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Longitudinal data analysis with auxiliary item information to deal with missing questionnaire data

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Study outcomes are often measured by multi-item questionnaires. Missing item scores can impair total score calculation and result in incomplete scale scores. Even though scale scores are of interest, it is most desirable to handle missing items at the item-level because that improves power. Many questionnaire manuals advice to average the available items or impute the mean; however these methods can introduce bias. A valid way to handle missing data without imputation is by using a model with maximum likelihood estimation. For longitudinal data this could be a linear growth model. However, these kinds of models do not necessarily include the item scores. The performance of a novel procedure that uses the item scores or some summary of these as the auxiliary variables was studied, while treating the scale scores as missing in a growth model. This method is advantageous because it incorporates the observed item-level data while maintaining the scale scores as the focus of the analysis. The auxiliary variables improve missing data handling by using the item information to improve the precision of model estimates. The performance of this novel method was examined in a simulation study in several longitudinal data conditions and analyzed through bias, mean square error, and coverage. Results showed that including the items as auxiliary variables results in rather dramatic power gains compared to not including the items. Including the observed items as auxiliary variables is the most optimal way to regain power, refine parameter estimates and decrease bias when scale scores are incomplete.

Biography

Iris Eekhout is currently working on his PhD at the VU University Medical Center in Amsterdam at the Department of Epidemiology and Biostatistics. Her research mainly focuses on methods to handle missing data in multi-item questionnaires. She also gives lectures on missing data.

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