Three pairs of items on each of the substances were used in our study.

1. Have you ever smoked a cigarette? (Yes = 1; No = 0)
2. If you have ever smoked, have you smoked a cigarette in the past three (3) months? (Yes = 1; No = 0; Never smoked = 2)
3. Have you ever drunk alcohol, other than just a sip or two? (Yes = 1; No = 0)
4. If you have ever drunk alcohol, have you drunk alcohol in the past three (3) months? (Yes = 1; No = 0; Have never drunk alcohol = 2)
5. Have you ever used marijuana? (Yes = 1; No = 0)
6. If you have ever used marijuana, have you used marijuana in the past three (3) months? (Yes = 1; No = 0; Never used marijuana = 2)

The items were recoded to form binary items that indicate whether the adolescents had been exposed to a substance (No = 1; Yes = 2; and Missing = 0). The two items were then combined to form a single indicator of substance exposure. Whenever an individual answered positively to one of the items, it was counted as a 'yes' to the single indicator.

4. Analytic Strategies

Latent Transition Analysis (LTA) (Collins & Wugalter, 1992; Graham, Collins, Wugalter, Chung, & Hansen, 1991; Langeheine & van de Pol, 1991; Collins, Graham, Rousculp, & Hansen, 1997; Collins, Schafer, Hyatt, & Flaherty, in preparation) was used to analyze our data. The statistical procedure is a special case of Latent Class Analysis where the latent variable is dynamic, i.e. changing in systematic ways over time (Collins & Cliff, 1990). LTA is a type of latent Markov model (van de Pol & Langeheine, 1989). It is designed for modeling changes in stage-sequential dynamic latent variables that have been measured in a longitudinal panel design. We are interested in studying the changes in individuals' substance use patterns, which are called latent statuses in our model, over the six years from 1988 to 1992.

In LTA that only has the dynamic part of the model, three types of parameters are estimated. The first set of parameters are the "big" ρ's. These parameters have the same meaning in LTA models as they do in LCA; that is, they represent the probability of a particular item response, conditional on latent status membership. Examining these parameter estimates helps the user to interpret the characteristics of each latent status. The second set of parameters are the δ's, which are estimates of the proportion of the population in each latent status at each occasion of measurement. The third set of parameter estimates are the τ's, or transition probabilities. For a first-order model, like the one in the present study, these are estimates of the probability of moving to a particular latent status in Time 2 conditional on latent status membership at Time 1. In a model that has both static and dynamic elements, two more sets of parameters are estimated. The first set is called "little" ρ's. They serve a similar function as the big ρ's in the dynamic part of the model and represent the probability of a particular item response, conditional on latent class membership. The second set of parameters in the static part of the model is the γ's, which represent the estimated proportions of each latent class (for a more detailed description of the LCA and LTA models, please refer to the WinLTA User Guide (Collins et al., 1999).

WinLTA 2.1 was used to fit our latent transition models (Collins, 1998b). The program, using the EM algorithm in its estimation of model parameters, has the ability to handle missing data.

4.1 Exploratory Search for the Basic Structure of LTA Models for the NLSY data

Although the data we used finally in our project were those from the Child Self-Administered Supplement Survey (CSAS) collected in years 1988, 1990 and 1992, we started our project fitting LTA models to the 1994 and 1996 NLSY Young Adult Survey (YAS) data . The YAS survey was started in 1994 for children who were fifteen and older. In the YAS, more elaborate questions were asked about substance use, including questions on binge drinking. Because initially we were interested in the relationship between binge drinking and other substance use, we started with the YAS data. To our disappointment, the binge drinking variables contain a large amount of missing values and the models we fitted had very poor fits. After months of trying, we decided to drop the binge drinking variables and switched to the CSAS survey, even though it contains much less information on substance use when compared to the YAS survey. We mention this initial round of model fitting, even though the results were not very promising, because we got a sense of the structure of the LTA models from the analyses. For the binge drinking model, we found that the "best" fitting model we can get among the models we fitted was one with 7 latent classes: "No Use", "Alcohol Only", "Cigarettes Only", "Alcohol and Cigarettes", "Alcohol and Marijuana", "Alcohol, Cigarettes and Marijuana" and "Alcohol and Binge Drinking" ($G^2 = 1099.77$, with df=161).

In the next stage of analyses, we dropped the binge drinking variables from our models. Based on the results of our previous analyses, we decided to try models with 6 latent classes (basically we eliminated the latent class that related to binge drinking) and to use only one indicator of substance use per substance. Although we have two indicators per substance in our data, we decided to go with one to see if the model fit better with simpler response patterns. The model fit for these group of models were still poor. The "smallest" model fit statistics we could get was a G^2 of 400.032 with degrees of freedom of 32.

After some quite disappointing experience with the YAS drug use data, we decided to switch to the CSAS data. Furthermore, we decided to combine the two indicators for each drug into a new single indicator. We fitted new models to the drug use items in 1988 and 1990. The fits for these groups of models were generally better than the previous models we fitted for the YAS data. The model with the smallest fit statistics had 5 latent classes: "No use", "Cigarettes Only", "Alcohol Only", "Alcohol and Cigarettes", and "Alcohol, Cigarettes and Marijuana". In this model, equality constraints were placed on ρ's across the two times and some ρ's for different substances within each time were constrained to be equal ($G^2 = 93.86$ with df=19).

Because we suspected that the amount of missing values decreased the overall fit of the model, we also tried fitted models to listwise-deleted data (after the deletion, the sample size was reduced from 886 to 484). Similar models as the previous ones were fitted and it seemed that the models fit better. The model with the "best" fit statistics has a G^2 of 31.704 with df = 31). This model also has equality constraints on the ρ's across time. The ρ's for some response categories were constrained to be equal.

Next, we fit a model to all three waves of data, the 1988, 1990 and 1992 substance use data in the CSAS survey. We first fit models to the listwise-deleted sample (N=378) and then to a sample with missing values (N = 886). For the listwise-deleted sample, the "best" fitting model has a G^2 of 207.997 with 460 degrees of freedom. For the sample with missing values, the "best" fitting model has a G^2 of 598.326 with 481 degrees of freedom.

Throughout our exploratory analyses, we fixed the number of latent classes and the pattern of constraints on the ρ's to be the same across the times of measurement. The other parameters in the model, the δ's and the τ's, were freely estimated. On the other hand, we tried different patterns of constraints for the ρ's within each time. The "final" model we got from the exploratory analysis had the following pattern of ρ constraints for all three time-points (See Table 1).

The proportions of adolescents responding with a "yes" to the smoking indicator were hypothesized to be equally high in the "smoking only", "drinking and smoking" and "Using all substance" latent classes. On the other hand, the corresponding proportion were hypothesized to be equally low in the "no use" and the "alcohol only" latent classes. A similar pattern of constraints was imposed for the drinking indicator, i.e. ρ's for "no use" and "smoking only" latent classes were set to be equally low and ρ's for the rest of the latent classes were set to be equally high.

For the marijuana indicator, a slightly different pattern of constraints was used. The proportion of adolescents responding "yes" to the indicator was hypothesized to be equally low for the "no use", "smoking only" and "drinking only" latent classes. It is hypothesized that the latent class of "drinking and smoking" has a low proportion too but it was allowed to be different from the other latent classes. The proportion in the "all" latent class was expected to be high and different from the other classes.

4.2 Gender as a Latent Class Variable in the Static Part of the LTA Model

In order to model gender differences in substance use onset, our LTA model has both static and dynamic components. The grouping variable, gender, is introduced into our LTA model as a categorical variable with two "latent" classes. Related to this "latent" variable there is only one manifest item: individual's gender reported in the survey. The latter has two response categories: male and female. We fixed the ρ's of the 'male' response category conditional on the first and the second latent class to be 1 and 0, respectively. At the same time, we fixed the ρ's of the 'female' response category conditional on the first and the second latent class to be 0 and 1. This avoided identification problems, and also treated gender as an observed rather than latent variable. By having the grouping variable 'gender' in our model, we can test for any differences in the dynamic part of our LTA model with respect to gender (see later section on 'sequential testing of gender difference model'). All the gender difference models have the following basic structure:

- 2 "latent" classes: "Male" and "Female"
- 1 "manifest" indicator (Male vs. Female) with two response categories (yes vs. no)
- 3 times of measurement: 1988, 1990 and 1992
- 5 latent statuses: (No Use, Smoking Only, Drinking Only, Smoking and Drinking, All)
- 3 manifest indicators (Smoking, Alcohol, Marijuana) of the dynamic latent variable at each occasion, each with two response categories (yes vs. no).

The same kind of constraints were imposed on the ρ's, δ's, and τ's as in the "final" model we got from the exploratory analyses, i.e. the δ's and τ's were allowed to be different for different latent classes. The ρ's have the same pattern of constraints as in the "final" model. On the other hand, as described below, different models have different equality constraints placed across gender for each group of parameters.

5. Sequential Testing of Gender Difference Models

In order to perform a formal test on the gender difference hypothesis, four models with different degrees of constraints on the different groups of parameters were fitted sequentially to the data. Among these four models, Model 4 is the most restrictive and it has the least number of freely-estimated parameters.

- **Model 1:** All δ's and τ's estimated freely; big ρ's allowed to vary across genders.
- **Model 2:** All δ's and τ's estimated freely; big ρ's constrained equal across genders.
- **Model 3:** All τ's estimated freely; δ's and big ρ's constrained equal across genders.
- **Model 4:** All δ's, τ's and big ρ's constrained equal across genders.

6. Results

All four models have reasonable fit to the data. The G^2's are all less than their corresponding degrees of freedom (See Table 2).

Model 4 is the most parsimonious among the four models (see Table 2). Other models do not provide statistically significant improvement in the fit statistics, which is represented by ΔG^2, the decrease in fit statistics from one model to the other. When two models are nested, ΔG^2 is distributed as χ^2 and can be used to test whether one model is significantly different from a bigger model. Such a result indicates that there are no gender differences in either the substance use pattern or the changes in such a pattern across time.

The measurement quality of the three indicators of substance use is fairly good in the first four latent statuses but the measurement of marijuana use in the fifth latent status is rather weak. Within such a latent class, the estimated probability that an individual has been exposed to marijuana is close to 0.5 for both the 'yes' and 'no' response categories (see Table 3). Such a weak ρ indicates that according to our model, nearly half of the people responding 'no' to the 'marijuana' item were actually exposed to marijuana while nearly half of the people responding 'yes' were not exposed. While it is straightforward to interpret the meaning of a latent status that has strong ρ's, it is more difficult to label one that has weak ρ's in some of the items (see Table 3 for pattern of ρ's and labels for each of the latent statuses).

The estimates of the δ parameters gave us the estimated proportion of adolescent substance users in each latent class. In 1988, most of the adolescents have not used any substances. The proportion of the "No Use" group fell below 0.5 in 1992. The group that has tried both alcohol and cigarettes and the group that has tried all three substances increased significantly over the six years. Together the two groups comprise about half of the sample in 1992 (see Figure 2).

When we examine the transition matrix, the matrix of τ parameters which represent the movement of individuals among the latent classes across time, we found that there was almost no movement of adolescents among the latent statuses between 1988 and 1990, except that about 20% of the adolescents in the "No Use" latent status were exposed to both alcohol and cigarettes in 1990. During the transition from 1990 to 1992, more movement among the latent statuses was seen. About 24% of adolescents in the "No Use" latent status in 1990 moved into the "All" latent status. Almost all the adolescents in the "Smoke Only" latent status in 1990 moved into other groups. 87% of this group tried alcohol as well as cigarettes. About 20% of the "Drink Only" latent status in 1990 reported having tried cigarettes and marijuana by 1992. However, only about 3% of the "Drink and Smoke" latent status in 1990 said they also tried marijuana in 1992 (See Table 4).

In this version of WinLTA, we do not have a way to test the statistical significance of individual parameters, which is something we want. In a future version of WinLTA (currently being tested), such an option will be available.

7. Conclusions

Latent transition analysis is a promising approach in drug prevention research. It can handle categorical outcome variables and provides estimates of the prevalence and patterns of substance use as well as the transition probabilities among stages of substance use. It provides a means to test theories on substance use. It is also possible to use multiple group analysis to test group differences.

No gender difference was found in the substance use patterns. Such a result is consistent with previous findings (Collins et al., 1994). Whereas Collins et al.'s sample is based on students residing in one state, the present study is based on a national sample. It further supports the belief that similar substance use prevention programs can be applied to both genders.

The gateway hypothesis of substance use is supported by our findings. In our search for the appropriate latent class structure for drug use responses among NLSY adolescents, we did not found a 'marijuana use only' latent statuses, while there are both 'smoking only' and 'drinking only' latent statuses, as well as a latent class that corresponds to exposure to all three substances. Such a result indicates that both legal substances, cigarettes and alcohol, act as gateway substances that increase the propensity of adolescents' use of marijuana.

The percentage of missing information in the part of NLSY data we used is high. Even though WinLTA can handle missing data, we have to interpret our results with great caution.

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Table 1: Constraints imposed on ρ's for the gender difference models

	SMOKING	DRINKING	MARIJUANA USE
NO USE	2	4	6
SMOKING ONLY	3	4	6
DRINKING ONLY	2	5	6
DRINKING AND SMOKING	3	5	7
ALL	3	5	8

Note: The same pattern of constraints was placed on the "yes" and "no" response categories. All cells with the same number have ρ's constrained to be equal.

Table 2. Comparison of model fit for the various gender difference models

	G^2	df	$_{\triangle}G^{2\,a}$	$_{\triangle}df^{\,a}$
Model 1: All Delta's and Tau's estimated freely; big Rho's allowed to vary across genders	831.093	960	32.434	31
Model 2: All Delta's and Tau's estimated freely; big Rho's constrained equal across genders	847.256	967	16.271	24
Model 3: All Tau's estimated freely; Delta's and big Rho's constrained equal across genders	852.239	971	11.288	21
Model 4: All Delta's, Tau's and big Rho's constrained equal across genders	863.527	991	Baseline	--

a $_{\triangle}G^2$ and $_{\triangle}$df were calculated by comparing a model to the baseline model

Table 3. Measurement quality of substance use indicators in the gender difference models

Big Rho's

	Smoking (No)	Drinking (No)	Marijuana Use (No)
NOUSE	0.897	0.849	0.981
SMONLY	0.246	0.849	0.981
DRKONLY	0.897	0.121	0.981
DRKSM	0.246	0.121	0.718
ALL	0.246	0.121	0.543

	Smoking (Yes)	Drinking (Yes)	Marijuana Use (Yes)
NOUSE	0.103	0.151	0.019
SMONLY	0.754	0.151	0.019
DRKONLY	0.103	0.879	0.019
DRKSM	0.754	0.879	0.282
ALL	0.754	0.879	0.457

Table 4. Transitions between latent statuses across measurement occasions

Tau matrix for transitions from 1988 to 1990

	No Use	Smoke Only	Drink Only	Drink and Smoke	All
No Use	0.744	0.016	0.027	0.209	0.005
Smoke Only	0.000	1.000	0.000	0.000	0.000
Drink Only	0.000	0.000	0.911	0.000	0.089
Drink and Smoke	0.000	0.000	0.000	1.000	0.000
All	0.000	0.000	0.000	0.000	1.000

Tau matrix for transitions from 1990 to 1992

	No Use	Smoke Only	Drink Only	Drink and Smoke	All
No Use	0.651	0.014	0.100	0.000	0.235
Smoke Only	0.000	0.023	0.104	0.874	0.000
Drink Only	0.000	0.000	0.808	0.000	0.192
Drink and Smoke	0.000	0.000	0.000	0.971	0.029
All	0.000	0.000	0.000	0.000	1.000

Figure 1. Model of Substance Use Transitions

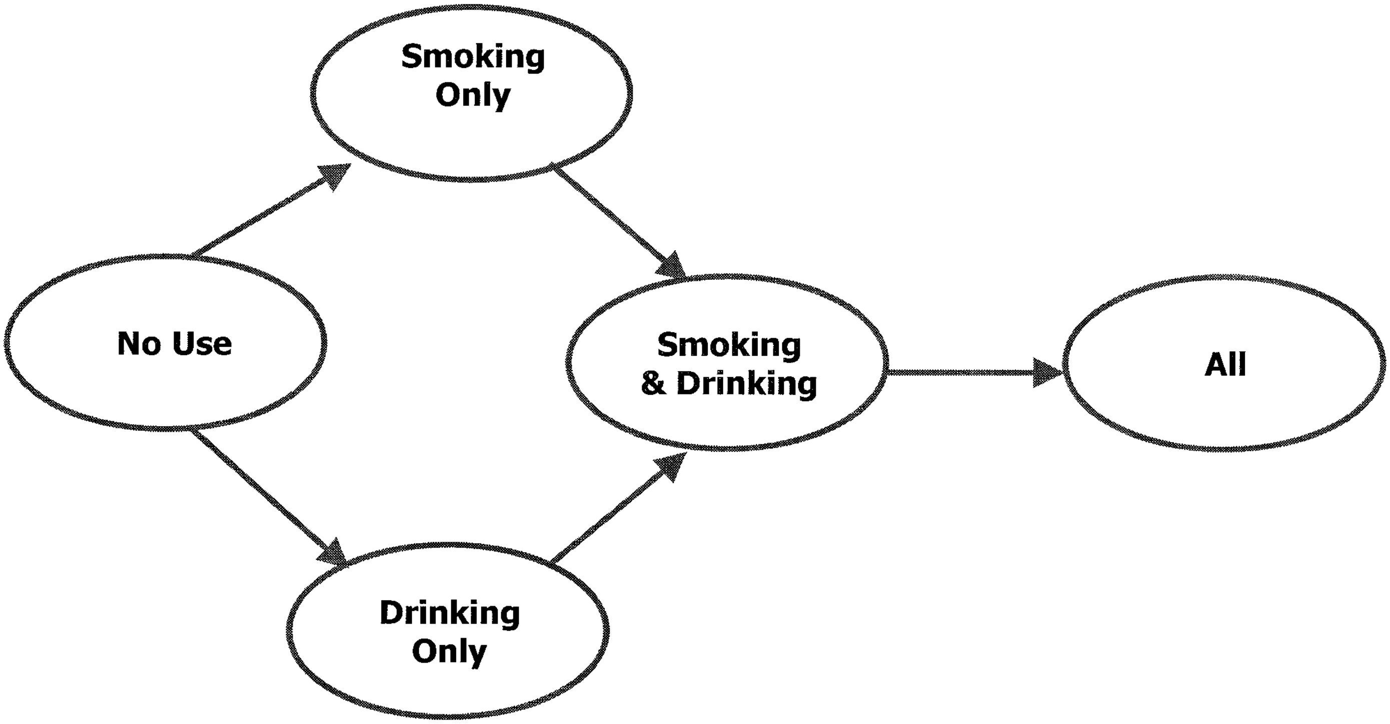
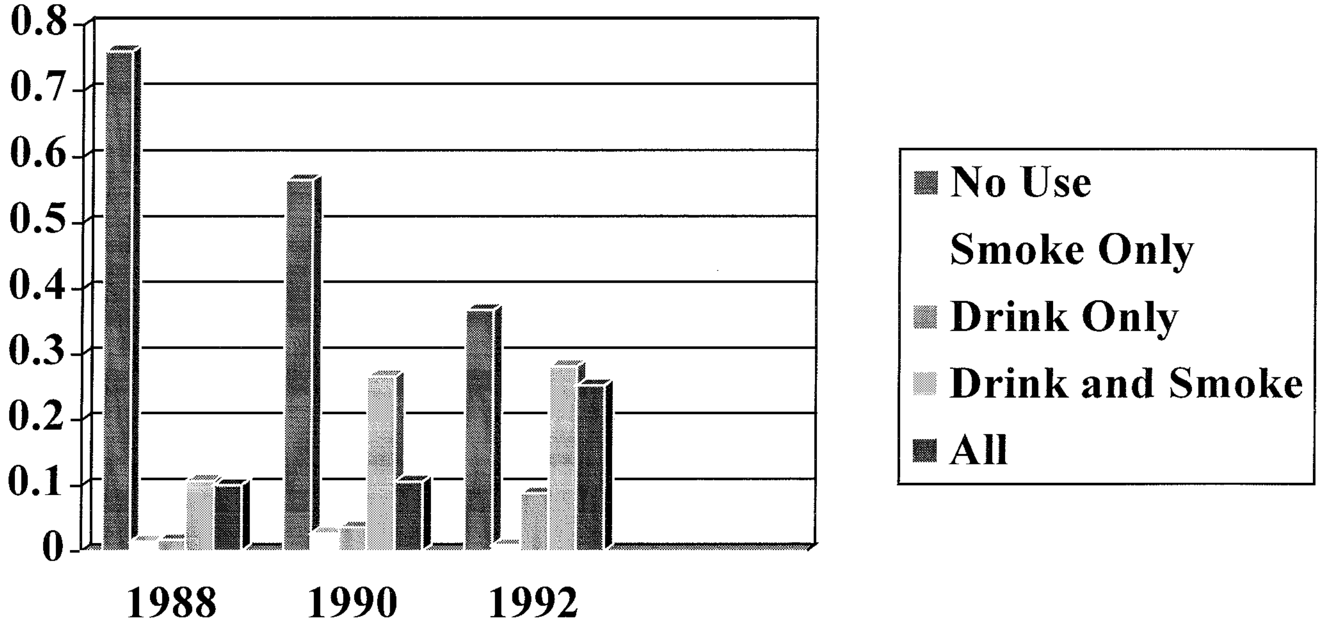


Figure 2. Estimated Proportions of Substance Use Latent Statuses



Appendix 1. LTA program output for final selected model

```
PROGRAM STARTED:       Sat Jun 12 21:35:00 1999

Model 4B: Same equivalent sets of Tau's, Delta's and big Rho's for
males and females

 **************************************************

 INFORMATION ABOUT THIS JOB:

 CONTROL DATA SET:
C:\nspr99\gend3wv\mgcmb311a.cnt

 DATA ANALYZED IN THIS RUN READ FROM:
c:\nspr99\gend3wv\msgcmb3.rsp

 OUTPUT PRINTED TO:
c:\nspr99\gend3wv\mgcmb311a.out

 PARAMETER ESTIMATES SAVED TO FILE:
c:\nspr99\gend3wv\mgcmb311a.prm

 STATIC LATENT VARIABLE                           YES
 NUMBER OF LATENT CLASSES                           2
 NUMBER OF MANIFEST ITEMS                           1

 DYNAMIC LATENT VARIABLE                          YES
 NUMBER OF LATENT STATUSES                          5
 NUMBER OF OCCASIONS OF MEASUREMENT                 3
 NUMBER OF MANIFEST ITEMS PER OCCASION              3
 TYPE OF PROCESS                          FIRST-ORDER

 NUMBER OF SUBJECTS                               886
 NUMBER OF UNIQUE RESPONSE PATTERNS               277
 MAXIMUM NUMBER OF ITERATIONS                   10000
 CONVERGENCE CRITERION                  .00000100000000
 MISSING DATA IN RESPONSE PATTERNS                YES

 PRINT RESIDUALS                                  YES
 **************************************************


 THE FOLLOWING CONSTRAINTS HAVE BEEN SPECIFIED
 WHERE 0=FIXED TO START VALUE
       1=FREE
       2 OR GREATER MEANS CONSTRAINED EQUAL TO ANY OTHER
         PARAMETER WITH THE SAME DESIGNATION

 **************************************************
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LITTLE RHO PARAMETERS
LITTLE RHOS ARE PROBABILITIES OF RESPONSES
TO ITEMS MEASURING THE STATIC LATENT VARIABLE
CONDITIONAL ON LATENT CLASS MEMBERSHIP

          RESPONSE CATEGORY  1

         | G M |
         | E A |
         | N L |
         | D E |
         | E   |
         | R   |
         |     |
         |     |
Male        0
Female      0

          RESPONSE CATEGORY  2

         | G F |
         | E E |
         | N M |
         | D A |
         | E L |
         | R E |
         |     |
         |     |
Male        0
Female      0

*************************************************

BIG RHO PARAMETER CONSTRAINTS
BIG RHOS ARE PROBABILITIES OF RESPONSE
TO ITEMS MEASURING THE DYNAMIC LATENT VARIABLE
CONDITIONAL ON LATENT STATUS, LATENT CLASS, AND TIME

          BIG RHO CONSTRAINTS FOR LATENT CLASS "Male    " AT TIME  1

          RESPONSE CATEGORY  1

         | S N | D N | M N |
         | M O | R O | A O |
         | O   | I   | R   |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE       2     4     6
SMONLY      3     4     6
ALCONLY     2     5     6
ALCSM       3     5     7
ALL         3     5     8
```

```
          RESPONSE CATEGORY  2

         | S Y | D Y | M Y |
         | M E | R E | A E |
         | O S | I S | R S |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE       12    14    16
SMONLY      13    14    16
ALCONLY     12    15    16
ALCSM       13    15    17
ALL         13    15    18

          BIG RHO CONSTRAINTS FOR LATENT CLASS "Male      " AT TIME  2

          RESPONSE CATEGORY  1

         | S N | D N | M N |
         | M O | R O | A O |
         | O   | I   | R   |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE        2     4     6
SMONLY       3     4     6
ALCONLY      2     5     6
ALCSM        3     5     7
ALL          3     5     8

          RESPONSE CATEGORY  2

         | S Y | D Y | M Y |
         | M E | R E | A E |
         | O S | I S | R S |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE       12    14    16
SMONLY      13    14    16
ALCONLY     12    15    16
ALCSM       13    15    17
ALL         13    15    18
```

```
          BIG RHO CONSTRAINTS FOR LATENT CLASS "Male     " AT TIME  3

          RESPONSE CATEGORY  1

         | S N | D N | M N |
         | M O | R O | A O |
         | O   | I   | R   |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE        2     4     6
SMONLY       3     4     6
ALCONLY      2     5     6
ALCSM        3     5     7
ALL          3     5     8

          RESPONSE CATEGORY  2

         | S Y | D Y | M Y |
         | M E | R E | A E |
         | O S | I S | R S |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE       12    14    16
SMONLY      13    14    16
ALCONLY     12    15    16
ALCSM       13    15    17
ALL         13    15    18

          BIG RHO CONSTRAINTS FOR LATENT CLASS "Female   " AT TIME  1

          RESPONSE CATEGORY  1

         | S N | D N | M N |
         | M O | R O | A O |
         | O   | I   | R   |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE        2     4     6
SMONLY       3     4     6
ALCONLY      2     5     6
ALCSM        3     5     7
ALL          3     5     8
```

```
          RESPONSE CATEGORY  2

          | S Y | D Y | M Y |
          | M E | R E | A E |
          | O S | I S | R S |
          | K   | N   | I   |
          | E   | K   | J   |
          |     |     |     |
          |     |     |     |
          |     |     |     |
NOUSE        12    14    16
SMONLY       13    14    16
ALCONLY      12    15    16
ALCSM        13    15    17
ALL          13    15    18

          BIG RHO CONSTRAINTS FOR LATENT CLASS "Female  " AT TIME  2

          RESPONSE CATEGORY  1

          | S N | D N | M N |
          | M O | R O | A O |
          | O   | I   | R   |
          | K   | N   | I   |
          | E   | K   | J   |
          |     |     |     |
          |     |     |     |
          |     |     |     |
NOUSE         2     4     6
SMONLY        3     4     6
ALCONLY       2     5     6
ALCSM         3     5     7
ALL           3     5     8

          RESPONSE CATEGORY  2

          | S Y | D Y | M Y |
          | M E | R E | A E |
          | O S | I S | R S |
          | K   | N   | I   |
          | E   | K   | J   |
          |     |     |     |
          |     |     |     |
          |     |     |     |
NOUSE        12    14    16
SMONLY       13    14    16
ALCONLY      12    15    16
ALCSM        13    15    17
ALL          13    15    18
```

BIG RHO CONSTRAINTS FOR LATENT CLASS "Female " AT TIME 3

RESPONSE CATEGORY 1

	SMOKE NO	DRINK NO	MARIJ NO
NOUSE	2	4	6
SMONLY	3	4	6
ALCONLY	2	5	6
ALCSM	3	5	7
ALL	3	5	8

RESPONSE CATEGORY 2

	SMOKE YES	DRINK YES	MARIJ YES
NOUSE	12	14	16
SMONLY	13	14	16
ALCONLY	12	15	16
ALCSM	13	15	17
ALL	13	15	18

****

CONSTRAINTS FOR GAMMA PARAMETERS
GAMMAS ARE UNCONDITIONAL PROBABILITIES OF MEMBERSHIP
IN EACH LATENT CLASS OF THE STATIC LATENT VARIABLE

Male	1
Female	1

****

CONSTRAINTS FOR DELTA PARAMETERS
DELTAS ARE PROBABILITIES OF LATENT STATUS MEMBERSHIP
CONDITIONAL ON LATENT CLASS

DELTA PARAMETER CONSTRAINTS FOR LATENT CLASS "Male "

	TIME 1
NOUSE	101
SMONLY	102
ALCONLY	103
ALCSM	104
ALL	105

DELTA PARAMETER CONSTRAINTS FOR LATENT CLASS "Female "

	TIME 1
NOUSE	101
SMONLY	102
ALCONLY	103
ALCSM	104
ALL	105

****

CONSTRAINTS FOR TAU PARAMETERS
TAUS ARE PROBABILITIES OF LATENT STATUS MEMBERSHIP AT TIME T+1 (COLUMNS)
CONDITIONAL ON LATENT STATUS MEMBERSHIP AT TIME T (ROWS)
AND ON LATENT CLASS MEMBERSHIP

TRANSITION PROBABILITIES FOR LATENT CLASS "Male "

ROWS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 1
COLUMNS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 2

	NOUSE	SMONLY	ALCONLY	ALCSM	ALL
NOUSE	201	202	203	204	205
SMONLY	0	206	207	208	209
ALCONLY	0	0	210	211	212
ALCSM	0	0	0	213	214
ALL	0	0	0	0	0

ROWS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 2
COLUMNS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 3

	NOUSE	SMONLY	ALCONLY	ALCSM	ALL
NOUSE	301	302	303	304	305
SMONLY	0	306	307	308	309
ALCONLY	0	0	310	311	312
ALCSM	0	0	0	313	314
ALL	0	0	0	0	0

```
TRANSITION PROBABILITIES FOR LATENT CLASS "Female    "

ROWS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 1
COLUMNS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 2

          |  N |  S |  A |  A |  A |
          |  O |  M |  L |  L |  L |
          |  U |  O |  C |  C |  L |
          |  S |  N |  O |  S |    |
          |  E |  L |  N |  M |    |
          |    |  Y |  L |    |    |
          |    |    |  Y |    |    |
          |    |    |    |    |    |
NOUSE       201  202  203  204  205
SMONLY        0  206  207  208  209
ALCONLY       0    0  210  211  212
ALCSM         0    0    0  213  214
ALL           0    0    0    0    0

ROWS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 2
COLUMNS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 3

          |  N |  S |  A |  A |  A |
          |  O |  M |  L |  L |  L |
          |  U |  O |  C |  C |  L |
          |  S |  N |  O |  S |    |
          |  E |  L |  N |  M |    |
          |    |  Y |  L |    |    |
          |    |    |  Y |    |    |
          |    |    |    |    |    |
NOUSE       301  302  303  304  305
SMONLY        0  306  307  308  309
ALCONLY       0    0  310  311  312
ALCSM         0    0    0  313  314
ALL           0    0    0    0    0

*************************************************
          START VALUES
*************************************************

LITTLE RHO PARAMETERS
LITTLE RHOS ARE PROBABILITIES OF RESPONSES
TO ITEMS MEASURING THE STATIC LATENT VARIABLE
CONDITIONAL ON LATENT CLASS MEMBERSHIP

          RESPONSE CATEGORY  1

          | G M |
          | E A |
          | N L |
          | D E |
          | E   |
          | R   |
          |     |
          |     |
Male        1.000
Female      0.000
```

```
          RESPONSE CATEGORY  2

         | G F |
         | E E |
         | N M |
         | D A |
         | E L |
         | R E |
         |     |
         |     |
Male      0.000
Female    1.000


************************************************

BIG RHO PARAMETERS
BIG RHOS ARE PROBABILITIES OF RESPONSES
TO ITEMS MEASURING THE DYNAMIC LATENT VARIABLE
CONDITIONAL ON LATENT STATUS, LATENT CLASS, AND TIME

          RHO PARAMETERS FOR LATENT CLASS "Male     " AT TIME  1

          RESPONSE CATEGORY  1

         | S N | D N | M N |
         | M O | R O | A O |
         | O   | I   | R   |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.800 0.800 0.800
SMONLY    0.200 0.800 0.800
ALCONLY   0.800 0.200 0.800
ALCSM     0.200 0.200 0.800
ALL       0.200 0.200 0.600

          RESPONSE CATEGORY  2

         | S Y | D Y | M Y |
         | M E | R E | A E |
         | O S | I S | R S |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.200 0.200 0.200
SMONLY    0.800 0.200 0.200
ALCONLY   0.200 0.800 0.200
ALCSM     0.800 0.800 0.200
ALL       0.800 0.800 0.400
```

```
RHO PARAMETERS FOR LATENT CLASS "Male     " AT TIME  2

RESPONSE CATEGORY  1

         | S N | D N | M N |
         | M O | R O | A O |
         | O   | I   | R   |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.800 0.800 0.800
SMONLY    0.200 0.800 0.800
ALCONLY   0.800 0.200 0.800
ALCSM     0.200 0.200 0.800
ALL       0.200 0.200 0.600

RESPONSE CATEGORY  2

         | S Y | D Y | M Y |
         | M E | R E | A E |
         | O S | I S | R S |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.200 0.200 0.200
SMONLY    0.800 0.200 0.200
ALCONLY   0.200 0.800 0.200
ALCSM     0.800 0.800 0.200
ALL       0.800 0.800 0.400

RHO PARAMETERS FOR LATENT CLASS "Male     " AT TIME  3

RESPONSE CATEGORY  1

         | S N | D N | M N |
         | M O | R O | A O |
         | O   | I   | R   |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.800 0.800 0.800
SMONLY    0.200 0.800 0.800
ALCONLY   0.800 0.200 0.800
ALCSM     0.200 0.200 0.800
ALL       0.200 0.200 0.600
```

```
          RESPONSE CATEGORY  2

         | S Y | D Y | M Y |
         | M E | R E | A E |
         | O S | I S | R S |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.200 0.200 0.200
SMONLY    0.800 0.200 0.200
ALCONLY   0.200 0.800 0.200
ALCSM     0.800 0.800 0.200
ALL       0.800 0.800 0.400
```

```
          RHO PARAMETERS FOR LATENT CLASS "Female    " AT TIME  1

          RESPONSE CATEGORY  1

         | S N | D N | M N |
         | M O | R O | A O |
         | O   | I   | R   |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.800 0.800 0.800
SMONLY    0.200 0.800 0.800
ALCONLY   0.800 0.200 0.800
ALCSM     0.200 0.200 0.800
ALL       0.200 0.200 0.600

          RESPONSE CATEGORY  2

         | S Y | D Y | M Y |
         | M E | R E | A E |
         | O S | I S | R S |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.200 0.200 0.200
SMONLY    0.800 0.200 0.200
ALCONLY   0.200 0.800 0.200
ALCSM     0.800 0.800 0.200
ALL       0.800 0.800 0.400
```

```
           RHO PARAMETERS FOR LATENT CLASS "Female   " AT TIME  2

           RESPONSE CATEGORY  1

          | S N | D N | M N |
          | M O | R O | A O |
          | O   | I   | R   |
          | K   | N   | I   |
          | E   | K   | J   |
          |     |     |     |
          |     |     |     |
          |     |     |     |
NOUSE      0.800 0.800 0.800
SMONLY     0.200 0.800 0.800
ALCONLY    0.800 0.200 0.800
ALCSM      0.200 0.200 0.800
ALL        0.200 0.200 0.600

           RESPONSE CATEGORY  2

          | S Y | D Y | M Y |
          | M E | R E | A E |
          | O S | I S | R S |
          | K   | N   | I   |
          | E   | K   | J   |
          |     |     |     |
          |     |     |     |
          |     |     |     |
NOUSE      0.200 0.200 0.200
SMONLY     0.800 0.200 0.200
ALCONLY    0.200 0.800 0.200
ALCSM      0.800 0.800 0.200
ALL        0.800 0.800 0.400

           RHO PARAMETERS FOR LATENT CLASS "Female   " AT TIME  3

           RESPONSE CATEGORY  1

          | S N | D N | M N |
          | M O | R O | A O |
          | O   | I   | R   |
          | K   | N   | I   |
          | E   | K   | J   |
          |     |     |     |
          |     |     |     |
          |     |     |     |
NOUSE      0.800 0.800 0.800
SMONLY     0.200 0.800 0.800
ALCONLY    0.800 0.200 0.800
ALCSM      0.200 0.200 0.800
ALL        0.200 0.200 0.600
```

```
          RESPONSE CATEGORY  2

         | S Y | D Y | M Y |
         | M E | R E | A E |
         | O S | I S | R S |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.200 0.200 0.200
SMONLY    0.800 0.200 0.200
ALCONLY   0.200 0.800 0.200
ALCSM     0.800 0.800 0.200
ALL       0.800 0.800 0.400

**************************************************

GAMMA PARAMETERS
GAMMAS ARE UNCONDITIONAL PROBABILITIES OF MEMBERSHIP IN EACH LATENT
CLASS
OF THE STATIC LATENT VARIABLE

Male       0.500
Female     0.500

**************************************************

DELTA PARAMETERS
DELTAS ARE PROBABILITIES OF LATENT STATUS MEMBERSHIP
CONDITIONAL ON LATENT CLASS


DELTA PARAMETERS FOR LATENT CLASS "Male     "

          TIME 1
NOUSE     0.600
SMONLY    0.100
ALCONLY   0.100
ALCSM     0.100
ALL       0.100


DELTA PARAMETERS FOR LATENT CLASS "Female   "

          TIME 1
NOUSE     0.600
SMONLY    0.100
ALCONLY   0.100
ALCSM     0.100
ALL       0.100

**************************************************
```

TAU PARAMETERS
TAUS ARE PROBABILITIES OF LATENT STATUS MEMBERSHIP AT TIME T+1 (COLUMNS)
CONDITIONAL ON LATENT STATUS MEMBERSHIP AT TIME T (ROWS)
AND ON LATENT CLASS MEMBERSHIP
(1X,A8,0005(F5.3,1x))
TRANSITION PROBABILITIES FOR LATENT CLASS "Male "

ROWS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 1
COLUMNS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 2

	NOUSE	SMONLY	ALCONLY	ALCSM	ALL
NOUSE	0.500	0.100	0.200	0.100	0.100
SMONLY	0.000	0.400	0.200	0.200	0.200
ALCONLY	0.000	0.000	0.500	0.200	0.300
ALCSM	0.000	0.000	0.000	0.500	0.500
ALL	0.000	0.000	0.000	0.000	1.000

ROWS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 2
COLUMNS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 3

	NOUSE	SMONLY	ALCONLY	ALCSM	ALL
NOUSE	0.500	0.100	0.200	0.100	0.100
SMONLY	0.000	0.400	0.200	0.200	0.200
ALCONLY	0.000	0.000	0.500	0.200	0.300
ALCSM	0.000	0.000	0.000	0.500	0.500
ALL	0.000	0.000	0.000	0.000	1.000

```
TRANSITION PROBABILITIES FOR LATENT CLASS "Female   "

ROWS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 1
COLUMNS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 2

        |  N  |  S  |  A  |  A  |  A  |
        |  O  |  M  |  L  |  L  |  L  |
        |  U  |  O  |  C  |  C  |  L  |
        |  S  |  N  |  O  |  S  |     |
        |  E  |  L  |  N  |  M  |     |
        |     |  Y  |  L  |     |     |
        |     |     |  Y  |     |     |
        |     |     |     |     |     |
NOUSE    0.500 0.100 0.200 0.100 0.100
SMONLY   0.000 0.400 0.200 0.200 0.200
ALCONLY  0.000 0.000 0.500 0.200 0.300
ALCSM    0.000 0.000 0.000 0.500 0.500
ALL      0.000 0.000 0.000 0.000 1.000

ROWS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 2
COLUMNS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 3

        |  N  |  S  |  A  |  A  |  A  |
        |  O  |  M  |  L  |  L  |  L  |
        |  U  |  O  |  C  |  C  |  L  |
        |  S  |  N  |  O  |  S  |     |
        |  E  |  L  |  N  |  M  |     |
        |     |  Y  |  L  |     |     |
        |     |     |  Y  |     |     |
        |     |     |     |     |     |
NOUSE    0.500 0.100 0.200 0.100 0.100
SMONLY   0.000 0.400 0.200 0.200 0.200
ALCONLY  0.000 0.000 0.500 0.200 0.300
ALCSM    0.000 0.000 0.000 0.500 0.500
ALL      0.000 0.000 0.000 0.000 1.000

**************************************************

 ITERATION HISTORY

**************************************************

STARTING G-SQUARED=  1450.303

ITER-   MAD             ITER-   MAD             ITER-   MAD
ATION                   ATION                   ATION

    1   .0292846925         2   .0135360129         3   .0099296022
    4   .0080879475         5   .0069273243         6   .0062962571
    7   .0057901429         8   .0054258402         9   .0051117213
   10   .0048087516        11   .0045238549        12   .0042603550
   13   .0040191525        14   .0037968760        15   .0035920644
   16   .0034068270        17   .0032423023        18   .0030898270
   19   .0029484705        20   .0028157520        21   .0026909254
   22   .0025733351        23   .0024624081        24   .0023589934
   25   .0022611923        26   .0021685976        27   .0020808899
<several pages of iteration history omitted>
```

3790	.0000010226	3791	.0000010219	3792	.0000010211
3793	.0000010204	3794	.0000010196	3795	.0000010189
3796	.0000010182	3797	.0000010174	3798	.0000010167
3799	.0000010159	3800	.0000010152	3801	.0000010145
3802	.0000010137	3803	.0000010130	3804	.0000010122
3805	.0000010115	3806	.0000010108	3807	.0000010100
3808	.0000010093	3809	.0000010086	3810	.0000010078
3811	.0000010071	3812	.0000010064	3813	.0000010056
3814	.0000010049	3815	.0000010042	3816	.0000010034
3817	.0000010027	3818	.0000010020	3819	.0000010013
3820	.0000010005	3821	.0000009998		

****

G-SQUARED= 863.527 WITH 991 DEGREES OF FREEDOM

WARNING: BE SURE TO INTERPRET THE LATENT CLASSES CAREFULLY
BASED ON THE ESTIMATED RHO PARAMETERS REPORTED BELOW.
YOU MAY WISH TO CHANGE THE LABELS YOU PREVIOUSLY
ASSIGNED TO THE LATENT CLASSES IN ORDER TO MAKE THEM
CONSISTENT WITH YOUR INTERPRETATION.

****

LITTLE RHO PARAMETERS
LITTLE RHOS ARE PROBABILITIES OF RESPONSES
TO ITEMS MEASURING THE STATIC LATENT VARIABLE
CONDITIONAL ON LATENT CLASS MEMBERSHIP

```
          RESPONSE CATEGORY  1

         | G M |
         | E A |
         | N L |
         | D E |
         | E   |
         | R   |
         |     |
         |     |
Male      1.000
Female    0.000

          RESPONSE CATEGORY  2

         | G F |
         | E E |
         | N M |
         | D A |
         | E L |
         | R E |
         |     |
         |     |
Male      0.000
Female    1.000
```

```
 **WARNING**: BE SURE TO INTERPRET THE LATENT STATUSES CAREFULLY
              BASED ON THE ESTIMATED RHO PARAMETERS REPORTED BELOW.
              YOU MAY WISH TO CHANGE THE LABELS YOU PREVIOUSLY
ASSIGNED
              TO THE LATENT STATUSES IN ORDER TO MAKE THEM
              CONSISTENT WITH YOUR INTERPRETATION.

 ***************************************************

 BIG RHO PARAMETERS
 BIG RHOS ARE PROBABILITIES OF RESPONSES
 TO ITEMS MEASURING THE DYNAMIC LATENT VARIABLE
 CONDITIONAL ON LATENT STATUS, LATENT CLASS, AND TIME

          RHO PARAMETERS FOR LATENT CLASS "Male     " AT TIME  1

          RESPONSE CATEGORY  1

         | S N | D N | M N |
         | M O | R O | A O |
         | O   | I   | R   |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.897 0.849 0.981
SMONLY    0.246 0.849 0.981
ALCONLY   0.897 0.121 0.981
ALCSM     0.246 0.121 0.718
ALL       0.246 0.121 0.543

          RESPONSE CATEGORY  2

         | S Y | D Y | M Y |
         | M E | R E | A E |
         | O S | I S | R S |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.103 0.151 0.019
SMONLY    0.754 0.151 0.019
ALCONLY   0.103 0.879 0.019
ALCSM     0.754 0.879 0.282
ALL       0.754 0.879 0.457
```

```
RHO PARAMETERS FOR LATENT CLASS "Male      " AT TIME  2

 RESPONSE CATEGORY  1

        | S N | D N | M N |
        | M O | R O | A O |
        | O   | I   | R   |
        | K   | N   | I   |
        | E   | K   | J   |
        |     |     |     |
        |     |     |     |
        |     |     |     |
NOUSE    0.897 0.849 0.981
SMONLY   0.246 0.849 0.981
ALCONLY  0.897 0.121 0.981
ALCSM    0.246 0.121 0.718
ALL      0.246 0.121 0.543

 RESPONSE CATEGORY  2

        | S Y | D Y | M Y |
        | M E | R E | A E |
        | O S | I S | R S |
        | K   | N   | I   |
        | E   | K   | J   |
        |     |     |     |
        |     |     |     |
        |     |     |     |
NOUSE    0.103 0.151 0.019
SMONLY   0.754 0.151 0.019
ALCONLY  0.103 0.879 0.019
ALCSM    0.754 0.879 0.282
ALL      0.754 0.879 0.457

RHO PARAMETERS FOR LATENT CLASS "Male      " AT TIME  3

 RESPONSE CATEGORY  1

        | S N | D N | M N |
        | M O | R O | A O |
        | O   | I   | R   |
        | K   | N   | I   |
        | E   | K   | J   |
        |     |     |     |
        |     |     |     |
        |     |     |     |
NOUSE    0.897 0.849 0.981
SMONLY   0.246 0.849 0.981
ALCONLY  0.897 0.121 0.981
ALCSM    0.246 0.121 0.718
ALL      0.246 0.121 0.543
```

RESPONSE CATEGORY 2

	SMOKE YES	DRINK YES	MARIJ YES
NOUSE	0.103	0.151	0.019
SMONLY	0.754	0.151	0.019
ALCONLY	0.103	0.879	0.019
ALCSM	0.754	0.879	0.282
ALL	0.754	0.879	0.457

RHO PARAMETERS FOR LATENT CLASS "Female " AT TIME 1

RESPONSE CATEGORY 1

	SMOKE NO	DRINK NO	MARIJ NO
NOUSE	0.897	0.849	0.981
SMONLY	0.246	0.849	0.981
ALCONLY	0.897	0.121	0.981
ALCSM	0.246	0.121	0.718
ALL	0.246	0.121	0.543

RESPONSE CATEGORY 2

	SMOKE YES	DRINK YES	MARIJ YES
NOUSE	0.103	0.151	0.019
SMONLY	0.754	0.151	0.019
ALCONLY	0.103	0.879	0.019
ALCSM	0.754	0.879	0.282
ALL	0.754	0.879	0.457

```
RHO PARAMETERS FOR LATENT CLASS "Female   " AT TIME  2

RESPONSE CATEGORY  1

         | S N | D N | M N |
         | M O | R O | A O |
         | O   | I   | R   |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.897 0.849 0.981
SMONLY    0.246 0.849 0.981
ALCONLY   0.897 0.121 0.981
ALCSM     0.246 0.121 0.718
ALL       0.246 0.121 0.543

RESPONSE CATEGORY  2

         | S Y | D Y | M Y |
         | M E | R E | A E |
         | O S | I S | R S |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.103 0.151 0.019
SMONLY    0.754 0.151 0.019
ALCONLY   0.103 0.879 0.019
ALCSM     0.754 0.879 0.282
ALL       0.754 0.879 0.457

RHO PARAMETERS FOR LATENT CLASS "Female   " AT TIME  3

RESPONSE CATEGORY  1

         | S N | D N | M N |
         | M O | R O | A O |
         | O   | I   | R   |
         | K   | N   | I   |
         | E   | K   | J   |
         |     |     |     |
         |     |     |     |
         |     |     |     |
NOUSE     0.897 0.849 0.981
SMONLY    0.246 0.849 0.981
ALCONLY   0.897 0.121 0.981
ALCSM     0.246 0.121 0.718
ALL       0.246 0.121 0.543
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RESPONSE CATEGORY  2

          | S Y | D Y | M Y |
          | M E | R E | A E |
          | O S | I S | R S |
          | K   | N   | I   |
          | E   | K   | J   |
          |     |     |     |
          |     |     |     |
          |     |     |     |
NOUSE     0.103 0.151 0.019
SMONLY    0.754 0.151 0.019
ALCONLY   0.103 0.879 0.019
ALCSM     0.754 0.879 0.282
ALL       0.754 0.879 0.457

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GAMMA PARAMETERS
GAMMAS ARE UNCONDITIONAL PROBABILITIES OF MEMBERSHIP IN EACH LATENT
CLASS
OF THE STATIC LATENT VARIABLE

Male        0.501
Female      0.499

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DELTA PARAMETERS
DELTAS ARE PROBABILITIES OF LATENT STATUS MEMBERSHIP
CONDITIONAL ON LATENT CLASS


DELTA PARAMETERS FOR LATENT CLASS "Male     "

           TIME 1 TIME 2 TIME 3
NOUSE      0.760  0.565  0.368
SMONLY     0.014  0.027  0.009
ALCONLY    0.017  0.036  0.088
ALCSM      0.107  0.266  0.282
ALL        0.101  0.106  0.253


DELTA PARAMETERS FOR LATENT CLASS "Female   "

           TIME 1 TIME 2 TIME 3
NOUSE      0.760  0.565  0.368
SMONLY     0.014  0.027  0.009
ALCONLY    0.017  0.036  0.088
ALCSM      0.107  0.266  0.282
ALL        0.101  0.106  0.253

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TAU PARAMETERS
TAUS ARE PROBABILITIES OF LATENT STATUS MEMBERSHIP AT TIME T+1 (COLUMNS)
CONDITIONAL ON LATENT STATUS MEMBERSHIP AT TIME T (ROWS)
AND ON LATENT CLASS MEMBERSHIP
(1X,A8,0005(F5.3,1x))
TRANSITION PROBABILITIES FOR LATENT CLASS "Male "

ROWS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 1
COLUMNS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 2

	NOUSE	SMONLY	ALCONLY	ALCSM	ALL
NOUSE	0.744	0.016	0.027	0.209	0.005
SMONLY	0.000	1.000	0.000	0.000	0.000
ALCONLY	0.000	0.000	0.911	0.000	0.089
ALCSM	0.000	0.000	0.000	1.000	0.000
ALL	0.000	0.000	0.000	0.000	1.000

ROWS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 2
COLUMNS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 3

	NOUSE	SMONLY	ALCONLY	ALCSM	ALL
NOUSE	0.651	0.014	0.100	0.000	0.235
SMONLY	0.000	0.023	0.104	0.874	0.000
ALCONLY	0.000	0.000	0.808	0.000	0.192
ALCSM	0.000	0.000	0.000	0.971	0.029
ALL	0.000	0.000	0.000	0.000	1.000

(1X,A8,0005(F5.3,1x))
TRANSITION PROBABILITIES FOR LATENT CLASS "Female "

ROWS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 1
COLUMNS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 2

	NOUSE	SMONLY	ALCONLY	ALCSM	ALL
NOUSE	0.744	0.016	0.027	0.209	0.005
SMONLY	0.000	1.000	0.000	0.000	0.000
ALCONLY	0.000	0.000	0.911	0.000	0.089
ALCSM	0.000	0.000	0.000	1.000	0.000
ALL	0.000	0.000	0.000	0.000	1.000

ROWS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 2
COLUMNS REPRESENT LATENT STATUS MEMBERSHIP AT TIME 3

	NOUSE	SMONLY	ALCONLY	ALCSM	ALL
NOUSE	0.651	0.014	0.100	0.000	0.235
SMONLY	0.000	0.023	0.104	0.874	0.000
ALCONLY	0.000	0.000	0.808	0.000	0.192
ALCSM	0.000	0.000	0.000	0.971	0.029
ALL	0.000	0.000	0.000	0.000	1.000

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EXPECTED CELL FREQUENCIES AND RESIDUALS

	OBS	EXP	RESID	PEARSON	
1111111111	25	30.1903	-5.1903	-0.9446	
2111111111	44	30.0543	13.9457	2.5438	*
1211111111	2	3.4932	-1.4932	-0.7989	
2211111111	2	3.4774	-1.4774	-0.7923	
1121111111	8	5.3743	2.6257	1.1326	
2121111111	2	5.3501	-3.3501	-1.4484	
1221111111	1	0.6276	0.3724	0.4701	
2221111111	1	0.6248	0.3752	0.4747	
1212111111	1	0.0682	0.9318	3.5690	*
1222111111	4	0.0153	3.9847	32.2398	*
1111211111	1	3.5601	-2.5601	-1.3568	
2111211111	5	3.5440	1.4560	0.7734	
1211211111	1	0.4486	0.5514	0.8234	
2211211111	2	0.4465	1.5535	2.3247	*
1222211111	1	0.0114	0.9886	9.2413	*
1111121111	1	5.6400	-4.6400	-1.9538	
2111121111	3	5.6146	-2.6146	-1.1034	

1211121111	2	0.6582	1.3418	1.6538	
2211121111	2	0.6553	1.3447	1.6612	
1121121111	3	1.1685	1.8315	1.6943	
2121121111	1	1.1632	-0.1632	-0.1514	
2221121111	1	0.1773	0.8227	1.9536	
1122121111	1	0.0300	0.9700	5.5998	*
1222121111	1	0.0260	0.9740	6.0390	*
1111221111	1	0.8856	0.1144	0.1216	
2111221111	2	0.8816	1.1184	1.1911	
2221221111	1	0.1579	0.8421	2.1189	*
1222221111	1	0.0724	0.9276	3.4486	*
1111112111	1	0.5895	0.4105	0.5346	
2111112111	1	0.5868	0.4132	0.5393	
1122112111	1	0.0027	0.9973	19.3110	*
2111122111	1	0.1382	0.8618	2.3185	*
1111222111	1	0.1075	0.8925	2.7214	*
2111222111	3	0.1071	2.8929	8.8414	*
1211222111	1	0.0221	0.9779	6.5852	*
2121222111	1	0.0431	0.9569	4.6073	*
1221222111	2	0.0743	1.9257	7.0668	*
1111111211	8	4.7395	3.2605	1.4977	
2111111211	3	4.7181	-1.7181	-0.7910	
2211111211	2	0.5709	1.4291	1.8913	
1221111211	1	0.1207	0.8793	2.5316	*
1222111211	1	0.0119	0.9881	9.0668	*
1111211211	1	0.7442	0.2558	0.2965	
2111211211	1	0.7409	0.2591	0.3010	
2111121211	1	1.1117	-0.1117	-0.1059	
2211121211	1	0.1506	0.8494	2.1885	*
1121121211	1	0.2765	0.7235	1.3758	
1221121211	1	0.1649	0.8351	2.0568	*
1111221211	1	0.8434	0.1566	0.1706	
2111221211	1	0.8396	0.1604	0.1751	
1222221211	1	0.2213	0.7787	1.6551	
1111111121	18	11.8366	6.1634	1.7915	
2111111121	11	11.7833	-0.7833	-0.2282	
2211111121	1	1.4372	-0.4372	-0.3647	
1121111121	4	2.2668	1.7332	1.1512	
2121111121	1	2.2566	-1.2566	-0.8365	
1112111121	1	0.2305	0.7695	1.6025	
1222111121	1	0.0287	0.9713	5.7322	*
1111211121	1	1.8948	-0.8948	-0.6500	
2111211121	2	1.8863	0.1137	0.0828	
2211211121	1	0.4591	0.5409	0.7983	
1121211121	1	0.3985	0.6015	0.9528	
2121211121	2	0.3967	1.6033	2.5454	*
1111121121	5	4.1969	0.8031	0.3920	
2111121121	5	4.1780	0.8220	0.4021	
2211121121	1	0.5375	0.4625	0.6309	
1121121121	1	1.9703	-0.9703	-0.6913	
2121121121	3	1.9615	1.0385	0.7415	
2221121121	1	0.5397	0.4603	0.6265	
1122121121	1	0.0916	0.9084	3.0022	*
2222121121	1	0.1736	0.8264	1.9836	
1111221121	3	2.1851	0.8149	0.5513	
2111221121	1	2.1752	-1.1752	-0.7968	
1121221121	2	0.8426	1.1574	1.2608	

1221221121	1	1.0645	-0.0645	-0.0626	
2221221121	1	1.0597	-0.0597	-0.0580	
1111212121	1	0.1271	0.8729	2.4482	*
1111122121	1	0.2951	0.7049	1.2975	
1111222121	2	0.6988	1.3012	1.5565	
2111222121	1	0.6957	0.3043	0.3649	
1121222121	2	0.3001	1.6999	3.1029	*
2222222121	1	0.3137	0.6863	1.2252	
1111111221	5	6.7611	-1.7611	-0.6773	
2111111221	11	6.7306	4.2694	1.6456	
2211111221	1	0.9379	0.0621	0.0642	
1121111221	2	1.2770	0.7230	0.6399	
2121111221	1	1.2712	-0.2712	-0.2405	
1221111221	1	0.3050	0.6950	1.2584	
1111211221	3	2.0751	0.9249	0.6421	
2111211221	4	2.0657	1.9343	1.3458	
2211211221	1	0.7352	0.2648	0.3088	
2221211221	1	0.5409	0.4591	0.6242	
1212211221	1	0.0436	0.9564	4.5795	*
1111121221	5	3.2079	1.7921	1.0006	
2111121221	4	3.1935	0.8065	0.4513	
1211121221	1	0.5277	0.4723	0.6503	
1121121221	1	1.1394	-0.1394	-0.1306	
2121121221	1	1.1343	-0.1343	-0.1261	
1122121221	1	0.1860	0.8140	1.8878	
1222121221	1	0.5245	0.4755	0.6566	
1111221221	5	5.5356	-0.5356	-0.2277	
2111221221	5	5.5107	-0.5107	-0.2176	
1211221221	1	1.1229	-0.1229	-0.1159	
2211221221	4	1.1178	2.8822	2.7261	*
1121221221	2	2.0112	-0.0112	-0.0079	
2121221221	4	2.0021	1.9979	1.4120	
1221221221	4	3.1952	0.8048	0.4502	
2221221221	1	3.1808	-2.1808	-1.2228	
1222221221	2	1.6075	0.3925	0.3096	
1111222221	4	2.1235	1.8765	1.2877	
1222222221	1	0.9679	0.0321	0.0326	
2222222221	1	0.9635	0.0365	0.0372	
2111111112	1	0.7763	0.2237	0.2539	
1111211112	1	0.1135	0.8865	2.6314	*
1222211112	1	0.0061	0.9939	12.7334	*
2111221112	1	0.1156	0.8844	2.6005	*
1111111122	1	1.6414	-0.6414	-0.5006	
2111111122	2	1.6340	0.3660	0.2864	
2111121122	2	0.5873	1.4127	1.8433	
2121121122	1	0.2147	0.7853	1.6947	
1111112122	1	0.0443	0.9557	4.5418	*
1111111222	5	4.4671	0.5329	0.2521	
2111111222	5	4.4470	0.5530	0.2622	
1121111222	1	0.8302	0.1698	0.1863	
2121111222	1	0.8265	0.1735	0.1909	
2221111222	1	0.1749	0.8251	1.9728	
1222111222	1	0.0457	0.9543	4.4629	*
2222111222	1	0.0455	0.9545	4.4739	*
2111211222	2	1.0274	0.9726	0.9596	
2221211222	1	0.2743	0.7257	1.3858	
1111121222	1	1.6243	-0.6243	-0.4898	

2111121222	2	1.6170	0.3830	0.3012	
2211121222	1	0.2660	0.7340	1.4229	
1121121222	1	0.5672	0.4328	0.5747	
2121121222	1	0.5646	0.4354	0.5794	
1122121222	1	0.1111	0.8889	2.6672	*
1111221222	3	2.3158	0.6842	0.4496	
2111221222	4	2.3054	1.6946	1.1161	
2121221222	3	0.9586	2.0414	2.0851	*
1221221222	1	1.6819	-0.6819	-0.5258	
2221221222	5	1.6743	3.3257	2.5702	*
1212221222	1	0.1399	0.8601	2.2996	*
2222221222	1	0.9722	0.0278	0.0282	
1111222222	2	0.8979	1.1021	1.1631	
2211222222	1	0.2323	0.7677	1.5928	
1121222222	2	0.4893	1.5107	2.1597	*
1221222222	2	0.9954	1.0046	1.0069	
2221222222	1	0.9909	0.0091	0.0091	
2122222222	1	0.2191	0.7809	1.6680	
1222222222	1	0.6663	0.3337	0.4089	
2222222222	1	0.6633	0.3367	0.4135	

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PROGRAM FINISHED: Sun Jun 13 00:58:16 1999
Time: 12197097