Cause for Concern: Omitted Cross-Loadings in Measurement Models of Nonlinear Structural Equation Models

Karina Navarro[1)] & Karin Schermelleh-Engel[2)]

[1)]*University of Chile, Faculty of Social Sciences, Santiago, Chile*

[2)]*Goethe University, Institute of Psychology, Frankfurt, Germany*

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Nonlinear structural equation modeling (SEM) generally assumes that all indicators of the measurement models are unidimensional, an assumption that is often violated in empirical research. Recent research on linear SEM has already shown that omitting positive crossloadings results in biased parameter estimates, with some paths being overestimated and other paths being underestimated. For nonlinear SEM, the consequences of omitting cross-loadings have not yet been systematically investigated. Because of the high complexity of these models, due to higher order terms in the model that are generally correlated, the effects of omitted cross-loadings are expected to be more severe than for linear SEM.

In a Monte Carlo study, we examined the patterns of parameter bias due to omitted crossloadings in measurement models of three nonlinear SEMs with increasing numbers of nonlinear effects (moderator effect, moderator and quadratic effect, moderator and two quadratic effects) by varying the sign and size of cross-loadings, nonlinear effects, and predictor correlation as well as sample size. The results demonstrate the detrimental effects of omitted cross-loadings with different patterns of overestimation or underestimation of all structural parameters. The results also show that under certain conditions, omitted crossloadings altered the nature of the relationships between predictor and criterion variables. A tentative explanation for the different patterns of bias is provided.