# Should Coefficient Alpha Be Replaced by Model-based Reliability Coefficients?

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## Abstract

We review and hope to stimulate a discussion of a variety of internal consistency reliability coefficients based on weights $w$ in $\rho_{xx} = 1 - w'\Psi w / w'\Sigma w$, where $\Sigma = \Sigma_C + \Psi$ is composed of the covariance matrices of the common and unique variates respectively (Bentler, 1968). Sample estimates of $w$, $\Sigma$, and $\Psi$ are used in practice. Depending on the assumptions, weights, and model used, coefficient α, 1-factor, x-factor, arbitrary model, maximal (two versions), dimension-free, and greatest lower bound reliability coefficients result. Most coefficients assume equal unit weights for variables and describe the reliability of an unweighted composite. Coefficient α is usually a lower bound to reliability. The 1- and x-factor coefficients are better lower bounds. An arbitrary model coefficient allows dependencies among factors as well as unique variates and takes substantive theory into a reliability estimate. Model-based coefficients are not useful if the models are not consistent with the empirical data. Dimension-free and greatest lower bound coefficients make no assumptions on the number of factors and usually improve on all the previous coefficients. They are based on a tautological model definition that can always describe empirical data, but have the drawback that there is an upward bias in small samples. Maximal reliability describes the reliability of a composite weighted by $w$. This can be based on a 1-factor model or an arbitrary dimension free model.

All coefficients are computed in EQS 6. Examples are used to provide illustrations of the various coefficients in practice. Research on bias reduction in the dimension-free and greatest lower bounds (Shapiro & ten Berge, 2000; Li & Bentler, 2001) is discussed.

## References

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