

Online Supporting Materials: Procedure and results of additional simulation (OSM Table 7, Table 8, and Figure 1)

We conducted an additional simulation to confirm the generalizability of the present results using the same data generation procedure (i.e., we systematically changed the number of total participants ($N = 100, 200, 400, 800, 1600, 3200$), the number of time points ($T = 4, 6, 8$), the number of true classes ($C = 2, 4$), the degree of separation (i.e., distances) between classes at the first time-point ($d = 0.5, 1.0, 1.5, 2.0, 2.5$), the agreement rate of the observed dichotomous covariate with its true latent profile ($r = 0.5, 0.6, 0.7, 0.8, 0.9, 1.0$), and a functional form of true latent trajectory in each class (linear or quadratic curve)). Additionally, we also manipulated the presence or absence of two kinds of model misspecification: an incorrect functional form (e.g., a model that incorrectly assumes a *linear* latent trajectory is fit to a dataset that actually has a *quadratic* functional form, or vice versa), and time-invariant error variances (i.e., a model that assumes that time-invariant error variances are incorrectly fit to a dataset that was actually generated using time-variant error variances). We generated simulation data under an orthogonal design, and 100 sets of simulation data were randomly generated for each condition.

In the new simulation, we set slope factor means to $\mu_I^{(1)} = 100$, $\mu_{S1}^{(1)} = 10$, and $\mu_{S2}^{(1)} = 1$ for the first class. The class-invariant variance–covariance matrix Φ was specified as

$$\Phi = \begin{pmatrix} 10 & 3 & 3 \\ & 10 & 3 \\ sym. & & 10 \end{pmatrix}.$$

Namely, all factor variances and covariances are set to 10 and 3, respectively, assuming small correlations among factor scores. Note that when the functional form of the true latent trajectory is linear, zero factor means and zero (co)variances are assumed (i.e.,

$\mu_{S2} = \phi_{S2}^2 = \phi_{IS2} = \phi_{S1S2} = 0$). (Time-variant) error variances ψ_t^2 are specified using random variables from gamma distribution as $\psi_t^2 \sim \Gamma(5, 50)$ so its mean and variance become $(50/5=) 10$ and $(50^2/5=) 500$, respectively. We set the intercept factor means for the remaining c -th classes as $\mu_I^{(c)} = \mu_I^{(1)} + d \times (c - 1) \times \sigma_1$. Here, σ_1 denotes (class-invariant) population standard deviations of the variables at $t = 1$, which can be calculated as $\sigma_1 = \sqrt{\phi_I^2 + E(\psi_t^2)} = \sqrt{10 + 10} = \sqrt{20}$. Slope factor means are assumed to be class-invariant, indicating true latent trajectories have the same degree of separations among classes at each time point.

Simulation results that correspond to Table 1 (i.e., the correct marginal estimation rates at each level of the manipulated factors), Table 2 (ANOVA results), and Fig. 1 (shifts in the correct marginal estimation rates at each level of the agreement rates) in the main document are provided in OSM Tables 7 and 8 and Fig. 1. Although these results showed slightly higher correct estimation rates on average from the simulation shown in the main document, similar tendencies (e.g., dominant influence of r , followed by N and C on correct estimation rates, and smaller but nonzero impact of misspecification of the time-invariant error variances) can be observed, indicating the high generalizability of the present simulation results.