

Non-linear growth modeling – cosine function

Question: We have data over a period of 4 years that follows a cosine function. How do we implement such a function in Mplus? Where can we find a good example(s) of how to define such a model? We expect to use time-invariant and time varying covariates.

[Kevin Grimm](#) posted on Friday, October 21, 2016 - 7:50 am

The MODEL CONSTRAINT command can be used to constrain the factor loadings of the slope latent variable to change according to the cosine function. The factor loadings for the slope latent variable are given labels in the MODEL statement and then those labels are used in the MODEL CONSTRAINT statement and set equal to the cosine function (e.g., $\text{COS}(t)$, where t is the timing variable). Similar examples can be found in

Grimm, K. J., & Ram, N. (2009). Nonlinear growth models in Mplus and SAS. *Structural Equation Modeling: A Multidisciplinary Journal*, 16, 676-701.

with input/output scripts available at

<https://sites.google.com/site/longitudinalmethods/downloads>

If time varies at the individual level, the timing variables can be added as CONSTRAINT variables in the VARIABLE statement and be put in place of t . For examples, see

Sterba, S.K. (2014). Fitting nonlinear latent growth models with individually-varying time points. *Structural Equation Modeling*, 21, 630-647.