Psy 7821, SEM
Problem Set 4
Due Tuesday Oct 18, 2016

A famous study published several years ago investigated whether academic and demographic variables could predict educational and occupational attainment. There are 8 variables, two exogenous, six endogenous. The six dependent variables are defined in terms of the following regression models. The residuals of all endogenous variables are uncorrelated.

Predictors of Educational and Occupational Attainment

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x1 Mental Ability
x2 Socioeconomic Status

y1 Academic Performance	$y_1 = \gamma_{11}x_1 + e_1$
y2 Significant Others' Influence	$y_2 = \gamma_{21}x_1 + \gamma_{22}x_2 + \beta_{21}y_1 + e_2$
y3 Educational Aspiration	$y_3 = \beta_{31}y_1 + \beta_{32}y_2 + e_3$
y4 Occupational Aspiration	$y_4 = \beta_{41}y_1 + \beta_{42}y_2 + \beta_{43}y_3 + e_4$
y5 Educational Attainment	$y_5 = \beta_{51}y_1 + \beta_{52}y_2 + \beta_{53}y_3 + e_5$
y6 Occupational Attainment	$y_6 = \beta_{64}y_4 + \beta_{65}y_5 + e_6$

All pairs of residual variances, e_j, e_k are uncorrelated

If you submit written work, then turn in only 2 pages. Submit electronic work on the course dropbox

1. Sketch the path diagram for this model. Use the variable names that are listed below the correlation matrices on the next page. Include all the parameters (Greek letters) on the figure so that the diagram is complete. We should all agree on this diagram. (Half page)

2. Fit the model to Sample A. Report parameter estimates and fit measures (T_{ml}, df, $RMSEA$, residuals in brief form). We should all agree on these numerical results. (Half page)

3. The model proposed above does not fit Sample A adequately. Use whatever steps you believe are reasonable to modify the model so that it fits better. This is a difficult exercise because we do not know much about the subject matter or the variables or the sample. In a research report or a PhD thesis you would describe everything you do and justify your decisions. For this question do not include any description or any justification of your work. ABSOLUTELY NO TEXT. For your answer you should only construct a path diagram of the modified model with all parameters (Greek letters) on the figure. There will be disagreements on this answer. (Half Page)

4. In the class notes I quoted Jöreskog who wrote, "After such an exploratory search it is important that the final model is cross validated on a different data set." There are several ways to cross validate a path model. The simplest method is to replace the Sample A correlation matrix with the Sample B matrix and run the model again with the same code. There are then two sets of estimates. Sample A estimates were produced after a specification search. Sample B estimates are a cold, clear, beautiful cross validation. On the bottom half of your page 2, report both sets of fit indices and both sets of parameter estimates so it is easy to compare.

Sample A N=935

```
  1
.225    1
.534  .181    1
.456  .344  .505    1
.404  .377  .442  .632    1
.429  .367  .473  .594  .767    1
.467  .382  .548  .640  .681  .632    1
.373  .308  .372  .460  .450  .468  .581    1
```

Sample B N=686

```
  1
.292    1
.501  .172    1
.407  .259  .426    1
.403  .332  .419  .552    1
.435  .297  .457  .510  .731    1
.512  .381  .490  .552  .649  .580    1
.344  .295  .330  .383  .430  .445  .587    1
```

Variable names

Ability SES AcaPerf SigOther EdAspire OccAspir EdAttain OccAtain