

S4 Appendix Prior Distributions

1. Prior Distributions for Naïve Model

$$\beta_{0,ee} \sim N(M_{\beta_{0,ee}}, C_{\beta_{0,ee}}) \quad (1)$$

$$\beta_{1,ee} \sim N(M_{\beta_{1,ee}}, C_{\beta_{1,ee}}) \quad (2)$$

$$\gamma_{g,ee} \sim N(M_{\gamma_{ee}}, C_{\gamma_{ee}}), \quad g = 1, 2, 3 \quad (3)$$

$$\sigma_{\epsilon^{ee}}^2 \sim IG(a_{yee}, b_{yee}) \quad (4)$$

$$\beta_{0,es} \sim N(M_{\beta_{0,es}}, C_{\beta_{0,es}}) \quad (5)$$

$$\beta_{1,es} \sim N(M_{\beta_{1,es}}, C_{\beta_{1,es}}) \quad (6)$$

$$\gamma_{g,es} \sim N(M_{\gamma_{es}}, C_{\gamma_{es}}), \quad g = 1, 2, 3 \quad (7)$$

$$\sigma_{\epsilon^{es}}^2 \sim IG(a_{yes}, b_{yes}). \quad (8)$$

IG refers to the inverse gamma distribution, and $\sigma_{\epsilon^{ee}}^2$ and $\sigma_{\epsilon^{es}}^2$ represent the measurement error and within-person variability as measured in the less precise EE and Δ ES tools, respectively.

2. Prior Distributions for LMEM

$$\beta_{0,ee} \sim N(M_{\beta_{0,ee}}, C_{\beta_{0,ee}}) \quad (9)$$

$$\beta_{1,ee} \sim N(M_{\beta_{1,ee}}, C_{\beta_{1,ee}}) \quad (10)$$

$$\gamma_{g,ee} \sim N(M_{\gamma_{ee}}, C_{\gamma_{ee}}), \quad g = 1, 2, 3 \quad (11)$$

$$\sigma_{\epsilon^{ee}}^2 \sim IG(a_{yee}, b_{yee}) \quad (12)$$

$$\sigma_{\nu^{ee}}^2 \sim IG(a_{wee}, b_{wee}) \quad (13)$$

$$\Sigma_X \sim Inv - Wish(\psi, d) \quad (14)$$

$$\beta_{0,es} \sim N(M_{\beta_{0,es}}, C_{\beta_{0,es}}) \quad (15)$$

$$\beta_{1,es} \sim N(M_{\beta_{1,es}}, C_{\beta_{1,es}}) \quad (16)$$

$$\gamma_{g,es} \sim N(M_{\gamma_{es}}, C_{\gamma_{es}}), \quad g = 1, 2, 3 \quad (17)$$

$$\sigma_{\epsilon^{es}}^2 \sim IG(a_{yes}, b_{yes}) \quad (18)$$

$$\sigma_{\nu^{es}}^2 \sim IG(a_{wes}, b_{wes}) \quad (19)$$

$$\mu_{EE}, \mu_{\Delta ES} \sim N(M_{\mu}, C_{\mu}). \quad (20)$$

3. Prior Distributions for SMEM

$$\sigma_{\epsilon^{ee}}^2 \sim IG(a_{yee}, b_{yee}) \quad (21)$$

$$\sigma_{\nu^{ee}}^2 \sim IG(a_{yes}, b_{yes}) \quad (22)$$

$$k_{ee} \sim Poi(\lambda_{ee}) \quad (23)$$

$$r_{ee} \sim DisUnif(X_1^{EE}, \dots, X_n^{EE}) \quad (24)$$

$$\Sigma_h \sim Inv - Wish(\psi, d), h = 1, \dots, H \quad (25)$$

$$\sigma_{\epsilon^{es}}^2 \sim IG(a_{wee}, b_{wee}) \quad (26)$$

$$\sigma_{\nu^{es}}^2 \sim IG(a_{wes}, b_{wes}) \quad (27)$$

$$k_{es} \sim Poi(\lambda_{es}) \quad (28)$$

$$r_{es} \sim DisUnif(X_1^{\Delta ES}, \dots, X_n^{\Delta ES}) \quad (29)$$

$$\mu_{EE,h}, \mu_{\Delta ES,h} \sim N(M_{\mu}, C_{\mu}), h = 1, \dots, H. \quad (30)$$