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SEMtrees in Longitudinal studies: The utility of goodness-of-fit indices for building theory

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Oral presentation

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Abstract

Longitudinal data allow us to examine both simple and complex types of change over time, but also require defining the expected types of change based on a theoretical background. In this context, SEMtrees (Brandmaier et al., 2013; Zeileis et al. 2008) is a powerful statistical method for building models to examine parameters of: (1) intraindividual change, and (2) interindividual differences, and also understand how and why both parameters are articulated, revealing patterns and interactions in data. In other words, SEMtrees advance the understanding of the relationships and mechanisms between variables, through the tree-based structure, providing a deeper, more theory-driven analysis.

The current work illustrates the application of SEMtrees to empirical data in the context of Alzheimer's disease, and discusses the substantive interpretation of the results. In particular, it highlights how and why aspects of cognitive evolution are linked to the biology of the disease, neuronal activation, and the evolution of plasma biomarkers.

Additionally, this work analyzes the performance of some of the most well-known goodness-of-fit indices for SEM models: CFI, TLI, RMSEA, SRMR, and SRMRu within each latent class grouping, using both empirical data and a simulation study.

The results align with previous SEM research, indicating that not all indices are capable of detecting specification errors in the model.

Finally, we discuss the implications of this work and provide practical recommendations regarding advanced new methods for accurately tracking individual changes over time, and identifying the sources of variance that contribute to observed age-related changes. Also, we highlight the importance of using goodness-of-fit indices in applied research based on longitudinal designs.

Keywords

SEMtrees, Longitudinal studies, goodness-of-fit-indices

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