Semiparametric latent variable transformation models for multiple mixed outcomes

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SUMMARY The surge of technological advances that allow multiple outcomes to be routinely collected has brought up a high demand of valid statistical methods that can summarize and study the latent variables underlying them. Mixed outcome data, e.g. those with continuous and ordinal components, present further statistical challenges. Addressing to these challenges, we develop a new class of semiparametric latent variable transformation models to summarize the multiple correlated outcomes of mixed types in a data-driven way. We propose a series of estimating equation-based and likelihood-based procedures for estimation and inference. The resulting estimators are shown to be $n^{1/2}$-consistent (even for the nonparametric link functions) and asymptotically normal. Simulations suggest robustness as well as high efficiency, and the proposed approach is applied to assess the effectiveness of recombinant tissue plasminogen activator on ischemic stroke patients.

KEY WORDS: Latent variable model, multiple mixed outcome, normal transformation model, semiparametric.

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