Model 3:

$$\begin{aligned}\text{SYS}_{ij} = \beta_0 &+ \beta_1 \cdot \text{AGE}_i + \beta_2 \cdot \text{FH123}_i + \beta_3 \cdot \text{HAP}_i + \beta_4 \cdot \text{HRT}_i + \beta_5 \cdot \text{MNACT5}_i \\ &+ \beta_6 \cdot \text{STR}_i + \beta_7 \cdot \text{TIR}_i + \beta_8 \cdot \text{DAY}_{ij} + \beta_9 \cdot \text{PHASE}_{ij} + \beta_{10} \cdot \text{POSTURE}_{ij} \\ &+ \beta_{11} \cdot \text{time}_{ij} + \beta_{12} \cdot \text{time}_{ij}^2 + b_{0i} + b_{1i} \cdot \text{time}_{ij} + \varepsilon_{ij}\end{aligned}$$

$$\begin{aligned}\begin{pmatrix} b_{0i} \\ b_{1i} \end{pmatrix} &\sim N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_0^2 & \sigma_{01} \\ \sigma_{01} & \sigma_1^2 \end{pmatrix} \right) \quad \text{(random effects for subject } i\text{)} \\ \varepsilon_{ij} &\sim N(0, \sigma_\varepsilon^2) \quad \text{(residual error)}\end{aligned}$$

Model 1:

$$\begin{aligned}\text{SYS}_{ij} = \beta_0 &+ \beta_1 \cdot \text{AGE}_i + \beta_2 \cdot \text{DIA}_{ij} + \beta_3 \cdot \text{FH123}_i + \beta_4 \cdot \text{HAP}_i + \beta_5 \cdot \text{HRT}_i + \beta_6 \cdot \text{MNACT5}_i \\ &+ \beta_7 \cdot \text{STR}_i + \beta_8 \cdot \text{TIR}_i + \beta_9 \cdot \text{DAY}_{ij} + \beta_{10} \cdot \text{PHASE}_{ij} + \beta_{11} \cdot \text{POSTURE}_{ij} \\ &+ \beta_{12} \cdot \text{time}_{ij} + \beta_{13} \cdot \text{time}_{ij}^2 + b_{0i} + b_{1i} \cdot \text{time}_{ij} + \varepsilon_{ij}\end{aligned}$$

$$\begin{aligned}\begin{pmatrix} b_{0i} \\ b_{1i} \end{pmatrix} &\sim N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_0^2 & \sigma_{01} \\ \sigma_{01} & \sigma_1^2 \end{pmatrix} \right) \quad \text{(random effects for subject } i\text{)} \\ \varepsilon_{ij} &\sim N(0, \sigma_\varepsilon^2) \quad \text{(residual error)}\end{aligned}$$

Model 0:

$$\begin{aligned}\text{SYS}_{ij} = \beta_0 &+ \beta_1 \cdot \text{AGE}_i + \beta_2 \cdot \text{DIA}_{ij} + \beta_3 \cdot \text{FH123}_i + \beta_4 \cdot \text{HAP}_i + \beta_5 \cdot \text{HRT}_i + \beta_6 \cdot \text{MNACT5}_i \\ &+ \beta_7 \cdot \text{STR}_i + \beta_8 \cdot \text{TIR}_i + \beta_9 \cdot \text{DAY}_{ij} + \beta_{10} \cdot \text{PHASE}_{ij} + \beta_{11} \cdot \text{POSTURE}_{ij} \\ &+ \beta_{12} \cdot \text{time}_{ij} + \beta_{13} \cdot \text{time}_{ij}^2 + b_{0i} + \varepsilon_{ij}\end{aligned}$$

$$\begin{aligned}b_{0i} &\sim N(0, \sigma_u^2) \quad \text{(random intercept for subject } i\text{)} \\ \varepsilon_{ij} &\sim N(0, \sigma_\varepsilon^2) \quad \text{(residual error)}\end{aligned}$$