MULTILEVEL ANALYSIS OF LONGITUDINAL DATA: ANALYSIS OF WORKSHOP DATA SET 1

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1. INTRODUCTION

Traditional analyses of longitudinal data have typically ignored the subject effect and have assumed that the rate of change of the response variable with respect to time is constant for all subjects in the study. The models resulting from making these assumptions tend to be too rigid and interesting individual differences are neglected. Goldstein [2] provided a methodology for the use of mixed generalized linear models in handling longitudinal and repeated measures whereby growth is taken as one level of a two-level model: the within-subject model takes care of changes within individuals across occasions as a result of time and/or other explanatory factors, and the between-subject model allows for different growth rates across subjects. Raudenbush [7] further elaborated the theory and provided examples of its applications in studying school effectiveness. This paper tries to give an illustration of the use of Goldstein's mixed generalized linear model on longitudinal and repeated measures arising from a randomized group experimental design.

Goldstein [2] viewed longitudinal data as a two-level hierarchy, with subjects as the higher level (level-2) and occasions within subjects as the lower level (level-1). Goldstein suggested using a two-level polynomial growth curve model decomposing the variance into between-subjects and within-subject-between-occasion components. In this way, the response , y_{it}, of subject i on occasion t can be represented by the basic model as:

$$y_{it} = \Sigma_j \beta_{ij} x_{tj} + \Sigma_k \Omega_k z_{itk} + e_{it} \qquad (1)$$

where x_{tj}'s are some measures of time at occasion t; β_{ij}'s are usually considered as random; z_{itk}'s are explanatory variables defined at level-2; Ω_k can be random or fixed effects; $\beta_{ij} = \beta_j + \vartheta_{ij}$; e_{it} are independently