

Estimated factor scores do not have the same properties as true factors. Estimated factor scores approximate true factors better the more highly correlated the two are. With continuous factor indicators, the correlation is measured by factor determinacy which is high when there are many highly reliable items measuring the factor. With categorical factor indicators, Item Response Theory advocates using Information Functions to determine the precision with which the factor is measured. Mplus provides factor determinacy in the regular output and Information Functions in the PLOT command.

The properties of estimated factor scores also differ for different factor score estimators. This is described, e.g., in Skrondal and Laake (2001). See

Skrondal, A. and Laake, P. (2001). Regression among factor scores. *Psychometrika* 66, 563-575.

With continuous variables, Mplus estimates factor scores as the maximum of the posterior distribution of the factor, which is the same as the Regression Method for factor score estimation. With this method, using factor scores as predictors gives unbiased regression slopes, but using factor scores as dependent variables gives biased slopes. With categorical variables and the weighted least-squares estimator, Mplus estimates factor scores as the maximum of the posterior distribution of the factor, which is also called the Maximum A Posteriori (MAP) method. With categorical variables and the maximum-likelihood estimator, Mplus estimates factor scores as the expected value of the posterior distribution of the factor, which is also called the Expected A Posteriori (EAP) method. For categorical variables, the MAP and EAP estimation methods are commonly used in Item Response Theory.

Bayesian estimation in Mplus allows the estimation of a distribution of factor score values for a subject. These estimates are referred to as plausible values. The use of plausible values can alleviate the biases mentioned above. Drawing for instance 100 values for each subject's factor score distribution, 100 data sets are created and 100 subsequent analyses can be carried out and summarized using the TYPE=IMPUTATION setting of the DATA command. The Mplus website describes plausible values in the paper posted under Papers, Bayesian Analysis

Asparouhov, T. & Muthén, B. (2010). Plausible values for latent variables using Mplus. Technical Report.

This paper also gives further references.