What is the annotated output for Factor Analysis in SAS?

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The annotated output for Factor Analysis in SAS is a detailed summary of the results from a factor analysis procedure performed in the SAS software. It includes a list of the variables used in the analysis, along with their descriptive statistics and factor loadings. The output also displays various measures of model fit and significance tests for the extracted factors. Additionally, the annotated output provides graphical representations of the factor structure and allows for the interpretation of the underlying latent factors. This comprehensive output is useful for researchers and analysts in understanding the factor analysis results and making informed decisions based on the data.

Factor Analysis | SAS Annotated Output

This page shows an example of a factor analysis with footnotes explaining the output. The data used in this example were collected by Professor James Sidanius, who has generously shared them with us. You can download the data set here.

Overview: The "what" and "why" of factor analysis

Factor analysis is a method of data reduction. It does this by seeking underlying unobservable (latent) variables that are reflected in the observed variables (manifest variables). There are many different methods that can be used to conduct a factor analysis (such as principal

axis factor, maximum
likelihood, generalized least squares, unweighted least squares), There are also
many different types of rotations that can be done after the initial extraction
of factors, including orthogonal rotations, such as varimax and equimax, which
impose the restriction that the factors cannot be correlated, and oblique
rotations, such as promax, which allow the factors to be correlated with one
another. You also need to determine the number of factors that you want to
extract. Given the number of factor analytic techniques and options, it is not
surprising that different analysts could reach very different results analyzing
the same data set. However, all analysts are looking for simple structure.
Simple structure is pattern of results such that each variable loads highly onto
one and only one factor.

Factor analysis is a technique that requires a large

sample size.
Factor analysis is based on the correlation matrix of the variables involved,
and correlations usually need a large sample size before they stabilize.
Tabachnick and Fidell (2001, page 588) cite Comrey and Lee's (1992) advise
regarding sample size: 50 cases is very poor, 100 is poor, 200 is fair, 300 is
good, 500 is very good, and 1000 or more is excellent. As a rule of thumb,
a bare minimum of 10 observations per variable is necessary to avoid
computational difficulties.

For the example below, we are going to do a rather "plain vanilla" factor
analysis. We will use iterated principal axis factor with three factors as our
method of extraction, a varimax rotation, and for comparison, we will also show
the promax oblique solution. The determination of the number of factors to
extract should be guided by theory, but also informed

**by running the analysis
extracting different numbers of factors and seeing which number of factors
yields the most interpretable results. We have used the priors = smc
option on the proc factor statement so that the squared multiple
correlation is used on the diagonal of the correlation matrix. (If this
option is not used, 1's are on the diagonal, and you will do a principal
components analysis instead of a principal axis factor analysis.)**

**In this example we have included many options, including the original
correlation matrix, the scree plot and the eigenvectors. While you may not
wish to use all of these options, we have included them here to aid in the
explanation of the analysis. We have also created a page of annotated
output for a principal components analysis that parallels this analysis.**

For general information regarding the similarities and differences between
principal components analysis and factor analysis, see Tabachnick and Fidell,
for example.

```
proc factor data = "d:m255_sas" nfactors = 3 corr scree
ev rotate = varimax method = prinit priors = smc;
var item13 item14 item15 item16 item17 item18 item19
item20 item21 item22 item23 item24 ;
run;
```