

PSYC 5322: Psychometrics

Tarleton State University

Homework 7

1. Lawley and Maxwell (1971) reported the following two-factor model to account for the correlations among scores on six school subjects. The varimax rotated factor loadings are as follows:

Subject	Factor Loadings	
	1	2
1. Gaelic	.229	.659
2. English	.323	.551
3. History	.086	.591
4. Arithmetic	.771	.173
5. Algebra	.720	.215
6. Geometry	.577	.213

- (a) Use the factor loadings to plot each subject as a point in the two-dimensional factor space. Use Factor 1 for the x-axis and Factor 2 for the y-axis.
 - (b) Based on the factor loadings, what is the estimated correlation between scores in Gaelic and scores in Arithmetic?
 - (c) Compute the common variance for each subject.
 - (d) Compute the unique variance for each subject.
2. For this exercise, you'll need to download the `hw7data.csv` file from Canvas and open it in JASP.
 - (a) Compute a correlation matrix for the 12 items and report the correlations between the following two pairs of items: Items 1 and 5, and Items 3 and 4.
 - (b) Perform an exploratory factor analysis using the initial JASP defaults (Number of factors = parallel analysis, Rotation = Oblique/promax, highlighted loadings > 0.4). How many factors do you end up with? Which items load on which factors?
 - (c) Compute the common variance and unique variance for Items 2 and 7. Explain what these numbers mean.
 - (d) Compute the model estimated correlations between Items 1 and 5 and Items 3 and 4. How do these estimated correlations compare with the actual correlations you obtained in (a) above?
 - (e) Which two factors are highly correlated with each other? What is the correlation?
 - (f) What happens to the model fit when you manually choose one less factor? Is this "reduced" model acceptable? Cite the appropriate statistic(s) to justify your answer.