

Confirmatory Factor Analysis with Ordinal Variables: A Simulation Study

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Abstract

When data collected through questionnaires, the variables are often ordinal. Observations on an ordinal variable are assumed to represent responses to a set of ordered categories, such as a five-category Likert scale. It is common in practice to treat such scores such as 1, 2, 3,... representing the ordered categories as if they have interval scale properties. Jöreskog (2002) says it would be wrong to compute a covariance matrix or product-moment correlation matrix for such scores. He argues that ordinal variables do not have origins or units of measurements. Means, variances and covariances of ordinal variables have no meaning. He suggests that polychoric correlations should be used with ordinal variables. On the other hand it could be argued that the theory of asymptotic robustness of Browne (1984, 1987) and Satorra (1993) still holds even for this kind of non-normality. The model can be fitted to the matrix by different methods, such as maximum likelihood (ML) or weighted least squares (WLS) using a weight matrix which is the inverse of an estimated asymptotic covariance matrix (ACM). An hybrid procedure, robust maximum likelihood (RML) is to use ML to estimate the parameters and the ACM matrix to obtain standard errors and chi-square values. For each procedure an issue is how large samples are required for it to work properly.

In this simulation study investigate the various procedures without presumptions. We like to show which procedure give the least biased parameter estimates and which procedure give the most correct standard errors and the most trustworthy chi-square values.

References

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