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Evaluating the Efficacy of Mixture Multigroup Factor Analysis in Handling Non-Normal and Ordinal Data: A Simulation Study

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In the social sciences, a common research objective is the comparison of latent variables among different groups, such as in cross-cultural studies. For making valid comparisons measurement invariance (MI) is required, which implies that constructs are measured consistently across populations. When dealing with many groups, MI often does not hold, requiring pairwise comparisons between the groups to identify the sources of non-invariance. However, such comparisons can become impractical when dealing with many groups. Mixture multigroup factor analysis (MMG-FA) offers a solution by clustering groups based on their measurement parameters. This method captures between-group differences and similarities in measurement parameters without requiring extensive pairwise comparisons. It combines cluster-specific and group-specific parameters to cluster groups on specific subsets of measurement parameters, for instance, on factor loadings to achieve metric invariance within each cluster of groups. An EM algorithm was developed for MMG-FA to drastically lower the computation time, but this is specific to maximum likelihood estimation. However, the use of maximum likelihood estimation in MMG-FA assumes continuous items and underlying multivariate normality—assumptions that are not always tenable in real-life settings. Using simulations, we investigate MMG-FA's performance with ordinal data and underlying non-normal distributions when clustering based on factor loadings, to examine the robustness of MMG-FA to violations of the previously mentioned assumptions.

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