

Supplementary Information

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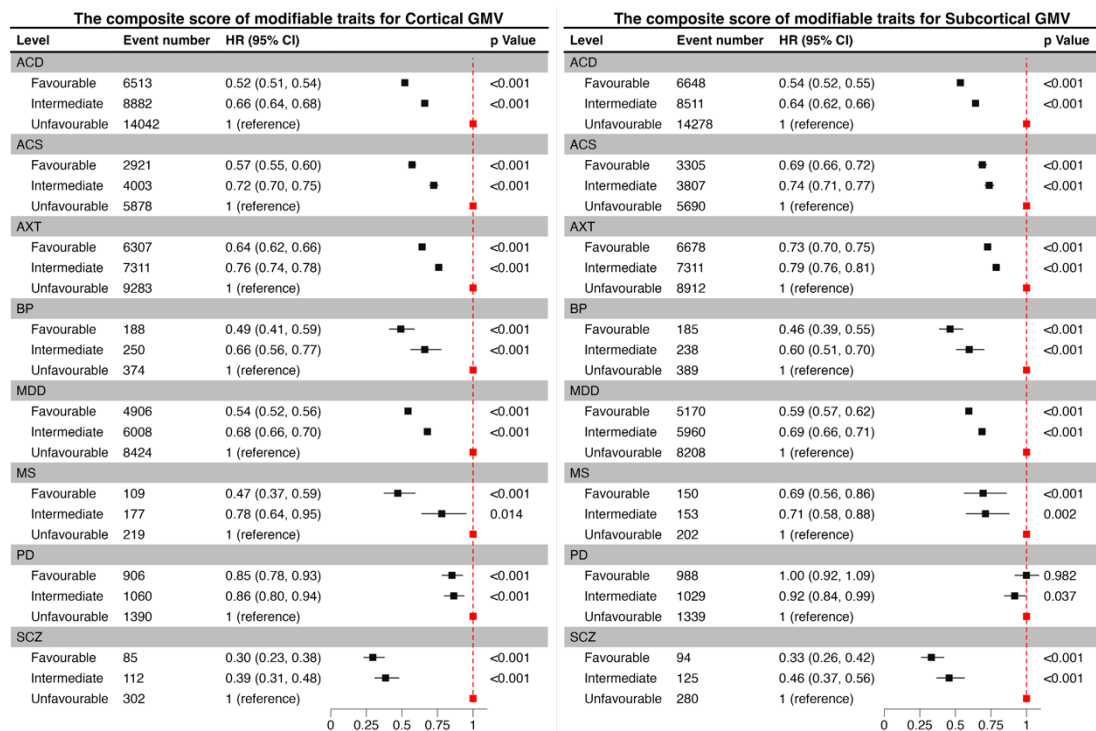
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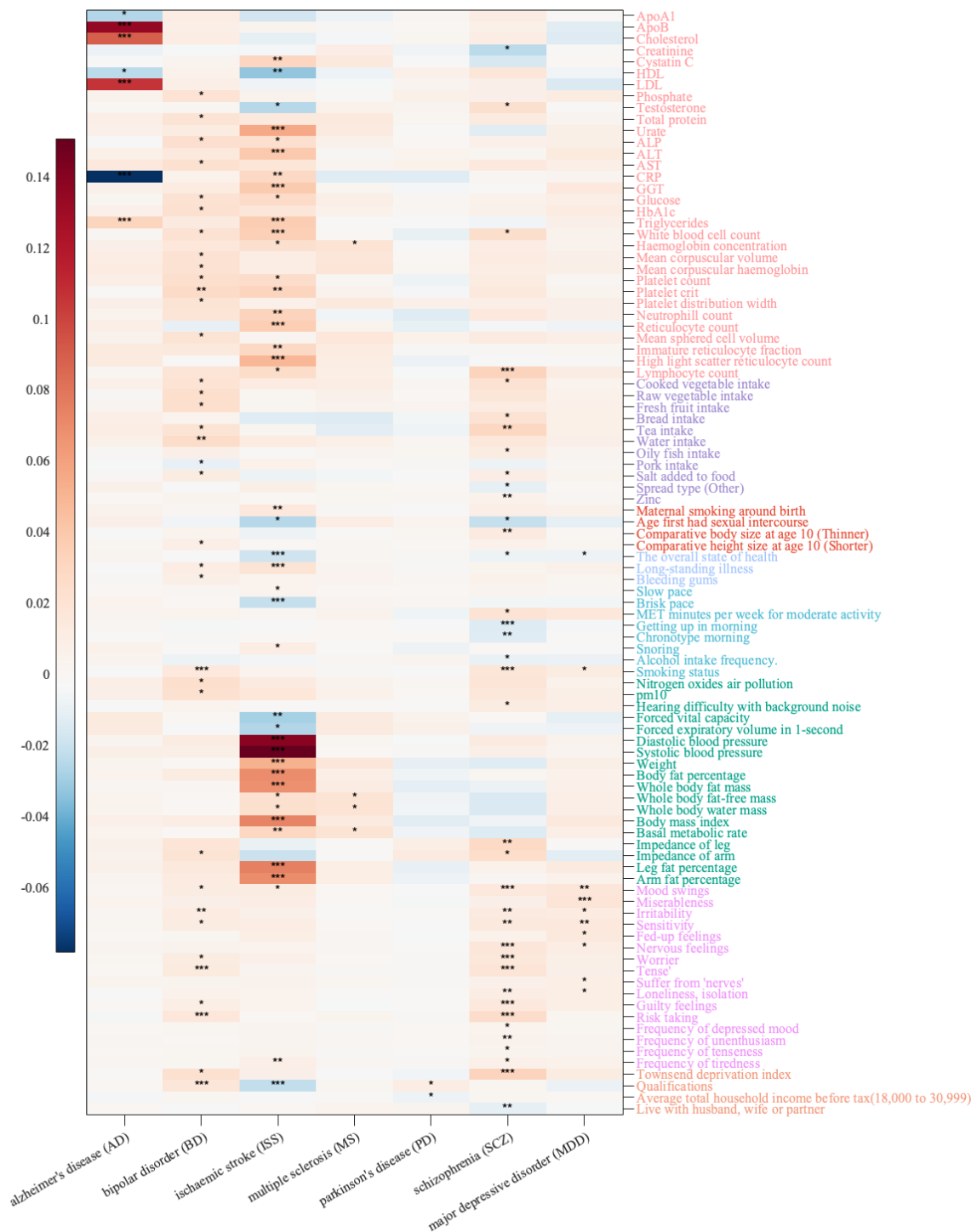
Supplementary Figure 1: Joint contributions of different categories of blood biomarkers to GMV Variance. **a**, Joint variance explained in regional GMV by all blood biomarkers. Full results are provided in Supplementary Table 4. **b**, Variance in total and regional GMV explained by different categories of blood biomarkers. R^2 values were calculated using PLS regression, adjusted for age at baseline, sex, ethnicity, assessment site, imaging center, TIV, and the time interval between baseline assessment and MRI scan. Detailed results are reported in Supplementary Table 4.



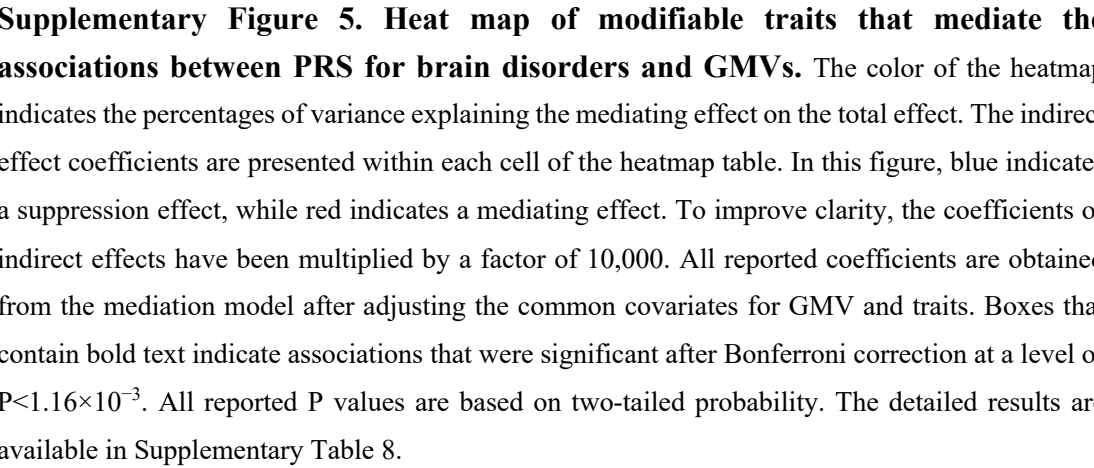
Supplementary Figure 2: Associations between the composite score of modifiable traits for both cortical and subcortical GMV and risk of brain disorders in non-MRI Group. The unfavorable profile was set as reference in each disorder. The associations were estimated by applying Cox proportional hazard regression models adjustment for age at baseline, sex, ethnicity. Dots represent hazard ratios; horizontal lines indicate corresponding 95% CIs. The detailed results are available in Supplementary Table 5.

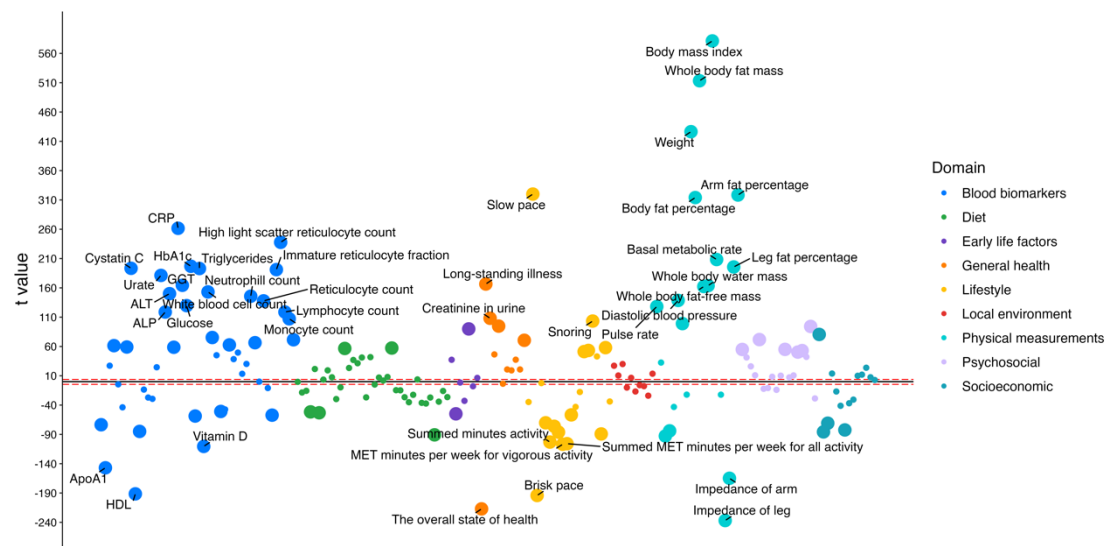


Supplementary figure 3: Heat map regarding the association between PRS for brain disorders and GMVs. Models were adjusted for age at baseline, sex, ethnicity, assessment site, imaging center, TIV, and the time interval between baseline assessment and imaging visit. The color of cells indicates the regression coefficient (β) between each PRS and regional GMV. P values were corrected using Bonferroni correction for multiple tests. * $P < 1.16 \times 10^{-3}$; ** $P < 2.70 \times 10^{-5}$; *** $P < 6.29 \times 10^{-7}$). The detailed results are available in Supplementary Table 6.

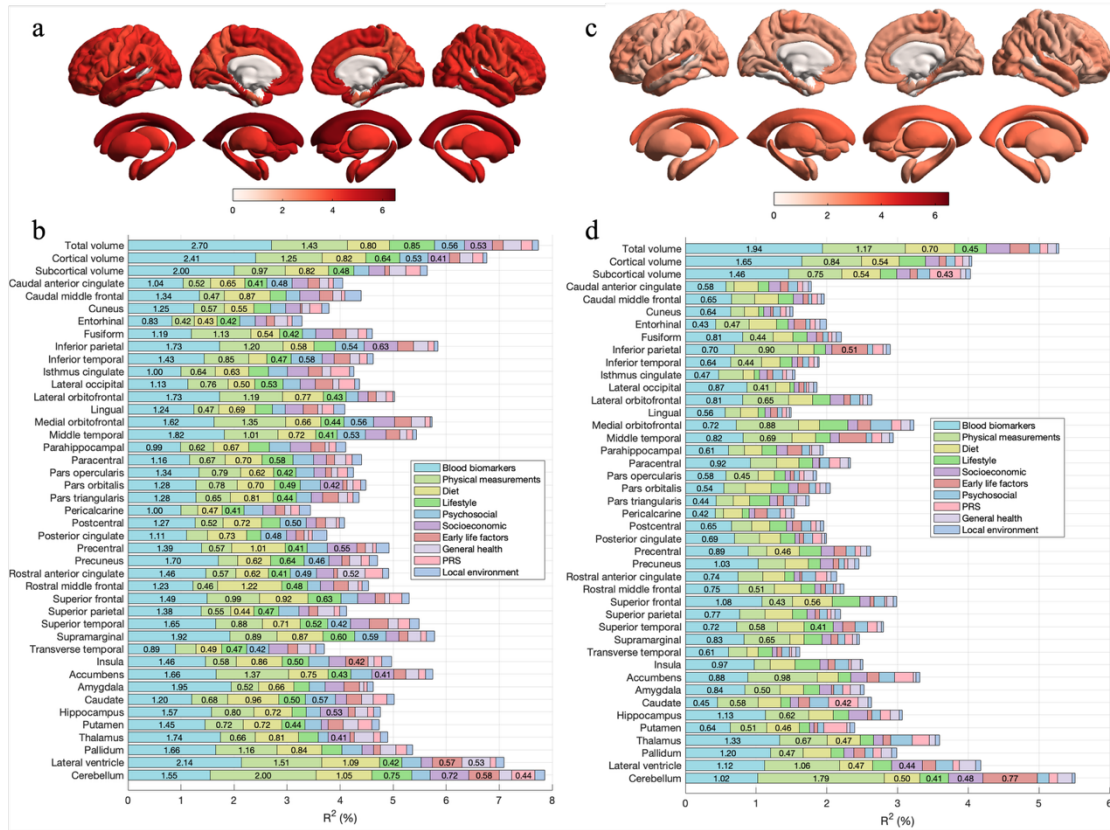


Supplementary Figure 4: Heat map regarding the association between PRS for brain disorders and modifiable traits. Models were adjusted for age at baseline, sex, ethnicity, assessment site, imaging center, TIV, and the time interval between baseline assessment and imaging visit. The color of cells indicates the regression coefficient (β) between each PRS and modifiable traits. Only modifiable traits that are at least significantly correlated with one PRS were shown. P values were corrected using Bonferroni correction for multiple tests. * $P < 2.75 \times 10^{-4}$; ** $P < 1.51 \times 10^{-6}$; *** $P < 8.29 \times 10^{-9}$). The detailed results are available in Supplementary Table 7.

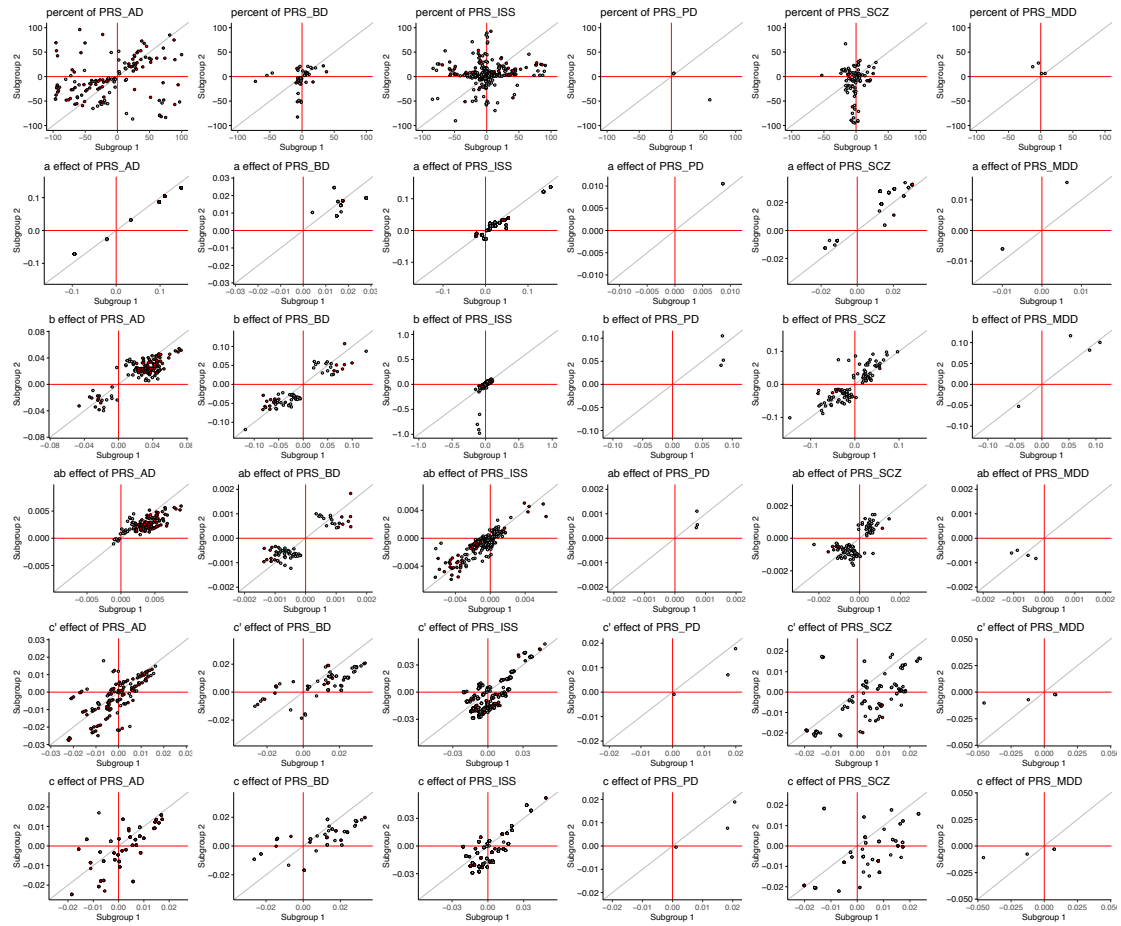




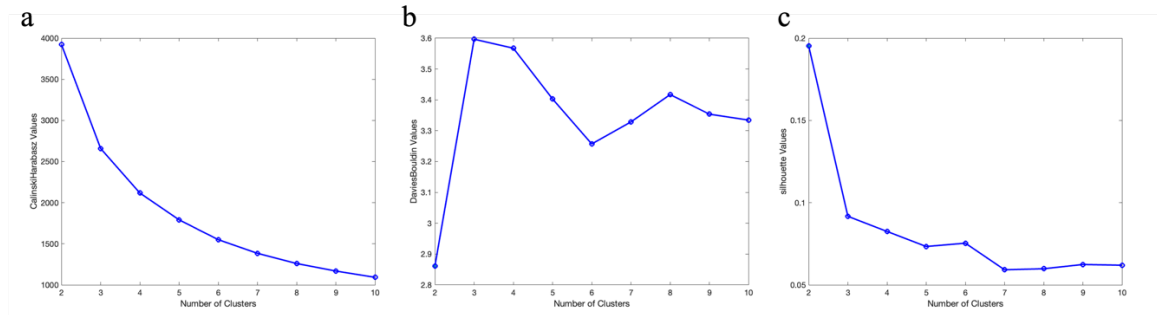
Supplementary Figure 6: The differences in modifiable traits between two subgroups in non-MRI Group. The x axis shows the category domains, and the y axis represents t value of two samples t-test. The dashed horizontal line marks the minimum absolute t value for traits that are statistically significant after multiple comparisons (Bonferroni correction, $P < 2.75 \times 10^{-4}$). A set of top significant traits were annotated. The detailed results are available in Supplementary Table 15.



Supplementary Figure 7: The joint contributions of different domain modifiable traits to the GMV variance. **a**, Joint explanation of variance with all 182 traits in regional GMV within Subgroup 1. The detailed results are available in Supplementary Table 11. **b**, Joint explanation of variance in total and regional GMV by different domain modifiable traits within Subgroup 1. R^2 were calculated using PLS after adjusting for age at baseline, sex, ethnicity, assessment site, imaging center, TIV, and the time interval between baseline assessment and imaging visit. The detailed results are available in Supplementary Table 11. **c**, Joint explanation of variance with all 182 traits in regional GMV within Subgroup 2. The detailed results are available in Supplementary Table 12. **d**, Joint explanation of variance in total and regional GMV by different domain modifiable traits within Subgroup 2. R^2 were calculated using PLS after adjusting for age at baseline, sex, ethnicity, assessment site, imaging center, TIV, and the time interval between baseline assessment and imaging visit. The detailed results are available in Supplementary Table 12.



Supplementary Figure 8: Correlation of mediation model coefficients in two subgroups from the MRI Group. This figure illustrates the correlation of mediation model coefficients between two subgroups within the MRI group. This analysis was only conducted on variables that were significant mediation in the MRI Group population. Each point represents the coefficient estimates from the mediation models, with the x-axis showing the coefficients for Subgroup 1 and the y-axis showing those for Subgroup 2. The color points indicate significant mediation in at least one subgroup. Detailed statistical analyses and subgroup characteristics are provided in Supplementary Table 13.



Supplementary Figure 9: Graphs depicting the Calinski–Harabasz, Davies-Bouldin, and silhouette criterion all show that the participants were more suitably partitioned into two subgroups.

Supplementary tables

Supplementary table 1: Baseline characteristics of participants.

Traits	MRI Group	non-MRI Group	Statistical value	P value
age	54.77(49.00,61.00)	56.67(50.00,63.00)	-42.66	0.00E+00
sex	16742(47.57%)	208249(45.43%)	53.39	2.74E-13
ethnic			494.92	6.02E-107
Asian	475(1.35%)	10826(2.36%)		
Black	217(0.62%)	7776(1.70%)		
Other	416(1.18%)	8903(1.94%)		
White	34087(96.85%)	430917(94.00%)		
Initial site			9497.93	0.00E+00
Barts	719(2.04%)	11612(2.53%)		
Birmingham	1629(4.63%)	23370(5.10%)		
Bristol	132(0.38%)	42822(9.34%)		
Bury	2972(8.44%)	24664(5.38%)		
Cardiff	36(0.10%)	17819(3.89%)		
Croydon	938(2.67%)	26136(5.70%)		
Edinburgh	1405(3.99%)	15489(3.38%)		
Glasgow	796(2.26%)	17705(3.86%)		
Hounslow	1508(4.28%)	26966(5.88%)		
Leeds	3718(10.56%)	39739(8.67%)		
Liverpool	3200(9.09%)	28749(6.27%)		
Manchester	2116(6.01%)	11340(2.47%)		
Middlesborough	2067(5.87%)	18769(4.09%)		
Newcastle	4314(12.26%)	31657(6.91%)		
Nottingham	2823(8.02%)	30465(6.65%)		
Oxford	759(2.16%)	13146(2.87%)		
Reading	1516(4.31%)	27584(6.02%)		
Sheffield	3010(8.55%)	26695(5.82%)		
Stockport	0(0.00%)	3218(0.70%)		
Stoke	1472(4.18%)	17643(3.85%)		
Swansea	4(0.01%)	2264(0.49%)		
Wrexham	61(0.17%)	570(0.12%)		
TIV	1549084.00(1440352.50,1651600.00)	1510600.00(1397180.00,1624020.00)	0.34	7.92E-01
First Imageinterval	8.95(7.67,10.29)	11.02(9.36,13.09)	-50.67	0.00E+00
Sencond Image interval	11.46(10.54,12.28)	11.32(10.22,12.34)	1.22	2.30E-01
Albumin	45.41(43.73,47.05)	45.19(43.47,46.91)	14.27	3.96E-46
ApoA1	1.55(1.36,1.71)	1.54(1.34,1.70)	9.91	3.88E-23
ApoB	1.03(0.87,1.17)	1.03(0.86,1.18)	0.38	7.01E-01

Urea	5.29(4.46,5.99)	5.41(4.49,6.15)	-16.47	8.61E-61
Calcium	2.38(2.31,2.43)	2.38(2.32,2.44)	-8.99	2.50E-19
Cholesterol	5.75(5.03,6.43)	5.69(4.90,6.42)	10.03	1.19E-23
Creatinine	72.15(61.90,80.90)	72.32(61.30,80.90)	-1.85	6.36E-02
Cystatin C	0.87(0.78,0.94)	0.91(0.81,0.98)	-53.01	0.00E+00
HDL	1.49(1.21,1.72)	1.45(1.17,1.67)	17.65	1.59E-69
IGF-1	22.14(18.30,25.38)	21.34(17.44,24.78)	24.36	2.32E-130
LDL	3.59(3.02,4.13)	3.55(2.94,4.12)	6.83	8.31E-12
Phosphate	1.16(1.05,1.26)	1.16(1.05,1.27)	-2.97	2.96E-03
Testosterone	6.43(0.98,11.75)	6.53(1.01,11.59)	-2.57	1.03E-02
Total protein	72.20(69.37,74.59)	72.53(69.75,75.08)	-14.22	8.68E-46
Urate	302.07(245.40,352.30)	309.82(250.90,361.60)	-16.69	2.03E-62
ALP	4.35(4.18,4.53)	4.40(4.23,4.58)	-31.85	1.46E-220
ALT	3.06(2.77,3.31)	3.10(2.80,3.35)	-12.62	1.88E-36
AST	3.24(3.08,3.38)	3.26(3.09,3.40)	-13.24	5.94E-40
CRP	0.86(0.43,1.13)	1.01(0.51,1.34)	-40.60	0.00E+00
GGT	3.32(2.91,3.63)	3.42(2.98,3.74)	-27.90	3.76E-170
Glucose	1.78(1.72,1.83)	1.80(1.72,1.84)	-26.20	1.52E-150
HbA1c	3.57(3.50,3.63)	3.60(3.52,3.66)	-43.12	0.00E+00
Total bilirubin	2.28(2.04,2.46)	2.24(2.00,2.43)	15.64	4.81E-55
Triglycerides	0.91(0.68,1.09)	0.96(0.72,1.15)	-24.72	3.90E-134
Vitamin D	3.83(3.55,4.16)	3.80(3.50,4.15)	10.89	1.34E-27
White blood cell count	6.55(5.40,7.44)	6.91(5.66,7.90)	-32.85	1.21E-234
Red blood cell count	4.51(4.23,4.78)	4.52(4.23,4.79)	-1.41	1.59E-01
Haemoglobin concentration	14.17(13.32,15.05)	14.17(13.32,15.03)	0.25	8.03E-01
Mean corpuscular volume	91.01(88.57,93.63)	91.13(88.52,93.90)	-4.01	6.05E-05
Mean corpuscular haemoglobin	31.45(30.54,32.46)	31.45(30.49,32.50)	0.16	8.77E-01
Red blood cell distribution width	13.40(12.85,13.75)	13.50(12.90,13.88)	-19.66	9.66E-86
Platelet count	250.26(212.10,283.40)	253.24(213.30,287.30)	-8.85	8.69E-19
Platelet crit	0.23(0.20,0.26)	0.23(0.20,0.26)	-10.00	1.65E-23
Mean platelet volume	9.34(8.60,9.99)	9.33(8.59,9.95)	0.85	3.94E-01
Platelet distribution width	16.48(16.10,16.79)	16.49(16.11,16.80)	-2.11	3.48E-02
Neutrophill count	3.98(3.10,4.66)	4.25(3.29,5.00)	-33.95	3.41E-250
Basophill count	0.03(0.00,0.04)	0.03(0.00,0.04)	-8.45	2.87E-17
Nucleated red blood cell count	0.00(0.00,0.00)	0.00(0.00,0.00)	-3.26	1.10E-03
Reticulocyte count	0.06(0.04,0.07)	0.06(0.04,0.07)	-17.64	1.88E-69

Mean reticulocyte volume	105.51(101.20,110.07)	105.95(101.47,110.61)	-10.24	1.44E-24
Mean sphered cell volume	82.63(79.30,85.80)	82.89(79.37,86.14)	-8.83	1.11E-18
Immature reticulocyte fraction	0.28(0.24,0.32)	0.29(0.25,0.33)	-22.18	1.45E-108
High light scatter reticulocyte count	0.02(0.01,0.02)	0.02(0.01,0.02)	-28.72	4.42E-180
Lymphocyte count	1.04(0.92,1.16)	1.06(0.92,1.19)	-14.70	8.50E-49
Monocyte count	0.37(0.30,0.43)	0.38(0.31,0.45)	-19.27	1.79E-82
Eosinophill count	0.15(0.10,0.18)	0.16(0.10,0.19)	-8.98	2.72E-19
Cooked vegetable intake	2.64(2.00,3.00)	2.74(2.00,3.00)	-9.90	4.23E-23
Raw vegetable intake	2.15(1.00,3.00)	2.19(1.00,3.00)	-3.66	2.49E-04
Fresh fruit intake	2.24(1.00,3.00)	2.23(1.00,3.00)	0.52	6.03E-01
Dried fruit intake	0.90(0.00,1.00)	0.85(0.00,1.00)	4.73	2.23E-06
Bread intake	12.22(6.00,15.00)	12.28(6.00,15.00)	-1.45	1.48E-01
Cereal intake	4.76(3.00,7.00)	4.47(2.00,7.00)	17.88	2.72E-71
Tea intake	3.36(1.00,5.00)	3.43(1.00,5.00)	-5.15	2.68E-07
Coffee intake	2.03(0.50,3.00)	2.01(0.50,3.00)	2.33	1.98E-02
Water intake	2.59(1.00,4.00)	2.75(1.00,4.00)	-12.59	2.82E-36
Oily fish intake	19626(55.76%)	254588(55.54%)	-0.07	9.46E-01
Non-oily fish intake	22988(65.32%)	302285(65.94%)	-3.83	1.27E-04
Processed meat intake	20672(58.74%)	275869(60.18%)	-5.82	6.01E-09
Poultry intake	29371(83.45%)	384738(83.93%)	-3.53	4.13E-04
Beef intake	14990(42.59%)	198030(43.20%)	-3.43	6.13E-04
Lamb intake	8323(23.65%)	117369(25.60%)	-8.94	4.11E-19
Pork intake	8314(23.62%)	118742(25.90%)	-10.23	1.52E-24
Cheese intake	29454(83.69%)	354512(77.33%)	18.87	3.70E-79
Salt added to food	13861(39.38%)	206236(44.99%)	-19.84	3.08E-87
Milk intake	34171(97.09%)	442366(96.50%)	4.56	5.06E-06
Spread type (Butter)	13245(37.63%)	165013(36.00%)	4.72	2.32E-06
Spread type (Benecol)	178(0.51%)	2501(0.55%)	-0.44	6.57E-01
Spread type (Other)	17706(50.31%)	237611(51.83%)	-7.08	1.47E-12
Variation in diet	22618(64.26%)	297378(64.87%)	-5.09	3.59E-07
Vitamin A	627(1.78%)	9206(2.01%)	-3.13	1.77E-03
Vitamin B	1304(3.71%)	19753(4.31%)	-5.16	2.45E-07
Vitamin C	2933(8.33%)	39946(8.71%)	-2.55	1.08E-02
Vitamin D (Diet)	1245(3.54%)	18436(4.02%)	-4.51	6.45E-06
Vitamin E	1012(2.88%)	13804(3.01%)	-1.21	2.28E-01
Folic acid	595(1.69%)	10538(2.30%)	-7.31	2.79E-13
Multivitamins	7884(22.40%)	99107(21.62%)	2.75	6.00E-03
Fish oil	11026(31.33%)	142337(31.05%)	0.43	6.68E-01

Glucosamine	7264(20.64%)	85683(18.69%)	8.32	9.15E-17
Calcium (Diet)	2240(6.36%)	32113(7.01%)	-4.79	1.69E-06
Zinc	1515(4.30%)	18630(4.06%)	2.25	2.44E-02
Iron	1107(3.15%)	15264(3.33%)	-2.22	2.68E-02
Selenium	924(2.63%)	10656(2.32%)	3.01	2.63E-03
Maternal smoking around birth	11642(33.08%)	115176(25.12%)	14.26	4.74E-46
Age first had sexual intercourse	19.34(17.00,21.00)	19.10(17.00,21.00)	10.58	3.76E-26
Ever had same-sex intercourse	1675(4.76%)	14202(3.10%)	10.43	1.91E-25
Comparative body size at age 10 (Thinner)	11820(33.58%)	149536(32.62%)	1.46	1.46E-01
Comparative body size at age 10 (Plumper)	5218(14.83%)	71625(15.62%)	-5.24	1.58E-07
Comparative height size at age 10 (Shorter)	7233(20.55%)	91777(20.02%)	0.25	8.04E-01
Comparative height size at age 10 (Taller)	9286(26.38%)	112985(24.65%)	4.64	3.53E-06
The overall state of health	30404(86.39%)	334475(72.96%)	60.42	0.00E+00
Long-standing illness	7337(20.85%)	149886(32.70%)	-51.43	0.00E+00
Creatinine in urine	8.85(8.35,9.37)	8.88(8.39,9.40)	-7.42	1.22E-13
Potassium in urine	4.01(3.63,4.43)	4.01(3.64,4.43)	-2.12	3.41E-02
Sodium in urine	4.14(3.72,4.60)	4.20(3.79,4.66)	-15.17	6.78E-52
Mouth ulcers	3568(10.14%)	45809(9.99%)	0.41	6.82E-01
Painful gums	836(2.38%)	14156(3.09%)	-8.81	1.27E-18
Bleeding gums	4848(13.77%)	60464(13.19%)	2.00	4.58E-02
Loose teeth	1070(3.04%)	20330(4.43%)	-13.33	1.85E-40
Toothache	1378(3.92%)	20481(4.47%)	-4.27	1.97E-05
Dentures	3273(9.30%)	79022(17.24%)	-43.68	0.00E+00
Duration of walks	3.60(3.04,4.11)	3.71(3.04,4.11)	-20.40	3.65E-92
Slow pace	778(2.21%)	39645(8.65%)	-60.65	0.00E+00
Brisk pace	18039(51.25%)	172588(37.65%)	46.10	0.00E+00
IPAQ activity group (moderate)	15665(44.51%)	148578(32.41%)	13.09	4.50E-39
IPAQ activity group (high)	13927(39.57%)	147545(32.19%)	-2.76	5.83E-03
Summed minutes activity	4.51(4.11,5.08)	4.47(4.03,5.20)	7.06	1.66E-12
MET minutes per week for walking	6.22(5.58,7.23)	6.24(5.70,7.23)	-1.12	2.64E-01

MET minutes per week for moderate activity	5.41(4.80,6.90)	5.35(4.80,7.09)	4.29	1.76E-05
MET minutes per week for vigorous activity	4.37(0.00,6.87)	3.80(0.00,6.87)	29.44	4.03E-189
Summed MET minutes per week for all activity	7.25(6.71,8.08)	7.25(6.68,8.18)	0.78	4.34E-01
Sleep duration	27572(78.34%)	332372(72.50%)	514.48	6.73E-114
Getting up in morning	29132(82.77%)	372036(81.16%)	3.77	1.64E-04
Chronotype morning	21919(62.28%)	254253(55.46%)	-1.10	2.71E-01
Nap during day	1273(3.62%)	25197(5.50%)	-16.84	1.60E-63
Sleeplessness	8300(23.58%)	130719(28.51%)	-19.38	2.31E-83
Snoring	12281(34.89%)	158670(34.61%)	-8.38	5.33E-17
Daytime dozing	687(1.95%)	13185(2.88%)	-11.08	1.75E-28
Alcohol intake frequency.	27134(77.10%)	313546(68.40%)	34.01	5.17E-251
Smoking status	13543(38.48%)	209154(45.62%)	-24.93	2.04E-136
Alcohol drinker status	34353(97.61%)	436381(95.19%)	23.08	1.88E-117
Nitrogen oxides air pollution	3.43(3.24,3.62)	3.46(3.28,3.64)	-18.29	1.57E-74
pm10	18.86(17.67,19.91)	19.35(18.11,20.45)	-43.59	0.00E+00
pm2.5	5.81(5.44,6.09)	5.87(5.49,6.16)	-18.53	2.05E-76
Inverse distance to the nearest major road	5.85(5.12,6.62)	5.85(5.13,6.62)	-0.33	7.38E-01
Noise pollution	52.80(50.23,53.75)	52.85(50.28,53.77)	-2.10	3.54E-02
Greenspace percentage	42.22(24.32,56.49)	39.91(23.01,52.79)	17.18	5.38E-66
Domestic garden percentage	27.39(18.66,36.39)	27.77(19.44,36.46)	-4.62	3.90E-06
Water percentage	1.11(0.16,1.11)	1.07(0.13,1.00)	2.26	2.37E-02
Natural environment percentage	36.21(16.24,51.68)	33.08(14.13,47.39)	21.27	5.40E-100
Traffic intensity on the nearest major road	9.78(9.41,10.07)	9.84(9.45,10.14)	-19.55	8.14E-85
Pulse rate	67.64(60.50,74.00)	69.50(62.00,76.00)	-29.19	6.13E-186
Hearing difficulty with background noise	12365(35.13%)	168834(36.83%)	-8.15	3.61E-16
Forced vital capacity	3.85(3.14,4.49)	3.57(2.86,4.20)	48.25	0.00E+00
Forced expiratory volume in 1-second	2.94(2.40,3.43)	2.70(2.16,3.20)	53.52	0.00E+00
Peak expiratory flow	401.89(315.00,483.92)	365.00(277.67,445.67)	49.29	0.00E+00
Diastolic blood pressure	81.29(74.50,87.50)	82.30(75.50,89.00)	-16.82	2.37E-63
Systolic blood pressure	134.74(122.50,145.50)	138.09(124.50,149.50)	-31.64	9.96E-218
Hand grip strength	31.73(23.00,40.00)	29.37(21.00,38.00)	36.14	1.33E-282
Weight	76.26(65.40,85.30)	78.17(66.50,87.70)	-21.58	7.22E-103

Body fat percentage	29.79(23.80,35.70)	31.59(25.30,37.90)	-37.09	2.27E-297
Whole body fat mass	22.87(17.10,27.20)	25.01(18.40,29.90)	-41.85	0.00E+00
Whole body fat-free mass	53.40(43.60,62.60)	53.20(43.50,62.30)	3.28	1.05E-03
Whole body water mass	39.07(31.90,45.80)	38.93(31.80,45.60)	2.91	3.58E-03
Body mass index	26.39(23.50,28.60)	27.51(24.20,30.00)	-44.35	0.00E+00
Basal metabolic rate	6610.20(5481.00,7598.00)	6615.97(5489.00,7598.00)	-0.57	5.68E-01
Impedance of whole body	32.85(24.50,41.00)	30.44(22.00,38.00)	37.72	3.00E-307
Impedance of leg	249.06(226.50,270.50)	247.26(223.00,270.50)	8.89	6.09E-19
Impedance of arm	331.35(287.00,371.50)	328.74(284.50,369.00)	7.82	5.26E-15
Leg fat percentage	30.25(20.85,39.15)	32.14(22.40,41.25)	-30.86	2.51E-207
Arm fat percentage	28.13(20.70,34.60)	30.13(21.90,37.45)	-35.28	1.08E-269
Mood swings	14067(39.97%)	205158(44.75%)	-21.04	6.50E-98
Miserableness	13922(39.56%)	193402(42.19%)	-11.77	6.15E-32
Irritability	9835(27.94%)	122150(26.65%)	-0.37	7.11E-01
Sensitivity	18261(51.89%)	247619(54.02%)	-12.67	9.38E-37
Fed-up feelings	12119(34.43%)	184055(40.15%)	-23.78	2.35E-124
Nervous feelings	6999(19.89%)	106752(23.29%)	-16.85	1.58E-63
Worrier	18291(51.97%)	253355(55.27%)	-16.47	9.15E-61
Tense'	5089(14.46%)	79470(17.34%)	-16.81	3.11E-63
Worry too long after embarrassment	17061(48.48%)	208857(45.56%)	3.07	2.13E-03
Suffer from 'nerves'	6323(17.97%)	94324(20.58%)	-15.72	1.40E-55
Loneliness, isolation	4946(14.05%)	85168(18.58%)	-22.76	3.36E-114
Guilty feelings	9661(27.45%)	128776(28.09%)	-5.87	4.50E-09
Risk taking	9675(27.49%)	117917(25.72%)	2.83	4.71E-03
Frequency of depressed mood	1052(2.99%)	22993(5.02%)	-20.72	4.14E-95
Frequency of unenthusiasm	1042(2.96%)	23268(5.08%)	-21.56	9.79E-103
Frequency of tenseness	987(2.80%)	21484(4.69%)	-19.86	1.53E-87
Frequency of tiredness	2921(8.30%)	58250(12.71%)	-28.38	5.12E-176
Able to confide	27176(77.22%)	326257(71.17%)	13.60	4.49E-42
Townsend deprivation index	-1.91(-3.88,-0.50)	-1.24(-3.62,0.63)	-40.72	0.00E+00
Qualifications	22287(63.32%)	206933(45.14%)	3748.43	0.00E+00
Current employment status	33598(95.46%)	419372(91.48%)	651.32	1.15E-143
Average total household income before tax(18,000 to 30,999)	7475(21.24%)	99589(21.72%)	-18.39	2.65E-75

Average total household income before tax(31,000 to 51,999)	11478(32.61%)	98997(21.60%)	25.13	1.70E-138
Average total household income before tax(52,000 to 100,000)	10460(29.72%)	75230(16.41%)	38.56	1.66E-320
Average total household income before tax(Greater than 100,000)	2617(7.44%)	19898(4.34%)	14.96	1.65E-50
Live with husband, wife or partner	27323(77.63%)	329749(71.93%)	21.58	6.89E-103
Live with son and/or daughter	14487(41.16%)	157273(34.31%)	23.48	2.61E-121
Live with brother and/or sister	124(0.35%)	3049(0.67%)	-9.07	1.28E-19
Live with mother and/or father	614(1.74%)	8964(1.96%)	-3.05	2.26E-03
Live with grandchild	184(0.52%)	4324(0.94%)	-9.90	4.37E-23
Live with other related	215(0.61%)	3290(0.72%)	-2.59	9.55E-03
Live with other unrelated	626(1.78%)	8639(1.88%)	-1.59	1.12E-01

Supplementary table 2: Joint explanation of variance in total and regional GMV by different domain modifiable traits.

Region name	Full model	Blood biomarkers	Diet	Early life factors	General health	Lifestyle	Local environment	PRS	Physical measurements	Psychosocial	Socioeconomic
Total volume	4.60%	2.21%	0.70%	0.27%	0.28%	0.61%	0.05%	0.14%	1.42%	0.18%	0.39%
Cortical volume	3.68%	1.79%	0.53%	0.13%	0.18%	0.41%	0.04%	0.14%	1.04%	0.14%	0.22%
Caudal anterior cingulate	1.50%	0.45%	0.30%	0.09%	0.07%	0.12%	0.02%	0.06%	0.18%	0.14%	0.13%
Caudal middle frontal	1.68%	0.62%	0.33%	0.07%	0.05%	0.16%	0.06%	0.08%	0.34%	0.07%	0.08%
Cuneus	1.22%	0.52%	0.16%	0.02%	0.05%	0.05%	0.01%	0.07%	0.20%	0.07%	0.07%
Entorhinal	1.40%	0.36%	0.21%	0.16%	0.05%	0.15%	0.06%	0.05%	0.37%	0.05%	0.09%
Fusiform	1.80%	0.69%	0.22%	0.13%	0.04%	0.21%	0.05%	0.05%	0.52%	0.06%	0.10%
Inferior parietal	2.62%	0.93%	0.22%	0.48%	0.11%	0.24%	0.05%	0.13%	1.11%	0.10%	0.13%
Inferior temporal	1.94%	0.85%	0.21%	0.14%	0.09%	0.23%	0.01%	0.10%	0.70%	0.12%	0.11%
Isthmus cingulate	1.34%	0.42%	0.17%	0.09%	0.05%	0.05%	0.03%	0.05%	0.29%	0.13%	0.10%
Lateral occipital	1.53%	0.73%	0.14%	0.11%	0.04%	0.07%	0.04%	0.06%	0.33%	0.04%	0.08%
Lateral orbitofrontal	2.30%	0.84%	0.34%	0.09%	0.15%	0.32%	0.03%	0.06%	0.88%	0.12%	0.15%
Lingual	1.38%	0.56%	0.22%	0.12%	0.03%	0.09%	0.02%	0.08%	0.20%	0.06%	0.07%
Medial orbitofrontal	2.73%	0.97%	0.32%	0.24%	0.30%	0.52%	0.04%	0.13%	1.23%	0.28%	0.18%
Middle temporal	2.78%	1.23%	0.31%	0.37%	0.17%	0.28%	0.04%	0.14%	0.99%	0.14%	0.17%
Parahippocampal	1.44%	0.48%	0.23%	0.19%	0.12%	0.20%	0.03%	0.02%	0.27%	0.10%	0.15%
Paracentral	1.93%	0.84%	0.28%	0.02%	0.11%	0.20%	0.02%	0.14%	0.45%	0.10%	0.08%
Pars opercularis	1.53%	0.54%	0.18%	0.03%	0.10%	0.12%	0.04%	0.07%	0.43%	0.06%	0.06%
Pars orbitalis	1.63%	0.56%	0.33%	0.15%	0.10%	0.24%	0.05%	0.05%	0.36%	0.06%	0.16%
Pars triangularis	1.35%	0.38%	0.19%	0.06%	0.11%	0.24%	0.03%	0.03%	0.22%	0.12%	0.11%
Pericalcarine	1.19%	0.36%	0.20%	0.17%	0.06%	0.07%	0.02%	0.07%	0.08%	0.11%	0.07%
Postcentral	1.69%	0.65%	0.24%	0.15%	0.08%	0.15%	0.04%	0.07%	0.31%	0.14%	0.06%
Posterior cingulate	1.68%	0.58%	0.25%	0.05%	0.06%	0.14%	0.04%	0.09%	0.41%	0.15%	0.06%
Precentral	2.23%	0.92%	0.45%	0.18%	0.11%	0.30%	0.05%	0.09%	0.41%	0.12%	0.22%
Precuneus	2.09%	1.02%	0.25%	0.07%	0.10%	0.18%	0.04%	0.05%	0.31%	0.09%	0.16%
Rostral anterior cingulate	1.77%	0.63%	0.26%	0.02%	0.08%	0.11%	0.07%	0.18%	0.33%	0.17%	0.07%
Rostral middle frontal	1.96%	0.64%	0.42%	0.08%	0.09%	0.21%	0.03%	0.04%	0.47%	0.08%	0.09%
Superior frontal	2.45%	0.97%	0.50%	0.07%	0.09%	0.32%	0.05%	0.06%	0.45%	0.14%	0.12%
Superior parietal	1.85%	0.77%	0.24%	0.06%	0.09%	0.21%	0.06%	0.05%	0.35%	0.10%	0.10%
Superior temporal	2.48%	0.85%	0.35%	0.24%	0.14%	0.41%	0.04%	0.15%	0.68%	0.13%	0.17%
Supramarginal	2.25%	0.87%	0.24%	0.12%	0.11%	0.32%	0.03%	0.10%	0.75%	0.12%	0.12%
Transverse temporal	1.19%	0.43%	0.12%	0.06%	0.07%	0.17%	0.04%	0.04%	0.18%	0.08%	0.06%
Insula	2.23%	0.95%	0.37%	0.14%	0.12%	0.29%	0.02%	0.05%	0.24%	0.15%	0.12%
Subcortical volume	3.39%	1.37%	0.49%	0.07%	0.08%	0.23%	0.05%	0.35%	0.68%	0.11%	0.18%
Accumbens	2.80%	0.85%	0.28%	0.16%	0.04%	0.18%	0.06%	0.20%	0.98%	0.18%	0.22%

Amygdala	2.00%	0.89%	0.30%	0.03%	0.11%	0.18%	0.05%	0.07%	0.39%	0.06%	0.16%
Caudate	2.25%	0.43%	0.32%	0.14%	0.11%	0.10%	0.05%	0.36%	0.50%	0.25%	0.09%
Hippocampus	2.46%	1.06%	0.31%	0.03%	0.10%	0.17%	0.04%	0.10%	0.53%	0.10%	0.27%
Putamen	2.10%	0.56%	0.35%	0.08%	0.05%	0.14%	0.05%	0.28%	0.45%	0.06%	0.04%
Thalamus	2.78%	1.29%	0.43%	0.08%	0.10%	0.20%	0.05%	0.20%	0.58%	0.21%	0.13%
Pallidum	2.61%	1.24%	0.35%	0.17%	0.19%	0.23%	0.05%	0.12%	0.78%	0.11%	0.14%
Lateral ventricle	3.35%	1.24%	0.48%	0.23%	0.23%	0.25%	0.08%	0.05%	1.14%	0.20%	0.33%
Cerebellum	4.00%	1.14%	0.56%	0.73%	0.25%	0.50%	0.04%	0.15%	1.90%	0.17%	0.50%

Supplementary table 3: Joint explanation of variance in total and regional GMV by different blood biomarkers categories.

Region name	Full Blood biomarkers	Blood platelets	Bone Marrow Hematopoietic Function	Immune function	Liver function	Metabolic Indicators	Others	Red blood cell	Renal function	Sex hormone
Total volume	2.20%	0.11%	0.29%	0.69%	0.48%	0.62%	0.11%	0.21%	0.26%	0.00%
Cortical volume	1.83%	0.12%	0.22%	0.57%	0.35%	0.51%	0.11%	0.17%	0.12%	0.00%
Caudal anterior cingulate	0.40%	0.03%	0.03%	0.09%	0.03%	0.07%	0.08%	0.03%	0.05%	0.01%
Caudal middle frontal	0.64%	0.08%	0.07%	0.11%	0.14%	0.13%	0.04%	0.06%	0.03%	0.01%
Cuneus	0.42%	0.03%	0.02%	0.03%	0.11%	0.15%	0.01%	0.06%	0.00%	0.02%
Entorhinal	0.31%	0.03%	0.01%	0.05%	0.05%	0.06%	0.03%	0.02%	0.08%	0.00%
Fusiform	0.67%	0.04%	0.05%	0.20%	0.13%	0.14%	0.07%	0.08%	0.09%	0.01%
Inferior parietal	0.88%	0.05%	0.20%	0.32%	0.14%	0.19%	0.09%	0.08%	0.09%	0.03%
Inferior temporal	0.84%	0.07%	0.17%	0.28%	0.14%	0.22%	0.07%	0.07%	0.10%	0.02%
Isthmus cingulate	0.45%	0.03%	0.03%	0.08%	0.07%	0.08%	0.05%	0.05%	0.03%	0.03%
Lateral occipital	0.60%	0.05%	0.04%	0.11%	0.09%	0.21%	0.03%	0.11%	0.01%	0.01%
Lateral orbitofrontal	0.90%	0.08%	0.18%	0.32%	0.18%	0.16%	0.08%	0.04%	0.06%	0.00%
Lingual	0.45%	0.07%	0.02%	0.09%	0.08%	0.11%	0.01%	0.02%	0.01%	0.02%
Medial orbitofrontal	1.03%	0.10%	0.23%	0.56%	0.24%	0.25%	0.05%	0.06%	0.13%	0.01%
Middle temporal	1.16%	0.06%	0.28%	0.43%	0.24%	0.34%	0.09%	0.10%	0.19%	0.04%
Parahippocampal	0.54%	0.03%	0.02%	0.13%	0.11%	0.16%	0.04%	0.04%	0.09%	0.00%
Paracentral	0.81%	0.00%	0.11%	0.20%	0.18%	0.17%	0.11%	0.07%	0.13%	0.00%
Pars opercularis	0.47%	0.07%	0.06%	0.12%	0.10%	0.10%	0.01%	0.04%	0.03%	0.00%
Pars orbitalis	0.52%	0.02%	0.07%	0.20%	0.09%	0.13%	0.05%	0.02%	0.07%	0.01%
Pars triangularis	0.30%	0.05%	0.04%	0.09%	0.04%	0.07%	0.01%	0.01%	0.03%	0.00%
Pericalcarine	0.29%	0.02%	0.02%	0.05%	0.03%	0.11%	0.03%	0.00%	0.00%	0.01%
Postcentral	0.65%	0.05%	0.04%	0.16%	0.12%	0.17%	0.10%	0.05%	0.05%	0.01%
Posterior cingulate	0.62%	0.02%	0.11%	0.18%	0.12%	0.14%	0.05%	0.07%	0.06%	0.00%
Precentral	0.93%	0.04%	0.13%	0.28%	0.21%	0.25%	0.05%	0.07%	0.13%	0.00%
Precuneus	0.98%	0.02%	0.08%	0.18%	0.28%	0.26%	0.06%	0.11%	0.06%	0.01%
Rostral anterior cingulate	0.59%	0.05%	0.05%	0.18%	0.08%	0.10%	0.15%	0.03%	0.01%	0.00%
Rostral middle frontal	0.68%	0.07%	0.01%	0.15%	0.17%	0.13%	0.01%	0.04%	0.05%	0.03%
Superior frontal	0.98%	0.03%	0.11%	0.19%	0.22%	0.29%	0.06%	0.14%	0.09%	0.00%
Superior parietal	0.75%	0.01%	0.05%	0.12%	0.12%	0.33%	0.02%	0.08%	0.08%	0.00%
Superior temporal	0.86%	0.04%	0.17%	0.33%	0.14%	0.23%	0.03%	0.12%	0.07%	0.00%
Supramarginal	0.91%	0.06%	0.14%	0.26%	0.14%	0.30%	0.08%	0.08%	0.14%	0.00%
Transverse temporal	0.46%	0.01%	0.01%	0.10%	0.11%	0.11%	0.04%	0.06%	0.06%	0.01%
Insula	1.05%	0.07%	0.18%	0.19%	0.16%	0.14%	0.22%	0.05%	0.13%	0.01%
Subcortical volume	1.26%	0.02%	0.09%	0.16%	0.35%	0.25%	0.16%	0.22%	0.19%	0.01%
Accumbens	0.72%	0.01%	0.11%	0.17%	0.10%	0.22%	0.02%	0.08%	0.12%	0.00%
Amygdala	0.91%	0.02%	0.13%	0.14%	0.28%	0.32%	0.05%	0.28%	0.04%	0.04%

Caudate	0.34%	0.05%	0.02%	0.03%	0.09%	0.02%	0.03%	0.04%	0.06%	0.00%
Hippocampus	1.00%	0.03%	0.08%	0.22%	0.23%	0.25%	0.09%	0.22%	0.05%	0.08%
Putamen	0.53%	0.03%	0.03%	0.07%	0.14%	0.10%	0.06%	0.06%	0.04%	0.00%
Thalamus	1.17%	0.02%	0.11%	0.17%	0.29%	0.21%	0.27%	0.20%	0.21%	0.02%
Pallidum	1.13%	0.02%	0.18%	0.32%	0.21%	0.20%	0.20%	0.07%	0.34%	0.00%
Lateral ventricle	1.10%	0.09%	0.19%	0.26%	0.24%	0.43%	0.05%	0.17%	0.15%	0.00%
Cerebellum	1.05%	0.03%	0.11%	0.31%	0.33%	0.31%	0.11%	0.06%	0.30%	0.01%

Supplementary table 4: Associations between the composite score of modifiable traits for GMV and 8 brain disorders in non-MRI Group.

Region name	Disease name	Level	HR	Lower	Upper	pvalue	Event number
Total volume	ACD	Favorable	0.48	0.47	0.50	0.00E+00	6248
Total volume	ACD	Intermediate	0.63	0.61	0.64	8.70E-258	8681
Total volume	ACD	Unfavorable	1.00	1.00	1.00	0.00E+00	14508
Total volume	ACS	Favorable	0.55	0.53	0.58	4.30E-149	2862
Total volume	ACS	Intermediate	0.69	0.66	0.72	3.58E-71	3905
Total volume	ACS	Unfavorable	1.00	1.00	1.00	0.00E+00	6035
Total volume	AXT	Favorable	0.61	0.59	0.63	1.50E-204	6130
Total volume	AXT	Intermediate	0.73	0.71	0.75	2.13E-92	7230
Total volume	AXT	Unfavorable	1.00	1.00	1.00	0.00E+00	9541
Total volume	BP	Favorable	0.44	0.36	0.52	1.27E-19	173
Total volume	BP	Intermediate	0.64	0.55	0.75	3.56E-08	252
Total volume	BP	Unfavorable	1.00	1.00	1.00	0.00E+00	387
Total volume	MDD	Favorable	0.50	0.48	0.51	0.00E+00	4703
Total volume	MDD	Intermediate	0.64	0.62	0.66	7.50E-155	5913
Total volume	MDD	Unfavorable	1.00	1.00	1.00	0.00E+00	8722
Total volume	MS	Favorable	0.51	0.41	0.64	2.86E-09	121
Total volume	MS	Intermediate	0.70	0.57	0.86	6.32E-04	163
Total volume	MS	Unfavorable	1.00	1.00	1.00	0.00E+00	221
Total volume	PD	Favorable	0.87	0.80	0.95	2.12E-03	902
Total volume	PD	Intermediate	0.91	0.84	0.99	2.21E-02	1086
Total volume	PD	Unfavorable	1.00	1.00	1.00	0.00E+00	1368
Total volume	SCZ	Favorable	0.24	0.18	0.31	1.21E-26	69
Total volume	SCZ	Intermediate	0.43	0.35	0.53	2.69E-15	126
Total volume	SCZ	Unfavorable	1.00	1.00	1.00	0.00E+00	304
Cortical volume	ACD	Favorable	0.52	0.51	0.54	0.00E+00	6513
Cortical volume	ACD	Intermediate	0.66	0.64	0.68	3.40E-204	8882
Cortical volume	ACD	Unfavorable	1.00	1.00	1.00	0.00E+00	14042
Cortical volume	ACS	Favorable	0.57	0.55	0.60	8.20E-132	2921
Cortical volume	ACS	Intermediate	0.72	0.70	0.75	1.09E-55	4003
Cortical volume	ACS	Unfavorable	1.00	1.00	1.00	0.00E+00	5878
Cortical volume	AXT	Favorable	0.64	0.62	0.66	5.40E-162	6307
Cortical volume	AXT	Intermediate	0.76	0.74	0.78	1.75E-69	7311
Cortical volume	AXT	Unfavorable	1.00	1.00	1.00	0.00E+00	9283
Cortical volume	BP	Favorable	0.49	0.41	0.59	2.61E-15	188
Cortical volume	BP	Intermediate	0.66	0.56	0.77	3.79E-07	250
Cortical volume	BP	Unfavorable	1.00	1.00	1.00	0.00E+00	374
Cortical volume	MDD	Favorable	0.54	0.52	0.56	7.20E-252	4906
Cortical volume	MDD	Intermediate	0.68	0.66	0.70	7.60E-116	6008
Cortical volume	MDD	Unfavorable	1.00	1.00	1.00	0.00E+00	8424

Cortical volume	MS	Favorable	0.47	0.37	0.59	1.44E-10	109
Cortical volume	MS	Intermediate	0.78	0.64	0.95	1.41E-02	177
Cortical volume	MS	Unfavorable	1.00	1.00	1.00	0.00E+00	219
Cortical volume	PD	Favorable	0.85	0.78	0.93	2.16E-04	906
Cortical volume	PD	Intermediate	0.86	0.80	0.94	3.75E-04	1060
Cortical volume	PD	Unfavorable	1.00	1.00	1.00	0.00E+00	1390
Cortical volume	SCZ	Favorable	0.30	0.23	0.38	5.13E-23	85
Cortical volume	SCZ	Intermediate	0.39	0.31	0.48	7.94E-18	112
Cortical volume	SCZ	Unfavorable	1.00	1.00	1.00	0.00E+00	302
Subcortical volume	ACD	Favorable	0.54	0.52	0.55	0.00E+00	6648
Subcortical volume	ACD	Intermediate	0.64	0.62	0.66	5.60E-229	8511
Subcortical volume	ACD	Unfavorable	1.00	1.00	1.00	0.00E+00	14278
Subcortical volume	ACS	Favorable	0.69	0.66	0.72	9.71E-64	3305
Subcortical volume	ACS	Intermediate	0.74	0.71	0.77	2.80E-47	3807
Subcortical volume	ACS	Unfavorable	1.00	1.00	1.00	0.00E+00	5690
Subcortical volume	AXT	Favorable	0.73	0.70	0.75	4.14E-86	6678
Subcortical volume	AXT	Intermediate	0.79	0.76	0.81	5.03E-52	7311
Subcortical volume	AXT	Unfavorable	1.00	1.00	1.00	0.00E+00	8912
Subcortical volume	BP	Favorable	0.46	0.39	0.55	7.30E-18	185
Subcortical volume	BP	Intermediate	0.60	0.51	0.70	3.88E-10	238
Subcortical volume	BP	Unfavorable	1.00	1.00	1.00	0.00E+00	389
Subcortical volume	MDD	Favorable	0.59	0.57	0.62	9.60E-188	5170
Subcortical volume	MDD	Intermediate	0.69	0.66	0.71	3.20E-107	5960
Subcortical volume	MDD	Unfavorable	1.00	1.00	1.00	0.00E+00	8208
Subcortical volume	MS	Favorable	0.69	0.56	0.86	7.46E-04	150
Subcortical volume	MS	Intermediate	0.71	0.58	0.88	1.51E-03	153
Subcortical volume	MS	Unfavorable	1.00	1.00	1.00	0.00E+00	202
Subcortical volume	PD	Favorable	1.00	0.92	1.09	9.82E-01	988
Subcortical volume	PD	Intermediate	0.92	0.84	0.99	3.73E-02	1029
Subcortical volume	PD	Unfavorable	1.00	1.00	1.00	0.00E+00	1339
Subcortical volume	SCZ	Favorable	0.33	0.26	0.42	2.85E-20	94
Subcortical volume	SCZ	Intermediate	0.46	0.37	0.56	3.48E-13	125
Subcortical volume	SCZ	Unfavorable	1.00	1.00	1.00	0.00E+00	280

Supplementary table 5: Associations between PRS for brain disorders and GMV across regional brain in MRI Group.

region names	alzheimer's disease (AD)			bipolar disorder (BD)			ischaemic stroke (ISS)			multiple sclerosis (MS)		
	coefficients	t value	p value	coefficients	t value	p value	coefficients	t value	p value	coefficients	t value	p value
Total volume	0.0081	1.49	1.37E-01	0.0162	3.12	1.79E-03	-0.0162	-2.80	5.11E-03	-0.0039	-0.75	4.55E-01
Cortical volume	0.0066	1.21	2.28E-01	0.0221	4.26	2.07E-05	-0.0219	-3.79	1.49E-04	-0.0035	-0.66	5.08E-01
Caudal anterior cingulate	-0.0049	-0.90	3.70E-01	0.0141	2.73	6.33E-03	-0.0121	-2.09	3.64E-02	-0.0040	-0.77	4.42E-01
Caudal middle frontal	-0.0054	-1.00	3.18E-01	0.0147	2.84	4.55E-03	-0.0159	-2.75	5.97E-03	0.0027	0.52	6.03E-01
Cuneus	0.0167	3.07	2.13E-03	0.0058	1.12	2.64E-01	-0.0045	-0.79	4.32E-01	-0.0074	-1.41	1.59E-01
Entorhinal	-0.0168	-3.10	1.97E-03	0.0087	1.68	9.20E-02	-0.0009	-0.15	8.79E-01	-0.0087	-1.67	9.46E-02
Fusiform	0.0052	0.95	3.41E-01	0.0013	0.26	7.99E-01	-0.0093	-1.61	1.08E-01	0.0051	0.98	3.29E-01
Inferior parietal	0.0124	2.27	2.29E-02	0.0084	1.62	1.06E-01	-0.0191	-3.30	9.67E-04	0.0054	1.03	3.03E-01
Inferior temporal	0.0040	0.74	4.62E-01	0.0184	3.55	3.86E-04	-0.0160	-2.77	5.53E-03	-0.0016	-0.30	7.66E-01
Isthmus cingulate	-0.0002	-0.04	9.71E-01	0.0087	1.69	9.16E-02	0.0059	1.02	3.09E-01	-0.0086	-1.65	9.96E-02
Lateral occipital	0.0137	2.52	1.17E-02	0.0105	2.03	4.27E-02	-0.0023	-0.39	6.94E-01	-0.0051	-0.97	3.31E-01
Lateral orbitofrontal	-0.0057	-1.05	2.93E-01	0.0078	1.51	1.30E-01	-0.0147	-2.55	1.07E-02	-0.0025	-0.49	6.27E-01
Lingual	0.0153	2.81	4.95E-03	0.0051	0.99	3.21E-01	0.0065	1.13	2.58E-01	-0.0067	-1.29	1.97E-01
Medial orbitofrontal	-0.0043	-0.79	4.29E-01	0.0058	1.11	2.67E-01	-0.0227	-3.93	8.40E-05	-0.0006	-0.12	9.02E-01
Middle temporal	0.0034	0.63	5.31E-01	0.0139	2.68	7.39E-03	-0.0240	-4.16	3.23E-05	-0.0045	-0.86	3.90E-01
Parahippocampal	-0.0011	-0.20	8.39E-01	-0.0021	-0.41	6.82E-01	-0.0066	-1.14	2.53E-01	0.0019	0.36	7.20E-01
Paracentral	0.0067	1.24	2.15E-01	0.0101	1.94	5.19E-02	-0.0272	-4.71	2.44E-06	-0.0048	-0.93	3.55E-01
Pars opercularis	-0.0040	-0.73	4.67E-01	0.0113	2.18	2.92E-02	-0.0135	-2.34	1.94E-02	-0.0026	-0.50	6.15E-01
Pars orbitalis	-0.0134	-2.46	1.37E-02	0.0053	1.02	3.09E-01	-0.0069	-1.19	2.33E-01	-0.0088	-1.69	9.03E-02
Pars triangularis	-0.0070	-1.28	2.00E-01	0.0083	1.59	1.11E-01	0.0009	0.16	8.76E-01	0.0015	0.29	7.71E-01
Pericalcarine	0.0129	2.38	1.75E-02	0.0020	0.39	6.97E-01	0.0003	0.06	9.56E-01	-0.0159	-3.04	2.33E-03
Postcentral	0.0085	1.57	1.17E-01	0.0190	3.67	2.44E-04	-0.0125	-2.17	3.01E-02	-0.0016	-0.30	7.65E-01
Posterior cingulate	-0.0029	-0.54	5.90E-01	0.0179	3.46	5.44E-04	-0.0139	-2.41	1.59E-02	-0.0125	-2.39	1.68E-02
Precentral	0.0011	0.21	8.34E-01	0.0087	1.67	9.41E-02	-0.0256	-4.43	9.51E-06	-0.0034	-0.65	5.19E-01
Precuneus	0.0113	2.08	3.73E-02	0.0128	2.48	1.32E-02	-0.0015	-0.26	7.92E-01	-0.0072	-1.37	1.71E-01
Rostral anterior cingulate	-0.0014	-0.25	8.01E-01	0.0225	4.35	1.39E-05	-0.0193	-3.33	8.62E-04	-0.0050	-0.95	3.41E-01
Rostral middle frontal	-0.0082	-1.51	1.30E-01	0.0084	1.63	1.03E-01	-0.0017	-0.30	7.62E-01	-0.0078	-1.49	1.36E-01
Superior frontal	-0.0020	-0.37	7.09E-01	0.0245	4.73	2.28E-06	-0.0124	-2.15	3.15E-02	-0.0025	-0.48	6.34E-01
Superior parietal	0.0148	2.73	6.36E-03	0.0084	1.62	1.06E-01	-0.0036	-0.63	5.28E-01	0.0058	1.11	2.68E-01
Superior temporal	0.0014	0.25	8.01E-01	0.0138	2.67	7.68E-03	-0.0212	-3.68	2.32E-04	0.0094	1.81	7.05E-02
Supramarginal	0.0099	1.82	6.85E-02	0.0143	2.75	5.92E-03	-0.0201	-3.48	5.04E-04	0.0000	0.00	9.99E-01
Transverse temporal	0.0012	0.22	8.29E-01	0.0139	2.68	7.27E-03	-0.0018	-0.31	7.60E-01	0.0061	1.18	2.40E-01
Insula	0.0029	0.54	5.90E-01	0.0218	4.21	2.51E-05	0.0037	0.64	5.20E-01	-0.0032	-0.61	5.42E-01
Subcortical volume	-0.0118	-2.16	3.06E-02	-0.0071	-1.36	1.72E-01	0.0364	6.31	2.76E-10	-0.0218	-4.17	3.00E-05
Accumbens	-0.0169	-3.10	1.93E-03	-0.0100	-1.93	5.35E-02	0.0013	0.23	8.18E-01	-0.0193	-3.70	2.14E-04
Amygdala	-0.0057	-1.04	2.98E-01	0.0044	0.85	3.94E-01	0.0190	3.30	9.75E-04	-0.0157	-3.00	2.68E-03

Caudate	-0.0092	-1.68	9.26E-02	0.0004	0.08	9.34E-01	0.0513	8.89	0.00E+00	-0.0159	-3.04	2.40E-03
Hippocampus	-0.0092	-1.70	8.96E-02	0.0025	0.49	6.27E-01	0.0128	2.22	2.65E-02	-0.0001	-0.02	9.85E-01
Putamen	-0.0091	-1.68	9.26E-02	0.0012	0.24	8.11E-01	0.0423	7.34	2.19E-13	-0.0283	-5.41	6.24E-08
Thalamus	-0.0205	-3.78	1.60E-04	-0.0093	-1.79	7.29E-02	0.0135	2.34	1.92E-02	-0.0124	-2.37	1.77E-02
Pallidum	0.0087	1.60	1.11E-01	-0.0130	-2.51	1.20E-02	0.0185	3.20	1.37E-03	-0.0111	-2.13	3.30E-02
Lateral ventricle	0.0091	1.67	9.56E-02	0.0029	0.56	5.76E-01	0.0055	0.96	3.38E-01	0.0140	2.68	7.37E-03
Cerebellum	0.0112	2.06	3.93E-02	-0.0085	-1.65	9.99E-02	-0.0025	-0.43	6.66E-01	0.0039	0.74	4.60E-01
region names	parkinson's disease (PD)			schizophrenia (SC'Z)			major depressive disorder (MDD)					
	coefficients	t value	p value	coefficients	t value	p value	coefficients	t value	p value			
Total volume	0.0069	1.32	1.86E-01	0.0028	0.51	6.08E-01	-0.0089	-1.45	1.47E-01			
Cortical volume	-0.0004	-0.08	9.40E-01	0.0081	1.51	1.31E-01	-0.0033	-0.54	5.89E-01			
Caudal anterior cingulate	-0.0001	-0.02	9.80E-01	0.0080	1.49	1.37E-01	-0.0011	-0.18	8.56E-01			
Caudal middle frontal	-0.0026	-0.50	6.20E-01	0.0073	1.36	1.74E-01	0.0017	0.27	7.89E-01			
Cuneus	-0.0065	-1.24	2.17E-01	0.0029	0.53	5.96E-01	0.0093	1.47	1.42E-01			
Entorhinal	-0.0070	-1.33	1.84E-01	0.0122	2.27	2.30E-02	-0.0026	-0.41	6.85E-01			
Fusiform	0.0080	1.53	1.27E-01	0.0091	1.70	8.99E-02	-0.0140	-2.23	2.56E-02			
Inferior parietal	-0.0001	-0.02	9.81E-01	-0.0066	-1.22	2.22E-01	-0.0149	-2.38	1.75E-02			
Inferior temporal	0.0008	0.15	8.77E-01	0.0061	1.14	2.55E-01	-0.0135	-2.16	3.07E-02			
Isthmus cingulate	-0.0076	-1.46	1.45E-01	0.0093	1.72	8.60E-02	0.0119	1.88	6.02E-02			
Lateral occipital	0.0001	0.02	9.85E-01	0.0071	1.32	1.87E-01	0.0018	0.29	7.73E-01			
Lateral orbitofrontal	0.0064	1.21	2.25E-01	0.0080	1.48	1.39E-01	0.0006	0.10	9.20E-01			
Lingual	0.0135	2.58	9.96E-03	0.0105	1.96	5.05E-02	0.0056	0.89	3.72E-01			
Medial orbitofrontal	-0.0071	-1.35	1.77E-01	-0.0156	-2.90	3.71E-03	-0.0012	-0.19	8.52E-01			
Middle temporal	-0.0015	-0.28	7.77E-01	-0.0052	-0.97	3.31E-01	-0.0052	-0.83	4.07E-01			
Parahippocampal	0.0094	1.80	7.17E-02	0.0025	0.46	6.45E-01	0.0033	0.52	6.03E-01			

Paracentral	-0.0016	-0.30	7.62E-01	0.0184	3.41	6.57E-04	0.0034	0.54	5.92E-01			
Pars opercularis	0.0062	1.18	2.39E-01	-0.0028	-0.52	6.03E-01	0.0023	0.37	7.13E-01			
Pars orbitalis	0.0039	0.75	4.52E-01	0.0127	2.36	1.82E-02	-0.0026	-0.41	6.80E-01			
Pars triangularis	-0.0073	-1.39	1.64E-01	0.0012	0.23	8.19E-01	0.0084	1.33	1.84E-01			
Pericalcarine	-0.0021	-0.39	6.93E-01	0.0002	0.03	9.74E-01	0.0024	0.38	7.01E-01			
Postcentral	0.0094	1.81	7.09E-02	0.0078	1.44	1.49E-01	0.0009	0.14	8.91E-01			
Posterior cingulate	-0.0002	-0.03	9.73E-01	0.0127	2.36	1.85E-02	-0.0059	-0.95	3.44E-01			
Precentral	-0.0022	-0.42	6.76E-01	0.0059	1.09	2.77E-01	-0.0039	-0.62	5.36E-01			
Precuneus	-0.0071	-1.36	1.74E-01	0.0148	2.75	5.98E-03	0.0015	0.24	8.13E-01			
Rostral anterior cingulate	0.0046	0.89	3.76E-01	0.0107	1.98	4.77E-02	-0.0090	-1.44	1.50E-01			
Rostral middle frontal	-0.0016	-0.31	7.53E-01	-0.0016	-0.29	7.71E-01	-0.0053	-0.85	3.97E-01			
Superior frontal	-0.0026	-0.50	6.19E-01	0.0162	3.00	2.72E-03	0.0007	0.11	9.11E-01			
Superior parietal	-0.0049	-0.94	3.49E-01	0.0197	3.67	2.46E-04	-0.0032	-0.51	6.13E-01			
Superior temporal	-0.0021	-0.40	6.90E-01	-0.0163	-3.03	2.48E-03	-0.0006	-0.10	9.20E-01			
Supramarginal	0.0048	0.93	3.54E-01	-0.0010	-0.19	8.51E-01	-0.0020	-0.33	7.44E-01			
Transverse temporal	-0.0068	-1.29	1.96E-01	0.0020	0.38	7.05E-01	0.0092	1.46	1.44E-01			
Insula	-0.0057	-1.09	2.78E-01	0.0051	0.94	3.46E-01	-0.0017	-0.26	7.92E-01			
Subcortical volume	0.0166	3.18	1.46E-03	-0.0109	-2.03	4.23E-02	0.0001	0.02	9.82E-01			
Accumbens	0.0089	1.69	9.01E-02	-0.0077	-1.42	1.55E-01	-0.0027	-0.42	6.71E-01			
Amygdala	-0.0042	-0.81	4.18E-01	-0.0042	-0.78	4.37E-01	-0.0063	-1.01	3.14E-01			
Caudate	0.0126	2.41	1.58E-02	-0.0028	-0.52	6.01E-01	0.0097	1.53	1.26E-01			
Hippocampus	0.0130	2.49	1.28E-02	-0.0057	-1.07	2.87E-01	0.0011	0.17	8.62E-01			

Putamen	0.0013	0.25	8.03E-01	0.0016	0.30	7.66E-01	0.0018	0.28	7.80E-01			
Thalamus	0.0168	3.22	1.29E-03	-0.0141	-2.62	8.89E-03	-0.0002	-0.03	9.76E-01			
Pallidum	0.0132	2.52	1.18E-02	-0.0041	-0.76	4.45E-01	-0.0017	-0.27	7.90E-01			
Lateral ventricle	-0.0018	-0.35	7.29E-01	0.0080	1.49	1.36E-01	-0.0002	-0.04	9.71E-01			
Cerebellum	0.0179	3.42	6.18E-04	-0.0126	-2.34	1.93E-02	-0.0191	-3.02	2.50E-03			

Supplementary table 6: Associations between PRS for brain disorders and modifiable traits in MRI Group.

region names	alzheimer's disease (AD)			bipolar disorder (BD)			ischaemic stroke (ISS)			multiple sclerosis (MS)		
	coefficient	t value	p value	coefficient	t value	p value	coefficient	t value	p value	coefficient	t value	p value
Albumin	0.0144	2.65	8.13E-03	0.0168	3.25	1.17E-03	0.0072	1.24	2.13E-01	0.0105	2.00	4.56E-02
ApoA1	-0.0258	-4.73	2.21E-06	0.0101	1.94	5.22E-02	-0.0175	-3.03	2.46E-03	-0.0084	-1.61	1.08E-01
ApoB	0.1341	24.85	0.00E+00	0.0091	1.75	7.96E-02	0.0030	0.52	6.04E-01	-0.0008	-0.15	8.77E-01
Urea	-0.0004	-0.07	9.46E-01	0.0052	1.01	3.13E-01	0.0148	2.57	1.02E-02	0.0023	0.44	6.60E-01
Calcium	0.0099	1.81	6.98E-02	0.0173	3.33	8.61E-04	0.0125	2.16	3.06E-02	0.0093	1.78	7.54E-02
Cholesterol	0.0894	16.49	0.00E+00	0.0102	1.96	5.02E-02	-0.0109	-1.89	5.81E-02	-0.0049	-0.93	3.51E-01
Creatinine	-0.0090	-1.65	9.91E-02	-0.0040	-0.76	4.46E-01	-0.0053	-0.92	3.58E-01	0.0097	1.85	6.43E-02
Cystatin C	-0.0028	-0.52	6.02E-01	0.0025	0.49	6.24E-01	0.0307	5.32	1.03E-07	0.0144	2.76	5.74E-03
HDL	-0.0242	-4.44	8.95E-06	0.0061	1.17	2.42E-01	-0.0329	-5.71	1.17E-08	-0.0084	-1.60	1.09E-01
IGF-1	0.0043	0.80	4.23E-01	0.0031	0.60	5.47E-01	0.0011	0.20	8.45E-01	0.0041	0.79	4.32E-01
LDL	0.1060	19.58	0.00E+00	0.0085	1.65	9.96E-02	-0.0069	-1.20	2.30E-01	-0.0039	-0.74	4.57E-01
Phosphate	0.0045	0.83	4.06E-01	0.0197	3.81	1.41E-04	0.0048	0.83	4.08E-01	-0.0014	-0.27	7.91E-01
Testosterone	-0.0004	-0.07	9.45E-01	0.0006	0.13	9.00E-01	-0.0250	-4.34	1.46E-05	0.0052	0.99	3.24E-01
Total protein	0.0089	1.63	1.03E-01	0.0197	3.80	1.48E-04	0.0143	2.47	1.34E-02	0.0147	2.80	5.08E-03
Urate	0.0069	1.26	2.07E-01	0.0111	2.15	3.18E-02	0.0559	9.68	0.00E+00	0.0130	2.48	1.31E-02
ALP	-0.0027	-0.50	6.15E-01	0.0233	4.50	6.96E-06	0.0232	4.01	6.06E-05	0.0062	1.18	2.38E-01
ALT	0.0072	1.31	1.89E-01	0.0144	2.77	5.63E-03	0.0391	6.78	1.23E-11	-0.0012	-0.24	8.13E-01
AST	0.0150	2.74	6.05E-03	0.0217	4.19	2.81E-05	0.0174	3.00	2.68E-03	0.0028	0.53	5.97E-01
CRP	-0.0780	-14.38	0.00E+00	0.0054	1.05	2.93E-01	0.0285	4.94	7.87E-07	-0.0132	-2.54	1.12E-02
GGT	0.0062	1.14	2.54E-01	0.0122	2.36	1.84E-02	0.0382	6.61	3.81E-11	0.0015	0.29	7.70E-01
Glucose	0.0015	0.27	7.85E-01	0.0208	4.00	6.31E-05	0.0259	4.49	7.23E-06	0.0085	1.62	1.04E-01
HbA1c	0.0068	1.24	2.14E-01	0.0215	4.15	3.28E-05	0.0171	2.97	3.00E-03	0.0050	0.97	3.34E-01
Total bilirubin	0.0086	1.59	1.12E-01	0.0121	2.34	1.91E-02	-0.0041	-0.71	4.80E-01	0.0134	2.56	1.04E-02
Triglycerides	0.0317	5.83	5.74E-09	0.0136	2.62	8.85E-03	0.0371	6.42	1.40E-10	-0.0020	-0.38	7.05E-01
Vitamin D	-0.0011	-0.20	8.44E-01	0.0056	1.08	2.82E-01	-0.0003	-0.05	9.57E-01	0.0031	0.59	5.54E-01
White blood cell count	0.0008	0.14	8.88E-01	0.0213	4.11	3.98E-05	0.0350	6.07	1.32E-09	0.0000	0.00	9.97E-01
Red blood cell count	0.0053	0.97	3.33E-01	0.0143	2.77	5.66E-03	0.0200	3.47	5.25E-04	0.0097	1.86	6.25E-02
Haemoglobin concentration	0.0076	1.39	1.64E-01	0.0165	3.19	1.42E-03	0.0227	3.92	8.77E-05	0.0202	3.86	1.14E-04
Mean corpuscular volume	0.0107	1.96	5.04E-02	0.0208	4.02	5.93E-05	0.0103	1.78	7.52E-02	0.0171	3.26	1.10E-03
Mean corpuscular haemoglobin	0.0126	2.31	2.10E-02	0.0209	4.03	5.61E-05	0.0104	1.81	7.07E-02	0.0189	3.62	2.90E-04
Red blood cell distribution width	-0.0086	-1.58	1.15E-01	0.0102	1.98	4.82E-02	0.0081	1.40	1.62E-01	0.0006	0.12	9.04E-01
Platelet count	0.0085	1.56	1.19E-01	0.0238	4.60	4.33E-06	0.0251	4.36	1.33E-05	0.0007	0.13	9.00E-01

Platelet crit	-0.0017	-0.32	7.52E-01	0.0261	5.03	4.96E-07	0.0315	5.46	4.84E-08	0.0047	0.90	3.70E-01
Mean platelet volume	-0.0111	-2.05	4.06E-02	0.0112	2.16	3.08E-02	0.0117	2.03	4.22E-02	0.0109	2.09	3.63E-02
Platelet distribution width	0.0077	1.41	1.57E-01	0.0196	3.78	1.56E-04	0.0068	1.17	2.42E-01	0.0146	2.79	5.27E-03
Neutrophill count	0.0041	0.76	4.48E-01	0.0186	3.60	3.20E-04	0.0324	5.62	1.90E-08	-0.0060	-1.15	2.51E-01
Basophil count	0.0044	0.82	4.15E-01	0.0050	0.97	3.34E-01	0.0100	1.75	8.09E-02	-0.0036	-0.69	4.87E-01
Nucleated red blood cell count	0.0016	0.30	7.63E-01	0.0061	1.17	2.41E-01	0.0027	0.47	6.38E-01	0.0049	0.93	3.52E-01
Reticulocyte count	0.0091	1.67	9.47E-02	-0.0096	-1.84	6.56E-02	0.0361	6.23	4.60E-10	0.0031	0.59	5.55E-01
Mean reticulocyte volume	0.0058	1.07	2.83E-01	0.0183	3.52	4.28E-04	0.0080	1.38	1.68E-01	0.0117	2.24	2.52E-02
Mean sphered cell volume	0.0048	0.88	3.80E-01	0.0194	3.74	1.81E-04	0.0025	0.43	6.70E-01	0.0161	3.08	2.07E-03
Immature reticulocyte fraction	0.0137	2.52	1.17E-02	0.0140	2.70	6.90E-03	0.0288	4.98	6.33E-07	0.0123	2.35	1.90E-02
High light scatter reticulocyte count	0.0136	2.49	1.27E-02	-0.0017	-0.32	7.49E-01	0.0485	8.39	0.00E+0 0	0.0106	2.02	4.31E-02
Lymphocyte count	0.0015	0.27	7.89E-01	0.0183	3.53	4.20E-04	0.0258	4.47	7.86E-06	0.0093	1.77	7.65E-02
Monocyte count	0.0010	0.18	8.59E-01	0.0116	2.23	2.58E-02	0.0202	3.50	4.62E-04	0.0016	0.31	7.54E-01
Eosinophill count	-0.0059	-1.09	2.77E-01	0.0014	0.28	7.81E-01	0.0191	3.31	9.37E-04	-0.0054	-1.03	3.02E-01
Cooked vegetable intake	0.0071	1.30	1.95E-01	0.0204	3.94	8.23E-05	0.0124	2.15	3.15E-02	0.0100	1.90	5.72E-02
Raw vegetable intake	-0.0013	-0.24	8.07E-01	0.0238	4.60	4.21E-06	0.0016	0.27	7.87E-01	0.0063	1.21	2.27E-01
Fresh fruit intake	0.0028	0.51	6.07E-01	0.0238	4.60	4.31E-06	0.0017	0.29	7.72E-01	0.0050	0.95	3.43E-01
Dried fruit intake	0.0058	1.07	2.84E-01	0.0156	3.01	2.62E-03	-0.0076	-1.31	1.89E-01	0.0067	1.28	1.99E-01
Bread intake	0.0085	1.57	1.17E-01	0.0040	0.78	4.36E-01	-0.0132	-2.29	2.20E-02	-0.0139	-2.67	7.68E-03
Cereal intake	0.0068	1.24	2.14E-01	0.0014	0.28	7.81E-01	-0.0134	-2.31	2.08E-02	0.0043	0.81	4.15E-01
Tea intake	0.0100	1.84	6.59E-02	0.0194	3.74	1.88E-04	0.0018	0.32	7.51E-01	-0.0119	-2.29	2.22E-02
Coffee intake	-0.0029	-0.54	5.91E-01	-0.0026	-0.50	6.19E-01	-0.0022	-0.39	6.98E-01	0.0135	2.58	1.00E-02
Water intake	0.0064	1.18	2.38E-01	0.0256	4.95	7.61E-07	0.0122	2.12	3.41E-02	0.0072	1.37	1.71E-01
Oily fish intake	-0.0012	-0.43	6.66E-01	0.0078	3.05	2.33E-03	-0.0025	-0.87	3.85E-01	0.0021	0.79	4.28E-01
Non-oily fish intake	0.0023	0.88	3.77E-01	0.0061	2.46	1.40E-02	0.0032	1.17	2.44E-01	-0.0027	-1.07	2.83E-01
Processed meat intake	-0.0041	-1.52	1.29E-01	-0.0091	-3.57	3.60E-04	-0.0011	-0.39	6.95E-01	0.0012	0.47	6.39E-01
Poultry intake	-0.0009	-0.42	6.71E-01	-0.0066	-3.41	6.46E-04	0.0059	2.75	5.90E-03	-0.0002	-0.09	9.27E-01
Beef intake	-0.0035	-1.30	1.95E-01	-0.0063	-2.48	1.33E-02	0.0033	1.16	2.44E-01	-0.0032	-1.25	2.10E-01
Lamb intake	-0.0070	-3.01	2.62E-03	0.0039	1.77	7.69E-02	-0.0044	-1.77	7.61E-02	-0.0022	-1.01	3.11E-01
Pork intake	-0.0039	-1.70	8.93E-02	-0.0097	-4.41	1.02E-05	0.0061	2.47	1.36E-02	-0.0008	-0.35	7.28E-01
Cheese intake	-0.0039	-1.96	5.02E-02	0.0007	0.36	7.22E-01	-0.0074	-3.46	5.46E-04	-0.0007	-0.36	7.16E-01
Salt added to food	-0.0009	-0.36	7.21E-01	0.0118	4.66	3.25E-06	-0.0081	-2.86	4.26E-03	-0.0054	-2.13	3.32E-02
Milk intake	-0.0001	-0.14	8.86E-01	0.0001	0.16	8.70E-01	-0.0007	-0.70	4.83E-01	-0.0003	-0.36	7.19E-01
Spread type (Butter)	-0.0070	-2.67	7.69E-03	0.0003	0.12	9.03E-01	-0.0087	-3.12	1.84E-03	-0.0032	-1.27	2.02E-01
Spread type (Benecol)	0.0000	0.11	9.12E-01	0.0009	2.42	1.54E-02	-0.0002	-0.60	5.46E-01	-0.0004	-1.07	2.86E-01
Spread type (Other)	0.0061	2.25	2.42E-02	-0.0033	-1.28	2.00E-01	0.0081	2.80	5.18E-03	0.0018	0.69	4.88E-01
Variation in diet	0.0028	1.08	2.81E-01	0.0060	2.40	1.65E-02	0.0087	3.16	1.58E-03	-0.0011	-0.42	6.73E-01
Vitamin A	-0.0001	-0.10	9.21E-01	0.0002	0.32	7.48E-01	0.0009	1.24	2.17E-01	0.0001	0.15	8.79E-01
Vitamin B	0.0012	1.19	2.36E-01	0.0015	1.58	1.14E-01	-0.0005	-0.48	6.32E-01	0.0000	0.02	9.86E-01
Vitamin C	-0.0013	-0.88	3.78E-01	0.0034	2.36	1.84E-02	-0.0049	-3.06	2.25E-03	0.0011	0.74	4.62E-01
Vitamin D (Diet)	0.0014	1.36	1.74E-01	0.0013	1.35	1.76E-01	-0.0018	-1.68	9.22E-02	-0.0006	-0.61	5.42E-01

Vitamin E	-0.0006	-0.71	4.76E-01	0.0016	1.81	7.01E-02	-0.0005	-0.49	6.28E-01	-0.0002	-0.23	8.16E-01
Folic acid	0.0000	0.04	9.69E-01	0.0010	1.46	1.43E-01	0.0012	1.61	1.07E-01	-0.0010	-1.56	1.20E-01
Multivitamins	0.0004	0.16	8.74E-01	0.0058	2.66	7.72E-03	-0.0010	-0.42	6.72E-01	0.0024	1.12	2.61E-01
Fish oil	-0.0005	-0.21	8.32E-01	0.0018	0.76	4.45E-01	-0.0046	-1.71	8.65E-02	-0.0006	-0.25	8.04E-01
Glucosamine	-0.0059	-2.66	7.87E-03	0.0029	1.40	1.62E-01	-0.0046	-1.95	5.14E-02	0.0007	0.34	7.36E-01
Calcium (Diet)	0.0018	1.36	1.75E-01	0.0033	2.59	9.61E-03	-0.0051	-3.59	3.30E-04	0.0003	0.21	8.37E-01
Zinc	0.0002	0.16	8.70E-01	0.0030	2.89	3.86E-03	0.0000	-0.01	9.92E-01	0.0014	1.36	1.73E-01
Iron	0.0015	1.61	1.08E-01	0.0004	0.39	6.99E-01	0.0002	0.20	8.44E-01	-0.0012	-1.32	1.86E-01
Selenium	0.0007	0.79	4.32E-01	0.0012	1.48	1.38E-01	0.0014	1.48	1.40E-01	0.0015	1.81	7.01E-02
Maternal smoking around birth	0.0045	1.75	8.09E-02	0.0011	0.44	6.60E-01	0.0151	5.56	2.64E-08	-0.0011	-0.47	6.41E-01
Age first had sexual intercourse	0.0078	1.44	1.50E-01	-0.0063	-1.22	2.23E-01	-0.0248	-4.31	1.62E-05	0.0100	1.92	5.48E-02
Ever had same-sex intercourse	-0.0005	-0.41	6.80E-01	0.0033	2.97	2.99E-03	0.0004	0.34	7.33E-01	0.0002	0.15	8.83E-01
Comparative body size at age 10 (Thinner)	-0.0038	-1.47	1.43E-01	0.0042	1.71	8.82E-02	-0.0081	-2.98	2.88E-03	-0.0022	-0.89	3.74E-01
Comparative body size at age 10 (Plumper)	-0.0001	-0.05	9.57E-01	0.0029	1.55	1.20E-01	0.0050	2.45	1.43E-02	0.0005	0.27	7.90E-01
Comparative height size at age 10 (Shorter)	0.0018	0.83	4.04E-01	0.0088	4.18	2.90E-05	0.0001	0.06	9.50E-01	0.0013	0.62	5.37E-01
Comparative height size at age 10 (Taller)	-0.0022	-0.92	3.58E-01	-0.0042	-1.82	6.89E-02	-0.0051	-2.00	4.57E-02	0.0030	1.31	1.90E-01
The overall state of health	0.0027	1.46	1.43E-01	-0.0031	-1.73	8.29E-02	-0.0183	-9.25	0.00E+0 0	0.0006	0.33	7.38E-01
Long-standing illness	-0.0030	-1.35	1.79E-01	0.0101	4.79	1.71E-06	0.0191	8.14	4.44E-16	0.0021	0.99	3.20E-01
Creatinine in urine	0.0084	1.54	1.25E-01	0.0093	1.79	7.29E-02	0.0144	2.49	1.29E-02	0.0070	1.34	1.82E-01
Potassium in urine	0.0074	1.37	1.71E-01	0.0062	1.20	2.32E-01	0.0099	1.71	8.77E-02	0.0059	1.13	2.58E-01
Sodium in urine	0.0109	2.00	4.50E-02	0.0002	0.04	9.69E-01	0.0144	2.49	1.27E-02	0.0029	0.56	5.78E-01
Mouth ulcers	0.0021	1.30	1.95E-01	0.0024	1.56	1.20E-01	-0.0010	-0.55	5.85E-01	-0.0051	-3.21	1.34E-03
Painful gums	0.0001	0.13	8.99E-01	0.0019	2.41	1.61E-02	0.0009	0.99	3.22E-01	0.0000	-0.06	9.53E-01
Bleeding gums	-0.0011	-0.60	5.49E-01	0.0079	4.40	1.10E-05	0.0043	2.17	2.97E-02	0.0035	1.93	5.34E-02
Loose teeth	0.0015	1.59	1.11E-01	0.0029	3.25	1.17E-03	0.0001	0.05	9.58E-01	0.0011	1.18	2.37E-01
Toothache	-0.0008	-0.73	4.68E-01	0.0017	1.70	8.88E-02	0.0020	1.81	7.02E-02	-0.0007	-0.69	4.87E-01
Dentures	-0.0030	-1.91	5.57E-02	0.0016	1.09	2.74E-01	0.0014	0.85	3.98E-01	-0.0025	-1.66	9.60E-02
Duration of walks	0.0099	1.82	6.92E-02	-0.0066	-1.27	2.03E-01	0.0147	2.54	1.09E-02	-0.0059	-1.13	2.60E-01
Slow pace	-0.0007	-0.81	4.16E-01	0.0009	1.21	2.27E-01	0.0038	4.44	9.21E-06	0.0003	0.39	6.97E-01
Brisk pace	0.0039	1.44	1.51E-01	0.0001	0.04	9.68E-01	-0.0212	-7.34	2.24E-13	0.0019	0.73	4.67E-01
IPAQ activity group (moderate)	-0.0025	-0.93	3.55E-01	0.0010	0.38	7.05E-01	0.0005	0.18	8.60E-01	-0.0013	-0.49	6.26E-01
IPAQ activity group (high)	0.0025	0.94	3.49E-01	-0.0021	-0.84	4.01E-01	0.0023	0.81	4.20E-01	-0.0023	-0.91	3.63E-01
Summed minutes activity	0.0093	1.71	8.66E-02	0.0052	1.00	3.18E-01	0.0075	1.30	1.93E-01	-0.0051	-0.98	3.29E-01
MET minutes per week for walking	0.0066	1.21	2.27E-01	-0.0016	-0.31	7.59E-01	0.0125	2.17	3.03E-02	-0.0067	-1.29	1.97E-01
MET minutes per week for moderate activity	0.0023	0.42	6.72E-01	0.0040	0.78	4.37E-01	0.0004	0.08	9.39E-01	0.0044	0.85	3.96E-01
MET minutes per week for vigorous	-0.0014	-0.26	7.97E-01	0.0123	2.38	1.74E-02	-0.0064	-1.12	2.65E-01	-0.0016	-0.31	7.57E-01

activity												
Summed MET minutes per week for all activity	0.0050	0.92	3.55E-01	0.0134	2.60	9.46E-03	0.0114	1.98	4.82E-02	-0.0034	-0.65	5.17E-01
Sleep duration	0.0005	0.21	8.30E-01	-0.0020	-0.95	3.41E-01	-0.0069	-2.90	3.69E-03	0.0010	0.49	6.27E-01
Getting up in morning	0.0005	0.24	8.10E-01	-0.0046	-2.33	1.98E-02	-0.0026	-1.21	2.27E-01	-0.0006	-0.32	7.52E-01
Chronotype morning	-0.0025	-0.94	3.49E-01	-0.0011	-0.42	6.72E-01	-0.0003	-0.10	9.20E-01	0.0003	0.11	9.15E-01
Nap during day	-0.0005	-0.45	6.50E-01	0.0019	1.93	5.37E-02	0.0023	2.15	3.16E-02	-0.0007	-0.74	4.61E-01
Sleeplessness	-0.0025	-1.06	2.87E-01	0.0039	1.78	7.50E-02	0.0085	3.45	5.63E-04	-0.0014	-0.65	5.15E-01
Snoring	0.0051	1.97	4.92E-02	-0.0018	-0.71	4.75E-01	0.0102	3.72	1.99E-04	-0.0015	-0.58	5.59E-01
Daytime dozing	-0.0011	-1.40	1.62E-01	0.0004	0.61	5.45E-01	-0.0001	-0.09	9.29E-01	0.0004	0.56	5.75E-01
Alcohol intake frequency.	0.0026	1.13	2.60E-01	-0.0078	-3.60	3.18E-04	-0.0059	-2.44	1.48E-02	0.0013	0.59	5.56E-01
Smoking status	-0.0030	-1.13	2.60E-01	0.0150	5.96	2.61E-09	0.0041	1.48	1.40E-01	-0.0014	-0.53	5.94E-01
Alcohol drinker status	-0.0016	-1.94	5.23E-02	-0.0017	-2.11	3.52E-02	-0.0013	-1.45	1.47E-01	-0.0009	-1.07	2.86E-01
Nitrogen oxides air pollution	0.0086	1.58	1.15E-01	0.0240	4.64	3.56E-06	0.0129	2.24	2.53E-02	0.0047	0.89	3.73E-01
pm10	0.0074	1.35	1.77E-01	0.0215	4.16	3.25E-05	0.0167	2.90	3.78E-03	0.0056	1.07	2.83E-01
pm2.5	0.0063	1.15	2.50E-01	0.0185	3.58	3.50E-04	0.0174	3.02	2.57E-03	0.0036	0.68	4.96E-01
Inverse distance to the nearest major road	-0.0024	-0.45	6.56E-01	0.0062	1.19	2.35E-01	0.0002	0.04	9.71E-01	0.0081	1.56	1.20E-01
Noise pollution	0.0103	1.90	5.78E-02	0.0177	3.42	6.35E-04	0.0092	1.59	1.13E-01	0.0076	1.46	1.46E-01
Greenspace percentage	0.0077	1.41	1.59E-01	-0.0152	-2.94	3.30E-03	0.0007	0.13	8.98E-01	0.0040	0.76	4.49E-01
Domestic garden percentage	0.0000	0.00	9.98E-01	0.0065	1.26	2.08E-01	0.0027	0.46	6.42E-01	0.0015	0.28	7.80E-01
Water percentage	0.0003	0.06	9.52E-01	0.0054	1.04	2.97E-01	0.0043	0.75	4.53E-01	0.0018	0.34	7.33E-01
Natural environment percentage	0.0069	1.26	2.06E-01	-0.0137	-2.65	8.03E-03	-0.0055	-0.95	3.43E-01	0.0024	0.47	6.39E-01
Traffic intensity on the nearest major road	0.0052	0.95	3.43E-01	0.0156	3.01	2.62E-03	0.0170	2.93	3.34E-03	0.0054	1.04	2.98E-01
Pulse rate	-0.0056	-1.04	3.00E-01	0.0102	1.97	4.86E-02	0.0202	3.50	4.59E-04	0.0041	0.78	4.38E-01
Hearing difficulty with background noise	-0.0035	-1.36	1.75E-01	0.0039	1.57	1.16E-01	-0.0014	-0.51	6.07E-01	-0.0017	-0.67	5.02E-01
Forced vital capacity	0.0138	2.54	1.10E-02	0.0001	0.01	9.92E-01	-0.0287	-4.97	6.62E-07	0.0133	2.56	1.06E-02
Forced expiratory volume in 1-second	0.0130	2.38	1.72E-02	-0.0030	-0.57	5.67E-01	-0.0262	-4.54	5.71E-06	0.0134	2.57	1.03E-02
Peak expiratory flow	0.0085	1.57	1.16E-01	-0.0007	-0.13	8.98E-01	-0.0064	-1.10	2.69E-01	0.0031	0.59	5.56E-01
Diastolic blood pressure	0.0023	0.42	6.73E-01	0.0115	2.22	2.67E-02	0.1386	24.19	0.00E+00	0.0015	0.30	7.67E-01
Systolic blood pressure	0.0081	1.48	1.38E-01	0.0084	1.61	1.07E-01	0.1506	26.32	0.00E+00	-0.0002	-0.05	9.62E-01
Hand grip strength	0.0043	0.79	4.30E-01	-0.0062	-1.20	2.31E-01	0.0008	0.15	8.83E-01	0.0136	2.60	9.29E-03
Weight	0.0029	0.53	5.93E-01	0.0002	0.03	9.72E-01	0.0519	9.00	0.00E+00	0.0170	3.26	1.11E-03
Body fat percentage	0.0041	0.75	4.56E-01	0.0114	2.21	2.72E-02	0.0693	12.02	0.00E+00	0.0085	1.64	1.02E-01
Whole body fat mass	0.0011	0.21	8.33E-01	0.0011	0.22	8.29E-01	0.0681	11.82	0.00E+00	0.0110	2.11	3.51E-02
Whole body fat-free mass	0.0040	0.73	4.66E-01	-0.0007	-0.13	8.95E-01	0.0226	3.92	9.00E-05	0.0197	3.78	1.59E-04

Whole body water mass	0.0034	0.62	5.32E-01	-0.0005	-0.10	9.17E-01	0.0231	4.00	6.24E-05	0.0199	3.81	1.37E-04
Body mass index	0.0067	1.23	2.20E-01	0.0102	1.98	4.82E-02	0.0733	12.73	0.00E+0 0	0.0135	2.59	9.59E-03
Basal metabolic rate	0.0041	0.75	4.56E-01	0.0001	0.01	9.90E-01	0.0293	5.07	3.92E-07	0.0194	3.72	2.02E-04
Impedance of whole body	0.0045	0.83	4.04E-01	-0.0066	-1.28	2.02E-01	-0.0009	-0.15	8.79E-01	0.0148	2.84	4.46E-03
Impedance of leg	0.0063	1.15	2.50E-01	0.0186	3.59	3.33E-04	-0.0092	-1.59	1.11E-01	-0.0014	-0.27	7.85E-01
Impedance of arm	0.0049	0.89	3.73E-01	0.0192	3.70	2.14E-04	-0.0199	-3.45	5.66E-04	-0.0016	-0.31	7.57E-01
Leg fat percentage	0.0064	1.17	2.41E-01	0.0147	2.84	4.56E-03	0.0751	13.03	0.00E+0 0	0.0092	1.77	7.71E-02
Arm fat percentage	0.0022	0.41	6.85E-01	0.0125	2.42	1.54E-02	0.0699	12.13	0.00E+0 0	0.0095	1.82	6.92E-02
Mood swings	0.0010	0.39	6.98E-01	0.0112	4.41	1.06E-05	0.0115	4.06	4.82E-05	-0.0007	-0.26	7.97E-01
Miserableness	0.0037	1.38	1.66E-01	0.0077	3.03	2.42E-03	0.0096	3.41	6.43E-04	-0.0007	-0.26	7.93E-01
Irritability	0.0010	0.43	6.68E-01	0.0122	5.25	1.51E-07	0.0062	2.38	1.72E-02	-0.0018	-0.77	4.42E-01
Sensitivity	0.0018	0.66	5.12E-01	0.0113	4.35	1.34E-05	0.0103	3.55	3.81E-04	-0.0004	-0.14	8.85E-01
Fed-up feelings	-0.0004	-0.15	8.81E-01	0.0018	0.71	4.75E-01	0.0094	3.42	6.37E-04	0.0009	0.36	7.21E-01
Nervous feelings	0.0023	1.04	2.98E-01	0.0046	2.23	2.56E-02	0.0041	1.77	7.61E-02	0.0004	0.20	8.41E-01
Worrier	0.0018	0.67	5.00E-01	0.0114	4.39	1.15E-05	0.0066	2.29	2.19E-02	-0.0003	-0.12	9.02E-01
Tense'	-0.0004	-0.22	8.25E-01	0.0136	7.47	8.35E-14	0.0025	1.24	2.15E-01	-0.0009	-0.49	6.28E-01
Worry too long after embarrassment	0.0032	1.17	2.43E-01	0.0039	1.51	1.30E-01	0.0042	1.46	1.44E-01	0.0021	0.79	4.27E-01
Suffer from 'nerves'	0.0031	1.50	1.33E-01	0.0030	1.53	1.27E-01	0.0047	2.13	3.33E-02	0.0016	0.78	4.34E-01
Loneliness, isolation	-0.0037	-1.94	5.29E-02	0.0056	3.14	1.72E-03	0.0039	1.96	5.05E-02	-0.0017	-0.94	3.46E-01
Guilty feelings	-0.0007	-0.29	7.69E-01	0.0095	4.10	4.10E-05	0.0040	1.55	1.21E-01	-0.0040	-1.73	8.39E-02
Risk taking	-0.0046	-1.87	6.09E-02	0.0163	7.05	1.82E-12	-0.0006	-0.23	8.17E-01	0.0034	1.46	1.44E-01
Frequency of depressed mood	0.0001	0.15	8.84E-01	0.0018	2.05	4.07E-02	0.0024	2.42	1.55E-02	-0.0009	-1.02	3.06E-01
Frequency of unenthusiasm	0.0008	0.87	3.82E-01	0.0003	0.32	7.48E-01	0.0020	1.99	4.64E-02	0.0010	1.18	2.39E-01
Frequency of tenseness	0.0002	0.17	8.65E-01	0.0015	1.71	8.68E-02	0.0029	3.07	2.13E-03	-0.0009	-1.08	2.79E-01
Frequency of tiredness	0.0004	0.27	7.87E-01	0.0017	1.16	2.45E-01	0.0091	5.71	1.14E-08	0.0008	0.53	5.94E-01
Able to confide	0.0025	1.10	2.71E-01	0.0032	1.45	1.47E-01	0.0003	0.12	9.02E-01	0.0026	1.18	2.40E-01
Townsend deprivation index	-0.0020	-0.37	7.13E-01	0.0220	4.24	2.23E-05	0.0074	1.29	1.99E-01	-0.0026	-0.50	6.14E-01
Qualifications	0.0000	-0.02	9.85E-01	0.0171	6.84	8.22E-12	-0.0221	-7.96	1.78E-15	0.0013	0.53	5.98E-01
Current employment status	0.0000	-0.01	9.89E-01	-0.0016	-1.52	1.29E-01	-0.0029	-2.40	1.64E-02	-0.0008	-0.71	4.81E-01
Average total household income before tax(18,000 to 30,999)	-0.0048	-2.17	3.04E-02	0.0014	0.68	4.95E-01	-0.0027	-1.13	2.60E-01	-0.0017	-0.82	4.14E-01
Average total household income before tax(31,000 to 51,999)	0.0036	1.42	1.55E-01	-0.0072	-2.96	3.09E-03	0.0060	2.23	2.58E-02	0.0033	1.36	1.75E-01
Average total household income before tax(52,000 to 100,000)	0.0008	0.34	7.34E-01	0.0033	1.39	1.65E-01	-0.0068	-2.59	9.74E-03	0.0012	0.51	6.08E-01
Average total household income before tax(Greater than 100,000)	-0.0010	-0.70	4.86E-01	0.0026	1.90	5.78E-02	-0.0024	-1.57	1.15E-01	0.0002	0.11	9.10E-01
Live with husband, wife or partner	-0.0004	-0.16	8.74E-01	-0.0030	-1.39	1.64E-01	0.0004	0.15	8.84E-01	0.0040	1.85	6.41E-02
Live with son and/or daughter	0.0022	0.81	4.18E-01	0.0060	2.37	1.78E-02	0.0055	1.93	5.36E-02	0.0043	1.68	9.38E-02

Live with brother and/or sister	0.0000	0.07	9.45E-01	-0.0006	-1.85	6.45E-02	0.0004	1.26	2.09E-01	0.0002	0.63	5.28E-01
Live with mother and/or father	0.0012	1.63	1.04E-01	-0.0005	-0.73	4.66E-01	-0.0005	-0.71	4.75E-01	0.0003	0.51	6.09E-01
Live with grandchild	-0.0002	-0.63	5.27E-01	0.0009	2.30	2.13E-02	-0.0002	-0.53	5.94E-01	0.0001	0.34	7.35E-01
Live with other related	-0.0002	-0.58	5.65E-01	0.0003	0.78	4.34E-01	-0.0003	-0.68	4.95E-01	0.0000	0.05	9.56E-01
Live with other unrelated	0.0000	-0.01	9.94E-01	0.0014	1.99	4.68E-02	-0.0002	-0.33	7.43E-01	-0.0008	-1.17	2.40E-01
region names	parkinson's disease (PD)			schizophrenia (SCZ)			major depressive disorder (MDD)					
	coefficients	t value	p value	coefficients	t value	p value	coefficients	t value	p value			
Albumin	0.0066	1.26	2.08E-01	0.0056	1.05	2.95E-01	0.0086	1.43	1.52E-01			
ApoA1	0.0007	0.13	9.00E-01	0.0110	2.04	4.12E-02	-0.0016	-0.26	7.96E-01			
ApoB	0.0001	0.02	9.83E-01	0.0073	1.35	1.79E-01	-0.0124	-1.98	4.83E-02			
Urea	-0.0026	-0.50	6.20E-01	-0.0080	-1.49	1.36E-01	0.0073	1.17	2.41E-01			
Calcium	0.0058	1.12	2.65E-01	0.0074	1.37	1.72E-01	0.0077	1.28	2.00E-01			
Cholesterol	0.0017	0.32	7.46E-01	0.0099	1.84	6.59E-02	-0.0137	-2.19	2.83E-02			
Creatinine	-0.0069	-1.31	1.90E-01	-0.0239	-4.44	9.24E-06	-0.0021	-0.34	7.31E-01			
Cystatin C	-0.0032	-0.61	5.40E-01	-0.0163	-3.02	2.52E-03	0.0002	0.04	9.69E-01			
HDL	0.0069	1.31	1.90E-01	0.0176	3.26	1.12E-03	-0.0063	-1.02	3.09E-01			
IGF-1	0.0056	1.07	2.86E-01	-0.0078	-1.45	1.47E-01	0.0012	0.20	8.43E-01			
LDL	0.0027	0.52	6.06E-01	0.0075	1.40	1.62E-01	-0.0149	-2.39	1.70E-02			
Phosphate	0.0072	1.38	1.69E-01	0.0074	1.37	1.70E-01	0.0115	1.86	6.24E-02			
Testosterone	0.0020	0.38	7.04E-01	0.0225	4.18	2.94E-05	-0.0022	-0.34	7.34E-01			
Total protein	0.0016	0.31	7.55E-01	0.0134	2.48	1.32E-02	0.0026	0.44	6.62E-01			
Urate	-0.0020	-0.38	7.01E-01	-0.0124	-2.29	2.19E-02	0.0083	1.32	1.87E-01			
ALP	0.0003	0.06	9.55E-01	0.0067	1.24	2.13E-01	0.0080	1.32	1.88E-01			
ALT	0.0040	0.76	4.50E-01	0.0018	0.33	7.40E-01	0.0139	2.26	2.40E-02			
AST	0.0054	1.04	2.99E-01	0.0153	2.83	4.68E-03	0.0085	1.40	1.62E-01			
CRP	-0.0131	-2.51	1.22E-02	0.0004	0.07	9.41E-01	0.0022	0.35	7.26E-01			
GGT	-0.0050	-0.96	3.37E-01	-0.0014	-0.25	8.01E-01	0.0154	2.47	1.35E-02			
Glucose	0.0013	0.24	8.08E-01	0.0055	1.03	3.04E-01	0.0087	1.44	1.50E-01			
HbA1c	0.0005	0.09	9.25E-01	0.0062	1.15	2.50E-01	0.0126	2.12	3.43E-02			
Total bilirubin	0.0123	2.36	1.83E-02	0.0031	0.58	5.61E-01	-0.0052	-0.83	4.05E-01			
Triglycerides	-0.0035	-0.66	5.09E-01	-0.0067	-1.24	2.16E-01	0.0078	1.25	2.12E-01			
Vitamin D	0.0021	0.41	6.85E-01	-0.0102	-1.90	5.74E-02	0.0004	0.06	9.50E-01			
White blood cell count	-0.0099	-1.90	5.77E-02	0.0242	4.48	7.33E-06	0.0046	0.75	4.53E-01			
Red blood cell count	-0.0025	-0.48	6.30E-01	0.0073	1.35	1.78E-01	0.0026	0.42	6.72E-01			
Haemoglobin concentration	-0.0033	-0.62	5.34E-01	0.0102	1.89	5.86E-02	0.0045	0.74	4.59E-01			
Mean corpuscular volume	-0.0001	-0.02	9.84E-01	0.0124	2.30	2.13E-02	0.0078	1.30	1.92E-01			
Mean corpuscular haemoglobin	0.0018	0.34	7.30E-01	0.0106	1.97	4.89E-02	0.0084	1.41	1.60E-01			
Red blood cell distribution width	-0.0033	-0.62	5.33E-01	-0.0021	-0.39	6.99E-01	0.0051	0.86	3.90E-01			
Platelet count	-0.0078	-1.50	1.35E-01	0.0112	2.07	3.82E-02	0.0007	0.11	9.10E-01			
Platelet crit	-0.0049	-0.94	3.46E-01	0.0141	2.61	8.99E-03	0.0034	0.55	5.81E-01			
Mean platelet volume	0.0069	1.31	1.90E-01	0.0073	1.36	1.73E-01	0.0079	1.29	1.97E-01			

Platelet distribution width	0.0070	1.33	1.84E-01	0.0090	1.67	9.51E-02	0.0075	1.26	2.07E-01			
Neutrophill count	-0.0133	-2.55	1.08E-02	0.0152	2.82	4.76E-03	0.0075	1.20	2.28E-01			
Basophil count	-0.0019	-0.37	7.14E-01	0.0127	2.36	1.81E-02	0.0059	0.91	3.64E-01			
Nucleated red blood cell count	0.0055	1.04	2.96E-01	0.0026	0.47	6.37E-01	-0.0012	-0.19	8.46E-01			
Reticulocyte count	-0.0102	-1.95	5.16E-02	-0.0054	-0.99	3.21E-01	-0.0068	-1.10	2.70E-01			
Mean reticulocyte volume	0.0057	1.09	2.75E-01	0.0047	0.87	3.83E-01	0.0064	1.06	2.90E-01			
Mean sphered cell volume	0.0057	1.09	2.75E-01	0.0131	2.44	1.48E-02	0.0091	1.51	1.31E-01			
Immature reticulocyte fraction	-0.0011	-0.21	8.33E-01	-0.0009	-0.17	8.61E-01	0.0014	0.22	8.25E-01			
High light scatter reticulocyte count	-0.0088	-1.68	9.31E-02	-0.0035	-0.65	5.15E-01	-0.0024	-0.38	7.01E-01			
Lymphocyte count	-0.0043	-0.83	4.09E-01	0.0323	5.99	2.16E-09	0.0108	1.73	8.31E-02			
Monocyte count	-0.0023	-0.44	6.59E-01	0.0161	3.00	2.74E-03	0.0036	0.58	5.65E-01			
Eosinophil count	-0.0033	-0.62	5.33E-01	0.0180	3.33	8.60E-04	0.0027	0.42	6.72E-01			
Cooked vegetable intake	0.0005	0.09	9.26E-01	0.0211	3.90	9.48E-05	0.0037	0.63	5.31E-01			
Raw vegetable intake	0.0003	0.06	9.52E-01	0.0174	3.23	1.25E-03	0.0060	1.00	3.18E-01			
Fresh fruit intake	0.0026	0.50	6.18E-01	0.0127	2.37	1.80E-02	0.0065	1.05	2.92E-01			
Dried fruit intake	0.0105	2.00	4.56E-02	0.0112	2.09	3.68E-02	-0.0002	-0.03	9.79E-01			
Bread intake	-0.0054	-1.04	2.99E-01	0.0210	3.90	9.44E-05	0.0071	1.13	2.58E-01			
Cereal intake	0.0061	1.16	2.46E-01	-0.0083	-1.54	1.23E-01	-0.0046	-0.73	4.64E-01			
Tea intake	-0.0075	-1.43	1.51E-01	0.0301	5.59	2.24E-08	0.0071	1.13	2.58E-01			
Coffee intake	0.0029	0.55	5.82E-01	-0.0094	-1.73	8.28E-02	-0.0073	-1.15	2.51E-01			
Water intake	0.0010	0.18	8.54E-01	0.0157	2.92	3.52E-03	0.0075	1.21	2.25E-01			
Oily fish intake	0.0018	0.68	4.94E-01	0.0112	4.20	2.68E-05	0.0025	0.79	4.29E-01			
Non-oily fish intake	0.0017	0.69	4.88E-01	0.0053	2.08	3.75E-02	0.0017	0.58	5.63E-01			
Processed meat intake	-0.0086	-3.33	8.64E-04	-0.0027	-1.01	3.10E-01	-0.0032	-1.04	3.01E-01			
Poultry intake	-0.0046	-2.37	1.77E-02	-0.0041	-2.06	3.94E-02	0.0027	1.17	2.41E-01			
Beef intake	0.0011	0.41	6.80E-01	-0.0045	-1.68	9.33E-02	-0.0034	-1.09	2.75E-01			
Lamb intake	0.0010	0.45	6.51E-01	0.0056	2.43	1.52E-02	-0.0002	-0.06	9.54E-01			
Pork intake	-0.0011	-0.48	6.32E-01	-0.0077	-3.36	7.66E-04	0.0007	0.26	7.95E-01			
Cheese intake	-0.0010	-0.53	5.96E-01	-0.0022	-1.12	2.62E-01	-0.0056	-2.44	1.47E-02			
Salt added to food	-0.0027	-1.04	2.99E-01	0.0097	3.70	2.14E-04	0.0032	1.04	3.00E-01			
Milk intake	-0.0002	-0.20	8.39E-01	-0.0005	-0.59	5.53E-01	-0.0027	-2.63	8.47E-03			
Spread type (Butter)	-0.0029	-1.14	2.55E-01	0.0051	1.96	4.98E-02	-0.0030	-0.99	3.23E-01			
Spread type (Benecol)	-0.0004	-1.11	2.66E-01	0.0009	2.43	1.52E-02	-0.0006	-1.31	1.90E-01			
Spread type (Other)	-0.0007	-0.26	7.98E-01	-0.0109	-4.04	5.39E-05	-0.0004	-0.13	8.93E-01			
Variation in diet	-0.0010	-0.39	6.95E-01	0.0028	1.09	2.78E-01	0.0017	0.57	5.71E-01			
Vitamin A	-0.0003	-0.45	6.55E-01	0.0006	0.80	4.24E-01	-0.0012	-1.45	1.46E-01			
Vitamin B	0.0006	0.58	5.62E-01	0.0018	1.75	7.99E-02	0.0004	0.38	7.07E-01			
Vitamin C	0.0012	0.82	4.12E-01	0.0052	3.52	4.34E-04	0.0012	0.70	4.84E-01			
Vitamin D (Diet)	-0.0002	-0.22	8.26E-01	0.0024	2.40	1.64E-02	-0.0029	-2.56	1.04E-02			
Vitamin E	-0.0002	-0.19	8.48E-01	0.0027	2.97	2.95E-03	-0.0010	-0.95	3.43E-01			
Folic acid	0.0011	1.70	8.95E-02	0.0019	2.72	6.51E-03	0.0006	0.74	4.60E-01			
Multivitamins	0.0007	0.33	7.43E-01	0.0074	3.30	9.80E-04	0.0001	0.02	9.81E-01			

Fish oil	0.0020	0.81	4.19E-01	-0.0007	-0.26	7.94E-01	0.0033	1.14	2.56E-01			
Glucosamine	0.0009	0.42	6.77E-01	-0.0039	-1.81	7.05E-02	-0.0047	-1.84	6.61E-02			
Calcium (Diet)	-0.0005	-0.38	7.01E-01	0.0018	1.35	1.76E-01	-0.0011	-0.75	4.53E-01			
Zinc	0.0004	0.39	6.95E-01	0.0053	4.84	1.31E-06	0.0010	0.81	4.17E-01			
Iron	0.0009	0.95	3.43E-01	0.0011	1.22	2.23E-01	0.0010	0.96	3.38E-01			
Selenium	0.0014	1.69	9.15E-02	0.0024	2.82	4.88E-03	0.0015	1.44	1.50E-01			
Maternal smoking around birth	-0.0029	-1.19	2.36E-01	0.0086	3.38	7.29E-04	0.0062	2.08	3.76E-02			
Age first had sexual intercourse	0.0035	0.67	5.02E-01	-0.0212	-3.94	8.00E-05	-0.0107	-1.74	8.15E-02			
Ever had same-sex intercourse	0.0028	2.55	1.07E-02	0.0037	3.26	1.10E-03	0.0002	0.14	8.85E-01			
Comparative body size at age 10 (Thinner)	0.0018	0.74	4.60E-01	0.0135	5.32	1.03E-07	-0.0007	-0.22	8.24E-01			
Comparative body size at age 10 (Plumper)	-0.0053	-2.87	4.13E-03	-0.0020	-1.06	2.89E-01	-0.0011	-0.50	6.14E-01			
Comparative height size at age 10 (Shorter)	0.0000	-0.01	9.90E-01	0.0054	2.49	1.26E-02	0.0015	0.60	5.49E-01			
Comparative height size at age 10 (Taller)	0.0032	1.38	1.68E-01	0.0037	1.56	1.20E-01	-0.0003	-0.11	9.12E-01			
The overall state of health	-0.0008	-0.45	6.55E-01	-0.0082	-4.42	1.01E-05	-0.0085	-4.00	6.23E-05			
Long-standing illness	-0.0010	-0.48	6.29E-01	0.0034	1.54	1.22E-01	0.0064	2.50	1.24E-02			
Creatinine in urine	-0.0032	-0.60	5.46E-01	0.0041	0.76	4.46E-01	0.0049	0.81	4.15E-01			
Potassium in urine	-0.0043	-0.82	4.13E-01	0.0068	1.26	2.08E-01	0.0062	1.01	3.10E-01			
Sodium in urine	-0.0095	-1.81	7.06E-02	0.0003	0.05	9.62E-01	0.0103	1.68	9.32E-02			
Mouth ulcers	-0.0017	-1.05	2.93E-01	0.0022	1.35	1.76E-01	0.0042	2.23	2.60E-02			
Painful gums	-0.0012	-1.47	1.41E-01	0.0015	1.85	6.45E-02	0.0009	0.92	3.59E-01			
Bleeding gums	0.0011	0.63	5.31E-01	0.0054	2.90	3.74E-03	0.0017	0.80	4.24E-01			
Loose teeth	-0.0006	-0.65	5.18E-01	0.0033	3.55	3.81E-04	0.0009	0.85	3.96E-01			
Toothache	0.0001	0.07	9.48E-01	0.0036	3.47	5.20E-04	0.0013	1.06	2.90E-01			
Dentures	-0.0016	-1.08	2.80E-01	0.0003	0.17	8.63E-01	0.0029	1.60	1.11E-01			
Duration of walks	0.0027	0.52	6.00E-01	0.0023	0.43	6.68E-01	0.0034	0.55	5.81E-01			
Slow pace	-0.0003	-0.37	7.09E-01	0.0021	2.58	9.76E-03	0.0007	0.78	4.38E-01			
Brisk pace	0.0011	0.43	6.67E-01	-0.0056	-2.07	3.89E-02	-0.0056	-1.79	7.42E-02			
IPAQ activity group (moderate)	-0.0016	-0.62	5.38E-01	-0.0033	-1.21	2.24E-01	-0.0074	-2.36	1.85E-02			
IPAQ activity group (high)	0.0006	0.24	8.13E-01	0.0029	1.11	2.66E-01	0.0071	2.32	2.03E-02			
Summed minutes activity	-0.0007	-0.14	8.88E-01	0.0122	2.26	2.36E-02	0.0107	1.73	8.36E-02			
MET minutes per week for walking	0.0070	1.33	1.82E-01	0.0024	0.45	6.55E-01	0.0025	0.41	6.85E-01			
MET minutes per week for moderate activity	-0.0076	-1.45	1.47E-01	0.0198	3.68	2.32E-04	0.0162	2.58	9.81E-03			
MET minutes per week for vigorous activity	0.0021	0.40	6.92E-01	0.0128	2.37	1.77E-02	0.0089	1.42	1.56E-01			
Summed MET minutes per week for all activity	0.0022	0.43	6.70E-01	0.0156	2.89	3.85E-03	0.0086	1.40	1.62E-01			
Sleep duration	0.0016	0.74	4.58E-01	-0.0006	-0.28	7.76E-01	-0.0047	-1.83	6.74E-02			

Getting up in morning	-0.0032	-1.59	1.11E-01	-0.0138	-6.79	1.15E-11	-0.0052	-2.21	2.73E-02			
Chronotype morning	0.0000	-0.02	9.85E-01	-0.0133	-5.07	3.91E-07	-0.0018	-0.58	5.62E-01			
Nap during day	0.0009	0.93	3.53E-01	0.0032	3.22	1.28E-03	0.0001	0.07	9.48E-01			
Sleeplessness	0.0020	0.90	3.66E-01	-0.0015	-0.63	5.26E-01	0.0049	1.83	6.66E-02			
Snoring	-0.0080	-3.23	1.25E-03	-0.0004	-0.17	8.62E-01	-0.0036	-1.20	2.29E-01			
Daytime dozing	0.0004	0.48	6.29E-01	0.0005	0.61	5.40E-01	-0.0002	-0.29	7.75E-01			
Alcohol intake frequency.	0.0025	1.12	2.65E-01	-0.0091	-4.03	5.51E-05	-0.0087	-3.36	7.79E-04			
Smoking status	-0.0025	-1.00	3.17E-01	0.0175	6.68	2.43E-11	0.0111	3.65	2.65E-04			
Alcohol drinker status	0.0002	0.28	7.83E-01	-0.0013	-1.57	1.18E-01	-0.0005	-0.63	5.29E-01			
Nitrogen oxides air pollution	0.0007	0.14	8.89E-01	0.0183	3.40	6.74E-04	0.0058	0.96	3.36E-01			
pm10	-0.0008	-0.15	8.84E-01	0.0159	2.96	3.12E-03	0.0083	1.37	1.72E-01			
pm2.5	-0.0005	-0.10	9.23E-01	0.0174	3.23	1.23E-03	0.0121	2.00	4.56E-02			
Inverse distance to the nearest major road	0.0012	0.23	8.16E-01	-0.0031	-0.57	5.68E-01	-0.0005	-0.07	9.41E-01			
Noise pollution	0.0022	0.43	6.68E-01	0.0116	2.15	3.16E-02	0.0101	1.66	9.66E-02			
Greenspace percentage	-0.0017	-0.33	7.42E-01	-0.0148	-2.74	6.17E-03	0.0040	0.63	5.31E-01			
Domestic garden percentage	0.0104	1.99	4.61E-02	-0.0030	-0.56	5.75E-01	-0.0112	-1.77	7.68E-02			
Water percentage	-0.0034	-0.64	5.23E-01	-0.0001	-0.03	9.80E-01	0.0025	0.40	6.86E-01			
Natural environment percentage	0.0005	0.09	9.29E-01	-0.0157	-2.90	3.68E-03	0.0000	0.00	9.97E-01			
Traffic intensity on the nearest major road	0.0025	0.47	6.40E-01	0.0116	2.15	3.15E-02	0.0055	0.92	3.58E-01			
Pulse rate	0.0034	0.65	5.14E-01	0.0039	0.73	4.67E-01	0.0067	1.09	2.77E-01			
Hearing difficulty with background noise	-0.0019	-0.78	4.35E-01	0.0114	4.45	8.77E-06	0.0090	3.00	2.66E-03			
Forced vital capacity	0.0049	0.94	3.49E-01	-0.0006	-0.11	9.13E-01	-0.0109	-1.76	7.91E-02			
Forced expiratory volume in 1-second	0.0063	1.20	2.29E-01	-0.0069	-1.27	2.03E-01	-0.0084	-1.35	1.77E-01			
Peak expiratory flow	0.0003	0.05	9.60E-01	-0.0106	-1.96	5.01E-02	-0.0037	-0.60	5.47E-01			
Diastolic blood pressure	-0.0039	-0.74	4.58E-01	0.0133	2.47	1.34E-02	0.0046	0.75	4.51E-01			
Systolic blood pressure	-0.0010	-0.20	8.41E-01	0.0075	1.39	1.65E-01	0.0019	0.31	7.57E-01			
Hand grip strength	-0.0008	-0.14	8.85E-01	-0.0032	-0.59	5.54E-01	-0.0045	-0.73	4.63E-01			
Weight	-0.0105	-2.00	4.56E-02	-0.0132	-2.46	1.40E-02	0.0084	1.36	1.75E-01			
Body fat percentage	-0.0073	-1.40	1.63E-01	0.0014	0.26	7.92E-01	0.0060	0.96	3.38E-01			
Whole body fat mass	-0.0115	-2.20	2.80E-02	-0.0088	-1.63	1.03E-01	0.0066	1.05	2.92E-01			
Whole body fat-free mass	-0.0069	-1.31	1.90E-01	-0.0150	-2.79	5.24E-03	0.0085	1.39	1.65E-01			
Whole body water mass	-0.0066	-1.26	2.09E-01	-0.0148	-2.74	6.09E-03	0.0088	1.43	1.52E-01			
Body mass index	-0.0122	-2.33	2.00E-02	-0.0071	-1.32	1.86E-01	0.0149	2.41	1.61E-02			
Basal metabolic rate	-0.0073	-1.39	1.64E-01	-0.0141	-2.62	8.73E-03	0.0089	1.44	1.49E-01			
Impedance of whole body	0.0026	0.49	6.25E-01	-0.0074	-1.38	1.68E-01	-0.0048	-0.77	4.40E-01			
Impedance of leg	0.0094	1.80	7.15E-02	0.0277	5.14	2.77E-07	-0.0018	-0.30	7.66E-01			
Impedance of arm	0.0133	2.55	1.08E-02	0.0249	4.61	3.97E-06	-0.0118	-1.93	5.32E-02			
Leg fat percentage	-0.0098	-1.87	6.20E-02	0.0054	1.01	3.12E-01	0.0129	2.08	3.73E-02			
Arm fat percentage	-0.0084	-1.61	1.07E-01	0.0010	0.19	8.53E-01	0.0052	0.83	4.07E-01			
Mood swings	-0.0035	-1.35	1.77E-01	0.0152	5.77	8.14E-09	0.0171	5.55	2.90E-08			

Miserableness	-0.0045	-1.76	7.79E-02	0.0076	2.89	3.89E-03	0.0183	5.95	2.77E-09			
Irritability	-0.0024	-1.03	3.03E-01	0.0133	5.50	3.90E-08	0.0121	4.29	1.76E-05			
Sensitivity	-0.0030	-1.14	2.56E-01	0.0143	5.33	9.88E-08	0.0153	4.86	1.19E-06			
Fed-up feelings	-0.0043	-1.73	8.32E-02	0.0055	2.17	3.03E-02	0.0142	4.75	2.06E-06			
Nervous feelings	-0.0022	-1.06	2.91E-01	0.0169	7.84	4.66E-15	0.0099	3.93	8.66E-05			
Worrier	-0.0012	-0.45	6.55E-01	0.0161	5.97	2.39E-09	0.0079	2.51	1.22E-02			
Tense'	-0.0013	-0.70	4.82E-01	0.0183	9.69	0.00E+0 0	0.0074	3.36	7.79E-04			
Worry too long after embarrassment	-0.0036	-1.37	1.71E-01	0.0064	2.38	1.73E-02	0.0099	3.15	1.62E-03			
Suffer from 'nerves'	-0.0013	-0.67	5.02E-01	0.0068	3.29	1.02E-03	0.0094	3.87	1.10E-04			
Loneliness, isolation	-0.0020	-1.13	2.60E-01	0.0099	5.28	1.28E-07	0.0095	4.41	1.05E-05			
Guilty feelings	-0.0022	-0.95	3.43E-01	0.0152	6.34	2.33E-10	0.0094	3.37	7.66E-04			
Risk taking	-0.0011	-0.48	6.34E-01	0.0250	10.40	0.00E+0 0	0.0014	0.52	6.05E-01			
Frequency of depressed mood	-0.0006	-0.65	5.18E-01	0.0041	4.46	8.19E-06	0.0016	1.53	1.27E-01			
Frequency of unenthusiasm	-0.0002	-0.19	8.51E-01	0.0048	5.23	1.70E-07	0.0020	1.97	4.89E-02			
Frequency of tenseness	-0.0015	-1.71	8.67E-02	0.0034	3.86	1.15E-04	0.0021	2.14	3.27E-02			
Frequency of tiredness	-0.0011	-0.76	4.48E-01	0.0066	4.44	9.20E-06	0.0057	3.33	8.64E-04			
Able to confide	0.0017	0.78	4.35E-01	0.0018	0.80	4.23E-01	-0.0070	-2.66	7.90E-03			
Townsend deprivation index	-0.0064	-1.21	2.24E-01	0.0322	5.98	2.24E-09	0.0112	1.81	7.07E-02			
Qualifications	0.0105	4.15	3.33E-05	0.0015	0.57	5.67E-01	-0.0088	-2.91	3.64E-03			
Current employment status	-0.0011	-1.03	3.05E-01	-0.0026	-2.35	1.86E-02	-0.0016	-1.22	2.23E-01			
Average total household income before tax(18,000 to 30,999)	-0.0086	-4.02	5.75E-05	0.0017	0.77	4.43E-01	0.0002	0.08	9.35E-01			
Average total household income before tax(31,000 to 51,999)	0.0046	1.89	5.93E-02	-0.0029	-1.16	2.45E-01	0.0044	1.49	1.35E-01			
Average total household income before tax(52,000 to 100,000)	0.0033	1.37	1.71E-01	-0.0058	-2.36	1.84E-02	-0.0014	-0.47	6.36E-01			
Average total household income before tax(Greater than 100,000)	0.0025	1.83	6.65E-02	-0.0007	-0.50	6.15E-01	-0.0047	-2.83	4.60E-03			
Live with husband, wife or partner	0.0028	1.29	1.98E-01	-0.0109	-4.85	1.27E-06	-0.0043	-1.67	9.52E-02			
Live with son and/or daughter	-0.0006	-0.24	8.14E-01	0.0084	3.18	1.45E-03	-0.0005	-0.15	8.77E-01			
Live with brother and/or sister	-0.0004	-1.16	2.46E-01	0.0006	1.76	7.87E-02	0.0001	0.44	6.57E-01			
Live with mother and/or father	-0.0003	-0.42	6.76E-01	0.0004	0.52	6.06E-01	0.0017	2.17	3.00E-02			
Live with grandchild	-0.0001	-0.31	7.57E-01	0.0009	2.27	2.32E-02	0.0002	0.35	7.23E-01			
Live with other related	0.0007	1.67	9.56E-02	0.0004	0.97	3.32E-01	-0.0005	-1.02	3.09E-01			
Live with other unrelated	0.0008	1.18	2.36E-01	-0.0002	-0.26	7.93E-01	0.0009	1.10	2.73E-01			

Supplementary table 7: Baseline characteristics and differences of participants in the two subgroups in MRI Group.

Trait name	subgroup 1 (n=8455)		subgroup 2 (n=26740)		t value	p value	Cluster feature	domain
	mean/count	std/percent	mean/count	std/percent				
Age	54.81	7.37	54.75	7.54	0.59	5.52E-01	FALSE	Covariates
Sex (male)	4073	48.17%	12669	47.38%	1.27	2.02E-01	FALSE	Covariates
Ethnic White	8174	96.68%	25913	96.91%	-1.06	2.90E-01	FALSE	Covariates
Ethnic Asian	106	1.25%	369	1.38%	-0.88	3.80E-01	FALSE	Covariates
Ethnic Black	62	0.73%	155	0.58%	1.57	1.16E-01	FALSE	Covariates
Ethnic Other	113	1.34%	303	1.13%	1.51	1.32E-01	FALSE	Covariates
Albumin	45.17	2.55	45.49	2.49	-9.98	0.00E+00	FALSE	Blood biomarkers
ApoA1	1.46	0.23	1.58	0.27	-39.49	0.00E+00	TRUE	Blood biomarkers
ApoB	1.07	0.23	1.02	0.22	18.13	0.00E+00	TRUE	Blood biomarkers
Urea	5.37	1.28	5.26	1.19	7.32	2.60E-13	FALSE	Blood biomarkers
Calcium	2.38	0.09	2.37	0.09	2.28	2.28E-02	FALSE	Blood biomarkers
Cholesterol	5.76	1.08	5.75	1.06	0.53	5.95E-01	TRUE	Blood biomarkers
Creatinine	73.85	15.25	71.61	13.23	13.10	0.00E+00	TRUE	Blood biomarkers
Cystatin C	0.92	0.14	0.85	0.11	44.80	0.00E+00	TRUE	Blood biomarkers
HDL	1.31	0.31	1.54	0.38	-49.96	0.00E+00	TRUE	Blood biomarkers
IGF-1	21.37	5.59	22.38	5.44	-14.86	0.00E+00	FALSE	Blood biomarkers
LDL	3.66	0.83	3.56	0.82	9.34	0.00E+00	TRUE	Blood biomarkers
Phosphate	1.15	0.16	1.16	0.16	-7.26	4.06E-13	TRUE	Blood biomarkers
Testosterone	6.01	5.56	6.57	6.27	-7.26	4.05E-13	FALSE	Blood biomarkers
Total protein	72.45	3.96	72.11	4.03	6.76	1.44E-11	FALSE	Blood biomarkers
Urate	333.71	78.32	292.07	73.57	44.65	0.00E+00	TRUE	Blood biomarkers
ALP	4.43	0.26	4.33	0.27	29.40	0.00E+00	TRUE	Blood biomarkers
ALT	3.23	0.45	3.01	0.41	40.59	0.00E+00	FALSE	Blood biomarkers
AST	3.28	0.27	3.23	0.25	14.11	0.00E+00	TRUE	Blood biomarkers
CRP	1.20	0.64	0.75	0.53	64.29	0.00E+00	TRUE	Blood biomarkers
GGT	3.53	0.58	3.26	0.55	38.70	0.00E+00	TRUE	Blood biomarkers
Glucose	1.81	0.17	1.77	0.10	29.29	0.00E+00	TRUE	Blood biomarkers
HbA1c	3.61	0.16	3.56	0.10	35.94	0.00E+00	TRUE	Blood biomarkers
Total bilirubin	2.23	0.35	2.29	0.36	-14.39	0.00E+00	FALSE	Blood biomarkers
Triglycerides	1.06	0.32	0.87	0.29	52.10	0.00E+00	FALSE	Blood biomarkers
Vitamin D	3.74	0.45	3.86	0.44	-22.66	0.00E+00	FALSE	Blood biomarkers
White blood cell count	7.25	2.26	6.33	1.52	42.57	0.00E+00	TRUE	Blood biomarkers
Red blood cell count	4.61	0.40	4.48	0.40	24.20	0.00E+00	FALSE	Blood biomarkers
Haemoglobin concentration	14.39	1.23	14.11	1.22	18.49	0.00E+00	FALSE	Blood biomarkers
Mean corpuscular volume	90.45	4.19	91.18	4.23	-14.03	0.00E+00	FALSE	Blood biomarkers
Mean corpuscular haemoglobin	31.28	1.73	31.50	1.75	-10.17	0.00E+00	FALSE	Blood biomarkers
Red blood cell distribution width	13.43	0.85	13.38	0.94	4.35	1.37E-05	TRUE	Blood biomarkers
Platelet count	257.30	59.76	248.04	55.14	13.19	0.00E+00	FALSE	Blood biomarkers

Platelet crit	0.24	0.05	0.23	0.04	15.67	0.00E+00	FALSE	Blood biomarkers
Mean platelet volume	9.36	1.11	9.33	1.06	2.00	4.58E-02	TRUE	Blood biomarkers
Platelet distribution width	16.51	0.52	16.47	0.51	5.74	9.32E-09	FALSE	Blood biomarkers
Neutrophill count	4.40	1.38	3.85	1.21	35.50	0.00E+00	TRUE	Blood biomarkers
Basophill count	0.04	0.08	0.03	0.03	18.63	0.00E+00	TRUE	Blood biomarkers
Nucleated red blood cell count	0.00	0.02	0.00	0.02	-0.49	6.24E-01	FALSE	Blood biomarkers
Reticulocyte count	0.07	0.05	0.05	0.02	44.09	0.00E+00	TRUE	Blood biomarkers
Mean reticulocyte volume	104.81	7.44	105.73	7.24	-10.09	0.00E+00	FALSE	Blood biomarkers
Mean sphered cell volume	81.72	4.85	82.92	4.96	-19.34	0.00E+00	FALSE	Blood biomarkers
Immature reticulocyte fraction	0.31	0.06	0.28	0.06	44.97	0.00E+00	TRUE	Blood biomarkers
High light scatter reticulocyte count	0.02	0.01	0.01	0.01	62.93	0.00E+00	TRUE	Blood biomarkers
Lymphocyte count	1.11	0.21	1.03	0.19	33.46	0.00E+00	TRUE	Blood biomarkers
Monocyte count	0.40	0.12	0.36	0.10	27.60	0.00E+00	TRUE	Blood biomarkers
Eosinophill count	0.17	0.11	0.15	0.10	18.52	0.00E+00	FALSE	Blood biomarkers
Cooked vegetable intake	2.61	1.65	2.65	1.77	-1.74	8.16E-02	FALSE	Diet
Raw vegetable intake	2.05	2.01	2.18	2.03	-5.01	5.55E-07	FALSE	Diet
Fresh fruit intake	2.13	1.47	2.28	1.45	-8.12	4.44E-16	FALSE	Diet
Dried fruit intake	0.65	1.13	0.98	1.74	-16.65	0.00E+00	TRUE	Diet
Bread intake	12.69	8.67	12.07	8.43	5.90	3.62E-09	FALSE	Diet
Cereal intake	4.40	2.68	4.88	2.71	-14.10	0.00E+00	TRUE	Diet
Tea intake	3.36	2.72	3.36	2.66	-0.01	9.95E-01	TRUE	Diet
Coffee intake	2.18	2.11	1.99	1.90	7.75	9.77E-15	FALSE	Diet
Water intake	2.56	2.16	2.59	2.12	-1.31	1.90E-01	FALSE	Diet
Oily fish intake	4433	52.43%	15193	56.82%	-7.08	1.42E-12	FALSE	Diet
Non-oily fish intake	5510	65.17%	17478	65.36%	-0.33	7.44E-01	FALSE	Diet
Processed meat intake	5527	65.37%	15145	56.64%	14.26	0.00E+00	FALSE	Diet
Poultry intake	7331	86.71%	22040	82.42%	9.25	0.00E+00	FALSE	Diet
Beef intake	3948	46.69%	11042	41.29%	8.76	0.00E+00	FALSE	Diet
Lamb intake	2171	25.68%	6152	23.01%	5.04	4.71E-07	FALSE	Diet
Pork intake	2259	26.72%	6055	22.64%	7.69	1.47E-14	TRUE	Diet
Cheese intake	7004	82.84%	22450	83.96%	-2.43	1.53E-02	FALSE	Diet
Salt added to food	3647	43.13%	10214	38.20%	8.11	5.55E-16	FALSE	Diet
Milk intake	8211	97.11%	25960	97.08%	0.15	8.82E-01	FALSE	Diet
Spread type (Butter)	3283	38.83%	9962	37.26%	2.60	9.21E-03	TRUE	Diet
Spread type (Benecol)	37	0.44%	141	0.53%	-1.01	3.11E-01	FALSE	Diet
Spread type (Other)	4310	50.98%	13396	50.10%	1.41	1.59E-01	FALSE	Diet
Variation in diet	5911	69.91%	16707	62.48%	12.46	0.00E+00	FALSE	Diet
Vitamin A	111	1.31%	516	1.93%	-3.74	1.86E-04	FALSE	Diet
Vitamin B	261	3.09%	1043	3.90%	-3.45	5.56E-04	FALSE	Diet
Vitamin C	587	6.94%	2346	8.77%	-5.31	1.10E-07	FALSE	Diet
Vitamin D (Diet)	151	1.79%	1094	4.09%	-10.02	0.00E+00	FALSE	Diet
Vitamin E	172	2.03%	840	3.14%	-5.31	1.09E-07	FALSE	Diet

Folic acid	117	1.38%	478	1.79%	-2.51	1.21E-02	FALSE	Diet
Multivitamins	1715	20.28%	6169	23.07%	-5.36	8.44E-08	FALSE	Diet
Fish oil	2366	27.98%	8660	32.39%	-7.61	2.73E-14	FALSE	Diet
Glucosamine	1615	19.10%	5649	21.13%	-4.01	6.08E-05	FALSE	Diet
Calcium (Diet)	90	1.06%	2150	8.04%	-23.08	0.00E+00	TRUE	Diet
Zinc	225	2.66%	1290	4.82%	-8.55	0.00E+00	FALSE	Diet
Iron	155	1.83%	952	3.56%	-7.94	2.11E-15	FALSE	Diet
Selenium	155	1.83%	769	2.88%	-5.23	1.72E-07	FALSE	Diet
Maternal smoking around birth	3138	37.11%	8504	31.80%	9.06	0.00E+00	TRUE	Early life factors
Age first had sexual intercourse	18.83	3.56	19.51	3.79	-14.43	0.00E+00	TRUE	Early life factors
Ever had same-sex intercourse	421	4.98%	1254	4.69%	1.09	2.75E-01	FALSE	Early life factors
Comparative body size at age 10 (Thinner)	2402	28.41%	9418	35.22%	-11.58	0.00E+00	FALSE	Early life factors
Comparative body size at age 10 (Plumper)	1935	22.89%	3283	12.28%	24.12	0.00E+00	TRUE	Early life factors
Comparative height size at age 10 (Shorter)	1566	18.52%	5667	21.19%	-5.30	1.16E-07	FALSE	Early life factors
Comparative height size at age 10 (Taller)	2409	28.49%	6877	25.72%	5.05	4.52E-07	FALSE	Early life factors
The overall state of health	6144	72.67%	24260	90.73%	-43.32	0.00E+00	TRUE	General health
Long-standing illness	2647	31.31%	4690	17.54%	27.45	0.00E+00	TRUE	General health
Creatinine in urine	9.02	0.64	8.79	0.68	27.03	0.00E+00	FALSE	General health
Potassium in urine	4.08	0.54	3.98	0.57	13.48	0.00E+00	FALSE	General health
Sodium in urine	4.29	0.58	4.10	0.60	26.41	0.00E+00	TRUE	General health
Mouth ulcers	798	9.44%	2770	10.36%	-2.45	1.45E-02	FALSE	General health
Painful gums	249	2.95%	587	2.20%	3.95	7.93E-05	FALSE	General health
Bleeding gums	1392	16.46%	3456	12.92%	8.24	2.22E-16	FALSE	General health
Loose teeth	363	4.29%	707	2.64%	7.71	1.33E-14	FALSE	General health
Toothache	417	4.93%	961	3.59%	5.53	3.19E-08	FALSE	General health
Dentures	1033	12.22%	2240	8.38%	10.62	0.00E+00	FALSE	General health
Duration of walks	3.55	0.91	3.61	0.85	-5.96	2.56E-09	FALSE	Lifestyle
Slow pace	774	9.15%	4	0.01%	51.68	0.00E+00	TRUE	Lifestyle
Brisk pace	2751	32.54%	15288	57.17%	-40.41	0.00E+00	TRUE	Lifestyle
IPAQ activity group (moderate)	3785	44.77%	11880	44.43%	0.55	5.85E-01	FALSE	Lifestyle
IPAQ activity group (high)	2816	33.31%	11111	41.55%	-13.55	0.00E+00	FALSE	Lifestyle
Summed minutes activity	4.36	1.06	4.55	0.86	-16.98	0.00E+00	FALSE	Lifestyle
MET minutes per week for walking	6.07	1.65	6.27	1.39	-11.49	0.00E+00	FALSE	Lifestyle
MET minutes per week for moderate activity	5.07	2.61	5.52	2.33	-14.93	0.00E+00	FALSE	Lifestyle
MET minutes per week for vigorous activity	3.76	3.22	4.56	3.09	-20.61	0.00E+00	FALSE	Lifestyle
Summed MET minutes per week for all activity	7.01	1.53	7.33	1.22	-19.74	0.00E+00	FALSE	Lifestyle
Sleep duration	6312	74.65%	21260	79.51%	-9.45	0.00E+00	FALSE	Lifestyle
Getting up in morning	6834	80.83%	22298	83.39%	-5.44	5.48E-08	FALSE	Lifestyle
Chronotype morning	5017	59.34%	16902	63.21%	-6.40	1.53E-10	FALSE	Lifestyle
Nap during day	412	4.87%	861	3.22%	7.10	1.27E-12	FALSE	Lifestyle
Sleeplessness	2218	26.23%	6082	22.74%	6.59	4.48E-11	FALSE	Lifestyle
Snoring	4221	49.92%	8060	30.14%	33.80	0.00E+00	TRUE	Lifestyle

Daytime dozing	190	2.25%	497	1.86%	2.25	2.44E-02	FALSE	Lifestyle
Alcohol intake frequency.	6009	71.07%	21125	79.00%	-15.18	0.00E+00	FALSE	Lifestyle
Smoking status	3842	45.44%	9701	36.28%	15.14	0.00E+00	TRUE	Lifestyle
Alcohol drinker status	8215	97.16%	26138	97.75%	-3.08	2.07E-03	FALSE	Lifestyle
Nitrogen oxides air pollution	3.44	0.27	3.43	0.29	3.22	1.27E-03	TRUE	Local environment
pm10	18.90	1.78	18.85	1.92	1.90	5.77E-02	FALSE	Local environment
pm2.5	5.83	0.54	5.81	0.55	4.25	2.12E-05	TRUE	Local environment
Inverse distance to the nearest major road	5.85	1.07	5.86	1.07	-0.52	6.03E-01	FALSE	Local environment
Noise pollution	52.82	4.22	52.79	4.20	0.54	5.89E-01	FALSE	Local environment
Greenspace percentage	41.72	20.94	42.38	22.67	-2.39	1.70E-02	FALSE	Local environment
Domestic garden percentage	27.52	12.21	27.36	12.93	1.03	3.01E-01	FALSE	Local environment
Water percentage	1.08	2.36	1.11	2.65	-1.05	2.93E-01	FALSE	Local environment
Natural environment percentage	35.35	23.27	36.48	25.17	-3.65	2.60E-04	FALSE	Local environment
Traffic intensity on the nearest major road	9.80	0.60	9.77	0.60	3.81	1.40E-04	FALSE	Local environment
Pulse rate	71.11	11.06	66.54	10.09	35.48	0.00E+00	TRUE	Physical measurements
Hearing difficulty with background noise	3132.00	0.37	9233.00	0.35	4.22	2.42E-05	FALSE	Physical measurements
Forced vital capacity	3.71	0.97	3.90	0.99	-15.17	0.00E+00	TRUE	Physical measurements
Forced expiratory volume in 1-second	2.86	0.76	2.96	0.76	-10.89	0.00E+00	TRUE	Physical measurements
Peak expiratory flow	401.89	127.98	401.89	126.33	0.00	1.00E+00	TRUE	Physical measurements
Diastolic blood pressure	85.45	9.58	79.98	9.59	45.70	0.00E+00	TRUE	Physical measurements
Systolic blood pressure	139.87	17.29	133.12	17.48	31.06	0.00E+00	TRUE	Physical measurements
Hand grip strength	32.18	11.80	31.58	10.79	4.33	1.50E-05	TRUE	Physical measurements
Weight	88.47	14.77	72.41	12.16	100.32	0.00E+00	TRUE	Physical measurements
Body fat percentage	35.12	8.18	28.10	7.41	74.09	0.00E+00	TRUE	Physical

								measurements
Whole body fat mass	31.12	9.31	20.27	6.11	124.08	0.00E+00	TRUE	Physical measurements
Whole body fat-free mass	57.35	11.82	52.16	10.79	37.70	0.00E+00	FALSE	Physical measurements
Whole body water mass	41.98	8.62	38.15	7.89	38.08	0.00E+00	FALSE	Physical measurements
Body mass index	30.71	4.25	25.03	2.95	137.46	0.00E+00	TRUE	Physical measurements
Basal metabolic rate	7198.48	1401.09	6424.19	1236.90	48.55	0.00E+00	FALSE	Physical measurements
Impedance of whole body	33.30	11.53	32.71	10.59	4.36	1.29E-05	TRUE	Physical measurements
Impedance of leg	233.50	31.01	253.98	31.68	-52.06	0.00E+00	TRUE	Physical measurements
Impedance of arm	312.31	49.86	337.37	54.52	-37.60	0.00E+00	TRUE	Physical measurements
Leg fat percentage	34.71	10.63	28.84	9.79	47.07	0.00E+00	TRUE	Physical measurements
Arm fat percentage	34.40	10.66	26.15	7.99	75.94	0.00E+00	TRUE	Physical measurements
Mood swings	3724	44.04%	10343	38.68%	8.79	0.00E+00	FALSE	Psychosocial
Miserableness	3675	43.47%	10247	38.32%	8.44	0.00E+00	FALSE	Psychosocial
Irritability	2574	30.44%	7261	27.15%	5.88	4.19E-09	FALSE	Psychosocial
Sensitivity	4491	53.12%	13770	51.50%	2.60	9.33E-03	FALSE	Psychosocial
Fed-up feelings	3444	40.73%	8675	32.44%	14.02	0.00E+00	TRUE	Psychosocial
Nervous feelings	1576	18.64%	5423	20.28%	-3.29	9.86E-04	FALSE	Psychosocial
Worrier	4256	50.34%	14035	52.49%	-3.45	5.63E-04	FALSE	Psychosocial
Tense'	1191	14.09%	3898	14.58%	-1.12	2.63E-01	FALSE	Psychosocial
Worry too long after embarrassment	4036	47.74%	13025	48.71%	-1.56	1.18E-01	FALSE	Psychosocial
Suffer from 'nerves'	1559	18.44%	4764	17.82%	1.30	1.94E-01	FALSE	Psychosocial
Loneliness, isolation	1473	17.42%	3473	12.99%	10.24	0.00E+00	FALSE	Psychosocial
Guilty feelings	2412	28.53%	7249	27.11%	2.55	1.09E-02	FALSE	Psychosocial
Risk taking	2434	28.79%	7241	27.08%	3.07	2.16E-03	FALSE	Psychosocial
Frequency of depressed mood	370	4.38%	682	2.55%	8.60	0.00E+00	FALSE	Psychosocial
Frequency of unenthusiasm	376	4.45%	666	2.49%	9.26	0.00E+00	FALSE	Psychosocial
Frequency of tenseness	316	3.74%	671	2.51%	5.96	2.47E-09	FALSE	Psychosocial
Frequency of tiredness	1103	13.05%	1818	6.80%	18.23	0.00E+00	TRUE	Psychosocial
Able to confide	6300	74.51%	20876	78.07%	-6.80	1.04E-11	FALSE	Psychosocial
Townsend deprivation index	-1.72	2.77	-1.98	2.69	7.59	3.33E-14	TRUE	Socioeconomic
Qualifications	4688	55.45%	17599	65.82%	-17.32	0.00E+00	TRUE	Socioeconomic
Current employment status	8021	94.87%	25577	95.65%	-3.02	2.54E-03	FALSE	Socioeconomic
Average total household income before tax(18,000 to 30,999)	1938	22.92%	5537	20.71%	4.34	1.42E-05	FALSE	Socioeconomic

Average total household income before tax(31,000 to 51,999)	2963	35.04%	8515	31.84%	5.47	4.42E-08	FALSE	Socioeconomic
Average total household income before tax(52,000 to 100,000)	2492	29.47%	7968	29.80%	-0.57	5.69E-01	TRUE	Socioeconomic
Average total household income before tax(Greater than 100,000)	158	1.87%	2459	9.20%	-22.55	0.00E+00	TRUE	Socioeconomic
Live with husband, wife or partner	6373	75.38%	20950	78.35%	-5.72	1.09E-08	FALSE	Socioeconomic
Live with son and/or daughter	3292	38.94%	11195	41.87%	-4.77	1.81E-06	TRUE	Socioeconomic
Live with brother and/or sister	33	0.39%	91	0.34%	0.68	4.99E-01	FALSE	Socioeconomic
Live with mother and/or father	169	2.00%	445	1.66%	2.05	4.05E-02	FALSE	Socioeconomic
Live with grandchild	53	0.63%	131	0.49%	1.52	1.28E-01	FALSE	Socioeconomic
Live with other related	59	0.70%	156	0.58%	1.18	2.39E-01	FALSE	Socioeconomic
Live with other unrelated	148	1.75%	478	1.79%	-0.23	8.22E-01	FALSE	Socioeconomic

Supplementary table 8: The GMV differences between the two subgroups in MRI Group.

Region name	Subgroup 1		Subgroup 2		t value	p value
	mean	std	mean	std		
Total volume	662264.64	58816.18	667058.28	59705.07	-6.46	1.08E-10
Cortical volume	492993.98	47287.90	496668.60	48180.42	-6.14	8.35E-10
Caudal anterior cingulate	5322.40	927.37	5356.82	931.77	-2.96	3.04E-03
Caudal middle frontal	13641.59	2012.11	13722.25	2060.45	-3.16	1.61E-03
Cuneus	8361.29	1259.71	8364.86	1281.91	-0.22	8.23E-01
Entorhinal	3511.93	617.04	3521.54	621.15	-1.24	2.14E-01
Fusiform	17978.43	2296.05	18080.77	2285.42	-3.58	3.38E-04
Inferior parietal	27379.88	3653.25	27741.12	3678.90	-7.88	3.33E-15
Inferior temporal	25094.89	3112.39	25362.30	3140.50	-6.84	8.11E-12
Isthmus cingulate	5325.99	770.34	5324.73	776.72	0.13	8.96E-01
Lateral occipital	25402.28	3297.59	25445.65	3400.94	-1.03	3.03E-01
Lateral orbitofrontal	18291.80	1946.81	18465.90	1929.90	-7.22	5.50E-13
Lingual	13281.19	2073.30	13288.47	2120.92	-0.28	7.82E-01
Medial orbitofrontal	9832.20	1069.29	9952.82	1072.68	-9.02	0.00E+00
Middle temporal	28109.53	3523.10	28490.75	3574.24	-8.58	0.00E+00
Parahippocampal	4173.99	538.71	4208.38	539.23	-5.11	3.19E-07
Paracentral	9045.85	1116.51	9131.47	1120.68	-6.13	8.98E-10
Pars opercularis	9173.05	1272.28	9223.44	1281.80	-3.16	1.60E-03
Pars orbitalis	4565.32	596.65	4612.33	597.20	-6.31	2.81E-10
Pars triangularis	8656.41	1291.14	8708.19	1298.77	-3.20	1.38E-03
Pericalcarine	4462.72	845.24	4462.27	865.68	0.04	9.66E-01
Postcentral	22431.83	2710.79	22594.68	2761.43	-4.75	2.07E-06
Posterior cingulate	7190.43	953.52	7238.52	965.42	-4.00	6.24E-05
Precentral	27338.24	3068.51	27625.98	3147.15	-7.37	1.72E-13
Precuneus	21374.91	2628.13	21485.87	2645.84	-3.37	7.63E-04
Rostral anterior cingulate	6396.11	1018.93	6436.07	1023.50	-3.13	1.74E-03
Rostral middle frontal	23305.27	3303.66	23432.64	3365.28	-3.05	2.32E-03
Superior frontal	53671.42	6110.56	53900.94	6202.31	-2.98	2.92E-03
Superior parietal	22923.96	2975.86	23066.20	2969.96	-3.84	1.25E-04
Superior temporal	33505.16	3575.42	33821.72	3597.07	-7.06	1.66E-12
Supramarginal	21100.06	2900.93	21329.64	2942.40	-6.27	3.55E-10
Transverse temporal	2223.05	363.44	2231.88	357.62	-1.97	4.87E-02
Insula	12975.36	1364.51	13057.60	1353.09	-4.86	1.17E-06
Subcortical volume	55149.06	4811.95	55238.73	4817.96	-1.49	1.36E-01
Accumbens	888.83	160.86	891.42	162.40	-1.28	2.01E-01
Amygdala	3301.83	424.35	3294.45	424.74	1.39	1.64E-01
Caudate	6687.24	872.25	6687.50	851.87	-0.02	9.81E-01
Hippocampus	8070.75	792.87	8082.18	802.22	-1.14	2.52E-01

Putamen	9171.78	1079.33	9144.87	1059.66	2.03	4.28E-02
Thalamus	13625.92	1363.37	13660.34	1375.45	-2.01	4.44E-02
Pallidum	3987.73	443.74	4023.44	441.94	-6.47	9.88E-11
Lateral ventricle	26702.11	14696.86	26115.81	14119.75	3.30	9.85E-04
Cerebellum	111523.73	11934.83	112461.91	11758.21	-6.37	1.89E-10

Supplementary table 9: Joint explanation of variance with all 182 traits in regional GMV within Subgroup 1.

Region name	Full model	Blood biomarkers	Diet	Early life factors	General health	Lifestyle	Local environment	PRS	Physical measurements	Psychosocial	Socioeconomic
Total volume	6.37%	2.70%	0.80%	0.20%	0.34%	0.85%	0.12%	0.21%	1.43%	0.56%	0.53%
Cortical volume	5.93%	2.41%	0.82%	0.19%	0.25%	0.64%	0.08%	0.19%	1.25%	0.53%	0.41%
Caudal anterior cingulate	3.89%	1.04%	0.65%	0.22%	0.17%	0.41%	0.18%	0.09%	0.52%	0.48%	0.31%
Caudal middle frontal	4.09%	1.34%	0.87%	0.25%	0.16%	0.30%	0.31%	0.06%	0.47%	0.26%	0.38%
Cuneus	3.67%	1.25%	0.55%	0.04%	0.15%	0.32%	0.13%	0.23%	0.57%	0.29%	0.27%
Entorhinal	3.21%	0.83%	0.43%	0.16%	0.24%	0.42%	0.19%	0.08%	0.42%	0.29%	0.21%
Fusiform	4.22%	1.19%	0.54%	0.25%	0.22%	0.42%	0.11%	0.16%	1.13%	0.25%	0.33%
Inferior parietal	5.11%	1.73%	0.58%	0.30%	0.27%	0.40%	0.07%	0.12%	1.20%	0.54%	0.63%
Inferior temporal	4.30%	1.43%	0.33%	0.31%	0.17%	0.47%	0.11%	0.15%	0.85%	0.58%	0.22%
Isthmus cingulate	4.16%	1.00%	0.63%	0.26%	0.16%	0.38%	0.09%	0.35%	0.64%	0.35%	0.40%
Lateral occipital	4.24%	1.13%	0.50%	0.33%	0.11%	0.53%	0.08%	0.30%	0.76%	0.33%	0.28%
Lateral orbitofrontal	4.64%	1.73%	0.77%	0.16%	0.19%	0.43%	0.04%	0.12%	1.19%	0.22%	0.18%
Lingual	4.10%	1.24%	0.69%	0.28%	0.08%	0.33%	0.21%	0.21%	0.47%	0.24%	0.34%
Medial orbitofrontal	4.63%	1.62%	0.66%	0.32%	0.26%	0.44%	0.03%	0.10%	1.35%	0.56%	0.39%
Middle temporal	4.63%	1.82%	0.72%	0.26%	0.13%	0.41%	0.07%	0.11%	1.01%	0.53%	0.39%
Parahippocampal	3.80%	0.99%	0.67%	0.27%	0.07%	0.39%	0.19%	0.13%	0.62%	0.40%	0.38%
Paracentral	4.26%	1.16%	0.70%	0.15%	0.21%	0.58%	0.18%	0.12%	0.67%	0.38%	0.25%
Pars opercularis	4.04%	1.34%	0.62%	0.12%	0.11%	0.42%	0.11%	0.19%	0.79%	0.34%	0.21%
Pars orbitalis	4.10%	1.28%	0.70%	0.08%	0.11%	0.49%	0.09%	0.15%	0.78%	0.38%	0.42%
Pars triangularis	4.21%	1.28%	0.81%	0.30%	0.17%	0.44%	0.12%	0.10%	0.65%	0.28%	0.21%
Pericalcarine	3.46%	1.00%	0.47%	0.18%	0.11%	0.41%	0.21%	0.16%	0.31%	0.36%	0.23%
Postcentral	3.85%	1.27%	0.72%	0.18%	0.21%	0.35%	0.09%	0.06%	0.52%	0.50%	0.18%
Posterior cingulate	3.41%	1.11%	0.73%	0.15%	0.08%	0.27%	0.28%	0.08%	0.40%	0.48%	0.18%
Precentral	4.55%	1.39%	1.01%	0.17%	0.13%	0.41%	0.24%	0.07%	0.57%	0.39%	0.55%
Precuneus	4.43%	1.70%	0.62%	0.14%	0.22%	0.64%	0.15%	0.16%	0.36%	0.46%	0.25%
Rostral anterior cingulate	4.46%	1.46%	0.62%	0.07%	0.52%	0.41%	0.12%	0.33%	0.57%	0.49%	0.32%
Rostral middle frontal	4.37%	1.23%	1.22%	0.28%	0.18%	0.48%	0.12%	0.07%	0.46%	0.24%	0.25%
Superior frontal	4.89%	1.49%	0.92%	0.18%	0.09%	0.63%	0.14%	0.23%	0.99%	0.31%	0.33%
Superior parietal	4.06%	1.38%	0.44%	0.17%	0.31%	0.47%	0.13%	0.10%	0.55%	0.38%	0.19%
Superior temporal	4.97%	1.65%	0.71%	0.35%	0.19%	0.52%	0.18%	0.21%	0.88%	0.42%	0.36%
Supramarginal	5.09%	1.92%	0.87%	0.17%	0.24%	0.60%	0.15%	0.10%	0.89%	0.59%	0.24%
Transverse temporal	3.46%	0.89%	0.49%	0.19%	0.23%	0.47%	0.16%	0.11%	0.39%	0.42%	0.36%
Insula	4.63%	1.46%	0.86%	0.42%	0.11%	0.50%	0.19%	0.14%	0.58%	0.39%	0.31%
Subcortical volume	5.07%	2.00%	0.82%	0.09%	0.31%	0.48%	0.13%	0.27%	0.97%	0.28%	0.30%
Accumbens	5.09%	1.66%	0.75%	0.22%	0.25%	0.43%	0.13%	0.13%	1.37%	0.39%	0.41%
Amygdala	4.46%	1.95%	0.66%	0.29%	0.08%	0.29%	0.11%	0.07%	0.52%	0.30%	0.35%
Caudate	4.77%	1.20%	0.96%	0.29%	0.22%	0.50%	0.14%	0.25%	0.68%	0.57%	0.21%

Hippocampus	4.54%	1.57%	0.72%	0.12%	0.24%	0.27%	0.12%	0.11%	0.80%	0.27%	0.53%
Putamen	4.45%	1.45%	0.72%	0.28%	0.28%	0.44%	0.14%	0.26%	0.72%	0.30%	0.13%
Thalamus	4.16%	1.74%	0.81%	0.08%	0.36%	0.38%	0.14%	0.13%	0.66%	0.19%	0.41%
Pallidum	4.71%	1.66%	0.84%	0.13%	0.29%	0.38%	0.11%	0.21%	1.16%	0.38%	0.22%
Lateral ventricle	6.02%	2.14%	1.09%	0.57%	0.53%	0.42%	0.16%	0.10%	1.51%	0.36%	0.20%
Cerebellum	6.20%	1.55%	1.05%	0.58%	0.23%	0.75%	0.18%	0.44%	2.00%	0.35%	0.72%

Supplementary table 10: Joint explanation of variance with all 182 traits in regional GMV within Subgroup 2.

Region name	Full model	Blood biomarkers	Diet	Early life factors	General health	Lifestyle	Local environment	PRS	Physical measurements	Psychosocial	Socioeconomic
Total volume	4.55%	1.94%	0.70%	0.27%	0.12%	0.45%	0.04%	0.11%	1.17%	0.15%	0.33%
Cortical volume	3.69%	1.65%	0.54%	0.10%	0.09%	0.37%	0.04%	0.11%	0.84%	0.13%	0.19%
Caudal anterior cingulate	1.81%	0.58%	0.34%	0.11%	0.08%	0.15%	0.05%	0.07%	0.11%	0.13%	0.17%
Caudal middle frontal	1.79%	0.65%	0.33%	0.08%	0.06%	0.21%	0.04%	0.08%	0.33%	0.05%	0.14%
Cuneus	1.51%	0.64%	0.20%	0.04%	0.05%	0.08%	0.05%	0.07%	0.19%	0.11%	0.09%
Entorhinal	1.84%	0.43%	0.39%	0.16%	0.07%	0.17%	0.09%	0.07%	0.47%	0.06%	0.09%
Fusiform	2.11%	0.81%	0.27%	0.09%	0.06%	0.20%	0.07%	0.05%	0.44%	0.08%	0.13%
Inferior parietal	2.56%	0.70%	0.22%	0.51%	0.05%	0.16%	0.05%	0.14%	0.90%	0.07%	0.09%
Inferior temporal	1.75%	0.64%	0.26%	0.08%	0.05%	0.17%	0.02%	0.07%	0.44%	0.08%	0.08%
Isthmus cingulate	1.46%	0.47%	0.15%	0.08%	0.09%	0.07%	0.03%	0.05%	0.35%	0.14%	0.11%
Lateral occipital	1.78%	0.87%	0.20%	0.07%	0.06%	0.06%	0.05%	0.04%	0.41%	0.03%	0.07%
Lateral orbitofrontal	2.37%	0.81%	0.34%	0.09%	0.07%	0.25%	0.06%	0.04%	0.65%	0.13%	0.20%
Lingual	1.44%	0.56%	0.25%	0.10%	0.04%	0.10%	0.02%	0.06%	0.22%	0.06%	0.08%
Medial orbitofrontal	2.61%	0.72%	0.30%	0.18%	0.13%	0.40%	0.06%	0.13%	0.88%	0.30%	0.14%
Middle temporal	2.60%	0.82%	0.33%	0.39%	0.11%	0.21%	0.05%	0.14%	0.69%	0.07%	0.12%
Parahippocampal	1.74%	0.61%	0.25%	0.20%	0.12%	0.21%	0.05%	0.03%	0.23%	0.11%	0.15%
Paracentral	2.17%	0.92%	0.32%	0.02%	0.11%	0.19%	0.03%	0.15%	0.37%	0.13%	0.09%
Pars opercularis	1.79%	0.58%	0.23%	0.06%	0.13%	0.15%	0.05%	0.07%	0.45%	0.07%	0.07%
Pars orbitalis	1.82%	0.54%	0.37%	0.16%	0.08%	0.25%	0.06%	0.06%	0.30%	0.09%	0.14%
Pars triangularis	1.62%	0.44%	0.23%	0.08%	0.13%	0.29%	0.05%	0.03%	0.24%	0.16%	0.11%
Pericalcarine	1.50%	0.42%	0.26%	0.18%	0.08%	0.10%	0.04%	0.08%	0.12%	0.18%	0.08%
Postcentral	1.89%	0.65%	0.25%	0.13%	0.06%	0.24%	0.05%	0.07%	0.29%	0.13%	0.08%
Posterior cingulate	2.03%	0.69%	0.30%	0.06%	0.05%	0.20%	0.02%	0.13%	0.35%	0.13%	0.07%
Precentral	2.37%	0.89%	0.46%	0.17%	0.08%	0.31%	0.06%	0.08%	0.26%	0.13%	0.18%
Precuneus	2.34%	1.03%	0.33%	0.08%	0.10%	0.17%	0.06%	0.04%	0.38%	0.08%	0.18%
Rostral anterior cingulate	2.07%	0.74%	0.31%	0.03%	0.06%	0.13%	0.08%	0.16%	0.35%	0.19%	0.08%
Rostral middle frontal	2.12%	0.75%	0.37%	0.07%	0.06%	0.19%	0.05%	0.04%	0.51%	0.11%	0.09%
Superior frontal	2.74%	1.08%	0.56%	0.05%	0.09%	0.39%	0.05%	0.03%	0.43%	0.15%	0.15%
Superior parietal	2.07%	0.77%	0.39%	0.06%	0.06%	0.21%	0.08%	0.05%	0.36%	0.11%	0.11%
Superior temporal	2.55%	0.72%	0.38%	0.18%	0.06%	0.41%	0.03%	0.13%	0.58%	0.18%	0.13%
Supramarginal	2.28%	0.83%	0.20%	0.10%	0.06%	0.26%	0.03%	0.11%	0.65%	0.09%	0.13%
Transverse temporal	1.56%	0.61%	0.16%	0.06%	0.06%	0.20%	0.05%	0.03%	0.26%	0.11%	0.07%
Insula	2.43%	0.97%	0.36%	0.10%	0.12%	0.35%	0.04%	0.04%	0.23%	0.19%	0.12%
Subcortical volume	3.86%	1.46%	0.54%	0.10%	0.07%	0.23%	0.07%	0.43%	0.75%	0.18%	0.19%
Accumbens	3.08%	0.88%	0.30%	0.17%	0.03%	0.17%	0.06%	0.27%	0.98%	0.22%	0.23%

Amygdala	2.21%	0.84%	0.33%	0.03%	0.14%	0.22%	0.05%	0.11%	0.50%	0.12%	0.17%
Caudate	2.54%	0.45%	0.32%	0.16%	0.14%	0.13%	0.05%	0.42%	0.58%	0.27%	0.11%
Hippocampus	2.81%	1.13%	0.35%	0.06%	0.13%	0.22%	0.04%	0.14%	0.62%	0.12%	0.26%
Putamen	2.46%	0.64%	0.46%	0.06%	0.04%	0.15%	0.06%	0.33%	0.51%	0.08%	0.06%
Thalamus	3.22%	1.33%	0.47%	0.11%	0.09%	0.18%	0.06%	0.24%	0.67%	0.30%	0.13%
Pallidum	2.68%	1.20%	0.39%	0.16%	0.15%	0.18%	0.07%	0.12%	0.47%	0.11%	0.14%
Lateral ventricle	3.36%	1.12%	0.47%	0.19%	0.23%	0.27%	0.07%	0.09%	1.06%	0.24%	0.44%
Cerebellum	4.02%	1.02%	0.50%	0.77%	0.21%	0.41%	0.04%	0.12%	1.79%	0.16%	0.48%

Supplementary table 11: The differences in PRS for brain disorders between the two subgroups for both MRI Group and non-MRI Group.

PRS for brain disordersname	MRI Group						non-MRI Group					
	subtype 1 (n=8,455)		subtype 2 (n=26,740)		t value	p value	subtype 1 (n=155,009)		subtype 2 (n=303,413)		t value	p value
	mean	std	mean	std			mean	std	mean	std		
alzheimer's disease (AD)	0.03	0.97	0.04	0.99	-0.48	6.29E-01	0.03	0.99	0.06	1.00	-8.91	0.00
bipolar disorder (BD)	-0.24	1.05	-0.25	1.03	0.40	6.90E-01	-0.23	1.05	-0.22	1.04	-2.08	3.79E-02
ischaemic stroke (ISS)	0.03	0.92	-0.13	0.93	13.37	0.00	0.08	0.93	-0.07	0.93	51.54	0.00
multiple sclerosis (MS)	-0.06	1.02	-0.07	1.03	0.14	8.85E-01	-0.05	1.02	-0.06	1.03	1.14	2.52E-01
parkinson's disease (PD)	-0.16	1.03	-0.13	1.02	-1.68	9.39E-02	-0.16	1.02	-0.13	1.02	-10.28	0.00
schizophrenia (SCZ)	-0.32	1.01	-0.32	0.99	-0.11	9.13E-01	-0.32	1.02	-0.29	1.00	-9.93	0.00
major depressive disorder (MDD)	0.00	1.01	-0.04	1.00	3.19	1.44E-03	0.03	1.00	-0.01	1.00	12.21	0.00

Supplementary table 12: Baseline characteristics and differences of participants in the two subgroups in non-MRI Group.

Trait name	subgroup 1 (n=155,009)		subgroup 2 (n=303,413)		t value	p value	domain
	mean/ count	std/ percent	mean/ count	std/ percent			
Age	57.37	7.92	56.32	8.21	41.43	0	Covariates
Sex (male)	73110	47.17%	135139	44.54%	16.89	0	Covariates
Ethnic White	143762	92.74%	287155	94.64%	-25.61	0	Covariates
Ethnic Asian	4196	2.71%	6630	2.19%	11.01	0	Covariates
Ethnic Black	3665	2.36%	4111	1.35%	25.06	0	Covariates
Ethnic Other	3386	2.18%	5517	1.82%	8.50	0	Covariates
Albumin	44.76	2.68	45.41	2.59	-73.51	0	Blood biomarkers
ApoA1	1.45	0.24	1.58	0.27	-146.98	0	Blood biomarkers
ApoB	1.05	0.25	1.03	0.23	27.16	0	Blood biomarkers
Urea	5.60	1.68	5.32	1.25	61.40	0	Blood biomarkers
Calcium	2.38	0.10	2.38	0.09	-4.61	4.03E-06	Blood biomarkers
Cholesterol	5.58	1.21	5.74	1.11	-43.80	0	Blood biomarkers
Creatinine	74.71	25.22	71.11	14.58	59.09	0	Blood biomarkers
Cystatin C	0.98	0.24	0.87	0.13	193.35	0	Blood biomarkers
HDL	1.29	0.32	1.53	0.39	-191.43	0	Blood biomarkers
IGF-1	20.31	5.87	21.87	5.56	-84.88	0	Blood biomarkers
LDL	3.53	0.92	3.57	0.85	-13.54	0	Blood biomarkers
Phosphate	1.15	0.17	1.16	0.16	-27.11	0	Blood biomarkers
Testosterone	6.14	5.46	6.74	6.32	-29.34	0	Blood biomarkers
Total protein	72.76	4.16	72.42	4.11	24.55	0	Blood biomarkers
Urate	340.03	83.54	294.47	74.66	181.23	0	Blood biomarkers
ALP	4.47	0.27	4.37	0.27	118.75	0	Blood biomarkers
ALT	3.23	0.46	3.03	0.41	150.09	0	Blood biomarkers
AST	3.30	0.30	3.25	0.25	58.66	0	Blood biomarkers
CRP	1.35	0.68	0.83	0.57	261.62	0	Blood biomarkers
GGT	3.63	0.63	3.31	0.58	164.37	0	Blood biomarkers
Glucose	1.84	0.21	1.78	0.11	129.71	0	Blood biomarkers
HbA1c	3.67	0.20	3.57	0.11	196.85	0	Blood biomarkers
Total bilirubin	2.20	0.35	2.27	0.35	-58.70	0	Blood biomarkers
Triglycerides	1.09	0.33	0.89	0.30	193.01	0	Blood biomarkers
Vitamin D	3.69	0.47	3.86	0.45	-110.47	0	Blood biomarkers
White blood cell count	7.59	2.62	6.57	1.77	153.06	0	Blood biomarkers
Red blood cell count	4.58	0.43	4.48	0.41	75.28	0	Blood biomarkers
Haemoglobin concentration	14.29	1.30	14.11	1.21	45.05	0	Blood biomarkers
Mean corpuscular volume	90.63	4.87	91.38	4.49	-50.84	0	Blood biomarkers
Mean corpuscular haemoglobin	31.26	2.03	31.55	1.87	-47.42	0	Blood biomarkers

Red blood cell distribution width	13.63	1.06	13.43	0.95	62.68	0	Blood biomarkers
Platelet count	258.15	63.67	250.74	58.41	38.41	0	Blood biomarkers
Platelet crit	0.24	0.05	0.23	0.05	49.55	0	Blood biomarkers
Mean platelet volume	9.36	1.11	9.32	1.07	13.37	0	Blood biomarkers
Platelet distribution width	16.52	0.54	16.47	0.52	30.23	0	Blood biomarkers
Neutrophil count	4.68	1.55	4.03	1.31	145.71	0	Blood biomarkers
Basophil count	0.04	0.07	0.03	0.04	66.45	0	Blood biomarkers
Nucleated red blood cell count	0.00	0.03	0.00	0.03	0.04	9.71E-01	Blood biomarkers
Reticulocyte count	0.07	0.04	0.06	0.03	137.82	0	Blood biomarkers
Mean reticulocyte volume	105.77	8.23	106.05	7.69	-10.92	0	Blood biomarkers
Mean sphered cell volume	82.23	5.38	83.22	5.30	-57.18	0	Blood biomarkers
Immature reticulocyte fraction	0.32	0.06	0.28	0.06	191.13	0	Blood biomarkers
High light scatter reticulocyte count	0.02	0.01	0.02	0.01	237.68	0	Blood biomarkers
Lymphocyte count	1.12	0.23	1.04	0.20	118.75	0	Blood biomarkers
Monocyte count	0.41	0.13	0.37	0.11	107.22	0	Blood biomarkers
Eosinophil count	0.17	0.11	0.15	0.10	71.46	0	Blood biomarkers
Cooked vegetable intake	2.74	1.97	2.74	1.93	-0.33	7.41E-01	Diet
Raw vegetable intake	2.11	2.13	2.23	2.18	-18.50	0	Diet
Fresh fruit intake	2.18	1.68	2.26	1.60	-15.65	0	Diet
Dried fruit intake	0.66	1.52	0.94	1.87	-51.58	0	Diet
Bread intake	12.66	8.74	12.08	8.57	21.56	0	Diet
Cereal intake	4.17	2.79	4.63	2.80	-53.10	0	Diet
Tea intake	3.45	3.09	3.42	2.79	3.44	5.73E-04	Diet
Coffee intake	2.10	2.28	1.97	2.00	19.27	0	Diet
Water intake	2.78	2.35	2.73	2.23	7.45	9.67E-14	Diet
Oily fish intake	81136	52.85%	173452	57.47%	-29.73	0	Diet
Non-oily fish intake	100494	65.38%	201791	66.83%	-9.76	0	Diet
Processed meat intake	102004	66.07%	173865	57.43%	56.64	0	Diet
Poultry intake	132677	85.90%	252061	83.24%	23.33	0	Diet
Beef intake	72662	47.22%	125368	41.49%	36.98	0	Diet
Lamb intake	43936	28.66%	73433	24.35%	31.42	0	Diet
Pork intake	45782	29.84%	72960	24.18%	41.16	0	Diet
Cheese intake	116053	77.28%	238459	80.71%	-26.84	0	Diet
Salt added to food	76375	49.30%	129861	42.82%	41.79	0	Diet
Milk intake	149244	96.44%	293122	96.72%	-4.93	8.20E-07	Diet
Spread type (Butter)	56812	37.04%	108201	35.98%	7.00	2.60E-12	Diet
Spread type (Benecol)	889	0.58%	1612	0.54%	1.87	6.10E-02	Diet
Spread type (Other)	81531	53.15%	156080	51.90%	7.97	1.55E-15	Diet
Variation in diet	108891	71.34%	188487	62.81%	57.35	0	Diet
Vitamin A	2451	1.59%	6755	2.24%	-14.59	0	Diet
Vitamin B	5702	3.71%	14051	4.65%	-14.81	0	Diet
Vitamin C	11082	7.21%	28864	9.56%	-26.56	0	Diet

Vitamin D (Diet)	4016	2.61%	14420	4.77%	-35.10	0	Diet
Vitamin E	3429	2.23%	10375	3.43%	-22.47	0	Diet
Folic acid	3737	2.43%	6801	2.25%	3.79	1.53E-04	Diet
Multivitamins	28678	18.65%	70429	23.32%	-36.20	0	Diet
Fish oil	42545	27.57%	99792	32.97%	-37.31	0	Diet
Glucosamine	25551	16.56%	60132	19.87%	-27.11	0	Diet
Calcium (Diet)	3493	2.26%	28620	9.46%	-90.76	0	Diet
Zinc	4133	2.68%	14497	4.79%	-34.17	0	Diet
Iron	4240	2.75%	11024	3.64%	-15.92	0	Diet
Selenium	2326	1.51%	8330	2.75%	-26.39	0	Diet
Maternal smoking around birth	43413	32.98%	71763	27.27%	37.31	0	Early life factors
Age first had sexual intercourse	18.61	3.77	19.33	3.94	-54.89	0	Early life factors
Ever had same-sex intercourse	4601	3.42%	9601	3.51%	-1.54	1.24E-01	Early life factors
Comparative body size at age 10 (Thinner)	45432	30.09%	104104	34.96%	-32.77	0	Early life factors
Comparative body size at age 10 (Plumper)	34436	22.81%	37189	12.49%	89.96	0	Early life factors
Comparative height size at age 10 (Shorter)	29891	19.76%	61886	20.76%	-7.84	4.55E-15	Early life factors
Comparative height size at age 10 (Taller)	38903	25.72%	74082	24.85%	6.35	2.16E-10	Early life factors
The overall state of health	83586	54.39%	250889	83.01%	-217.06	0	General health
Long-standing illness	74506	49.59%	75380	25.43%	166.54	0	General health
Creatinine in urine	9.03	0.65	8.80	0.69	108.09	0	General health
Potassium in urine	4.07	0.54	3.99	0.57	46.43	0	General health
Sodium in urine	4.32	0.59	4.14	0.60	94.74	0	General health
Mouth ulcers	15134	9.81%	30675	10.14%	-3.56	3.76E-04	General health
Painful gums	5934	3.85%	8222	2.72%	20.80	0	General health
Bleeding gums	22507	14.59%	37957	12.55%	19.22	0	General health
Loose teeth	9332	6.05%	10998	3.64%	37.44	0	General health
Toothache	8293	5.38%	12188	4.03%	20.78	0	General health
Dentures	35180	22.80%	43842	14.50%	70.55	0	General health
Duration of walks	3.63	0.90	3.74	0.86	-34.74	0	Lifestyle
Slow pace	39402	25.57%	243	0.08%	320.01	0	Lifestyle
Brisk pace	29338	19.04%	143250	47.37%	-194.20	0	Lifestyle
IPAQ activity group (moderate)	47472	40.35%	101106	40.78%	-2.48	1.30E-02	Lifestyle
IPAQ activity group (high)	37816	32.14%	109729	44.26%	-70.23	0	Lifestyle
Summed minutes activity	4.21	1.28	4.59	0.92	-103.06	0	Lifestyle
MET minutes per week for walking	5.94	1.97	6.38	1.47	-76.20	0	Lifestyle
MET minutes per week for moderate activity	4.81	2.89	5.60	2.44	-86.16	0	Lifestyle
MET minutes per week for vigorous activity	2.97	3.29	4.20	3.25	-106.82	0	Lifestyle
Summed MET minutes per week for all activity	6.86	1.90	7.43	1.30	-105.83	0	Lifestyle
Sleep duration	104306	67.29%	228066	75.17%	-56.70	0	Lifestyle
Getting up in morning	120350	78.46%	251686	83.66%	-43.12	0	Lifestyle
Chronotype morning	83289	60.74%	170964	63.58%	-17.66	0	Lifestyle
Nap during day	12242	7.92%	12955	4.28%	51.26	0	Lifestyle

Sleeplessness	51865	33.51%	78854	26.02%	53.25	0	Lifestyle
Snoring	68217	48.05%	90453	31.99%	103.35	0	Lifestyle
Daytime dozing	6739	4.39%	6446	2.13%	43.01	0	Lifestyle
Alcohol intake frequency.	92830	59.99%	220716	72.82%	-89.21	0	Lifestyle
Smoking status	79823	51.79%	129331	42.78%	58.02	0	Lifestyle
Alcohol drinker status	145192	93.87%	291189	96.10%	-33.87	0	Lifestyle
Nitrogen oxides air pollution	3.48	0.27	3.45	0.29	27.12	0	Local environment
pm10	19.40	1.87	19.33	1.97	10.48	0	Local environment
pm2.5	5.91	0.57	5.85	0.58	30.01	0	Local environment
Inverse distance to the nearest major road	5.83	1.06	5.87	1.08	-10.10	0	Local environment
Noise pollution	52.91	4.33	52.82	4.25	6.50	8.13E-11	Local environment
Greenspace percentage	39.11	20.31	40.31	22.09	-16.78	0	Local environment
Domestic garden percentage	27.61	11.80	27.86	12.58	-6.03	1.66E-09	Local environment
Water percentage	1.03	2.40	1.09	2.54	-7.66	1.84E-14	Local environment
Natural environment percentage	31.89	22.73	33.69	24.45	-23.95	0	Local environment
Traffic intensity on the nearest major road	9.86	0.63	9.83	0.63	13.52	0	Local environment
Pulse rate	72.54	11.90	67.96	10.68	128.12	0	Physical measurements
Hearing difficulty with background noise	62044.0 0	0.41	106790. 00	0.36	32.55	0	Physical measurements
Forced vital capacity	3.36	0.99	3.67	1.03	-92.70	0	Physical measurements
Forced expiratory volume in 1-second	2.55	0.77	2.77	0.78	-83.96	0	Physical measurements
Peak expiratory flow	352.71	127.78	371.01	128.24	-43.15	0	Physical measurements
Diastolic blood pressure	85.24	10.20	80.80	9.83	138.56	0	Physical measurements
Systolic blood pressure	142.01	18.40	136.10	18.59	99.03	0	Physical measurements
Hand grip strength	28.85	11.97	29.63	10.98	-22.18	0	Physical measurements
Weight	90.14	16.14	72.01	11.91	426.44	0	Physical measurements
Body fat percentage	36.66	8.17	28.98	7.54	314.03	0	Physical measurements
Whole body fat mass	33.19	9.99	20.81	6.10	513.31	0	Physical measurements
Whole body fat-free mass	56.98	12.08	51.25	10.70	162.30	0	Physical measurements
Whole body water mass	41.72	8.84	37.50	7.83	163.75	0	Physical measurements

Body mass index	31.92	4.76	25.25	2.91	581.28	0	Physical measurements
Basal metabolic rate	7182.18	1453.94	6324.91	1222.90	208.34	0	Physical measurements
Impedance of whole body	29.93	11.60	30.70	10.70	-22.25	0	Physical measurements
Impedance of leg	230.78	34.95	255.74	32.63	-236.96	0	Physical measurements
Impedance of arm	310.24	51.79	338.25	54.99	-164.86	0	Physical measurements
Leg fat percentage	36.31	10.74	30.00	9.97	195.65	0	Physical measurements
Arm fat percentage	36.26	10.98	26.98	8.22	318.39	0	Physical measurements
Mood swings	77718	51.76%	127440	43.12%	54.89	0	Psychosocial
Miserableness	71683	47.30%	121719	40.86%	41.31	0	Psychosocial
Irritability	44744	30.49%	77406	26.73%	26.09	0	Psychosocial
Sensitivity	85416	56.89%	162203	55.18%	10.84	0	Psychosocial
Fed-up feelings	73192	48.49%	110863	37.39%	71.75	0	Psychosocial
Nervous feelings	34414	22.88%	72338	24.53%	-12.20	0	Psychosocial
Worrier	83834	55.76%	169521	57.46%	-10.88	0	Psychosocial
Tense'	27703	18.72%	51767	17.70%	8.31	1.11E-16	Psychosocial
Worry too long after embarrassment	68388	46.16%	140469	48.39%	-13.96	0	Psychosocial
Suffer from 'nerves'	33096	22.32%	61228	20.99%	10.16	0	Psychosocial
Loneliness, isolation	35538	23.42%	49630	16.64%	55.06	0	Psychosocial
Guilty feelings	44423	29.65%	84353	28.61%	7.24	4.35E-13	Psychosocial
Risk taking	41176	27.78%	76741	26.28%	10.63	0	Psychosocial
Frequency of depressed mood	11208	7.67%	11785	4.06%	50.45	0	Psychosocial
Frequency of unenthusiasm	11481	7.79%	11787	4.02%	52.98	0	Psychosocial
Frequency of tenseness	10036	6.84%	11448	3.93%	42.22	0	Psychosocial
Frequency of tiredness	29510	19.80%	28740	9.78%	94.16	0	Psychosocial
Able to confide	105704	71.25%	220553	75.26%	-28.65	0	Psychosocial
Townsend deprivation index	-0.73	3.31	-1.51	2.98	80.52	0	Socioeconomic
Qualifications	56419	36.40%	150514	49.61%	-85.70	0	Socioeconomic
Current employment status	135499	87.41%	283873	93.56%	-70.91	0	Socioeconomic
Average total household income before tax(18,000 to 30,999)	34621	27.16%	64968	25.09%	13.82	0	Socioeconomic
Average total household income before tax(31,000 to 51,999)	30515	23.94%	68482	26.45%	-16.81	0	Socioeconomic
Average total household income before tax(52,000 to 100,000)	20062	15.74%	55168	21.31%	-41.19	0	Socioeconomic
Average total household income before tax(Greater than 100,000)	1288	1.01%	18610	7.19%	-82.40	0	Socioeconomic
Live with husband, wife or partner	106198	68.84%	223551	74.00%	-36.88	0	Socioeconomic
Live with son and/or daughter	48511	31.45%	108762	36.00%	-30.67	0	Socioeconomic
Live with brother and/or sister	1291	0.84%	1758	0.58%	10.00	0	Socioeconomic

Live with mother and/or father	3559	2.31%	5405	1.79%	11.93	0	Socioeconomic
Live with grandchild	2195	1.42%	2129	0.70%	23.70	0	Socioeconomic
Live with other related	1314	0.85%	1976	0.65%	7.47	8.20E-14	Socioeconomic
Live with other unrelated	3041	1.97%	5598	1.85%	2.77	5.57E-03	Socioeconomic

Supplementary table 13: Results of Cox proportional hazard regression models between subgroup 1 and subgroup 2 across all 8 brain disorders analyzed in non-MRI Group.

All cause demencia											
covariate	coef	HR	se(coef)	coef lower 95%	coef upper 95%	HR lower 95%	HR upper 95%	cmp to	z	p	-log2(p)
sex	0.45	1.58	0.01	0.43	0.48	1.54	1.61	0.00	39.29	0.00E+00	inf
age	0.09	1.09	0.00	0.09	0.09	1.09	1.09	0.00	97.53	0.00E+00	inf
Asian	-0.17	0.85	0.05	-0.26	-0.08	0.77	0.92	0.00	-3.71	2.09E-04	12.23
Black	0.21	1.23	0.05	0.11	0.30	1.12	1.35	0.00	4.29	1.75E-05	15.80
Other	0.06	1.06	0.05	-0.03	0.15	0.97	1.16	0.00	1.36	1.74E-01	2.52
Group_label	0.43	1.54	0.01	0.41	0.45	1.50	1.57	0.00	37.26	6.62E-304	1007.14

All cause stroke											
covariate	coef	HR	se(coef)	coef lower 95%	coef upper 95%	HR lower 95%	HR upper 95%	cmp to	z	p	-log2(p)
sex	0.44	1.55	0.02	0.40	0.47	1.50	1.61	0.00	24.96	1.80E-137	454.30
age	0.09	1.09	0.00	0.08	0.09	1.09	1.09	0.00	63.28	0.00E+00	inf
Asian	0.07	1.07	0.06	-0.05	0.19	0.95	1.21	0.00	1.14	2.53E-01	1.98
Black	0.27	1.30	0.07	0.13	0.40	1.14	1.50	0.00	3.78	1.57E-04	12.64
Other	-0.03	0.97	0.07	-0.17	0.12	0.85	1.12	0.00	-0.36	7.21E-01	0.47
Group_label	0.42	1.52	0.02	0.38	0.45	1.46	1.57	0.00	23.73	2.00E-124	410.95

Anxiety disorder											
covariate	coef	HR	se(coef)	coef lower 95%	coef upper 95%	HR lower 95%	HR upper 95%	cmp to	z	p	-log2(p)
sex	-0.55	0.58	0.01	-0.58	-0.53	0.56	0.59	0.00	-39.88	0.00E+00	inf
age	0.01	1.01	0.00	0.00	0.01	1.00	1.01	0.00	6.67	2.58E-11	35.17
Asian	-0.22	0.80	0.05	-0.32	-0.13	0.73	0.88	0.00	-4.58	4.76E-06	17.68
Black	-0.23	0.79	0.05	-0.34	-0.12	0.71	0.88	0.00	-4.19	2.78E-05	15.13
Other	0.05	1.05	0.05	-0.04	0.14	0.96	1.15	0.00	0.99	3.23E-01	1.63
Group_label	0.39	1.48	0.01	0.37	0.42	1.45	1.52	0.00	29.78	6.40E-195	645.10

Bipolar disorder											
covariate	coef	HR	se(coef)	coef lower 95%	coef upper 95%	HR lower 95%	HR upper 95%	cmp to	z	p	-log2(p)
sex	-0.20	0.82	0.07	-0.33	-0.06	0.72	0.94	0.00	-2.80	5.18E-03	7.59
age	-0.01	0.99	0.00	-0.02	0.00	0.98	1.00	0.00	-2.50	1.26E-02	6.31
Asian	-0.48	0.62	0.28	-1.03	0.07	0.36	1.07	0.00	-1.71	8.71E-02	3.52
Black	-0.08	0.92	0.26	-0.60	0.43	0.55	1.54	0.00	-0.32	7.50E-01	0.41
Other	0.54	1.72	0.19	0.18	0.91	1.20	2.49	0.00	2.92	3.54E-03	8.14
Group_label	0.56	1.75	0.07	0.43	0.70	1.53	2.01	0.00	8.11	5.01E-16	50.83

Major depressive disorder											
covariate	coef	HR	se(coef)	coef lower 95%	coef upper 95%	HR lower 95%	HR upper 95%	cmp to	z	p	-log2(p)
sex	-0.34	0.71	0.01	-0.37	-0.31	0.69	0.73	0.00	-23.32	3.00E-120	397.07
age	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00	-3.38	7.34E-04	10.41
Asian	-0.27	0.76	0.05	-0.37	-0.17	0.69	0.84	0.00	-5.21	1.87E-07	22.35
Black	-0.37	0.69	0.06	-0.50	-0.25	0.61	0.78	0.00	-6.08	1.20E-09	29.64
Other	0.12	1.13	0.05	0.03	0.21	1.03	1.24	0.00	2.53	1.14E-02	6.45
Group_label	0.57	1.77	0.01	0.55	0.60	1.73	1.82	0.00	40.19	0.00E+00	inf

Mutiple sclerosis											
covariate	coef	HR	se(coef)	coef lower 95%	coef upper 95%	HR lower 95%	HR upper 95%	cmp to	z	p	-log2(p)
sex	-0.49	0.61	0.09	-0.67	-0.31	0.51	0.73	0.00	-5.30	1.18E-07	23.01
age	-0.04	0.97	0.01	-0.05	-0.03	0.95	0.98	0.00	-6.66	2.71E-11	35.10
Asian	-0.86	0.43	0.41	-1.66	-0.05	0.19	0.95	0.00	-2.08	3.76E-02	4.73
Black	-0.36	0.70	0.36	-1.06	0.34	0.35	1.41	0.00	-1.00	3.16E-01	1.66
Other	-0.29	0.75	0.34	-0.95	0.37	0.39	1.45	0.00	-0.86	3.91E-01	1.35
Group_label	0.43	1.54	0.09	0.26	0.61	1.29	1.84	0.00	4.84	1.29E-06	19.57

Parkinson's disease											
covariate	coef	HR	se(coef)	coef lower 95%	coef upper 95%	HR lower 95%	HR upper 95%	cmp to	z	p	-log2(p)
sex	0.63	1.87	0.04	0.56	0.69	1.74	2.00	0.00	17.81	5.59E-71	233.37
age	0.13	1.14	0.00	0.12	0.13	1.13	1.14	0.00	41.92	0.00E+00	inf
Asian	-0.02	0.98	0.13	-0.27	0.24	0.76	1.27	0.00	-0.12	9.08E-01	0.14
Black	-0.04	0.96	0.17	-0.38	0.30	0.68	1.35	0.00	-0.24	8.11E-01	0.30
Other	-0.01	0.99	0.15	-0.31	0.28	0.74	1.32	0.00	-0.10	9.20E-01	0.12
Group_label	0.08	1.09	0.04	0.02	0.15	1.02	1.17	0.00	2.42	1.55E-02	6.01

Schizophrenia											
covariate	coef	HR	se(coef)	coef lower 95%	coef upper 95%	HR lower 95%	HR upper 95%	cmp to	z	p	-log2(p)
sex	0.40	1.49	0.09	0.22	0.57	1.25	1.77	0.00	4.49	6.99E-06	17.13
age	-0.01	0.99	0.01	-0.02	0.00	0.98	1.00	0.00	-1.97	4.94E-02	4.34
Asian	0.55	1.74	0.22	0.11	0.99	1.12	2.70	0.00	2.46	1.38E-02	6.18
Black	1.45	4.26	0.17	1.11	1.79	3.05	5.97	0.00	8.44	3.14E-17	54.82
Other	1.00	2.71	0.20	0.60	1.39	1.82	4.03	0.00	4.90	9.42E-07	20.02
Group_label	0.78	2.19	0.09	0.61	0.96	1.84	2.61	0.00	8.90	5.81E-19	60.58

Supplementary table 14: Information of diseases that potentially confound brain atrophy.

Field ID	Description
130836	Date F00 first reported (dementia in alzheimer's disease)
130837	Source of report of F00 (dementia in alzheimer's disease)
130838	Date F01 first reported (vascular dementia)
130839	Source of report of F01 (vascular dementia)
130840	Date F02 first reported (dementia in other diseases classified elsewhere)
130841	Source of report of F02 (dementia in other diseases classified elsewhere)
130842	Date F03 first reported (unspecified dementia)
130843	Source of report of F03 (unspecified dementia)
42006	Date of stroke
42007	Source of stroke report
42008	Date of ischaemic stroke
42009	Source of ischaemic stroke report
42010	Date of intracerebral haemorrhage
42011	Source of intracerebral haemorrhage report
42012	Date of subarachnoid haemorrhage
42013	Source of subarachnoid haemorrhage report
42018	Date of all cause dementia report
42019	Source of all cause dementia report
42020	Date of alzheimer's disease report
42021	Source of alzheimer's disease report
42022	Date of vascular dementia report
42023	Source of vascular dementia report
42024	Date of frontotemporal dementia report
42025	Source of frontotemporal dementia report
Diseases of the nervous system; G00-G99	
Field ID	Description
130992	Date G00 first reported (bacterial meningitis, not elsewhere classified)
130993	Source of report of G00 (bacterial meningitis, not elsewhere classified)
130994	Date G01 first reported (meningitis in bacterial diseases classified elsewhere)
130995	Source of report of G01 (meningitis in bacterial diseases classified elsewhere)
130996	Date G02 first reported (meningitis in other infectious and parasitic diseases classified elsewhere)
130997	Source of report of G02 (meningitis in other infectious and parasitic diseases classified elsewhere)
130998	Date G03 first reported (meningitis due to other and unspecified causes)
130999	Source of report of G03 (meningitis due to other and unspecified causes)
131000	Date G04 first reported (encephalitis, myelitis and encephalomyelitis)
131001	Source of report of G04 (encephalitis, myelitis and encephalomyelitis)
131002	Date G05 first reported (encephalitis, myelitis and encephalomyelitis in diseases classified elsewhere)
131003	Source of report of G05 (encephalitis, myelitis and encephalomyelitis in diseases classified elsewhere)
131004	Date G06 first reported (intracranial and intraspinal abscess and granuloma)

131005	Source of report of G06 (intracranial and intraspinal abscess and granuloma)
131006	Date G07 first reported (intracranial and intraspinal abscess and granuloma in diseases classified elsewhere)
131007	Source of report of G07 (intracranial and intraspinal abscess and granuloma in diseases classified elsewhere)
131008	Date G08 first reported (intracranial and intraspinal phlebitis and thrombophlebitis)
131009	Source of report of G08 (intracranial and intraspinal phlebitis and thrombophlebitis)
131010	Date G09 first reported (sequelae of inflammatory diseases of central nervous system)
131011	Source of report of G09 (sequelae of inflammatory diseases of central nervous system)
131012	Date G10 first reported (huntington's disease)
131013	Source of report of G10 (huntington's disease)
131014	Date G11 first reported (hereditary ataxia)
131015	Source of report of G11 (hereditary ataxia)
131016	Date G12 first reported (spinal muscular atrophy and related syndromes)
131017	Source of report of G12 (spinal muscular atrophy and related syndromes)
131018	Date G13 first reported (systemic atrophies primarily affecting central nervous system in diseases classified elsewhere)
131019	Source of report of G13 (systemic atrophies primarily affecting central nervous system in diseases classified elsewhere)
131020	Date G14 first reported (postpolio syndrome)
131021	Source of report of G14 (postpolio syndrome)
131022	Date G20 first reported (parkinson's disease)
131023	Source of report of G20 (parkinson's disease)
131024	Date G21 first reported (secondary parkinsonism)
131025	Source of report of G21 (secondary parkinsonism)
131026	Date G22 first reported (parkinsonism in diseases classified elsewhere)
131027	Source of report of G22 (parkinsonism in diseases classified elsewhere)
131028	Date G23 first reported (other degenerative diseases of basal ganglia)
131029	Source of report of G23 (other degenerative diseases of basal ganglia)
131030	Date G24 first reported (dystonia)
131031	Source of report of G24 (dystonia)
131032	Date G25 first reported (other extrapyramidal and movement disorders)
131033	Source of report of G25 (other extrapyramidal and movement disorders)
131034	Date G26 first reported (extrapyramidal and movement disorders in diseases classified elsewhere)
131035	Source of report of G26 (extrapyramidal and movement disorders in diseases classified elsewhere)
131036	Date G30 first reported (alzheimer's disease)
131037	Source of report of G30 (alzheimer's disease)
131038	Date G31 first reported (other degenerative diseases of nervous system, not elsewhere classified)
131039	Source of report of G31 (other degenerative diseases of nervous system, not elsewhere classified)
131040	Date G32 first reported (other degenerative disorders of nervous system in diseases classified elsewhere)
131041	Source of report of G32 (other degenerative disorders of nervous system in diseases classified elsewhere)
131042	Date G35 first reported (multiple sclerosis)
131043	Source of report of G35 (multiple sclerosis)
131044	Date G36 first reported (other acute disseminated demyelination)
131045	Source of report of G36 (other acute disseminated demyelination)
131046	Date G37 first reported (other demyelinating diseases of central nervous system)

131047	Source of report of G37 (other demyelinating diseases of central nervous system)
131048	Date G40 first reported (epilepsy)
131049	Source of report of G40 (epilepsy)
131050	Date G41 first reported (status epilepticus)
131051	Source of report of G41 (status epilepticus)
131052	Date G43 first reported (migraine)
131053	Source of report of G43 (migraine)
131054	Date G44 first reported (other headache syndromes)
131055	Source of report of G44 (other headache syndromes)
131056	Date G45 first reported (transient cerebral ischaemic attacks and related syndromes)
131057	Source of report of G45 (transient cerebral ischaemic attacks and related syndromes)
131058	Date G46 first reported (vascular syndromes of brain in cerebrovascular diseases)
131059	Source of report of G46 (vascular syndromes of brain in cerebrovascular diseases)
131060	Date G47 first reported (sleep disorders)
131061	Source of report of G47 (sleep disorders)
131062	Date G50 first reported (disorders of trigeminal nerve)
131063	Source of report of G50 (disorders of trigeminal nerve)
131064	Date G51 first reported (facial nerve disorders)
131065	Source of report of G51 (facial nerve disorders)
131066	Date G52 first reported (disorders of other cranial nerves)
131067	Source of report of G52 (disorders of other cranial nerves)
131068	Date G53 first reported (cranial nerve disorders in diseases classified elsewhere)
131069	Source of report of G53 (cranial nerve disorders in diseases classified elsewhere)
131070	Date G54 first reported (nerve root and plexus disorders)
131071	Source of report of G54 (nerve root and plexus disorders)
131072	Date G55 first reported (nerve root and plexus compressions in diseases classified elsewhere)
131073	Source of report of G55 (nerve root and plexus compressions in diseases classified elsewhere)
131074	Date G56 first reported (mononeuropathies of upper limb)
131075	Source of report of G56 (mononeuropathies of upper limb)
131076	Date G57 first reported (mononeuropathies of lower limb)
131077	Source of report of G57 (mononeuropathies of lower limb)
131078	Date G58 first reported (other mononeuropathies)
131079	Source of report of G58 (other mononeuropathies)
131080	Date G59 first reported (mononeuropathy in diseases classified elsewhere)
131081	Source of report of G59 (mononeuropathy in diseases classified elsewhere)
131082	Date G60 first reported (hereditary and idiopathic neuropathy)
131083	Source of report of G60 (hereditary and idiopathic neuropathy)
131084	Date G61 first reported (inflammatory polyneuropathy)
131085	Source of report of G61 (inflammatory polyneuropathy)
131086	Date G62 first reported (other polyneuropathies)
131087	Source of report of G62 (other polyneuropathies)
131088	Date G63 first reported (polyneuropathy in diseases classified elsewhere)

131089	Source of report of G63 (polyneuropathy in diseases classified elsewhere)
131090	Date G64 first reported (other disorders of peripheral nervous system)
131091	Source of report of G64 (other disorders of peripheral nervous system)
131092	Date G70 first reported (myasthenia gravis and other myoneural disorders)
131093	Source of report of G70 (myasthenia gravis and other myoneural disorders)
131094	Date G71 first reported (primary disorders of muscles)
131095	Source of report of G71 (primary disorders of muscles)
131096	Date G72 first reported (other myopathies)
131097	Source of report of G72 (other myopathies)
131098	Date G73 first reported (disorders of myoneural junction and muscle in diseases classified elsewhere)
131099	Source of report of G73 (disorders of myoneural junction and muscle in diseases classified elsewhere)
131100	Date G80 first reported (infantile cerebral palsy)
131101	Source of report of G80 (infantile cerebral palsy)
131102	Date G81 first reported (hemiplegia)
131103	Source of report of G81 (hemiplegia)
131104	Date G82 first reported (paraplegia and tetraplegia)
131105	Source of report of G82 (paraplegia and tetraplegia)
131106	Date G83 first reported (other paralytic syndromes)
131107	Source of report of G83 (other paralytic syndromes)
131108	Date G90 first reported (disorders of autonomic nervous system)
131109	Source of report of G90 (disorders of autonomic nervous system)
131110	Date G91 first reported (hydrocephalus)
131111	Source of report of G91 (hydrocephalus)
131112	Date G92 first reported (toxic encephalopathy)
131113	Source of report of G92 (toxic encephalopathy)
131114	Date G93 first reported (other disorders of brain)
131115	Source of report of G93 (other disorders of brain)
131116	Date G94 first reported (other disorders of brain in diseases classified elsewhere)
131117	Source of report of G94 (other disorders of brain in diseases classified elsewhere)
131118	Date G95 first reported (other diseases of spinal cord)
131119	Source of report of G95 (other diseases of spinal cord)
131120	Date G96 first reported (other disorders of central nervous system)
131121	Source of report of G96 (other disorders of central nervous system)
131122	Date G97 first reported (postprocedural disorders of nervous system, not elsewhere classified)
131123	Source of report of G97 (postprocedural disorders of nervous system, not elsewhere classified)
131124	Date G98 first reported (other disorders of nervous system, not elsewhere classified)
131125	Source of report of G98 (other disorders of nervous system, not elsewhere classified)
131126	Date G99 first reported (other disorders of nervous system in diseases classified elsewhere)
131127	Source of report of G99 (other disorders of nervous system in diseases classified elsewhere)
Q00-Q07 Congenital malformations of the nervous system	
Field ID	Description
132432	Date Q00 first reported (anencephaly and similar malformations)

132433	Source of report of Q00 (anencephaly and similar malformations)
132434	Date Q01 first reported (encephalocele)
132435	Source of report of Q01 (encephalocele)
132436	Date Q02 first reported (microcephaly)
132437	Source of report of Q02 (microcephaly)
132438	Date Q03 first reported (congenital hydrocephalus)
132439	Source of report of Q03 (congenital hydrocephalus)
132440	Date Q04 first reported (other congenital malformations of brain)
132441	Source of report of Q04 (other congenital malformations of brain)
132442	Date Q05 first reported (spina bifida)
132443	Source of report of Q05 (spina bifida)
132444	Date Q06 first reported (other congenital malformations of spinal cord)
132445	Source of report of Q06 (other congenital malformations of spinal cord)
132446	Date Q07 first reported (other congenital malformations of nervous system)
132447	Source of report of Q07 (other congenital malformations of nervous system)
I60-I69 Cerebrovascular diseases	
Field ID	Description
131360	Date I60 first reported (subarachnoid haemorrhage)
131361	Source of report of I60 (subarachnoid haemorrhage)
131362	Date I61 first reported (intracerebral haemorrhage)
131363	Source of report of I61 (intracerebral haemorrhage)
131364	Date I62 first reported (other nontraumatic intracranial haemorrhage)
131365	Source of report of I62 (other nontraumatic intracranial haemorrhage)
131366	Date I63 first reported (cerebral infarction)
131367	Source of report of I63 (cerebral infarction)
131368	Date I64 first reported (stroke, not specified as haemorrhage or infarction)
131369	Source of report of I64 (stroke, not specified as haemorrhage or infarction)
131370	Date I65 first reported (occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction)
131371	Source of report of I65 (occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction)
131372	Date I66 first reported (occlusion and stenosis of cerebral arteries, not resulting in cerebral infarction)
131373	Source of report of I66 (occlusion and stenosis of cerebral arteries, not resulting in cerebral infarction)
131374	Date I67 first reported (other cerebrovascular diseases)
131375	Source of report of I67 (other cerebrovascular diseases)
131376	Date I68 first reported (cerebrovascular disorders in diseases classified elsewhere)
131377	Source of report of I68 (cerebrovascular disorders in diseases classified elsewhere)
131378	Date I69 first reported (sequelae of cerebrovascular disease)
131379	Source of report of I69 (sequelae of cerebrovascular disease)
C71 Malignant neoplasm of brain	
S06 Intracranial injury	

Supplementary table 15: Categories of blood biomarkers.

Abbreviation	Category	Abbreviation	Category
Platelet count	Blood platelets	ApoA1	Metabolic Indicators
Platelet crit	Blood platelets	ApoB	Metabolic Indicators
Mean platelet volume	Blood platelets	Cholesterol	Metabolic Indicators
Platelet distribution width	Blood platelets	HDL	Metabolic Indicators
Reticulocyte count	Bone Marrow Hematopoietic Function	LDL	Metabolic Indicators
Mean reticulocyte volume	Bone Marrow Hematopoietic Function	Glucose	Metabolic Indicators
Mean sphered cell volume	Bone Marrow Hematopoietic Function	HbA1c	Metabolic Indicators
Immature reticulocyte fraction	Bone Marrow Hematopoietic Function	Triglycerides	Metabolic Indicators
High light scatter reticulocyte count	Bone Marrow Hematopoietic Function	Red blood cell count	Red blood cell
CRP	Immune function	Haemoglobin concentration	Red blood cell
White blood cell count	Immune function	Mean corpuscular volume	Red blood cell
Neutrophil count	Immune function	Mean corpuscular haemoglobin	Red blood cell
Basophil count	Immune function	Red blood cell distribution width	Red blood cell
Lymphocyte count	Immune function	Nucleated red blood cell count	Red blood cell
Monocyte count	Immune function	Urea	Renal function
Eosinophil count	Immune function	Creatinine	Renal function
Albumin	Liver function	Cystatin C	Renal function
Total protein	Liver function	Urate	Renal function
ALP	Liver function	Testosterone	Sex hormone
ALT	Liver function	Calcium	Others
AST	Liver function	IGF-1	Others
GGT	Liver function	Phosphate	Others
Total bilirubin	Liver function	Vitamin D	Others

Supplementary table 16: Selection and processing of modifiable traits.

category		FieldID	Traits	ValueType	coding	coding values		coding notes
			Eid					
Blood biomarkers	1	30600	Albumin	Continuous				
	2	30610	ALP	Continuous		Logarithmic transformation		
	3	30620	ALT	Continuous		Logarithmic transformation		
	4	30630	ApoA1	Continuous				
	5	30640	ApoB	Continuous				
	6	30650	AST	Continuous		Logarithmic transformation		
	7	30660	Direct bilirubin	Continuous		Logarithmic transformation		Deleted due to small sample size
	8	30670	Urea	Continuous				
	9	30680	Calcium	Continuous				
	10	30690	Cholesterol	Continuous				
	11	30700	Creatinine	Continuous				
	12	30710	CRP	Continuous		Logarithmic transformation		
	13	30720	Cystatin C	Continuous				
	14	30730	GGT	Continuous		Logarithmic transformation		
	15	30740	Glucose	Continuous		Logarithmic transformation		
	16	30750	HbA1c	Continuous		Logarithmic transformation		
	17	30760	HDL	Continuous				
	18	30770	IGF-1	Continuous				
	19	30780	LDL	Continuous				
	20	30810	Phosphate	Continuous				
	21	30830	SHBG	Continuous				Deleted due to small sample size
	22	30840	Total bilirubin	Continuous		Logarithmic transformation		
	23	30850	Testosterone	Continuous				
	24	30860	Total protein	Continuous				
	25	30870	Triglycerides	Continuous		Logarithmic transformation		
	26	30880	Urate	Continuous				
	27	30890	Vitamin D	Continuous		Logarithmic transformation		
	28	30000	White blood cell count	Continuous				
	29	30010	Red blood cell count	Continuous				
	30	30020	Haemoglobin concentration	Continuous				
	31	30040	Mean corpuscular volume	Continuous				
	32	30050	Mean corpuscular haemoglobin	Continuous				

	33	30070	Red blood cell distribution width	Continuous				
	34	30080	Platelet count	Continuous				
	35	30090	Platelet crit	Continuous				
	36	30100	Mean platelet volume	Continuous				
	37	30110	Platelet distribution width	Continuous				
	38	30120	Lymphocyte count	Continuous		Logarithmic transformation		
	39	30130	Monocyte count	Continuous		Logarithmic transformation		
	40	30140	Neutrophil count	Continuous				
	41	30150	Eosinophil count	Continuous		Logarithmic transformation		
	42	30160	Basophil count	Continuous				
	43	30170	Nucleated red blood cell count	Continuous				
	44	30250	Reticulocyte count	Continuous				
	45	30260	Mean reticulocyte volume	Continuous				
	46	30270	Mean spheroid cell volume	Continuous				
	47	30280	Immature reticulocyte fraction	Continuous				
	48	30300	High light scatter reticulocyte count	Continuous				
Diet	49	1289	Cooked vegetable intake	Integer	100373	-3	Prefer not to answer	set as NA
						-1	Do not know	set as NA
						-10	Less than one	set as 0.5
	50	1299	Raw vegetable intake	Integer	100373	Same as above		
	51	1309	Fresh fruit intake	Integer	100373	Same as above		
	52	1319	Dried fruit intake	Integer	100373	Same as above		
	53	1329	Oily fish intake	Categorical single	100377	-3	Prefer not to answer	set as NA
						-1	Do not know	set as NA
						0	Never	set as 0
						1	Less than once a week	set as 0
						2	Once a week	set as 1
						3	2-4 times a week	set as 1
						4	5-6 times a week	set as 1
						5	Once or more daily	set as 1
	54	1339	Non-oily fish intake	Categorical single	100377	Same as above		
	55	1349	Processed meat intake	Categorical single	100377	Same as above		
	56	1359	Poultry intake	Categorical single	100377	Same as above		
	57	1369	Beef intake	Categorical single	100377	Same as above		
	58	1379	Lamb intake	Categorical single	100377	Same as above		

59	1389	Pork intake	Categorical single	100377	Same as above		
60	1408	Cheese intake	Categorical single	100377	Same as above		
61	1418	Milk type used	Categorical single	100387	-1	Do not know	set as NA
					-3	Prefer not to answer	set as NA
					1	Full cream	set as 1
					2	Semi-skimmed	set as 1
					3	Skimmed	set as 1
					4	Soya	set as 1
					5	Other type of milk	set as 1
					6	Never/rarely have milk	set as 0
62	1428	Spread type	Categorical single	100388	-3	Prefer not to answer	set as NA
					-1	Do not know	set as NA
					0	Never/rarely use spread	set as reference
					1	Butter/spreadable butter	spreadable butter
					2	Flora Pro-Active/Benecol	Benecol
					3	Other type of spread/margarine	margarine
63	1438	Bread intake	Integer	100373	Same as above		
64	1458	Cereal intake	Integer	100373	Same as above		
65	1478	Salt added to food	Categorical single	100394	-3	Prefer not to answer	set as NA
					1	Never/rarely	set as 0
					2	Sometimes	set as 0
					3	Usually	set as 1
					4	Always	set as 1
66	1488	Tea intake	Integer	100373	Same as above		
67	1498	Coffee intake	Integer	100373	Same as above		
68	1528	Water intake	Integer	100373	Same as above		
69	1548	Variation in diet	Categorical single	100401	-3	Prefer not to answer	set as NA
					-1	Do not know	set as NA
					1	Never/rarely	set as 0
					2	Sometimes	set as 1
					3	Often	set as 1
	6155	Vitamin and mineral supplements	Categorical multiple	100629	-7	None of the above	set as reference
					-3	Prefer not to answer	set as NA
70					1	Vitamin A	

71					2	Vitamin B	
72					3	Vitamin C	
73					4	Vitamin D (Diet)	
74					5	Vitamin E	
75					6	Folic acid	
76					7	Multivitamins	
	6179	Mineral and other dietary supplements	Categorical multiple	100630	-7	None of the above	set as reference
					-3	Prefer not to answer	set as NA
77					1	Fish oil	
78					2	Glucosamine	
79					3	Calcium (Diet)	
80					4	Zinc	
81					5	Iron	
82					6	Selenium	
Lifestyle	83	874	Duration of walks	Integer	100291	Logarithmic transformation	
						-3	Prefer not to answer
						-1	Do not know
		924	Usual walking pace	Categorical single	100313	-7	None of the above
						-3	Prefer not to answer
	84					1	Slow pace
						2	Steady average pace
							set as reference
	85					3	Brisk pace
		22032	IPAQ activity group	Categorical single	100700	0	low
							set as reference
	86					1	moderate
	87					2	high
	88	22034	Summed minutes activity	Integer		Logarithmic transformation	
	89	22037	MET minutes per week for walking	Continuous		Logarithmic transformation	
	90	22038	MET minutes per week for moderate activity	Continuous		Logarithmic transformation	
	91	22039	MET minutes per week for vigorous activity	Continuous		Logarithmic transformation	
	92	22040	Summed MET minutes per week for all activity	Continuous		Logarithmic transformation	
	93	1160	Sleep duration	Integer	100291	-3	Prefer not to answer
							Sleep duration >=7 and <=9h
							otherwise
							set as 1
							set as 0
	94	1170	Getting up in morning	Categorical single	100341	-3	Prefer not to answer
							set as NA

					-1	Do not know	set as NA
					1	Not at all easy	set as 0
					2	Not very easy	set as 0
					3	Fairly easy	set as 1
					4	Very easy	set as 1
95	1180	Chronotype morning	Categorical single	100342	-3	Prefer not to answer	set as NA
					-1	Do not know	set as NA
					1	Definitely a 'morning' person	set as 1
					2	More a 'morning' than 'evening' person	set as 1
					3	More an 'evening' than a 'morning' person	set as 0
					4	Definitely an 'evening' person	set as 0
96	1190	Nap during day	Categorical single	100343	-3	Prefer not to answer	set as NA
					1	Never/rarely	set as 0
					2	Sometimes	set as 0
					3	Usually	set as 1
97	1200	Sleeplessness	Categorical single	100343	Same as above		
98	1210	Snoring	Categorical single	100345	-3	Prefer not to answer	set as NA
					-1	Do not know	set as NA
					1	Yes	set as 1
					2	No	set as 0
99	1220	Daytime dozing	Categorical single	100346	-3	Prefer not to answer	set as NA
					-1	Do not know	set as NA
					0	Never/rarely	set as 0
					1	Sometimes	set as 0
					2	Often	set as 1
					3	All of the time	set as 1
100	1558	Alcohol intake frequency.	Categorical single	100402	-3	Prefer not to answer	set as NA
					1	Daily or almost daily	set as 1
					2	Three of four times a week	set as 1
					3	Once or twice a week	set as 1
					4	One to three times a month	set as 0
					5	Special occasions only	set as 0
					6	Never	set as 0
101	20116	Smoking status	Categorical single	90	-3	Prefer not to answer	set as NA
					0	Never	set as 0

					1	Previous	set as 1
					2	Current	set as 1
	102	20117	Alcohol drinker status	Categorical single	90	Same as above	
Early life factors	103	1677	Breastfed as a baby	Categorical single	100349	Same as above	Deleted due to small sample size
		1687	Comparative body size at age 10	Categorical single	100428	-3	Prefer not to answer
					-1	Do not know	set as NA
	104				1	Thinner	
	105				2	Plumper	
					3	About average	set as reference
		1697	Comparative height size at age 10	Categorical single	100429	-3	Prefer not to answer
					-1	Do not know	set as NA
	106				1	Shorter	
	107				2	Taller	
					3	About average	set as reference
	108	1787	Maternal smoking around birth	Categorical single	100349	Same as above	
	109	2139	Age first had sexual intercourse	Integer	100504	-3	Prefer not to answer
					-2	Never had sex	set as NA
					-1	Do not know	set as NA
	110	2159	Ever had same-sex intercourse	Categorical single	100352	-3	Prefer not to answer
					0	No	set as 0
					1	Yes	set as 1
General health	111	2178	The overall state of health	Categorical single	100508	-3	Prefer not to answer
					-1	Do not know	set as NA
					1	Excellent	set as 1
					2	Good	set as 1
					3	Fair	set as 0
					4	Poor	set as 0
	112	2188	Long-standing illness	Categorical single	100349	Same as above	
	113	30510	Creatinine in urine	Continuous		Logarithmic transformation	
	114	30520	Potassium in urine	Continuous		Logarithmic transformation	
	115	30530	Sodium in urine	Continuous		Logarithmic transformation	

		6149	Mouth/teeth dental problems	Categorical multiple	100538	-7	None of the above	set as reference
						-3	Prefer not to answer	set as NA
	116					1	Mouth ulcers	
	117					2	Painful gums	
	118					3	Bleeding gums	
	119					4	Loose teeth	
	120					5	Toothache	
	121					6	Dentures	
Local environment	122	24003	Nitrogen dioxide air pollution; 2010	Continuous	Logarithmic transformation		Nitrogen oxides air pollution	mean values
		24004	Nitrogen oxides air pollution; 2010	Continuous	Logarithmic transformation			
		24016	Nitrogen dioxide air pollution; 2005	Continuous	Logarithmic transformation			
		24017	Nitrogen dioxide air pollution; 2006	Continuous	Logarithmic transformation			
		24018	Nitrogen dioxide air pollution; 2007	Continuous	Logarithmic transformation			
	122	24005	pm10; 2010	Continuous			pm10	mean values
		24019	pm10; 2007	Continuous				
	123	24006	pm2.5; 2010	Continuous			pm2.5	mean values
		24007	pm2.5 absorbance; 2010	Continuous				
		24008	pm 2.5-10um; 2010	Continuous				
	124	24011	Traffic intensity on the nearest major road	Integer		Logarithmic transformation		
	125	24012	Inverse distance to the nearest major road	Continuous		Take the reciprocal	Convert to real distance and then convert to logarithm	
	126	24013	Total traffic load on major roads	Continuous				
	127	24015	Sum of road length of major roads within 100m	Continuous				
	128	24020	Average daytime sound level of noise pollution	Continuous	Noise pollution			
		24021	Average evening sound level of noise pollution	Continuous				
		24022	Average night-time sound level of noise pollution	Continuous				
		24023	Average 16-hour sound level of noise pollution	Continuous				
		24024	Average 24-hour sound level of noise pollution	Continuous				
	129	24503	Greenspace percentage, buffer 300m	Continuous	Greenspace percentage			
		24500	Greenspace percentage, buffer 1000m	Continuous				
	130	24504	Domestic garden percentage, buffer 300m	Continuous	Domestic garden percentage			
		24501	Domestic garden percentage, buffer 1000m	Continuous				

	131	24505	Water percentage, buffer 300m	Continuous	Water percentage			
		24502	Water percentage, buffer 1000m	Continuous				
	132	24507	Natural environment percentage, buffer 300m	Continuous	Natural environment percentage			
		24506	Natural environment percentage, buffer 1000m	Continuous				
Physical measurements	133	102	Pulse rate	Integer				
	134	2257	Hearing difficulty with background noise	Categorical single	110349	Same as above		
	135	3062	Forced vital capacity	Continuous				
	136	3063	Forced expiratory volume in 1-second	Continuous				
	137	3064	Peak expiratory flow	Integer				
	138	4079	Diastolic blood pressure	Integer				
	139	4080	Systolic blood pressure	Integer				
	140	23098	Weight	Continuous				
	141	23099	Body fat percentage	Continuous				
	142	23100	Whole body fat mass	Continuous				
	143	23101	Whole body fat-free mass	Continuous				
	144	23102	Whole body water mass	Continuous				
	145	23104	Body mass index	Continuous				
	146	23105	Basal metabolic rate	Continuous				
	147	23106	Impedance of whole body	Continuous				
	148	46/47	Hand grip strength	Integer		Get the mean value of the two field		
	149	23107/23108	Impedance of leg	Continuous		Get the mean value of the two field		
	150	23109/23110	Impedance of arm	Continuous		Get the mean value of the two field		
	151	23111/23115	Leg fat percentage	Continuous		Get the mean value of the two field		
	152	23119/23123	Arm fat percentage	Continuous		Get the mean value of the two field		
Psychosocial	153	1920	Mood swings	Categorical single	100349			
						-1	Do not know	set as NA
						-3	Prefer not to answer	set as NA
						1	Yes	set as 1
						0	No	set as 0
	154	1930	Miserableness	Categorical single	100349	Same as above		
	155	1940	Irritability	Categorical single	100349	Same as above		

156	1950	Sensitivity	Categorical single	100349	Same as above		
157	1960	Fed-up feelings	Categorical single	100349	Same as above		
158	1970	Nervous feelings	Categorical single	100349	Same as above		
159	1980	Worrier	Categorical single	100349	Same as above		
160	1990	Tense	Categorical single	100349	Same as above		
161	2000	Worry too long after embarrassment	Categorical single	100349	Same as above		
162	2010	Suffer from 'nerves'	Categorical single	100349	Same as above		
163	2020	Loneliness, isolation	Categorical single	100349	Same as above		
164	2030	Guilty feelings	Categorical single	100349	Same as above		
165	2040	Risk taking	Categorical single	100349	Same as above		
166	2050	Frequency of depressed mood	Categorical single	100484	-3	Prefer not to answer	set as NA
					-1	Do not know	set as NA
					1	Not at all	set as 0
					2	Several days	set as 0
					3	More than half the days	set as 1
					4	Nearly every day	set as 1
167	2060	Frequency of unenthusiasm	Categorical single	100484	Same as above		
168	2070	Frequency of tenseness	Categorical single	100484	Same as above		
169	2080	Frequency of tiredness	Categorical single	100484	Same as above		
170	2110	Able to confide	Categorical single	100501	-3	Prefer not to answer	set as NA
					-1	Do not know	set as NA
					0	Never or almost never	set as 0
					1	Once every few months	set as 0
					2	About once a month	set as 0
					3	About once a week	set as 1
					4	2-4 times a week	set as 1
					5	Almost daily	set as 1

	171	20127	Neuroticism	Integer				Deleted due to small sample size
Socioeconomic	172	22189	Townsend deprivation index	Continuous				
		738	Average total household income before tax	Categorical single	100294	-3	Prefer not to answer	set as NA
						-1	Do not know	set as NA
						1	Less than 18,00	set as reference
	173					2	18,000 to 30,999	
	174					3	31,000 to 51,999	
	175					4	52,000 to 100,000	
	176					5	Greater than 100,000	
	177	6138	Qualifications	Categorical multiple	100305	-7	None of the above	set as 0
						-3	Prefer not to answer	set as NA
						1	College or University degree	set as 1
						2	A levels/AS levels or equivalent	set as 0
						3	O levels/GCSEs or equivalent	set as 0
						4	CSEs or equivalent	set as 0
						5	NVQ or HND or HNC or equivalent	set as 0
						6	Other professional qualifications	set as 1
	178	6141	How are people in household related to participant	Categorical multiple	100292	-3	Prefer not to answer	
	179	6141	Live with husband, wife or partner	Categorical multiple		1	Husband, wife or partner	
	180	6141	Live with son and/or daughter	Categorical multiple		2	Son and/or daughter	
	181	6141	Live with brother and/or sister.	Categorical multiple		3	Brother and/or sister	
	182	6141	Live with mother and/or father	Categorical multiple		4	Mother and/or father	
		6141	Live with grandparent	Categorical multiple		5		Deleted due to small sample size
	183	6141	Live with grandchild	Categorical multiple		6		
	184	6141	Live with other related	Categorical multiple		7		
	185	6141	Live with other unrelated	Categorical multiple		8	Other related	
	186	6142	Current employment status		100295	-7	None of the above	set as NA
						-3	Prefer not to answer	set as NA
						1	In paid employment or self-employed	set as 1
						2	Retired	set as 1
						3	Looking after home and/or family	set as 0
						4	Unable to work because of sickness or disability	set as 0

						5	Unemployed	set as 0
						6	Doing unpaid or voluntary work	set as 1
						7	Full or part-time student	set as 1