Trait	gcov_int	gcov_int_se	gcov_int_L95CI	gcov_int_U95CI	gcov_int (95%CI)	Z-statistic	P
Asthma	-0,0078	0,0123	-0,031907508	0,016307508	-0,0078 (95%CI: -0,0319-0,0163)	0,634146341	0,5259853
BMI	-0,0176	0,0134	-0,043863464	0,008663464	-0,0176 (95%CI: -0,0439-0,0087)	1,313432836	0,890371
Depression	0,0121	0,0063	-0,000247748	0,024447748	0,0121 (95%CI: -0,0002-0,0244)	1,920634921	0,05477775
Educational attainment	0,0073	0,0085	-0,00935966	0,02395966	0,0073 (95%CI: -0,0094-0,024)	0,858823529	0,3904379
Epilepsy	0,0134	0,0077	-0,001691692	0,028491692	0,0134 (95%CI: -0,0017-0,0285)	1,74025974	0,08181342
HDL	-0,0737	0,0665	-0,20403734	0,05663734	-0,0737 (95%CI: -0,204-0,0566)	1,108270677	0,2677449
Height	-0,016	0,0126	-0,040695496	0,008695496	-0,016 (95%CI: -0,0407-0,0087)	1,26984127	0,2041412
Hypertension	0,0084	0,0157	-0,022371372	0,039171372	0,0084 (95%CI: -0,0224-0,0392)	0,535031847	0,5926278
IBS	0,0095	0,006	-0,00225976	0,02125976	0,0095 (95%CI: -0,0023-0,0213)	1,583333333	0,1133455
LDL	0,2146	0,2062	-0,189543752	0,618743752	0,2146 (95%CI: -0,1895-0,6187)	1,040737148	0,2979976
Migraine	0,0113	0,0054	**0,000716216**	**0,021883784**	**0,0113 (95%CI: 0,0007-0,0219)**	**2,092592593**	**0,03638554**
Sleep	-0,0001	0,0112	-0,022051552	0,021851552	-0,0001 (95%CI: -0,0221-0,0219)	0,008928571	0,9928761
Smoke initiation	-0,0035	0,0061	-0,015455756	0,008455756	-0,0035 (95%CI: -0,0155-0,0085)	0,573770492	0,5661231
Type 2 Diabetes	-0,0059	0,0116	-0,028635536	0,016835536	-0,0059 (95%CI: -0,0286-0,0168)	0,50862069	0,6110181
Vitamin D	-0,0033	0,0157	-0,034071372	0,027471372	-0,0033 (95%CI: -0,0341-0,0275)	0,210191083	0,8335185

Table S1: Overview of sample overlap between the Alzheimer's disease summary statistics and each of the other summary statistics, respectively. Significant results (P < 0.05) are shown in bold and suggests that there is a significant sample overlap between the two summary statistics.

Exposure	Outcome	bxy	se	p	N_SNP
Asthma	Alzheimer's disease	-0,000213394	0,000304712	0,483733	289
Alzheimer's disease	**Asthma**	**-0,558094**	**0,153725**	**0,000282915**	**34**
BMI	Alzheimer's disease	0,000477848	0,000491683	0,331119	1386
Alzheimer's disease	BMI	0,0371218	0,0503855	0,461271	26
Depression	Alzheimer's disease	0,00416947	0,00265079	0,115738	57
Alzheimer's disease	Depression	0,0302865	0,104958	0,77292	37
Educational attainment	Alzheimer's disease	-0,00131821	0,000903566	0,144594	817
Alzheimer's disease	Educational attainment	-0,0491548	0,0438713	0,26253	35
Epilepsy	Alzheimer's disease	-0,00745003	0,011347	0,511461	5
Alzheimer's disease	Epilepsy	-0,0581087	0,147099	0,69282	26
HDL	Alzheimer's disease	0,000307592	0,000183109	0,0929893	1735
Alzheimer's disease	**HDL**	**0,0927157**	**0,0392267**	**0,0180991**	**28**
Height	**Alzheimer's disease**	**-0,00129218**	**0,000308783**	**2,85E-05**	**6703**
Alzheimer's disease	Height	0,0693526	0,0383935	0,0708615	19
Hypertension	Alzheimer's disease	-	-	-	-
Alzheimer's disease	Hypertension	-	-	-	-
IBS	Alzheimer's disease	-0,0020169	0,0106959	0,850431	7
Alzheimer's disease	IBS	-0,0215292	0,166724	0,897254	38
LDL	Alzheimer's disease	-0,000282872	0,000204467	0,166524	1241
Alzheimer's disease	**LDL**	**-0,135604**	**0,0392287**	**0,000546696**	**30**
Migraine	**Alzheimer's disease**	**0,00224444**	**0,00104096**	**0,0310739**	**41**
Alzheimer's disease	Migraine	0,156737	0,187223	0,402496	38
Sleep duration	Alzheimer's disease	-0,00545697	0,0035752	0,126926	91
Alzheimer's disease	Sleep duration	-0,0415026	0,0556881	0,456109	35
Smoke initiation	Alzheimer's disease	0,00299747	0,00188061	0,110963	233
Alzheimer's disease	Smoke initiation	0,0247374	0,0468666	0,59762	37
Type 2 Diabetes	Alzheimer's disease	0,000498776	0,00025748	0,0527279	307
Alzheimer's disease	**Type 2 Diabetes**	**-0,381734**	**0,161087**	**0,0178003**	**33**
Vitamin D	Alzheimer's disease	0,000368039	0,000447772	0,411114	258
Alzheimer's disease	Vitamin D	-0,0538398	0,0492499	0,274308	36

Table S2: Results of the causal relationship between Alzheimer's disease and relevant traits, respectively, using bidirectional GSMR with a GWAS significance threshold of P < 5 ✕ 10-8, LD threshold of r2 < 0.05 and a HEIDI threshold below 0.01. Chromosome 19 have been removed. Significant results are shown in bold.

Exposure	Outcome	bxy	se	p	N_SNP
Asthma	Alzheimer's disease	-1,26E-05	0,000558726	0,981955	61
Alzheimer's disease	**Asthma**	**-0,458026**	**0,166268**	**0,00587395**	**21**
BMI	Alzheimer's disease	0,00571893	0,00398719	0,15148	67
Alzheimer's disease	BMI	-0,0772707	0,0551139	0,16091	18
Depression	Alzheimer's disease	0,00334586	0,00349662	0,338627	30
Alzheimer's disease	Depression	0,0899187	0,111626	0,420512	25
Educational attainment	Alzheimer's disease	-0,00571534	0,00394447	0,147351	68
Alzheimer's disease	Educational attainment	-0,0806762	0,0472574	0,0877912	23
Epilepsy	Alzheimer's disease	-	-	-	-
Alzheimer's disease	Epilepsy	-0,0256293	0,157487	0,870724	20
HDL	Alzheimer's disease	-1,18E-05	0,000517305	0,981735	73
Alzheimer's disease	**HDL**	**0,12961**	**0,0402622**	**0,00128576**	**21**
Height	Alzheimer's disease	-	-	-	-
Alzheimer's disease	Height	-	-	-	-
Hypertension	Alzheimer's disease	-	-	-	-
Alzheimer's disease	Hypertension	-	-	-	-
IBS	Alzheimer's disease	0,00193312	0,0115916	0,867552	6
Alzheimer's disease	IBS	0,0553712	0,1785	0,756407	25
LDL	Alzheimer's disease	-0,000621837	0,000957938	0,516247	75
Alzheimer's disease	LDL	-0,0710029	0,0383339	0,0639938	22
Migraine	Alzheimer's disease	0,00176344	0,00123156	0,152178	28
Alzheimer's disease	Migraine	0,181445	0,200362	0,365155	24
Sleep duration	Alzheimer's disease	-0,00191912	0,0046967	0,682825	40
Alzheimer's disease	Sleep duration	-0,0301528	0,0585801	0,606744	25
Smoke initiation	Alzheimer's disease	-0,000960004	0,00281278	0,732877	66
Alzheimer's disease	Smoke initiation	0,0613407	0,0507871	0,227124	24
Type 2 Diabetes	Alzheimer's disease	0,000600967	0,000547201	0,272092	62
Alzheimer's disease	**Type 2 Diabetes**	**-0,520566**	**0,171593**	**0,00241549**	**23**
Vitamin D	Alzheimer's disease	0,0744156	0,0107364	4,17E-12	24
Alzheimer's disease	Vitamin D	-0,0236395	0,0540746	0,661993	23

Table S3: Results of the causal relationship between Alzheimer's disease and relevant traits, respectively, using bidirectional GSMR with a GWAS significance threshold of P < 5 × 10-8, LD threshold of r2 < 0.01 and a HEIDI threshold below 0.01. Chromosome 19 have been removed. Significant results are shown in bold.