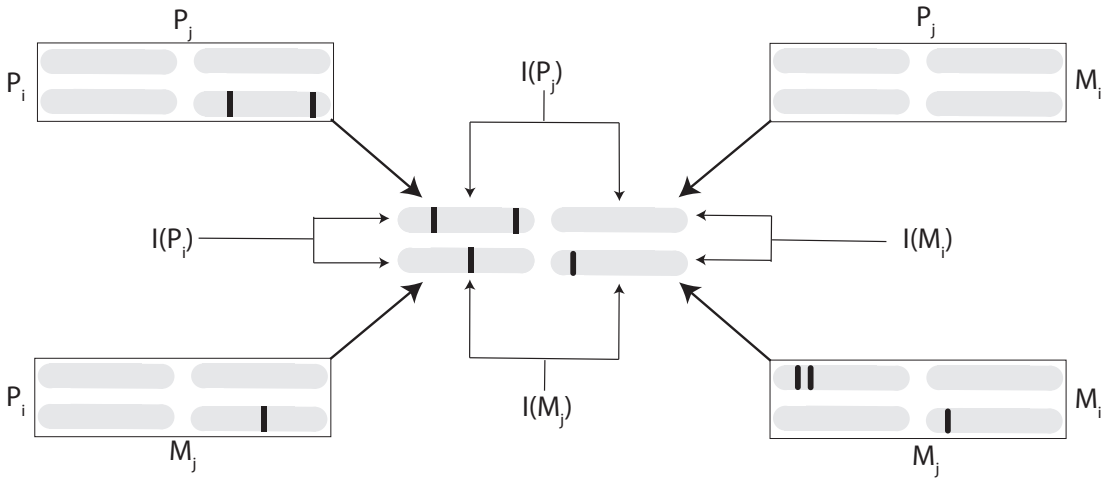
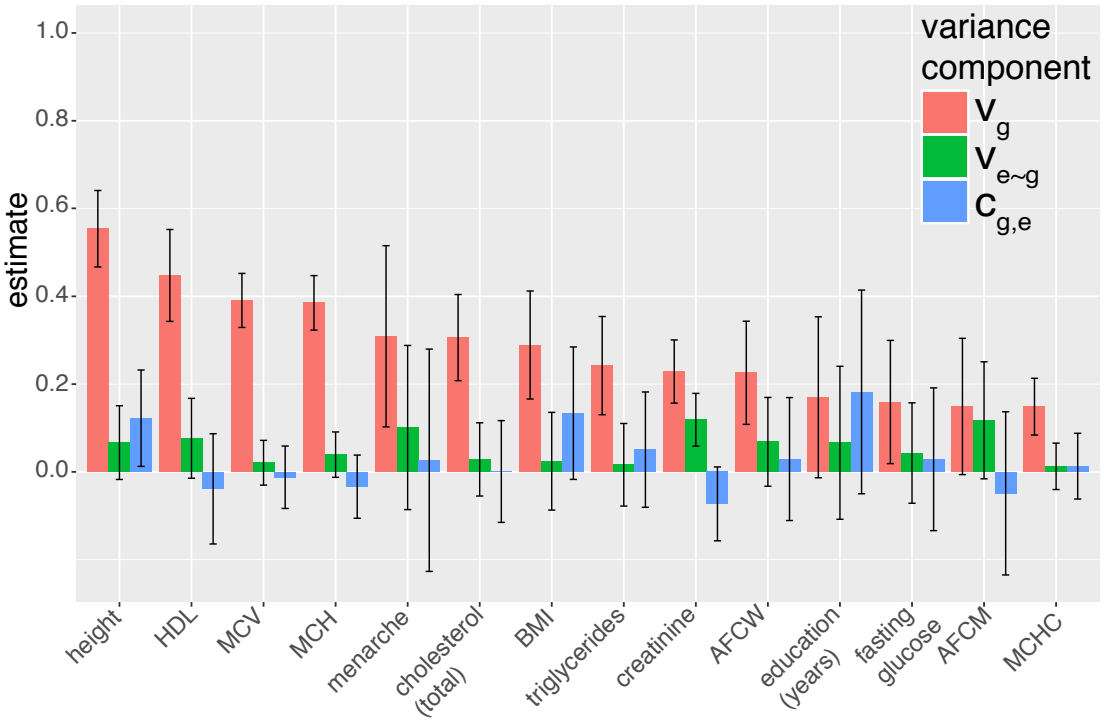


Supplementary Figure 1. Diagram of determination of offspring relatedness. The diagram shows how the identity-by-descent sharing states of two individuals ***i*** and ***j*** are determined by the identity-by-descent sharing states of their parents and the segregation events in the parents during meiosis. The identity-by-descent sharing states of ***i*** and ***j*** are represented by the four chromosomes in the centre, with black bands indicating regions shared identical-by-descent. The four chromosomes represent the four possible pairs of homologous chromosomes (maternal-maternal, paternal-maternal, maternal-paternal, and paternal-paternal): the identity-by-descent sharing between the chromosome inherited from ***i*** 's father, P_i, and ***j*** 's mother, M_j, etc. The identity-by-descent sharing states of the four possible pairs of parents, one from each individual, are shown in the corners (P_i and P_j, P_j and M_i, P_j and M_i, and M_j and M_i). The segregation event in ***i*** 's father is represented by $I(P_i)$, the segregation event in ***j*** 's mother represented by $I(M_j)$, etc. Note that for simplicity we ignore recombination in this diagram. See the Relatedness Disequilibrium Lemma in the Supplementary Note for a mathematical description of this process and its consequences.



Supplementary Figure 2. RDR variance component estimates. Estimated variance components of the RDR covariance model for 14 quantitative traits in Iceland (Supplementary Table 4), expressed as a % of phenotypic variance, shown with intervals +/- 1.96 standard errors around the estimate. Trait abbreviations: BMI, body mass index; AFCW, age at first child in women; AFCM, age at first child in men; education (years), educational attainment (years); HDL, high density lipoprotein; MCH, mean cell haemoglobin; MCHC, mean cell heamoglobin concentration; MCV, mean cell volume.