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Exploratory Structural Equation Modeling (ESEM) in Comparison with CFA Models

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Psychometric evaluations of psychological assessment measures have shown that several instruments produce inconsistent factor structures across groups and contexts and provide questionable reliability and predictive validity. A key conceptual issue concerns how a theoretical construct is defined vs. how it is measured. Given that psychological constructs cannot be observed directly, but only inferred through rating scales, the methodology used to validate psychometric instruments may be the central issue. When cross-loadings are constrained to zero in estimation models, dynamic interactions between factors cannot be captured. Therefore, more innovative approaches to scale validation may be needed.
Exploratory Structural Equation Modeling (ESEM) has emerged as a viable option for overcoming some of these challenges, combining the finest features of exploratory and confirmatory factor analysis within the traditional SEM framework (Asparouhov & Muthén, 2009; Morin et al., 2020). Therefore, this contribution focuses on ESEM as a technique that provides a compromise between the mechanical iterative approach of finding optimal factorial solutions through rotations and the restrictive a priori theory-driven modeling approach to promote the rational use of a methodology that can support a clearer representation of the complexity of psychological constructs (Marsh et al., 2014). The purpose of this presentation is to provide a brief overview of ESEM and results from empirical studies comparing ESEM and CFA models.
Specific types of ESEM are presented as useful strategies to extend the applicability of this technique within more complex analytical frameworks. Set-ESEM enables the simultaneous estimation of multiple constructs and finds an optimal balance between CFAs and Full-ESEMs in terms of parsimony, data-model fit, rigor, flexibility, and well-defined factor estimation (Marsh et al., 2020). ESEM-within-CFA allows for the re-specification of an ESEM model within a CFA framework for more complex research questions (e.g., hierarchical structures, partial mediation, longitudinal mediation, latent change score models) (Morin & Asparouhov, 2018).
The comparison between two 4-factor solutions with 20 items and 26 cross-loadings ($|\lambda| = .103 - .417$, M = .174) reveals a reduction in correlations between factors: CFA ($.63 < r < .81$, Mr = .74), ESEM ($.49 < r < .74$, Mr = .61). The comparison between two 2-factor solutions with 7 items and 3 cross-loadings ($|\lambda| = .130 - .208$, M = .16) shows a reduction of the factor correlation as follows: CFA ($r = .63$), ESEM ($r = .56$). The comparison between two 3-factor solutions with 10 items and 12 cross-loadings ($|\lambda| = .101 - .444$, M = .234) shows a reduction of the factor correlations: CFA ($.74 < r < .79$, Mr = .77), ESEM ($.37 < r < .46$, Mr = .40).
The choice of the "best"model reflects a combination of adherence to theory and research question, goodness of fit, interpretation of parameter estimates, and parsimony. Of course, the choice is rarely so straightforward when based on real data, and researchers must balance goodness of fit, parsimony, theoretical considerations, and interpretation of parameter estimates. Golden rules about which models are best are inappropriate and even counterproductive.

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