

**“In-depth research in latent class modeling”**

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In many studies, the conceptually or clinically most meaningful outcome is unobservable. Hence, a set of multiple discrete indicators, for example, a set of questionnaires, is measured in place of this outcome. Latent variable models explore the relationships between unobservable outcomes and their measured indicators. My research focuses on the cases where the unobservable outcome is described by a categorical variable identifying subpopulations or “classes” with each of which has homogeneous outcome status (i.e., the latent class variable). I have devoted myself on the statistical methodological and theoretical research of latent class models, and all have obtained valuable results and excellent publications. However, there are many more important research topics and unsolved issues in latent class modeling, including model diagnosis, variable selection, and model identifiability. They are of great interest to the latent class literature. Solving these issues can guarantee the latent class models to extract true information underlying the data and can greatly benefit future medical research. Based on my previous achievements on latent class methodological development, this project proposes to provide satisfying solutions to above three topics.

Keywords: latent variable model; model diagnosis; model identifiability; structure equation model; variable selection.