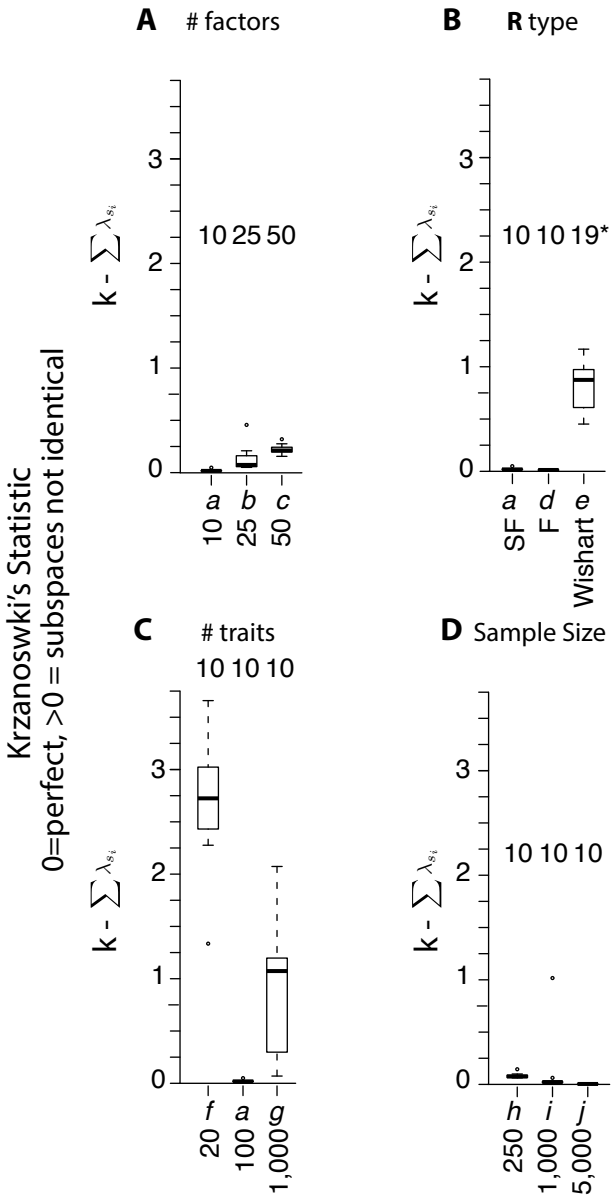

FIGURE S1. **P-matrix subspaces were accurately recovered.** This figure is identical to Figure 1 but for **P**. Each subplot shows the distribution of Krzanowski's statistics ($\sum \lambda_{s_i}$) calculated for posterior mean estimates of **P** across a related set of scenarios. The value of k used in each scenario is listed inside each boxplot. The simulation parameter varied in each set of simulations is described at the bottom. (A) Increasing numbers of simulated factors. (B) Different properties of the **R** matrix. "SF": a sparse-factor form for **R**. "F": a (non-sparse) factor form for **R**. "Wishart": **R** was sampled from a Wishart distribution. In scenario *e*, the residual matrix did not have a factor form. We set $k = 19$ for the Krzanowski's statistics because the corresponding eigenvectors of the true **P** each explained $> 1\%$ of total phenotypic variation. (C) Different numbers of traits. (D) Different numbers of sampled individuals. Complete parameter sets describing each simulation are described in Table 1.

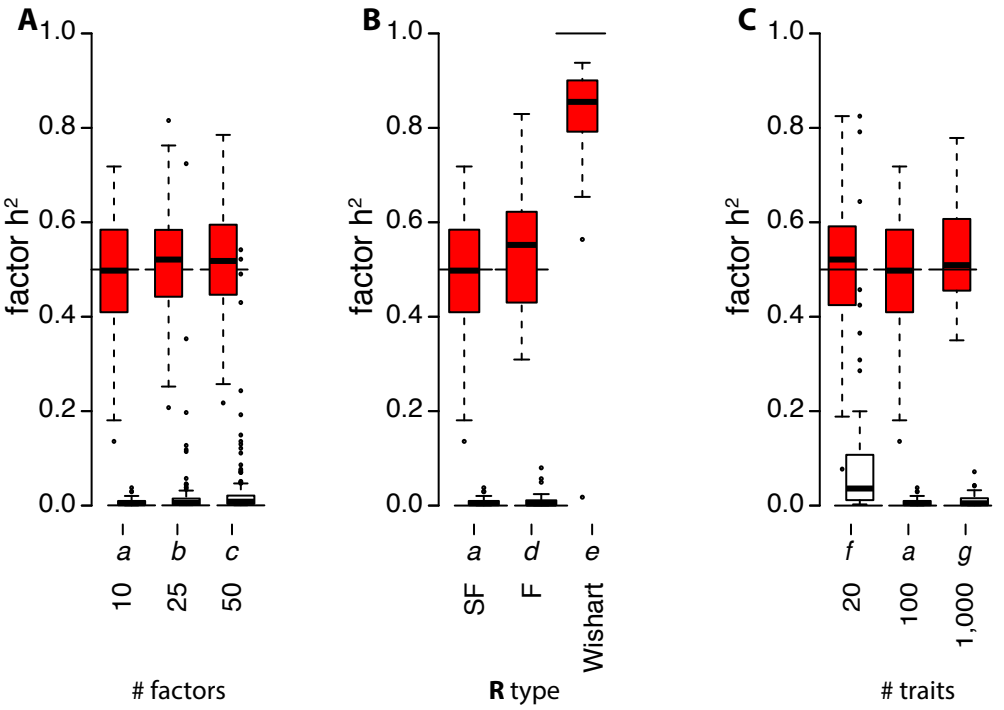

FIGURE S2. **Latent factor heritabilities were accurately recovered.** Distributions of factor h^2 estimates by simulation scenario. Each simulated factor was matched to the estimated factor with the most similar trait-loadings as in Figure 3. Thin horizontal lines in each column show the simulated h^2 values. Red boxes show the distribution of factor h^2 estimates across 10 simulations for all factors with $h^2 = 0.5$ or 1.0. Black boxes show the distribution of factor h^2 estimates across the same 10 simulations for all factors with $h^2 = 0.0$. Scenarios differed by: (A) Increasing numbers of simulated factors. (B) Different types of **R** matrices. (C) Different numbers of traits.