**Supplementary Table 6.** 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 all sites, as shown in **Supplementary Fig. 6**. Marginally non-significant results are marked with \*.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Estimate** | **S.E.** | ***P*** |
|  |  |  |  |
| **Female, Adaptive Cellular** | | | |
| *Immune State:* |  |  |  |
| **CD4** | **0.966** | **0.010** | **<0.0001** |
| **CD8** | **0.976** | **0.009** | **<0.0001** |
| **CD19** | **0.859** | **0.023** | **<0.0001** |
| *Immune State:* |  |  |  |
| Season | -0.127 | 0.068 | 0.061\* |
| **Age** | **-0.343** | **0.069** | **<0.0001** |
| **Condition** | **0.433** | **0.062** | **<0.0001** |
| Infection | -0.097 | 0.083 | 0.245 |
| *Infection:* |  |  |  |
| **Age** | **0.302** | **0.065** | **<0.0001** |
| Season | -0.093 | 0.070 | 0.183 |
| *Condition:* |  |  |  |
| Age | 0.083 | 0.071 | 0.242 |
| **Season** | **-0.233** | **0.068** | **0.001** |
| Infection | -0.042 | 0.077 | 0.585 |
| *Age:* |  |  |  |
| Season | 0.022 | 0.069 | 0.750 |
|  |  |  |  |
| **Male, Adaptive Cellular** | | | |
| *Immune State:* |  |  |  |
| **CD4** | **0.921** | **0.018** | **<0.0001** |
| **CD8** | **0.919** | **0.018** | **<0.0001** |
| **CD19** | **0.838** | **0.025** | **<0.0001** |
| *Immune State:* |  |  |  |
| **Season** | **-0.134** | **0.061** | **0.027** |
| **Age** | **-0.229** | **0.063** | **<0.0001** |
| **Condition** | **0.523** | **0.053** | **<0.0001** |
| Infection | -0.014 | 0.066 | 0.833 |
| *Infection:* |  |  |  |
| **Age** | **0.279** | **0.061** | **<0.0001** |
| Season | 0.044 | 0.064 | 0.489 |
| *Condition:* |  |  |  |
| **Age** | **0.157** | **0.064** | **0.014** |
| **Season** | **-0.158** | **0.061** | **0.010** |
| Infection | -0.033 | 0.068 | 0.629 |
| *Age:* |  |  |  |
| Season | -0.014 | 0.064 | 0.824 |
|  |  |  |  |
| **Female, Innate Cellular** | | | |
| *Immune State:* |  |  |  |
| NKp46 | 0.845 | 0.028 | **<0.0001** |
| F4/80 | 0.965 | 0.013 | **<0.0001** |
| Ly6G | 0.942 | 0.013 | **<0.0001** |
| CD11c | 0.576 | 0.056 | **<0.0001** |
| *Immune State:* |  |  |  |
| **Season** | **-0.149** | **0.071** | **0.037** |
| **Age** | **-0.233** | **0.076** | **0.002** |
| **Condition** | **0.302** | **0.071** | **<0.0001** |
| **Infection** | **-0.215** | **0.077** | **0.005** |
| *Infection:* |  |  |  |
| **Age** | **0.301** | **0.065** | **<0.0001** |
| Season | -0.089 | 0.069 | 0.198 |
| *Condition:* |  |  |  |
| Age | 0.083 | 0.071 | 0.245 |
| **Season** | **-0.236** | **0.068** | **<0.0001** |
| Infection | -0.042 | 0.077 | 0.583 |
| *Age:* |  |  |  |
| Season | 0.021 | 0.069 | 0.761 |
|  |  |  |  |
| **Male, Innate Cellular** | | | |
| *Immune State:* |  |  |  |
| **NKp46** | **0.814** | **0.030** | **<0.0001** |
| **F4/80** | **0.932** | **0.019** | **<0.0001** |
| **Ly6G** | **0.820** | **0.028** | **<0.0001** |
| **CD11c** | **0.791** | **0.031** | **<0.0001** |
| *Immune State:* |  |  |  |
| Season | -0.094 | 0.066 | 0.154 |
| **Age** | **-0.215** | **0.068** | **0.002** |
| **Condition** | **0.386** | **0.062** | **<0.0001** |
| Infection | -0.076 | 0.074 | 0.302 |
| *Infection:* |  |  |  |
| **Age** | **0.281** | **0.061** | **<0.0001** |
| Season | 0.044 | 0.064 | 0.490 |
| *Condition:* |  |  |  |
| **Age** | **0.158** | **0.064** | **0.014** |
| **Season** | **-0.158** | **0.061** | **0.010** |
| Infection | -0.034 | 0.068 | 0.624 |
| *Age:* |  |  |  |
| Season | -0.014 | 0.064 | 0.829 |
|  |  |  |  |
| **Female, Adaptive Humoral** | | | |
| *Immune State:* |  |  |  |
| **IgG** | **0.401** | **0.101** | **<0.0001** |
| **IgE** | **0.334** | **0.101** | **0.001** |
| **IgA** | **0.207** | **0.090** | **0.022** |
| *Immune State:* |  |  |  |
| Season | 0.065 | 0.135 | 0.630 |
| **Age** | **0.720** | **0.172** | **<0.0001** |
| Condition | 0.073 | 0.127 | 0.562 |
| **Infection** | **0.530** | **0.173** | **0.002** |
| *Infection:* |  |  |  |
| **Age** | **0.306** | **0.065** | **<0.0001** |
| Season | -0.092 | 0.069 | 0.182 |
| *Condition:* |  |  |  |
| Age | 0.083 | 0.071 | 0.246 |
| **Season** | **-0.240** | **0.068** | **<0.0001** |
| Infection | -0.031 | 0.077 | 0.690 |
| *Age:* |  |  |  |
| Season | 0.022 | 0.069 | 0.753 |
|  |  |  |  |
| **Male, Adaptive Humoral** | | | |
| *Immune State:* |  |  |  |
| **IgG** | **0.586** | **0.107** | **<0.0001** |
| **IgE** | **0.579** | **0.103** | **<0.0001** |
| IgA | 0.034 | 0.098 | 0.728 |
| *Immune State:* |  |  |  |
| Season | -0.057 | 0.104 | 0.585 |
| **Age** | **0.300** | **0.095** | **0.002** |
| Condition | 0.078 | 0.095 | 0.409 |
| **Infection** | **0.286** | **0.096** | **0.003** |
| *Infection:* |  |  |  |
| **Age** | **0.284** | **0.061** | **<0.0001** |
| Season | 0.050 | 0.064 | 0.433 |
| *Condition:* |  |  |  |
| **Age** | **0.158** | **0.064** | **0.014** |
| **Season** | **-0.158** | **0.061** | **0.010** |
| Infection | -0.033 | 0.068 | 0.632 |
| *Age:* |  |  |  |
| Season | -0.013 | 0.064 | 0.833 |