

Statistical power considerations in genotype-based recall randomized controlled trials

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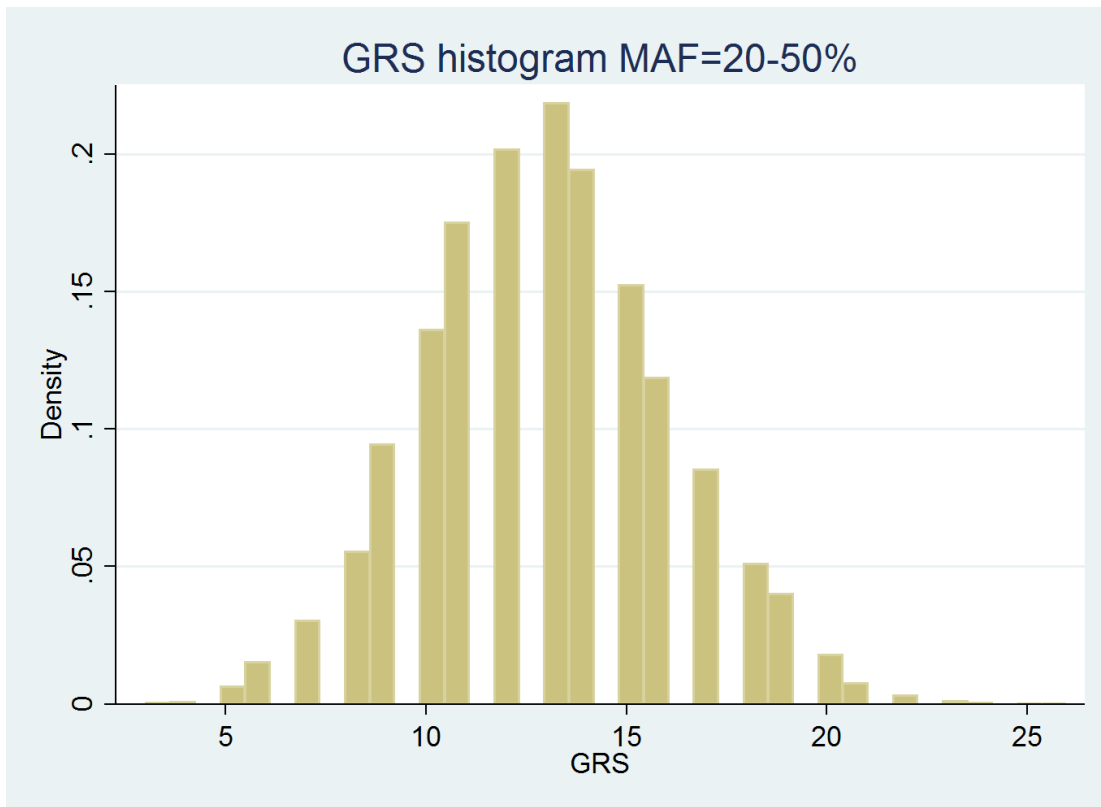
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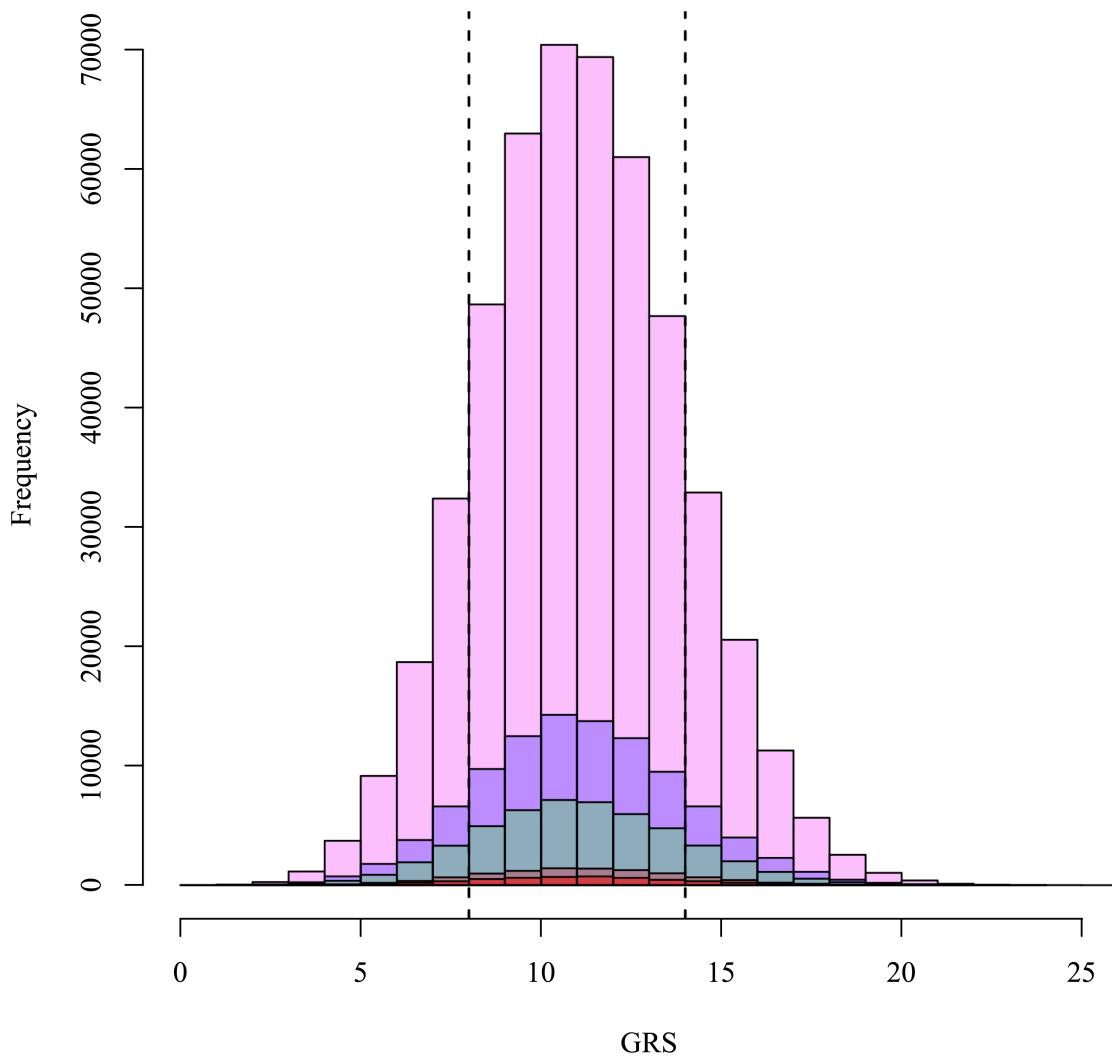
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Supplementary Figure 1: Histogram of a GRS effect allele frequency distribution for 20 uncorrelated, randomly selected SNPs (minor allele frequency of 0.20-0.50) in 6,064 participants from GLACIER Study cohort



Supplementary Figure 2: Histograms of simulated GRS effect allele frequency distributions for different initial sampling-frames. The x axis indicates the GRS values and the y axis indicates allele frequencies.

	Figure 1	Figure 2-A	Figure 2-B	Figure 2-C	Figure 2-D
Significance Level	0.05	0.05	0.05	0.05	0.05
Treatment Frequency	0.5	0.5	0.5	0.5	0.5
Effect Size for Treatment	-0.5	-0.5	-0.5	-0.5	-0.5
Lowest Sample Size	500	300	200	200	500
Highest Sample Size	3500	700	2600	1200	5000
Sample integer Size	500	50	300	100	500
Population Sample Frame	31000	10000	10000	10000	10000
Interaction Effect Size for SNPs	-0.4	0.17,0.30,0.22, 0.27,0.21,0.23, 0.18,0.17,0.27, 0.18,0.21,0.15, 0.28,0.28,0.30, 0.30,0.24,0.19, 0.25,0.23	0.06,0.11,0.06, 0.06,0.07,0.11, 0.05,0.08,0.05, 0.11,0.08,0.13, 0.07,0.13,0.07, 0.10,0.10,0.05, 0.07,0.13	0.17,0.30,0.22, 0.27,0.21,0.23, 0.18,0.17,0.27, 0.18,0.21,0.15, 0.28,0.28,0.30, 0.30,0.24,0.19, 0.25,0.23	0.06,0.11,0.06, 0.06,0.07,0.11, 0.05,0.08,0.05, 0.11,0.08,0.13, 0.07,0.13,0.07, 0.10,0.10,0.05, 0.07,0.13
Main Effect size for SNPs	1	0.46,0.34,0.40, 0.42,0.46,0.13, 0.33,0.33,0.48, 0.18,0.29,0.11, 0.42,0.25,0.33, 0.20,0.40,0.38, 0.40,0.42	0.34,0.10,0.25, 0.39,0.27,0.19, 0.46,0.33,0.49, 0.16,0.31,0.40, 0.49,0.26,0.26, 0.35,0.38,0.38, 0.16,0.46	0.46,0.34,0.40, 0.42,0.46,0.13, 0.33,0.33,0.48, 0.18,0.29,0.11, 0.42,0.25,0.33, 0.20,0.40,0.38, 0.40,0.42	0.34,0.10,0.25, 0.39,0.27,0.19, 0.46,0.33,0.49, 0.16,0.31,0.40, 0.49,0.26,0.26, 0.35,0.38,0.38, 0.16,0.46
Minor Allele Frequencies of SNPs	0.44	0.43,0.39,0.27, 0.37,0.27,0.28, 0.49,0.46,0.28, 0.37,0.47,0.23, 0.36,0.27,0.38, 0.42,0.40,0.25, 0.27,0.22	0.43,0.39,0.27, 0.37,0.27,0.28, 0.49,0.46,0.28, 0.37,0.47,0.23, 0.36,0.27,0.38, 0.42,0.40,0.25, 0.27,0.22	0.16,0.15,0.05, 0.20,0.13,0.13, 0.11,0.16,0.10, 0.18,0.16,0.13, 0.07,0.09,0.10, 0.15,0.15,0.20, 0.10,0.15	0.16,0.15,0.05, 0.20,0.13,0.13, 0.11,0.16,0.10, 0.18,0.16,0.13, 0.07,0.09,0.10, 0.15,0.15,0.20, 0.10,0.15
Type of survival time distributions	Weibull	Gompertz	Gompertz	Gompertz	Gompertz
Mean for Time to Event	2.165	2.165	2.165	2.165	2.165
Variance for Time to Event	1.24	1.242	1.242	1.242	1.24
End point for the study	4	4	4	4	4
Frequency of Event	0.376	0.16	0.16	0.16	0.16

Supplementary table 1: Parameters used in the simulations shown in the Figure1 and Figure 2 for Cox Regression Model (SNP).

	Figure 3
Significance Level	0.05
Treatment Frequency	0.5
Effect Size for Treatment	-1.84
Lowest Sample Size	200
Highest Sample Size	2000
Sample integer Size	200
Population Sample Frame	31000
Value for Intercept	767
Residual Standard Error	0.75
Interaction Effect Size for GRS	0.03
Main Effect size for GRS	0.66
Mean for GRS	36.9
Standard deviation for GRS	3.22

Supplementary table 2: Parameters used in the simulations shown in the Figure3 for Linear Regression Model (GRS).

	Figure 4-A	Figure 4-B	Figure 4-C	Figure 4-D
Significance Level	0.05	0.05	0.05	0.05
Treatment Frequency	0.5	0.5	0.5	0.5
Effect Size for Treatment	-0.2	-0.2	-0.2	-0.2
Lowest Sample Size	50	400	50	400
Highest Sample Size	500	2000	500	2000
Sample integer Size	50	200	50	200
Population Sample Frame	10000	10000	10000	10000
Interaction Effect Size for SNPs	0.20,0.26,0.26, 0.25,0.20,0.25, 0.21,0.27,0.16, 0.23,0.30,0.15, 0.20,0.17,0.15, 0.30,0.29,0.29, 0.25,0.23	0.06,0.08,0.07, 0.08,0.05,0.13, 0.06,0.13,0.06, 0.14,0.12,0.12, 0.15,0.08,0.10, 0.12,0.10,0.09, 0.09,0.07	0.20,0.26,0.26, 0.25,0.20,0.25, 0.21,0.27,0.16, 0.23,0.30,0.15, 0.20,0.17,0.15, 0.30,0.29,0.29, 0.25,0.23	0.06,0.08,0.07, 0.08,0.05,0.13, 0.06,0.13,0.06, 0.14,0.12,0.12, 0.15,0.08,0.10, 0.12,0.10,0.09, 0.09,0.07
Main Effect size for SNPs	0.20,0.23,0.29, 0.33,0.33,0.32, 0.35,0.23,0.24, 0.29,0.33,0.24, 0.20,0.31,0.32, 0.21,0.24,0.31, 0.28,0.25	0.09,0.18,0.09, 0.07,0.18,0.17, 0.12,0.17,0.08, 0.08,0.15,0.06, 0.18,0.14,0.15, 0.07,0.07,0.13, 0.06,0.08	0.20,0.23,0.29, 0.33,0.33,0.32, 0.35,0.23,0.24, 0.29,0.33,0.24, 0.20,0.31,0.32, 0.21,0.24,0.31, 0.28,0.25	0.09,0.18,0.09, 0.07,0.18,0.17, 0.12,0.17,0.08, 0.08,0.15,0.06, 0.18,0.14,0.15, 0.07,0.07,0.13, 0.06,0.08
Minor Allele Frequencies of SNPs	0.50,0.28,0.36, 0.43,0.48,0.47, 0.43, 0.29, 0.30, 0.20, 0.46, 0.50, 0.24, 0.29, 0.33, 0.36, 0.49, 0.46, 0.23, 0.29	0.50,0.28,0.36, 0.43,0.48,0.47, 0.43, 0.29, 0.30, 0.20, 0.46, 0.50, 0.24, 0.29, 0.33, 0.36, 0.49, 0.46, 0.23, 0.29	0.06,0.19,0.06, 0.13,0.06,0.17, 0.20,0.12,0.05, 0.15,0.16,0.16, 0.08,0.12,0.19, 0.20,0.17,0.08, 0.06,0.15	0.06,0.19,0.06, 0.13,0.06,0.17, 0.20,0.12,0.05, 0.15,0.16,0.16, 0.08,0.12,0.19, 0.20,0.17,0.08, 0.06,0.15
Value for Intercept	1	1	1	1
Residual Standard Error	3.47	3.47	3.47	3.47

Supplementary table 3: Parameters used in the simulations shown in the Figure4 for Linear Regression Model (SNP)

	Figure 5-AB Red	Figure 5-AB Orange	Figure 5-AB Green	Figure 5-AB Blue	Figure 5-AB Purple
Significance Level	0.05	0.05	0.05	0.05	0.05
Treatment Frequency	0.5	0.5	0.5	0.5	0.5
Effect Size for Treatment	-0.5	-0.5	-0.5	-0.5	-0.5
Lowest Sample Size	200	200	200	200	200
Highest Sample Size	2200	2200	2200	2200	2200
Sample integer Size	200	200	200	200	200
Population Sample Frame	5000	10000	50000	100000	500000
Interaction Effect Size for SNPs	0.06,0.09,0.06,0.13,0.05,0.13,0.08,0.10,0.08,0.09,0.13,0.12,0.08,0.14,0.08,0.07,0.06,0.07,0.11,0.05	0.06,0.09,0.06,0.13,0.05,0.13,0.08,0.10,0.08,0.09,0.13,0.12,0.08,0.14,0.08,0.07,0.06,0.07,0.11,0.05	0.06,0.09,0.06,0.13,0.05,0.13,0.08,0.10,0.08,0.09,0.13,0.12,0.08,0.14,0.08,0.07,0.06,0.07,0.11,0.05	0.06,0.09,0.06,0.13,0.05,0.13,0.08,0.10,0.08,0.09,0.13,0.12,0.08,0.14,0.08,0.07,0.06,0.07,0.11,0.05	0.06,0.09,0.06,0.13,0.05,0.13,0.08,0.10,0.08,0.09,0.13,0.12,0.08,0.14,0.08,0.07,0.06,0.07,0.11,0.05
Main Effect size for SNPs	0.24,0.42,0.42,0.39,0.26,0.10,0.47,0.44,0.36,0.18,0.35,0.39,0.46,0.49,0.24,0.37,0.39,0.17,0.46,0.35	0.24,0.42,0.42,0.39,0.26,0.10,0.47,0.44,0.36,0.18,0.35,0.39,0.46,0.49,0.24,0.37,0.39,0.17,0.46,0.35	0.24,0.42,0.42,0.39,0.26,0.10,0.47,0.44,0.36,0.18,0.35,0.39,0.46,0.49,0.24,0.37,0.39,0.17,0.46,0.35	0.24,0.42,0.42,0.39,0.26,0.10,0.47,0.44,0.36,0.18,0.35,0.39,0.46,0.49,0.24,0.37,0.39,0.17,0.46,0.35	0.24,0.42,0.42,0.39,0.26,0.10,0.47,0.44,0.36,0.18,0.35,0.39,0.46,0.49,0.24,0.37,0.39,0.17,0.46,0.35
Minor Allele Frequencies of SNPs	0.06,0.19,0.06,0.13,0.06,0.17,0.20,0.12,0.05,0.15,0.16,0.16,0.08,0.12,0.19,0.20,0.17,0.08,0.06,0.15	0.06,0.19,0.06,0.13,0.06,0.17,0.20,0.12,0.05,0.15,0.16,0.16,0.08,0.12,0.19,0.20,0.17,0.08,0.06,0.15	0.06,0.19,0.06,0.13,0.06,0.17,0.20,0.12,0.05,0.15,0.16,0.16,0.08,0.12,0.19,0.20,0.17,0.08,0.06,0.15	0.06,0.19,0.06,0.13,0.06,0.17,0.20,0.12,0.05,0.15,0.16,0.16,0.08,0.12,0.19,0.20,0.17,0.08,0.06,0.15	0.06,0.19,0.06,0.13,0.06,0.17,0.20,0.12,0.05,0.15,0.16,0.16,0.08,0.12,0.19,0.20,0.17,0.08,0.06,0.15
Type of survival time distributions	Gompertz	Gompertz	Gompertz	Gompertz	Gompertz
Mean for Time to Event	2.165	2.165	2.165	2.165	2.165
Variance for Time to Event	1.242	1.242	1.242	1.24	1.24
End point for the study	4	4	4	4	4
Frequency of Event	0.16	0.16	0.16	0.16	0.16

Supplementary table 4: Parameters used in the simulations shown in the Figure5-AB for Cox Regression Model (SNP)

	Figure 5-CD Red	Figure 5-CD Orange	Figure 5-CD Green	Figure 5-CD Blue	Figure 5-CD Purple
Significance Level	0.05	0.05	0.05	0.05	0.05
Treatment Frequency	0.5	0.5	0.5	0.5	0.5
Effect Size for Treatment	-0.2	-0.2	-0.2	-0.2	-0.2
Lowest Sample Size	100	100	100	100	100
Highest Sample Size	1000	1000	1000	1000	1000
Sample integer Size	100	100	100	100	100
Population Sample Frame	5000	10000	50000	100000	500000
Interaction Effect Size for SNPs	0.06,0.08,0.07, 0.08,0.05,0.13, 0.06,0.13,0.06, 0.14,0.12,0.12, 0.15,0.08,0.10, 0.12,0.10,0.09, 0.09,0.07	0.06,0.08,0.07, 0.08,0.05,0.13, 0.06,0.13,0.06, 0.14,0.12,0.12, 0.15,0.08,0.10, 0.12,0.10,0.09, 0.09,0.07	0.06,0.08,0.07, 0.08,0.05,0.13, 0.06,0.13,0.06, 0.14,0.12,0.12, 0.15,0.08,0.10, 0.12,0.10,0.09, 0.09,0.07	0.06,0.08,0.07, 0.08,0.05,0.13, 0.06,0.13,0.06, 0.14,0.12,0.12, 0.15,0.08,0.10, 0.12,0.10,0.09, 0.09,0.07	0.06,0.08,0.07, 0.08,0.05,0.13, 0.06,0.13,0.06, 0.14,0.12,0.12, 0.15,0.08,0.10, 0.12,0.10,0.09, 0.09,0.07
Main Effect size for SNPs	0.09,0.18,0.09, 0.07,0.18,0.17, 0.12,0.17,0.08, 0.08,0.15,0.06, 0.18,0.14,0.15, 0.07,0.07,0.13, 0.06,0.08	0.09,0.18,0.09, 0.07,0.18,0.17, 0.12,0.17,0.08, 0.08,0.15,0.06, 0.18,0.14,0.15, 0.07,0.07,0.13, 0.06,0.08	0.09,0.18,0.09, 0.07,0.18,0.17, 0.12,0.17,0.08, 0.08,0.15,0.06, 0.18,0.14,0.15, 0.07,0.07,0.13, 0.06,0.08	0.09,0.18,0.09, 0.07,0.18,0.17, 0.12,0.17,0.08, 0.08,0.15,0.06, 0.18,0.14,0.15, 0.07,0.07,0.13, 0.06,0.08	0.09,0.18,0.09, 0.07,0.18,0.17, 0.12,0.17,0.08, 0.08,0.15,0.06, 0.18,0.14,0.15, 0.07,0.07,0.13, 0.06,0.08
Minor Allele Frequencies of SNPs	0.50,0.28,0.36, 0.43,0.48,0.47, 0.43,0.29,0.30, 0.20,0.46,0.50, 0.24,0.29,0.33, 0.36,0.49,0.46, 0.23,0.29	0.50,0.28,0.36, 0.43,0.48,0.47, 0.43,0.29,0.30, 0.20,0.46,0.50, 0.24,0.29,0.33, 0.36,0.49,0.46, 0.23,0.29	0.50,0.28,0.36, 0.43,0.48,0.47, 0.43,0.29,0.30, 0.20,0.46,0.50, 0.24,0.29,0.33, 0.36,0.49,0.46, 0.23,0.29	0.50,0.28,0.36, 0.43,0.48,0.47, 0.43,0.29,0.30, 0.20,0.46,0.50, 0.24,0.29,0.33, 0.36,0.49,0.46, 0.23,0.29	0.50,0.28,0.36, 0.43,0.48,0.47, 0.43,0.29,0.30, 0.20,0.46,0.50, 0.24,0.29,0.33, 0.36,0.49,0.46, 0.23,0.29
Value for Intercept	1	1	1	1	1
Residual Standard Error	3.47	3.47	3.47	3.47	3.47

Supplementary table 5: Parameters used in the simulations shown in the Figure5-CD for Linear Regression Model (SNP).

	Figure 7 Red	Figure 7 Blue	Figure 7 Green
Significance Level	0.05	0.05	0.05
Treatment Frequency	0.5	0.5	0.5
Effect Size for Treatment	-0.2	-0.2	-0.2
Lowest Sample Size	100	100	100
Highest Sample Size	1000	1000	1000
Sample integer Size	100	100	100
Population Sample Frame	10000	10000	10000
Interaction Effect Size for SNPs	0.06,0.08,0.07, 0.08,0.05,0.13, 0.06,0.13,0.06, 0.14,0.12,0.12, 0.15,0.08,0.10, 0.12,0.10,0.09, 0.09,0.07	0.06,0.08,0.07, 0.08,0.05,0.13, 0.06,0.13,0.06, 0.14,0.12,0.12, 0.15,0.08,0.10, 0.12,0.10,0.09, 0.09,0.07	0.06,0.08,0.07, 0.08,0.05,0.13, 0.06,0.13,0.06, 0.14,0.12,0.12, 0.15,0.08,0.10, 0.12,0.10,0.09, 0.09,0.07
Main Effect size for SNPs	0.09,0.18,0.09, 0.07,0.18,0.17, 0.12,0.17,0.08, 0.08,0.15,0.06, 0.18,0.14,0.15, 0.07,0.07,0.13, 0.06,0.08	0.09,0.18,0.09, 0.07,0.18,0.17, 0.12,0.17,0.08, 0.08,0.15,0.06, 0.18,0.14,0.15, 0.07,0.07,0.13, 0.06,0.08	0.09,0.18,0.09, 0.07,0.18,0.17, 0.12,0.17,0.08, 0.08,0.15,0.06, 0.18,0.14,0.15, 0.07,0.07,0.13, 0.06,0.08
Minor Allele Frequencies of SNPs	0.50,0.28,0.36, 0.43,0.48,0.47, 0.43,0.29,0.30, 0.20,0.46,0.50, 0.24,0.29,0.33, 0.36,0.49,0.46, 0.23,0.29	0.50,0.28,0.36, 0.43,0.48,0.47, 0.43,0.29,0.30, 0.20,0.46,0.50, 0.24,0.29,0.33, 0.36,0.49,0.46, 0.23,0.29	0.50,0.28,0.36, 0.43,0.48,0.47, 0.43,0.29,0.30, 0.20,0.46,0.50, 0.24,0.29,0.33, 0.36,0.49,0.46, 0.23,0.29
Value for Intercept	1	1	1
Residual Standard Error	2.2912	1.333	0.75

Supplementary table 6: Parameters used in the simulations shown in the Figure7 for Linear Regression Model (SNP).