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MixMG-SEM with double mixture modeling to capture similarities in measurement model and in structural relations across many groups

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Comparing relations between latent constructs across groups is essential for understanding social phenomena in different contexts. A key assumption for valid comparisons of such relations is that the constructs are measured equivalently across the groups, referred to as "measurement invariance". Specifically, partial metric invariance is sufficient –meaning that at least some factor loadings are invariant across groups –provided that non-invariant measurement parameters are appropriately accounted for in the model. To address this, we propose double-mixture multigroup structural equation modeling (2MixMG-SEM), which applies a mixture clustering of the groups to capture differences in the measurement model (measurement clusters) and another mixture clustering to capture differences in the structural relations (structural relations clusters). 2MixMG-SEM thus captures measurement non-invariance with cluster-specific measurement parameters, as opposed to mixture multigroup SEM (MixMG-SEM), which captures them with group-specific parameters. We therefore expect 2MixMG-SEM to perform better than MixMG-SEM when some groups are too small for group-specific parameters to be accurately estimated. Through a simulation study, we evaluate 2MixMG-SEM's performance, addressing key challenges such as classification uncertainty and selecting the cluster numbers for both layers of clustering.

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