# Model Process

Structural Equation Modeling (SEM) was used to replicate the Carnegie Classification Method. Two latent factors were constructed: one with the 7 aggregate variables and another with the 3 per capita variables. These two latent factors were loaded onto a single factor of factors (**Figure of SEM Paths of this model**). However, this model failed to converge, which suggested a model misspecification, namely that the two latent factors were too similar to be separated. Although the ranked per capita manifest variables are not exactly correlated with their ranked aggregate counterparts, the correlations are very close to 1 (“SERD”: 0.92, “Non-SERD”: 0.88, Research Staff: 0.96). This is a serious issue in SEM because we are unable to identify how much variability in the data is from each manifest variable (**citation**).

A correlation matrix plot (**Figure of correlation matrix**) showed that the aggregate variables are naturally divided into two groups. The first includes **[STEM variable names]** and the second includes **[Non-STEM variable names]**. A new model was constructed which loaded these variables to two latent factors, cross-loading number of faculty onto both latent factors to emulate the per-capita variables without using them directly. The two latent factors were then loaded onto a factor of factors. This model was able to converge with Huber-White robust standard errors.

# Model Fit Assessment

Model fit was fair (RMSEA: 0.141, CFI: 0.958, Chi-Square: 6.5), with fit characteristics suggestive of good relative fit, but an absolute fit that may need improvement. That is, the model is comparatively better than an alternative with only an intercept, but does a middling job recreating the variability of the data. The proportion of the variability in the manifest variables explained by the latent traits was above 0.7 for all variables with the exceptions of “Other RSD,” “Non-SERD,” and number of faculty (**Table(s) of variability proportions??**).

This model gives a different interpretation than the Carnegie Classifications. Scores are computed as averages of the ranks and weights associated with each manifest variable. Each university receives three scores, a humanities score and a STEM score, and a weighted average aggregate score of the two. **[Need some help with estimate interpretation.]**