**S13 Table. Power evaluation of the proposed Simple Sum colocalization analytical method, and the true positive rate of COLOC** **and eCAVIAR, under the alternative that the eQTL peak overlapped with the lower GWAS peak (Alter3 in S7 Table).** The LD pattern at the simulated region follows that at the *SLC6A14* locus. For the SS method, the nominal type 1 error was set at alpha=0.05 or alpha= 0.005. The eQTL evidence was measured continuously as -log10 (eQTL p-value) or dichotomized using the eQTL p<0.05 or <0.005 threshold.For COLOC and eCAVIAR, the false positive rates were calculated by applying the 0.5, 0.75 or 0.9 threshold to the colocalization posterior probability. The values of $λ\_{Z\_{c1} }$and $λ\_{Z\_{c2} }$represent the standardized true effect sizes of two GWAS associated variants, while $λ\_{T\_{c1} }$and $λ\_{T\_{c2} }$represent the standardized true effect sizes of two eQTL variants. Here, $ λ\_{Z\_{c1} }$is set to be 6.57 and $λ\_{Z\_{c2} }$is set to be 5.73 such that 0.8 and 0.5 power are achieved to detect GWAS signals at significance level of 10-8. $λ\_{T\_{c1} }$is set to be 0, and $λ\_{T\_{c2} }$is set to be 3.4, 4.09, 4.45, 5.21 or 5.73 for each row of the table such that 0.01, 0.05, 0.1, 0.3, or 0.5 power is achieved to detect the eQTL association at significance level 10-8. In total, 104 replications were simulated to obtain each cell of the table. See S1 Appendix for other simulation details

|  |  |  |  |
| --- | --- | --- | --- |
| Alter3: the eQTL peak overlapped with the lower GWAS peak | Power of the proposed Simple Sum colocalization analytical method | True positive rate of COLOC | True positive rate of eCAVIAR |
| -log10(eQTL p):alpha=0.05 | eQTL p<0.05:alpha=0.05 | eQTL p<0.005:alpha=0.05 | -log10(eQTL p):alpha=0.005 | eQTL p<0.05:alpha=0.005 | eQTL p<0.005:alpha=0.005 | cut off =0.5 | cut off =0.75 | cut off =0.90 | cut off =0.5 | cut off =0.75 | cut off =0.90 |
| $λ\_{T\_{c2} }= $3.40 | 0.4036 | 0.3759 | 0.5073 | 0.2623 | 0.2340 | 0.3899 | 0.2160 | 0.1569 | 0.1085 | 0.043 | 0.0176 | 0.0045 |
| $$λ\_{T\_{c2} }=4.09$$ | 0.4155 | 0.3642 | 0.5490 | 0.2613 | 0.2177 | 0.4089 | 0.3228 | 0.2594 | 0.2030 | 0.122 | 0.0593 | 0.0204 |
| $$λ\_{T\_{c2} }= 4.45$$ | 0.4229 | 0.3560 | 0.5354 | 0.2605 | 0.2083 | 0.3799 | 0.3700 | 0.3101 | 0.2511 | 0.1956 | 0.0981 | 0.0359 |
| $$λ\_{T\_{c2} }=5.21$$ | 0.4308 | 0.3343 | 0.4709 | 0.2566 | 0.1863 | 0.2995 | 0.4460 | 0.3926 | 0.3329 | 0.3711 | 0.2279 | 0.0993 |
| $$λ\_{T\_{c2} }=5.73$$ | 0.4313 | 0.3222 | 0.4195 | 0.2548 | 0.1755 | 0.2459 | 0.4762 | 0.4231 | 0.3690 | 0.4867 | 0.3278 | 0.1668 |