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ABSTRACT. The growth curve models (GCM) are widely used in longitudinal studies and repeated measures. Most existing approaches for statistical inference in the GCM assume a specific structure on the within-subject covariances, for example, compound symmetry, AR(1) and unstructured covariances. The specification, however, may select a suboptimal or even wrong model, which in turn may affect the estimates of regression coefficients and/or bias standard errors of the estimates. Accordingly, statistical inferences of the models may be severely influenced by misspecification of covariance structures. Within the framework of the GCM in this paper we propose a data-driven approach for modelling the within-subject covariance structures, investigate the effects of misspecification of covariance structures on statistical inferences, and study the heterogeneity of covariances between different treatment groups.