**Supplementary Table 7.** The estimated standardised covariances (Estimate), their standard error (S.E.), and two-tailed *P* values (with *P <* 0.05 shown in bold) for Structural Equation Models of Adaptive Cellular, Innate Cellular, and Adaptive Humoral immune state for female and male mice from site HW, as shown in **Fig. 5**. Marginally non-significant results are marked with \*.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Estimate** | **S.E.** | ***P*** |
|  |  |  |  |
| **Female, Adaptive Cellular** | | | |
| *Immune State:* |  |  |  |
| **CD4** | **0.978** | **0.019** | **<0.0001** |
| **CD8** | **0.952** | **0.022** | **<0.0001** |
| **CD19** | **0.696** | **0.080** | **<0.0001** |
| *Immune State:* |  |  |  |
| **Season** | **-0.338** | **0.116** | **0.004** |
| **Age** | **-0.520** | **0.093** | **<0.0001** |
| **Condition** | **0.726** | **0.101** | **<0.0001** |
| **Infection** | **-0.233** | **0.110** | **0.034** |
| *Infection:* |  |  |  |
| **Age** | **0.209** | **0.103** | **0.042** |
| **Season** | **-0.352** | **0.104** | **0.001** |
| *Condition:* |  |  |  |
| **Age** | **0.440** | **0.096** | **<0.0001** |
| Season | -0.001 | 0.111 | 0.993 |
| Infection | -0.097 | 0.117 | 0.408 |
| *Age:* |  |  |  |
| Season | -0.195 | 0.107 | 0.068\* |
|  |  |  |  |
| **Male, Adaptive Cellular** | | | |
| *Immune State:* |  |  |  |
| **CD4** | **0.999** | **0.017** | **<0.0001** |
| **CD8** | **0.899** | **0.028** | **<0.0001** |
| **CD19** | **0.856** | **0.037** | **<0.0001** |
| *Immune State:* |  |  |  |
| **Season** | **-0.189** | **0.092** | **0.041** |
| **Age** | **-0.301** | **0.095** | **0.002** |
| **Condition** | **0.617** | **0.076** | **<0.0001** |
| Infection | -0.046 | 0.113 | 0.683 |
| *Infection:* |  |  |  |
| Age | 0.157 | 0.108 | 0.145 |
| Season | -0.177 | 0.110 | 0.106 |
| *Condition:* |  |  |  |
| Age | 0.193 | 0.099 | 0.051\* |
| Season | -0.164 | 0.100 | 0.099 |
| Infection | 0.000 | 0.110 | 1.000 |
| *Age:* |  |  |  |
| **Season** | **-0.245** | **0.094** | **0.009** |
|  |  |  |  |
| **Female, Innate Cellular** | | | |
| *Immune State:* |  |  |  |
| **NKp46** | **0.877** | **0.038** | **<0.0001** |
| **F4/80** | **0.648** | **0.090** | **<0.0001** |
| **Ly6G** | **0.979** | **0.022** | **<0.0001** |
| **CD11c** | **0.865** | **0.039** | **<0.0001** |
| *Immune State:* |  |  |  |
| **Season** | **-0.337** | **0.119** | **0.005** |
| **Age** | **-0.412** | **0.106** | **<0.0001** |
| **Condition** | **0.522** | **0.114** | **<0.0001** |
| **Infection** | **-0.288** | **0.132** | **0.029** |
| *Infection:* |  |  |  |
| **Age** | **0.212** | **0.103** | **0.040** |
| **Season** | **-0.349** | **0.104** | **0.001** |
| *Condition:* |  |  |  |
| **Age** | **0.439** | **0.096** | **<0.0001** |
| Season | -0.001 | 0.110 | 0.994 |
| Infection | -0.098 | 0.117 | 0.404 |
| *Age:* |  |  |  |
| Season | -0.196 | 0.107 | 0.067\* |
|  |  |  |  |
| **Male, Innate Cellular** | | | |
| *Immune State:* |  |  |  |
| **NKp46** | **0.940** | **0.025** | **<0.0001** |
| **F4/80** | **0.799** | **0.055** | **<0.0001** |
| **Ly6G** | **0.867** | **0.044** | **<0.0001** |
| **CD11c** | **0.878** | **0.038** | **<0.0001** |
| *Immune State:* |  |  |  |
| Season | -0.185 | 0.100 | 0.064\* |
| **Age** | **-0.326** | **0.099** | **0.001** |
| **Condition** | **0.513** | **0.091** | **<0.0001** |
| Infection | -0.181 | 0.127 | 0.154 |
| *Infection:* |  |  |  |
| Age | 0.168 | 0.107 | 0.116 |
| Season | -0.174 | 0.109 | 0.112 |
| *Condition:* |  |  |  |
| Age | 0.194 | 0.099 | 0.050\* |
| Season | -0.165 | 0.099 | 0.098 |
| Infection | -0.001 | 0.109 | 0.994 |
| *Age:* |  |  |  |
| **Season** | **-0.243** | **0.095** | **0.010** |
|  |  |  |  |
| **Female, Adaptive Humoral** | | | |
| *Immune State:* |  |  |  |
| **IgG** | **0.503** | **0.117** | **<0.0001** |
| **IgE** | **0.356** | **0.117** | **0.002** |
| **IgA** | **0.594** | **0.114** | **<0.0001** |
| *Immune State:* |  |  |  |
| Season | -0.142 | 0.152 | 0.350 |
| **Age** | **0.662** | **0.165** | **<0.0001** |
| Condition | 0.228 | 0.149 | 0.127 |
| **Infection** | **0.414** | **0.165** | **0.012** |
| *Infection:* |  |  |  |
| **Age** | **0.209** | **0.102** | **0.041** |
| **Season** | **-0.363** | **0.102** | **<0.0001** |
| *Condition:* |  |  |  |
| **Age** | **0.437** | **0.096** | **<0.0001** |
| Season | 0.001 | 0.111 | 0.993 |
| Infection | -0.089 | 0.118 | 0.449 |
| *Age:* |  |  |  |
| Season | -0.196 | 0.107 | 0.067\* |
|  |  |  |  |
| **Male, Adaptive Humoral** | | | |
| *Immune State:* |  |  |  |
| **IgG** | **0.353** | **0.160** | **0.027** |
| **IgE** | **0.520** | **0.199** | **0.009** |
| IgA | 0.210 | 0.195 | 0.282 |
| *Immune State:* |  |  |  |
| Season | 0.166 | 0.167 | 0.321 |
| **Age** | **0.633** | **0.241** | **0.009** |
| Condition | -0.0221 | 0.168 | 0.188 |
| Infection | 0.393 | 0.205 | 0.055\* |
| *Infection:* |  |  |  |
| Age | 0.171 | 0.107 | 0.109 |
| Season | -0.168 | 0.109 | 0.125 |
| *Condition:* |  |  |  |
| **Age** | **0.195** | **0.099** | **0.048** |
| Season | -0.166 | 0.099 | 0.095 |
| Infection | -0.066 | 0.109 | 0.957 |
| *Age on:* |  |  |  |
| **Season** | **-0.242** | **0.095** | **0.011** |