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How to integrate categorical and numerical information in scale construction?

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In a 3-level model, the interplay of factors at the school and classroom level on student achievement is investigated. In the context of school and teaching quality, high multicollinearities are to be expected. With the help of a multidimensional Rasch model (Reckase, 2007), the latent dimensions of the 3-level model are formed at the school and classroom level. The person ability parameters "theta" of the latent dimensions correlate highly with each other, so that multicollinearity is clearly present. The model needs a respecification, which we do by combining latent dimensions into higher order factors. The thetas generated by a multidimensional Rasch model are interval scaled. Therefore higher order factors can be built through confirmatory factor analysis (CFA). To counteract the problem of multicollinearity, we form second-order factors and third-order factors for school as well as classroom level. The approach of combining categorical and numerical information in scale construction is presented and results of multilevel modelling are discussed with regard to the underlying scale construction.

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