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# A Comparative Study of Dynamic Structural Equation Modeling and Structural Equation Modeling in Longitudinal Actor-Partner Interdependence (APIM) Mediation Analysis

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## Poster

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## Abstract

The Actor-Partner Interdependence Model (APIM) is a widely used framework for analyzing dyadic data, which enables the capture of both actor and partner effects. Recently, the APIM has been extended to assess mediation effects in dyads. The APIM is traditionally implemented within the framework of Structural Equation Modeling (SEM), APIM assumes static relationships, which may overlook the temporal dynamics inherent in dyadic interactions. Furthermore, when applying SEM to longitudinal APIM data, researchers often simplify models to fit the data, rather than tailoring the model to the research question (Planalp et al., 2017; Savord et al., 2023).

Dynamic structural equation modeling (DSEM; Asparouhov & Muthén; 2019) has emerged as a promising alternative by integrating time series analysis, SEM, and multilevel modeling to capture the dynamic and multilevel structure of the data. Fang et al. (2024) proposed a method to investigate examining mediation effects in intensive longitudinal dynamic data within the DSEM framework and showed that residual DSEM (RDSEM) outperforms traditional DSEM in de-trending mediation analysis. However, few studies have applied the DSEM framework to APIM, and Savord et al. (2023) only demonstrated the feasibility and characteristics of APIM within DSEM through the utilization of illustrative data in Mplus, without conducting a comprehensive comparison between the SEM and DSEM frameworks in the context of APIM data.

The purpose of this study is to compare SEM, DSEM, and RDSEM within the APIM mediation analysis framework using Monte Carlo simulations, with a focusing on the accuracy of parameter estimates, Type I error rates, and power performance under different modeling conditions. Furthermore, this research investigates the power and sample size requirements of APIM mediation models within SEM and DSEM frameworks. The findings will provide methodological guidelines for empirical researchers to make informed decisions about selecting the most suitable model framework and optimizing study design for APIM mediation analysis.

## Keywords

APIM, DSEM, SEM,sample_size, model performance

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