Type I error and power simulation

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Simulation Set-up

$$\begin{bmatrix} Y_i \\ \hat{Y}_i \end{bmatrix} \mid Z_{ik} \sim N\Big(\begin{bmatrix} \beta_G G + \beta_0 + \beta_1 * age_i + \beta_2 * sex_i \\ \alpha_0 + \alpha_1 * age_i + \alpha_2 * sex_i \end{bmatrix}, \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix} \Big)$$

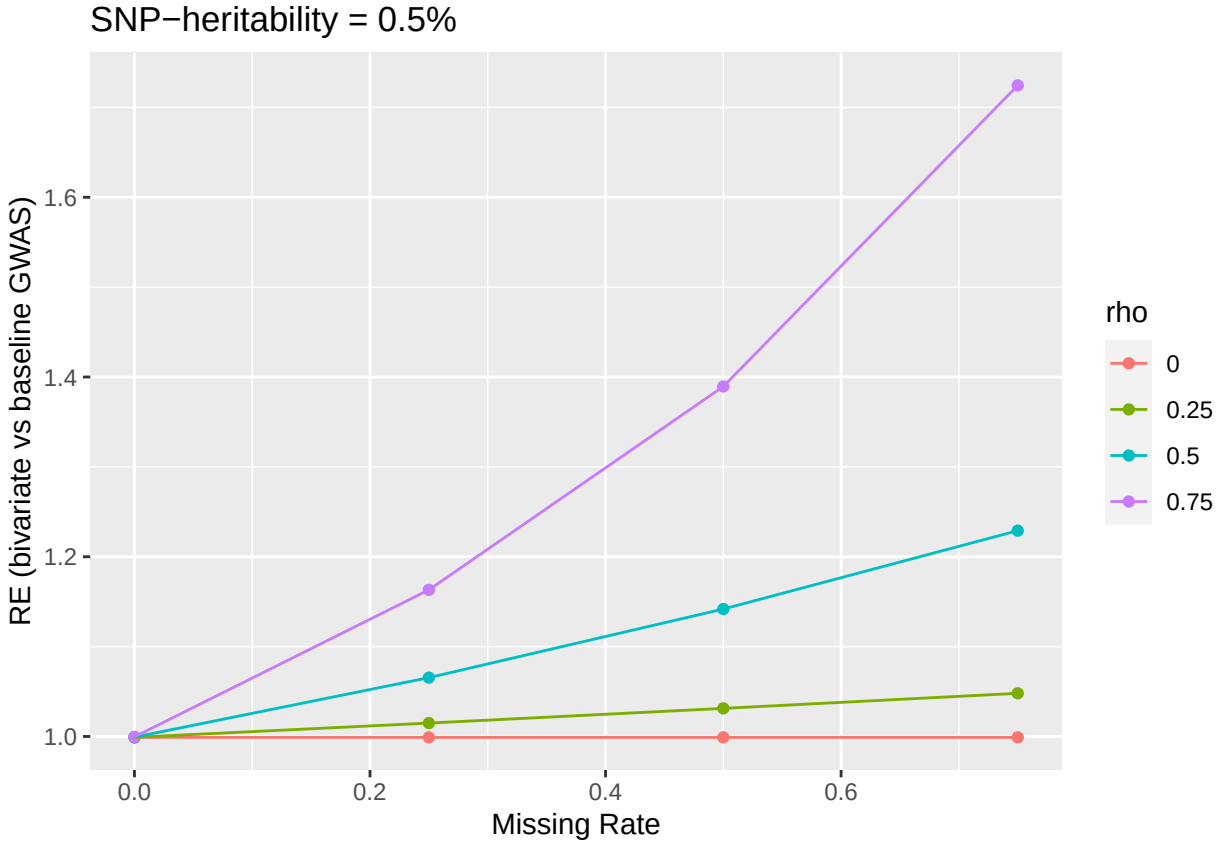
- $G \sim Bin(2, maf)$
- $maf = 0.25, age_i \sim N(0,1), sex_i \sim Bern(0.5)$
- $\alpha_0 = \beta_0 = 1$, $\alpha_1 = \beta_1 = 0.42$, $\alpha_2 = \beta_2 = 0.11$, $\beta_g = 0$
- missing rate $\in \{0, 0.25, 0.5, 0.75\}$
- $\rho \in \{0, 0.25, 0.5, 0.75\}$

Type I error

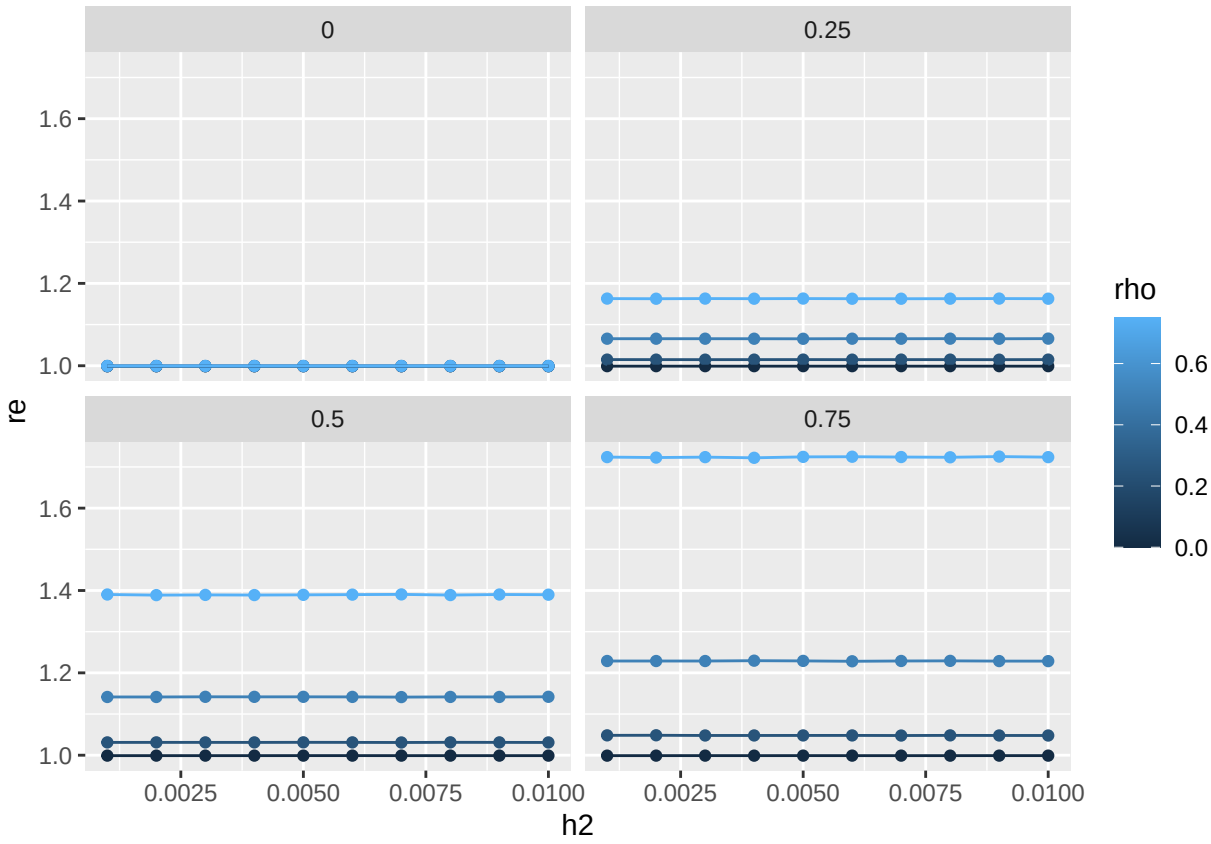
Table 1: Proportion of test making type I error

mssing	rho	t1e rejection	Chisq
0.00	0.00	0.0473	0.9749307
0.00	0.25	0.0509	1.0044826
0.00	0.50	0.0456	0.9787724
0.00	0.75	0.0483	0.9811161
0.25	0.00	0.0521	0.9964332
0.25	0.25	0.0551	1.0339412
0.25	0.50	0.0505	1.0167177
0.25	0.75	0.0480	1.0019893
0.50	0.00	0.0508	1.0003585
0.50	0.25	0.0500	1.0040915
0.50	0.50	0.0537	0.9967186
0.50	0.75	0.0494	1.0007287
0.75	0.00	0.0485	0.9916063
0.75	0.25	0.0489	0.9992889
0.75	0.50	0.0517	1.0103253
0.75	0.75	0.0524	1.0097825

Increased Power relative to baseline GWAS



Unlike the Figure 1 in that paper, SNP heritability plays no role in relative efficiency.


0
0.25
0.5
0.75
re
h2
rho
1.0
1.2
1.4
1.6
0.0025
0.0050
0.0075
0.0100
0.0
0.2
0.4
0.6