

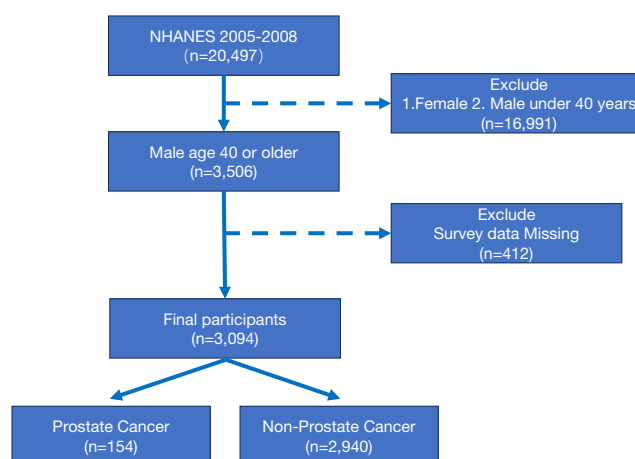


Figure S1 Flowchart of sample selection from NHANES (2005–2008). NHANES, National Health and Nutrition Examination Survey.

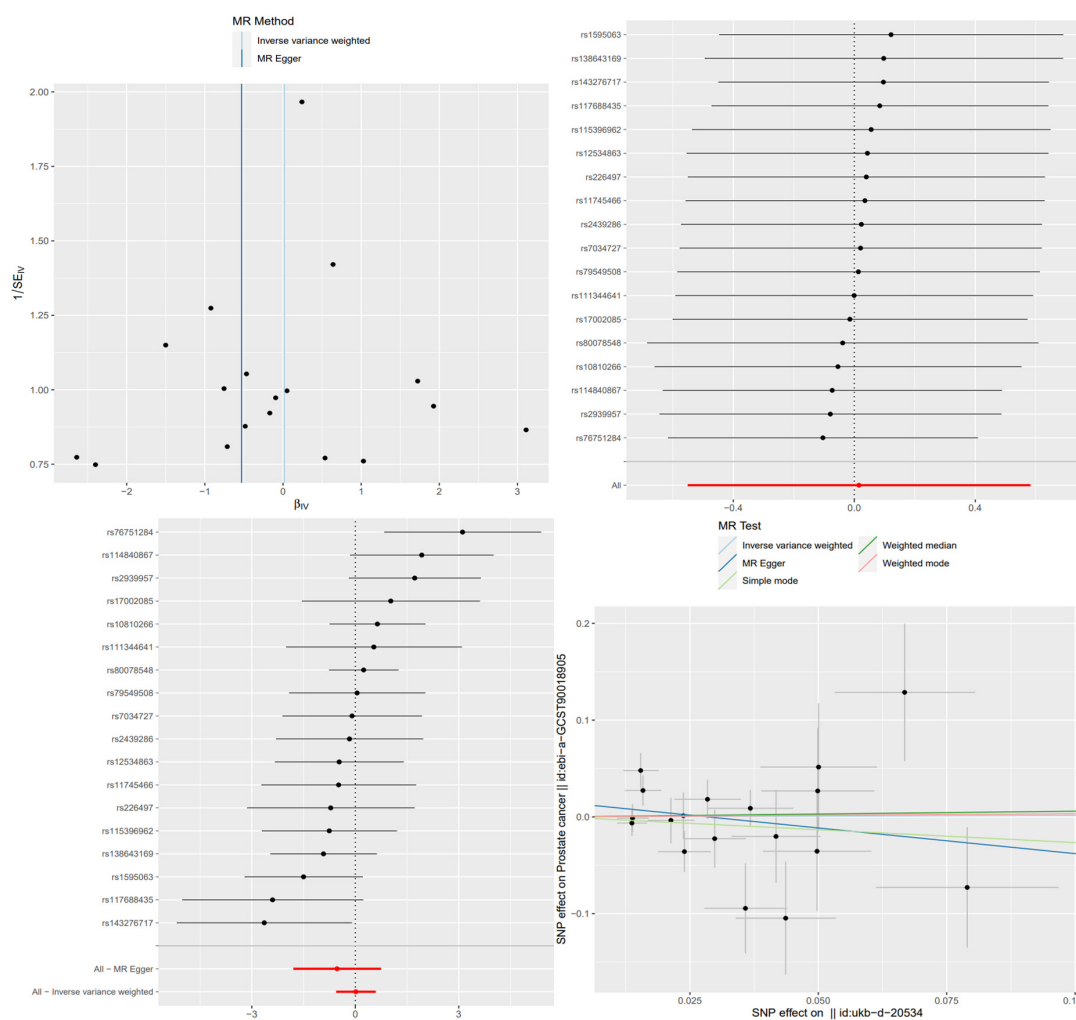


Figure S2 Forest plot, funnel plot, scatter and sensitivity analysis for Sleeping too much in prostate cancer (Mendelian Randomization, MR).

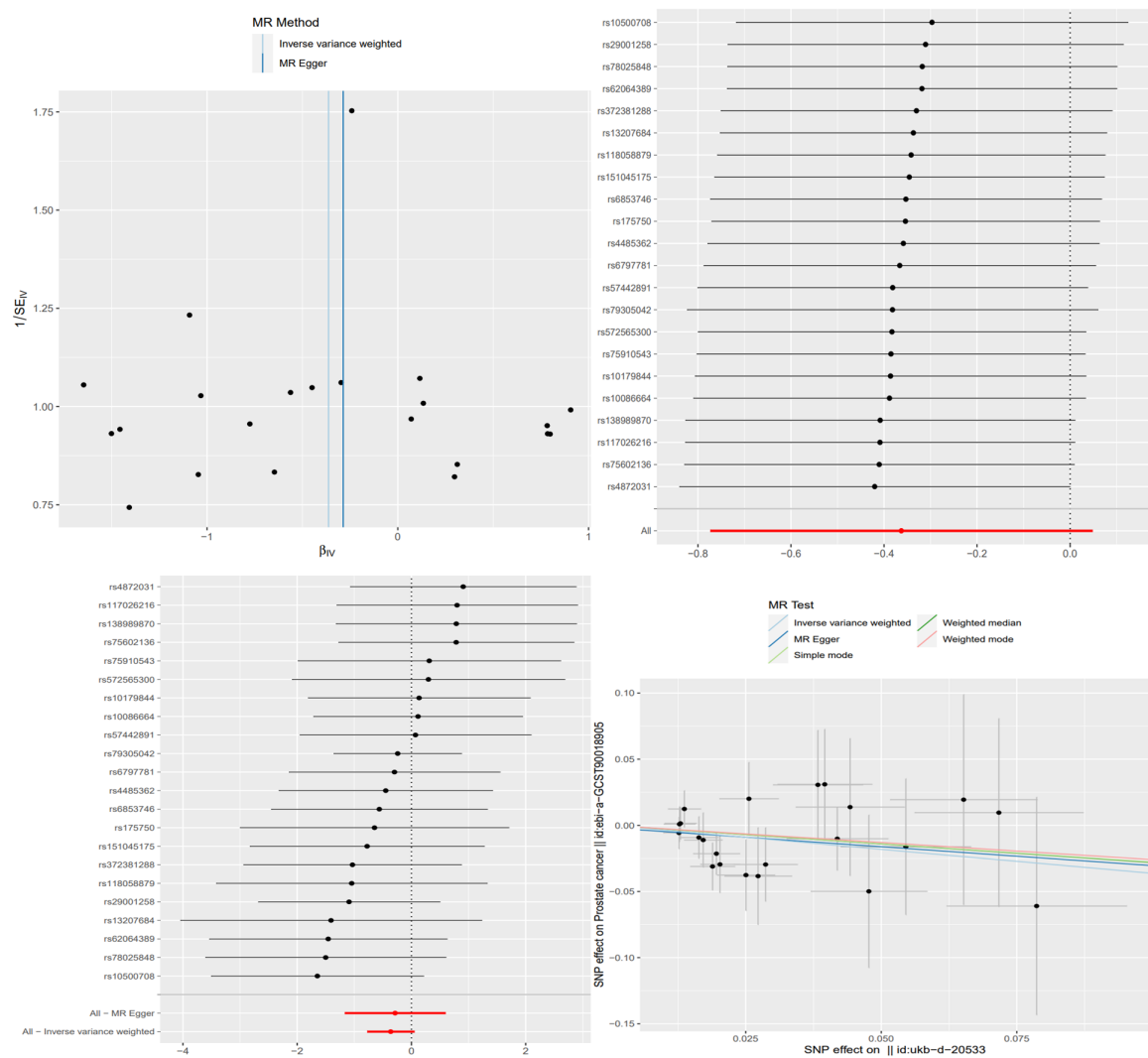


Figure S3 Forest plot, funnel plot, scatter and sensitivity analysis for Trouble falling asleep in prostate cancer (Mendelian Randomization, MR).

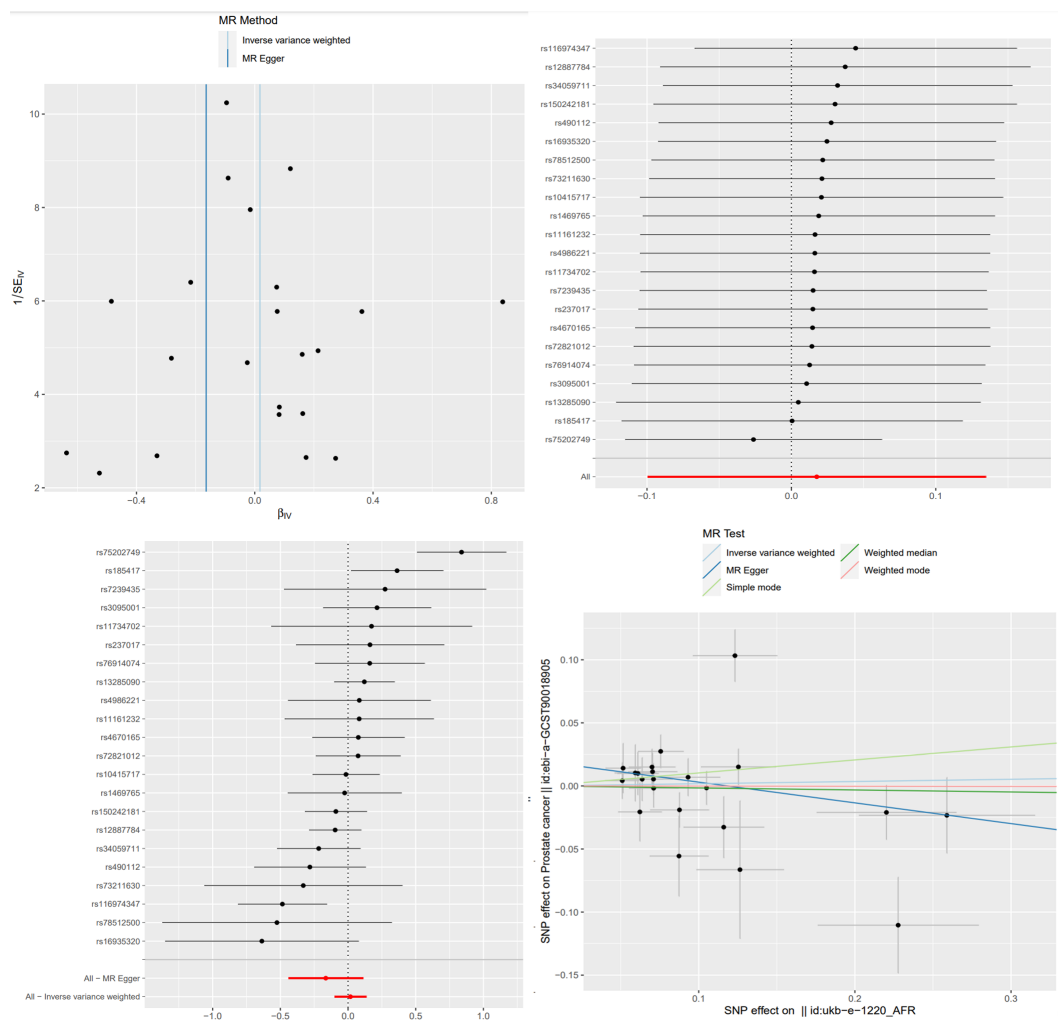


Figure S4 Forest plot, funnel plot, scatter and sensitivity analysis for Daytime dozing / sleeping (narcolepsy) in prostate cancer (Mendelian Randomization, MR).

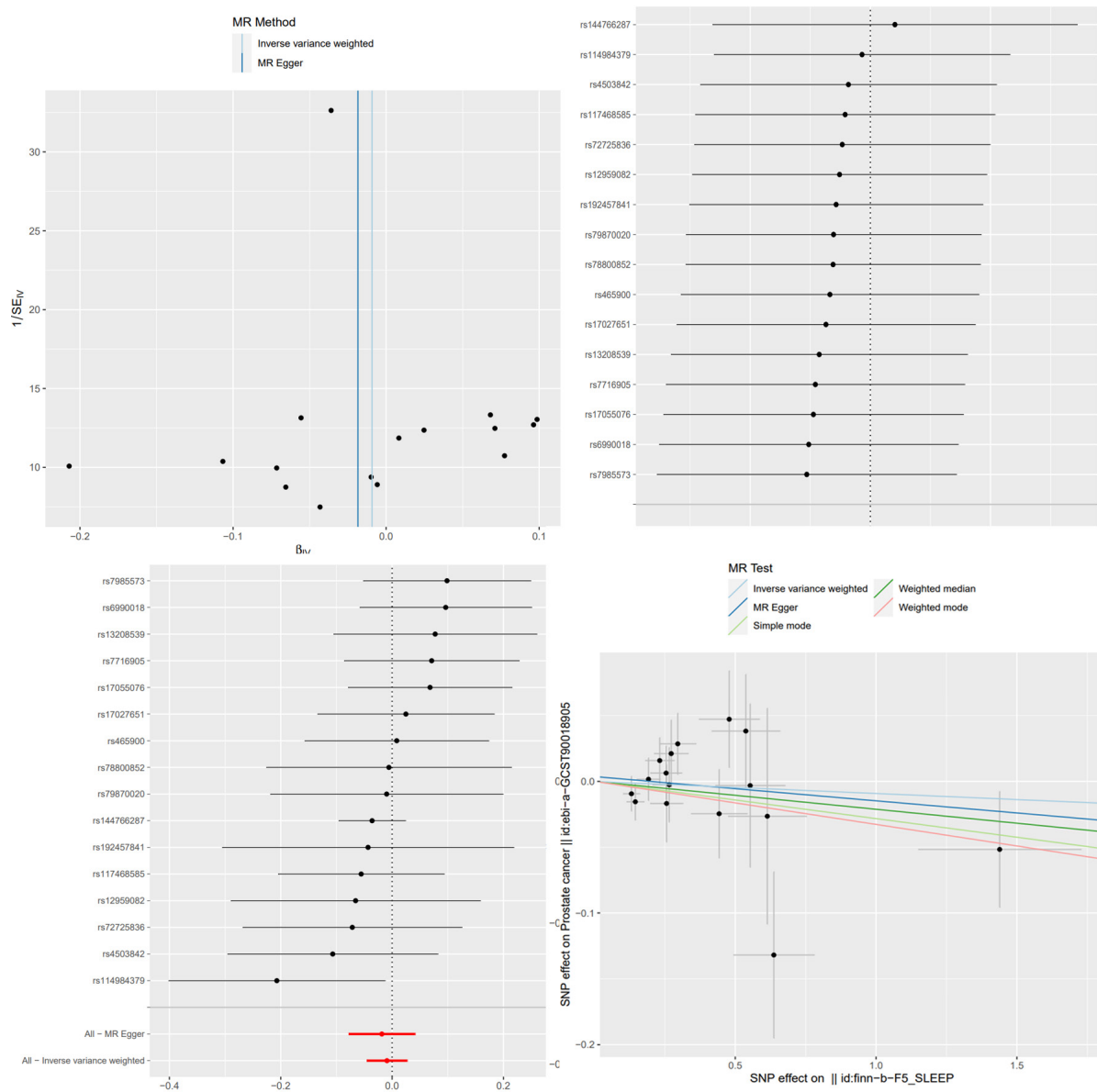


Figure S5 Forest plot, funnel plot, scatter and sensitivity analysis for sleep disorders in prostate cancer (Mendelian Randomization, MR).

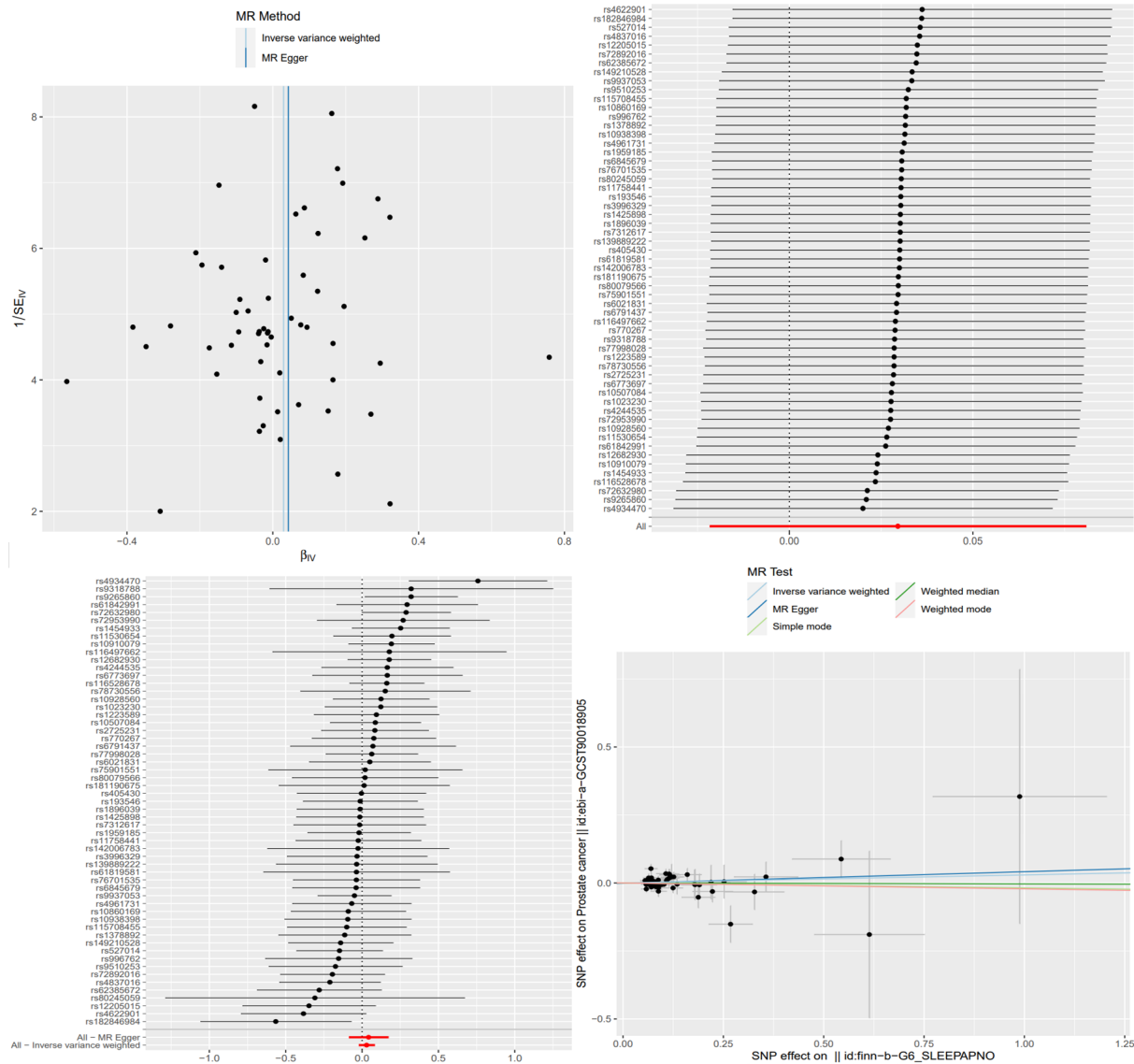


Figure S6 Forest plot, funnel plot, scatter and sensitivity analysis for Sleep apnea in prostate cancer (Mendelian Randomization, MR).

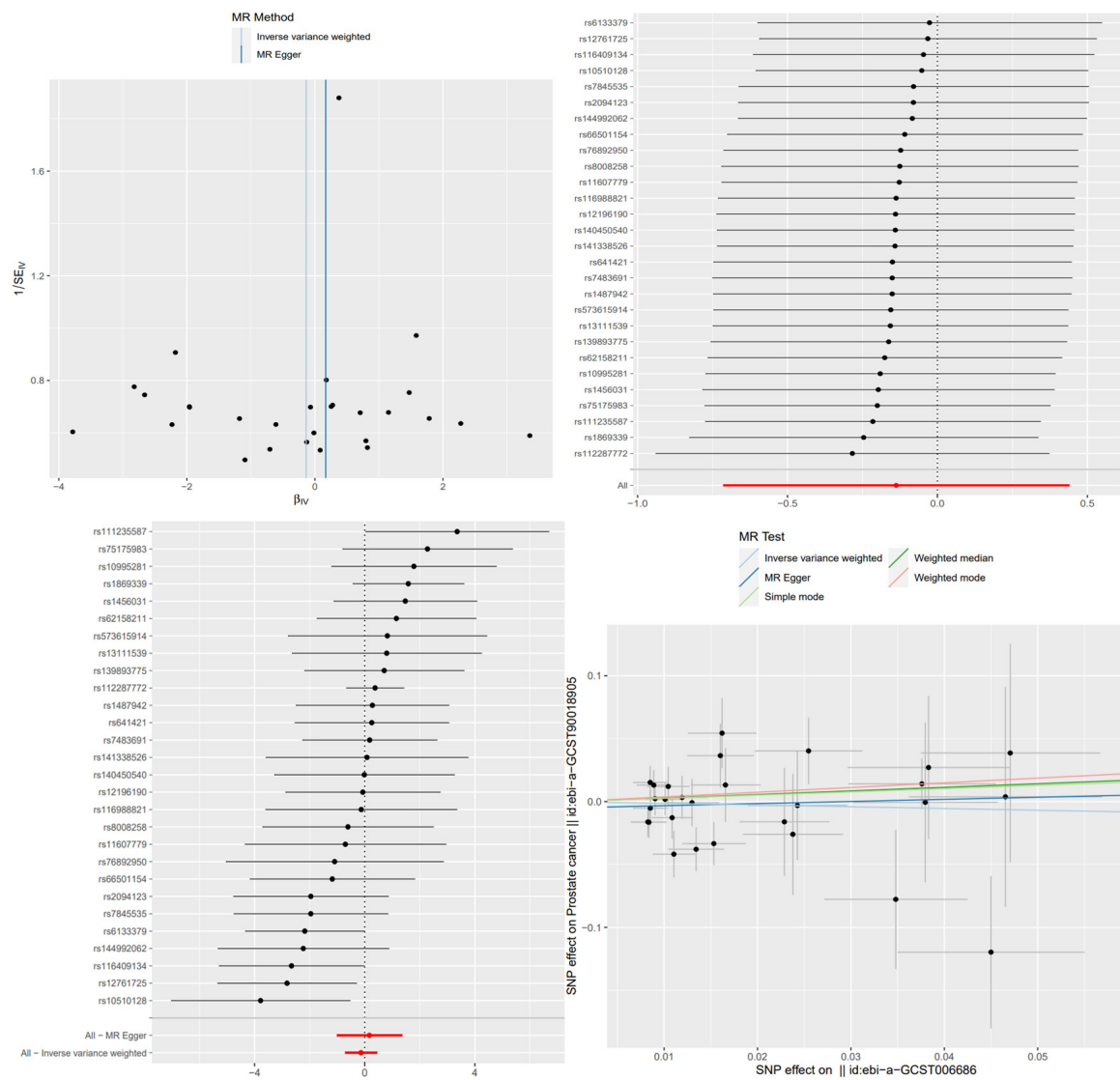


Figure S7 Forest plot, funnel plot, scatter and sensitivity analysis for Sleep duration (undersleepers) in prostate cancer (Mendelian Randomization, MR).

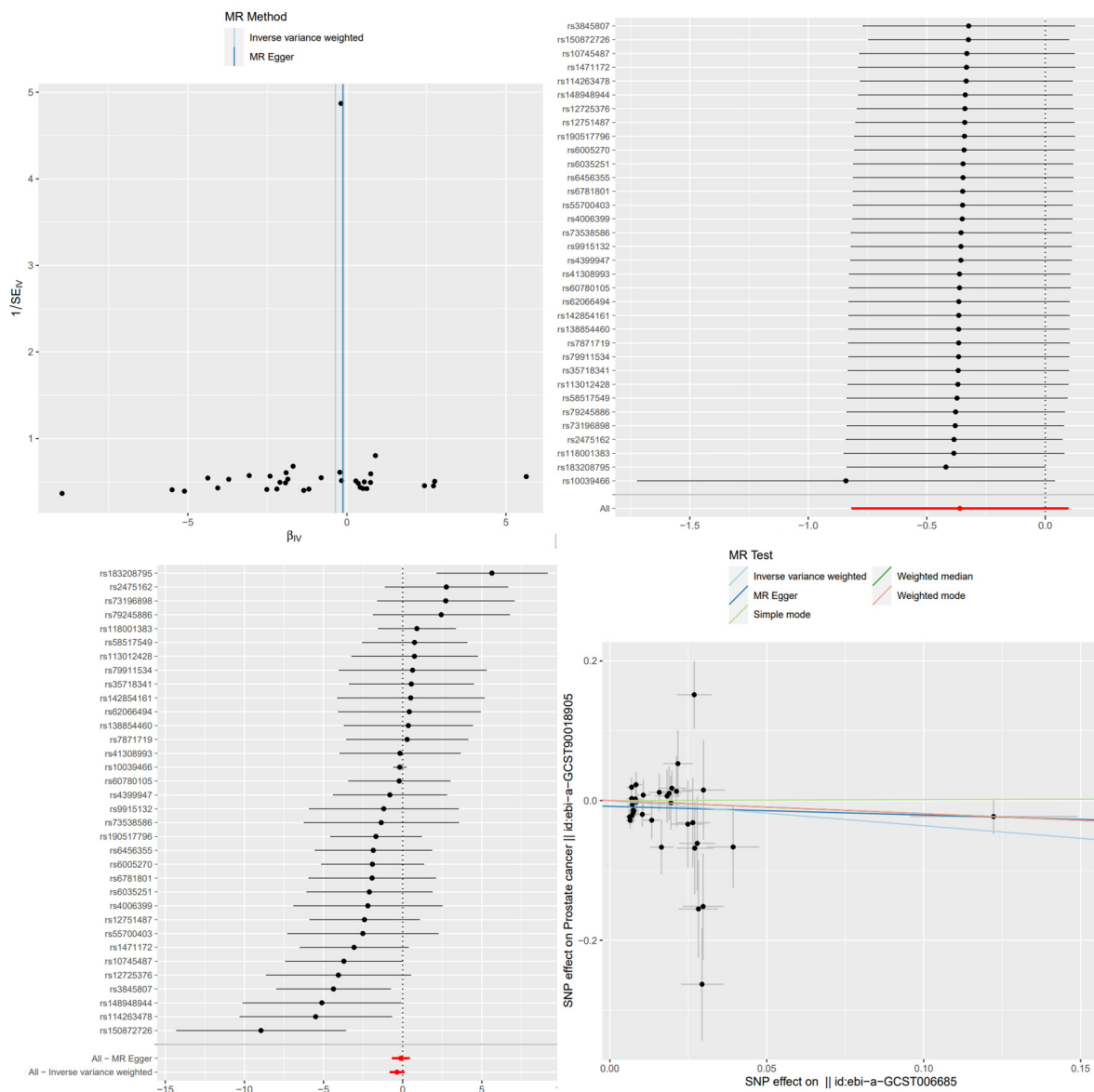


Figure S8 Forest plot, funnel plot, scatter and sensitivity analysis for Sleep duration (oversleepers) in prostate cancer (Mendelian Randomization, MR).

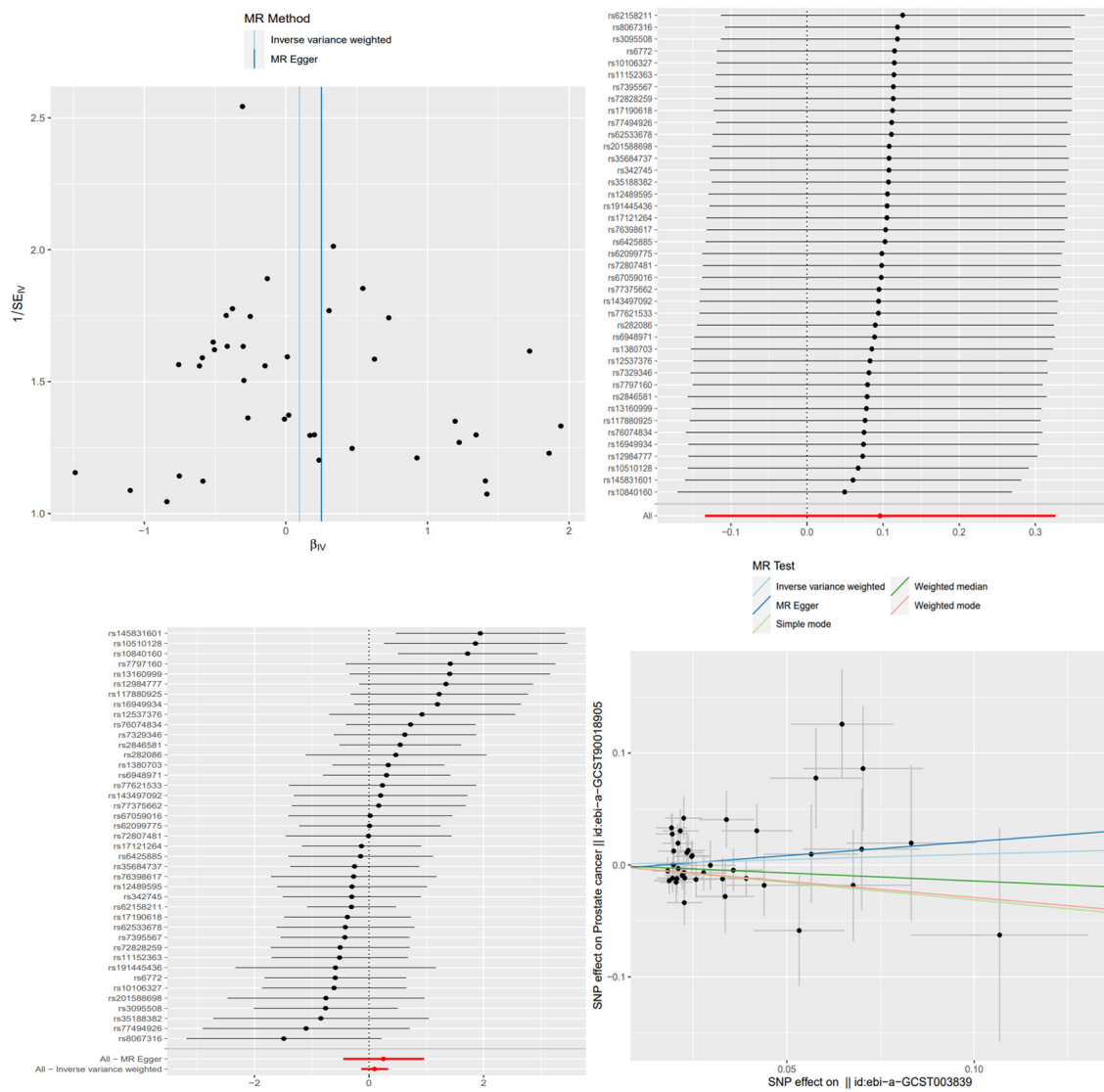


Figure S9 Forest plot, funnel plot, scatter and sensitivity analysis for Sleep duration in prostate cancer (Mendelian Randomization, MR).

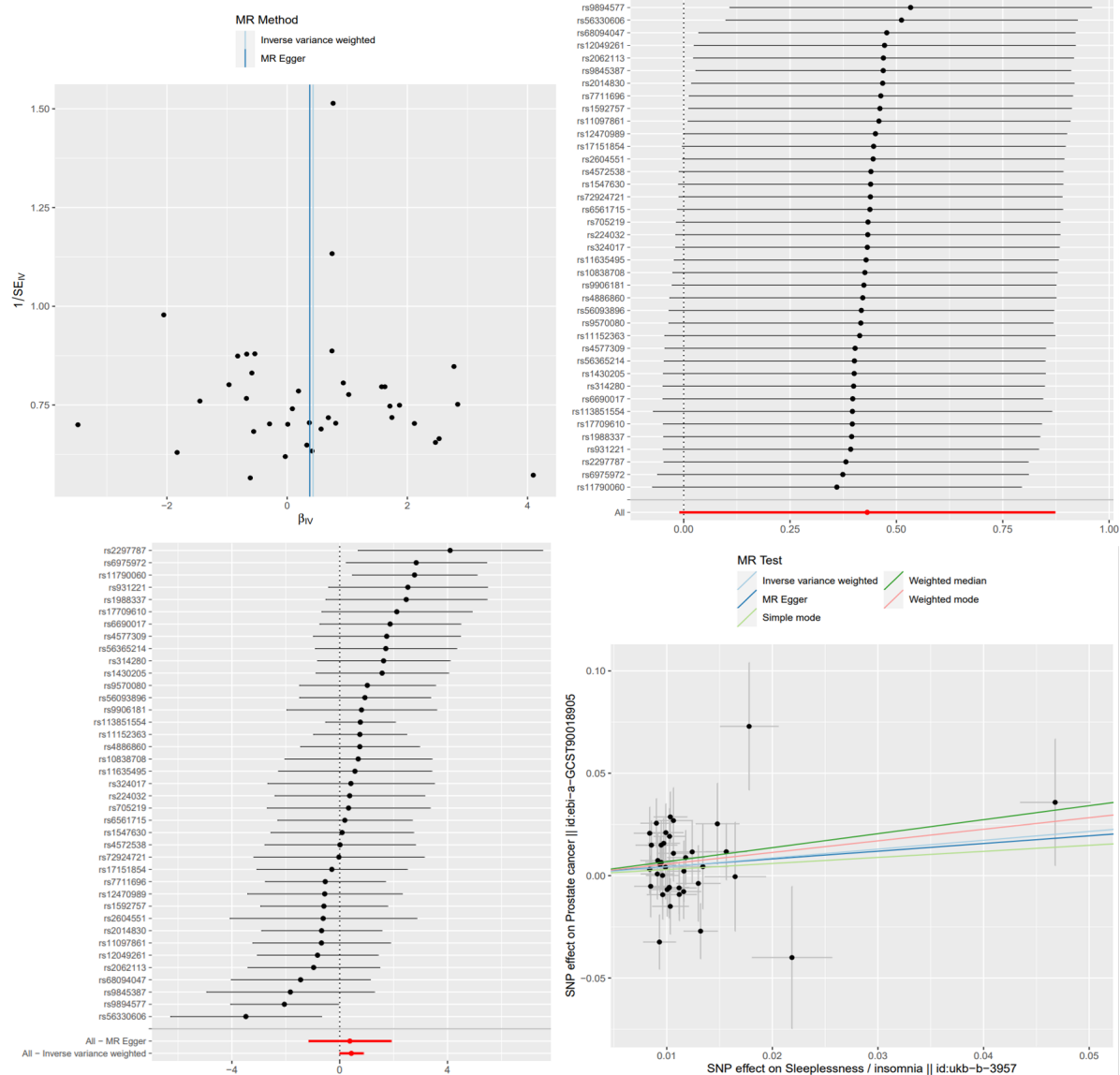


Figure S10 Forest plot, funnel plot, scatter and sensitivity analysis for Sleeplessness/insomnia in prostate cancer (Mendelian Randomization, MR).

Table S1 Baseline characteristics of the study population

Characteristic	Overall (N=3094)	Prostate Cancer (N=154)	Non-Prostate Cancer (N=2940)	P-Value ¹
Age (years)	53 (47, 64)	72.58 (67, 79)	53.00 (46, 63)	<0.001
Race				0.14
Non-Hispanic White	1,677 (54.2%)	91 (59.1%)	1586(53.9%)	
Non-Hispanic Black	640 (20.7%)	45 (29.2%)	595(20.2%)	
Mexican American	464 (14.9%)	8 (5.2%)	456(15.5%)	
Other Hispanic	313 (10.1%)	10 (6.5%)	303(10.3%)	
Education_level				0.5
9-11th Grade (Includes 12th grade with no diploma)	461 (14.8%)	30 (19.5%)	431 (14.6%)	
College Graduate or above	640 (28%)	31 (20.1%)	609 (23.9%)	
High School Grad/GED or Equivalent	736 (23.8%)	33 (21.4%)	703 (23.9%)	
Less Than 9th Grade	519 (16.8%)	21 (13.6%)	498 (16.9%)	
Some College or AA degree	738 (23.9%)	39 (25.3%)	699 (23.8%)	
Family_PIR	3.64 (1.95, 5.00)	3.12 (2.05, 5.00)	3.65 (1.95, 5.00)	0.5
Marital_Status				0.002
Divorced	352 (11.3%)	11 (7.2%)	341 (11.6%)	
Living with partner	152 (5.0%)	3 (1.9%)	149 (5.1%)	
Married	2,075 (67.1%)	114 (74.0%)	1,961 (66.7%)	
Never married	214 (6.9%)	4 (2.6%)	210 (7.1%)	
Separated	85 (2.7%)	4 (2.6%)	81 (2.7%)	
Widowed	216 (7.0%)	18 (11.7%)	198 (6.7%)	
Annual_Family_Income				0.013
\$20,001-\$55,000	569 (18.3%)	36 (65%)	533 (18.8%)	
\$55,001-\$75,000	139 (4.4%)	1 (0.5%)	138 (4.7%)	
<\$20,000	309 (10.0%)	7 (9.5%)	302 (10.2%)	
>\$75,001	330 (10.7%)	9 (25%)	321 (10.9%)	
Other	2316(74.8%)	101(65.6%)	2215(75.3%)	
Diabetes				0.5
Diabetes	514 (16.7%)	26 (16.9%)	488 (16.6%)	
Non-Diabetes	2,580 (83.4%)	128 (83.1%)	2,452 (83.4%)	
Smoke				0.057
Smoke	1,936 (62.6%)	101 (65.6%)	1,835 (62.4%)	
Non-Smoke	1,158 (37.4%)	53 (34.4%)	1,105 (37.6%)	
BMI	28.3 (25.3, 31.6)	27.7 (25.4, 30.9)	28.3 (25.3, 31.7)	0.4
Uric_acid	357 (315, 410)	345 (310, 413)	357 (315, 410)	0.6
Total_calcium	2.35 (2.30, 2.43)	2.35 (2.28, 2.40)	2.35 (2.30, 2.43)	0.2
Creatinine	88 (80, 98)	97 (81, 107)	88 (80, 97)	<0.001

¹Wilcoxon rank-sum test for complex survey samples; chi-squared test with Rao & Scott's second-order correction; BMI: Body Mass Index.

Table S2 MR result

X	id.exposure	exposure	id.outcome	outcome	method	nsnp	b	se	Pval	lo_ci	up_ci	or	or_lci95	or_uci95
1	ebi-a-GCST003839	Sleep duration	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	MR Egger	41	0.251512	0.357543	0.485956	-0.44927	0.952295	1.285968	0.638093	2.591652
1	ebi-a-GCST003839	Sleep duration	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted median	41	-0.14338	0.154652	0.353866	-0.4465	0.159738	0.866424	0.639864	1.173203
1	ebi-a-GCST003839	Sleep duration	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Inverse variance weighted	41	0.095951	0.117317	0.413427	-0.13399	0.325892	1.100705	0.874598	1.385266
1	ebi-a-GCST003839	Sleep duration	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Simple mode	41	-0.31224	0.268736	0.252171	-0.83896	0.214484	0.731807	0.432159	1.239223
1	ebi-a-GCST003839	Sleep duration	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted mode	41	-0.2913	0.249065	0.24909	-0.77947	0.196864	0.747289	0.458649	1.217579
2	ebi-a-GCST006685	Sleep duration (oversleepers)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	MR Egger	34	-0.12427	0.279104	0.659142	-0.67131	0.422775	0.883142	0.511037	1.526191
2	ebi-a-GCST006685	Sleep duration (oversleepers)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted median	34	-0.18774	0.236071	0.426451	-0.65044	0.274957	0.828828	0.521815	1.316474
2	ebi-a-GCST006685	Sleep duration (oversleepers)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Inverse variance weighted	34	-0.36033	0.233338	0.122525	-0.81768	0.097007	0.697443	0.441456	1.101868
2	ebi-a-GCST006685	Sleep duration (oversleepers)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Simple mode	34	0.013106	0.847347	0.987752	-1.64769	1.673907	1.013193	0.192493	5.332961
2	ebi-a-GCST006685	Sleep duration (oversleepers)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted mode	34	-0.18823	0.204723	0.364551	-0.58948	0.213032	0.828428	0.554614	1.237424
3	ebi-a-GCST006686	Sleep duration (undersleepers)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	MR Egger	28	0.168604	0.603038	0.782003	-1.01335	1.350558	1.183651	0.363001	3.859579
3	ebi-a-GCST006686	Sleep duration (undersleepers)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted median	28	0.283672	0.415124	0.49439	-0.52997	1.097314	1.327997	0.588622	2.996109
3	ebi-a-GCST006686	Sleep duration (undersleepers)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Inverse variance weighted	28	-0.13755	0.294427	0.640361	-0.71463	0.439523	0.871487	0.489372	1.551967
3	ebi-a-GCST006686	Sleep duration (undersleepers)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Simple mode	28	0.257898	0.804577	0.751027	-1.31907	1.834869	1.294207	0.267383	6.264311
3	ebi-a-GCST006686	Sleep duration (undersleepers)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted mode	28	0.372863	0.49305	0.456054	-0.59351	1.339242	1.451886	0.552382	3.816148
4	finn-b-F5_SLEEP	Sleep disorders	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	MR Egger	16	-0.01844	0.03044	0.554379	-0.0781	0.041224	0.98173	0.92487	1.042085
4	finn-b-F5_SLEEP	Sleep disorders	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted median	16	-0.02119	0.027917	0.447797	-0.07591	0.033526	0.979031	0.926901	1.034094
4	finn-b-F5_SLEEP	Sleep disorders	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Inverse variance weighted	16	-0.00921	0.01851	0.618761	-0.04549	0.027068	0.990832	0.95553	1.027438
4	finn-b-F5_SLEEP	Sleep disorders	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Simple mode	16	-0.02829	0.051224	0.588827	-0.12869	0.072104	0.972102	0.879243	1.074767
4	finn-b-F5_SLEEP	Sleep disorders	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted mode	16	-0.03271	0.028835	0.274465	-0.08922	0.023809	0.967821	0.91464	1.024094
5	finn-b-G6_SLEEPAPNO	Sleep apnoea	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	MR Egger	57	0.042592	0.065414	0.517684	-0.08562	0.170804	1.043512	0.917943	1.186259
5	finn-b-G6_SLEEPAPNO	Sleep apnoea	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted median	57	-0.0034	0.037856	0.928472	-0.0776	0.0708	0.996607	0.925338	1.073367
5	finn-b-G6_SLEEPAPNO	Sleep apnoea	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Inverse variance weighted	57	0.02957	0.026143	0.258013	-0.02167	0.08081	1.030012	0.978563	1.084165
5	finn-b-G6_SLEEPAPNO	Sleep apnoea	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Simple mode	57	-0.01829	0.082761	0.825919	-0.1805	0.143924	0.981878	0.834853	1.154796
5	finn-b-G6_SLEEPAPNO	Sleep apnoea	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted mode	57	-0.02162	0.080901	0.790297	-0.18018	0.13695	0.978615	0.835117	1.146771
6	ukb-b-3957	Sleeplessness / insomnia	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	MR Egger	205	-0.10898	0.442593	0.805751	-0.97646	0.758502	0.896748	0.376641	2.135075
6	ukb-b-3957	Sleeplessness / insomnia	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted median	205	0.368888	0.172968	0.03295	0.02987	0.707906	1.446125	1.03032	2.029736
6	ukb-b-3957	Sleeplessness / insomnia	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Inverse variance weighted	205	0.297417	0.127883	0.020035	0.046766	0.548069	1.346377	1.047877	1.729909
6	ukb-b-3957	Sleeplessness / insomnia	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Simple mode	205	0.78633	0.547156	0.152215	-0.2861	1.858757	2.195326	0.751191	6.415754
6	ukb-b-3957	Sleeplessness / insomnia	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted mode	205	0.669654	0.440633	0.130121	-0.19399	1.533295	1.953561	0.823669	4.633418
7	ukb-d-20533	Trouble falling asleep	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	MR Egger	22	-0.28613	0.448598	0.530824	-1.16538	0.593126	0.751168	0.311804	1.809637
7	ukb-d-20533	Trouble falling asleep	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted median	22	-0.28173	0.299568	0.346989	-0.86888	0.305425	0.754479	0.419421	1.357202
7	ukb-d-20533	Trouble falling asleep	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Inverse variance weighted	22	-0.36284	0.209511	0.083305	-0.77348	0.047806	0.6957	0.461405	1.048967
7	ukb-d-20533	Trouble falling asleep	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Simple mode	22	-0.27833	0.519935	0.598051	-1.2974	0.740739	0.757045	0.27324	2.097485
7	ukb-d-20533	Trouble falling asleep	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted mode	22	-0.25899	0.491999	0.604117	-1.22331	0.705323	0.771827	0.294254	2.0245
8	ukb-d-20534	Sleeping too much	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	MR Egger	18	-0.53056	0.645905	0.423478	-1.79653	0.735414	0.588275	0.165873	2.086345
8	ukb-d-20534	Sleeping too much	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted median	18	0.059111	0.329223	0.857508	-0.58617	0.704389	1.060893	0.556456	2.02261
8	ukb-d-20534	Sleeping too much	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Inverse variance weighted	18	0.01533	0.288886	0.95768	-0.55089	0.581546	1.015448	0.576439	1.788801
8	ukb-d-20534	Sleeping too much	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Simple mode	18	-0.26567	0.585752	0.655886	-1.41375	0.882404	0.766692	0.243231	2.416704
8	ukb-d-20534	Sleeping too much	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted mode	18	0.033252	0.446808	0.941545	-0.84249	0.908996	1.033811	0.430636	2.481829
9	ukb-e-1220_AFR	Daytime dozing / sleeping (narcolepsy)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	MR Egger	22	-0.16438	0.140389	0.255394	-0.43955	0.110778	0.848416	0.644329	1.117147
9	ukb-e-1220_AFR	Daytime dozing / sleeping (narcolepsy)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted median	22	-0.01597	0.059557	0.788639	-0.1327	0.100766	0.984161	0.875729	1.106018
9	ukb-e-1220_AFR	Daytime dozing / sleeping (narcolepsy)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Inverse variance weighted	22	0.017562	0.059744	0.768793	-0.09954	0.134661	1.017717	0.905257	1.144149
9	ukb-e-1220_AFR	Daytime dozing / sleeping (narcolepsy)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Simple mode	22	0.103062	0.091414	0.272282	-0.07611	0.282234	1.10856	0.926715	1.326089
9	ukb-e-1220_AFR	Daytime dozing / sleeping (narcolepsy)	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	Weighted mode	22	-0.00119	0.069671	0.986516	-0.13775	0.135363	0.998809	0.87132	1.144952

SNP: Single Nucleotide Polymorphism; OR: Odds Ratio.

Table S3 Horizontal pleiotropy in MR

id.exposure	id.outcome	outcome	exposure	egger_intercept	se	Pval
ebi-a-GCST003839	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	id:ebi-a-GCST003839	-0.00426	0.009231	0.647258
ebi-a-GCST006685	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	id:ebi-a-GCST006685	-0.00829	0.005591	0.148017
ebi-a-GCST006686	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	id:ebi-a-GCST006686	-0.00497	0.008505	0.564229
finn-b-F5_SLEEP	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	id:finn-b-F5_SLEEP	0.00366	0.009583	0.708287
finn-b-G6_SLEEPAPNO	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	id:finn-b-G6_SLEEPAPNO	-0.00125	0.005757	0.828883
ukb-b-3957	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	id:ukb-b-3957	0.003914	0.004081	0.338625
ukb-d-20533	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	id:ukb-d-20533	-0.00186	0.009628	0.848606
ukb-d-20534	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	id:ukb-d-20534	0.015089	0.015956	0.358378
ukb-e-1220_AFR	ebi-a-GCST90018905	Prostate cancer id:ebi-a-GCST90018905	id:ukb-e-1220_AFR	0.019451	0.013652	0.169626

Table S4 Heterogeneity statistics in MR

id.exposure	method	Q	Q_df	Q_Pval
ebi-a-GCST003839	MR Egger	51.38762	39	0.08843
ebi-a-GCST003839	Inverse variance weighted	51.66781	40	0.102288
ebi-a-GCST006685	MR Egger	54.28951	32	0.008248
ebi-a-GCST006685	Inverse variance weighted	58.01768	33	0.004563
ebi-a-GCST006686	MR Egger	36.80182	26	0.077879
ebi-a-GCST006686	Inverse variance weighted	37.28463	27	0.089876
finn-b-F5_SLEEP	MR Egger	13.60032	14	0.479892
finn-b-F5_SLEEP	Inverse variance weighted	13.74615	15	0.544863
finn-b-G6_SLEEPAPNO	MR Egger	52.83696	55	0.557714
finn-b-G6_SLEEPAPNO	Inverse variance weighted	52.88412	56	0.593565
ukb-b-3957	MR Egger	270.8554	203	0.00102
ukb-b-3957	Inverse variance weighted	272.0828	204	0.00101
ukb-d-20533	MR Egger	12.894	20	0.881885
ukb-d-20533	Inverse variance weighted	12.9314	21	0.911008
ukb-d-20534	MR Egger	27.13261	16	0.040033
ukb-d-20534	Inverse variance weighted	28.64915	17	0.037902
ukb-e-1220_AFR	MR Egger	48.02745	20	0.000422
ukb-e-1220_AFR	Inverse variance weighted	52.90255	21	0.000142

Q: Cochran's Q test.