

Multilevel linear mixed model for the analysis of longitudinal studies

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Abstract

The use of longitudinal studies (studies in which the response of each individual is observed on two or more occasions) has been considered a lot over the last decades. Longitudinal studies beyond the cross-sectional studies in several ways: longitudinal study gives the opportunity for controlled and more reliable measurement of exposure history. Also longitudinal study gives information about individual change over time and factors that affected this change. Finally, this study provides more efficient estimates of parameters than cross-sectional study with the same number of individuals. A number of methods and statistical models on the analysis of hierarchical and longitudinal data have used in most researches, including traditional approaches such as repeated measurements analysis and multivariate analysis of variance. But new approaches, including multilevel linear mixed models, also known as hierarchical linear models, random coefficient models, and mixed-effect models, have become an increasingly important strategy for analyzing longitudinal data.

The observations within an individual are assumed to be correlated in such data and multilevel linear mixed models include the subject-specific profile in the model structure, therefore, these models should be well suited to describe longitudinal data. Recently, multilevel linear mixed models have applied in a few medical literatures, while this field has the potential and possibilities of these models. In this paper we introduce multilevel linear mixed model for the analysis of longitudinal data and interpretation of the parameters of the model at each level. As an example, the data from a sample of dental composites will analyze using SAS PROC MIXED.

Keywords

Multilevel linear mixed model, longitudinal study, dental composites.

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