

Supplementary Table 1. Summary data from all GWAS used in current study.

phenotype	abbreviation	Cases	Controls	Ethnics	Number of SNPs	PMID
overall acceleration average	AccAve	91,084	-	EUR	11,826,775	29899525
moderate-to-vigorous physical activity	MVPA	377,234	-	EUR	11,838,639	29899525
vigorous physical activity	VPA	98,060	162,995	EUR	11,834,614	29899525
strenuous sports or other exercises	SSOE	124,842	225,650	EUR	11,838,159	29899525
overall activity	-	91,105	-	EUR	7,654,310	30531941
prospective memory	PM	152,605	-	EUR	9,331,187	UKBB
episodic memory	EM	331,679	-	EUR	1,185,709	32895543

EUR, European; SNP, single nucleotide polymorphism; GWAS, genome-wide association study; PMID, PubMed ID.

Supplementary Table 2. Phenotypes significantly associated with instrumental variables of physical activity identified by PhenoScanner.

exposure trait	SNP	associated phenotype
AccAve		Leg fat mass right, Leg fat percentage right, Leg fat mass left, Leg fat percentage left, Waist circumference, Body mass index, Whole body fat mass, Body fat percentage, Hip circumference, Trunk fat mass, Arm fat mass left, Arm fat mass right, Trunk fat percentage, Arm fat percentage left, Arm fat percentage right, Weight, Meningioma, Meningioma, Meningioma, Invasive ovarian cancer, Serous invasive ovarian cancer, High grade serous ovarian cancer, Arm predicted mass right, Arm fat-free mass left, Forced vital capacity, best measure, Arm predicted mass left, Sodium in urine, Arm fat-free mass right
	rs11012732	Getting up in morning
	rs12522261	n.a.
	rs148193266	Basal metabolic rate, Whole body fat-free mass, Whole body water mass, Leg predicted mass right, Leg fat-free mass left, Leg fat-free mass right, Leg predicted mass left, Weight, Trunk fat-free mass, Trunk predicted mass, Arm fat-free mass left, Arm predicted mass left, Arm fat-free mass right, Arm predicted mass right, Height, Hip circumference, Arm fat mass left, Trunk fat mass, Arm fat mass right, Whole body fat mass, Leg fat mass left, Leg fat mass right, Comparative height size at age 10, Sitting height, Body mass index, Waist circumference, Impedance of leg right, Impedance of leg left, Impedance of whole body, Trunk fat percentage, Arm fat percentage left, Arm fat percentage right, Body fat percentage, Leg fat percentage left, Creatinine in urine, Lung cancer, Impedance of arm right, Impedance of arm left, Leg fat percentage right, Forced vital capacity, Forced vital capacity, best measure, Psoriasis, Forced expiratory volume in 1-second, predicted, Lung adenocarcinoma
	rs34517439	Hair or balding pattern: pattern 4, Nap during day, Forced vital capacity, Forced vital capacity, best measure, Forced expiratory volume in 1-second, Red blood cell count, Sitting height, Relative age of first facial hair, Forced expiratory volume in 1-second, best measure, Red cell distribution width, Sensitivity or hurt feelings, Hematocrit, Hemoglobin concentration, Neuroticism score, Hair or balding pattern: pattern 3, Eosinophil percentage of granulocytes, Neutrophil percentage of granulocytes, Eosinophil percentage of white cells, Forced expiratory volume in 1-second, predicted percentage, Mood swings, Pain type experienced in last month: headache, Medication for pain relief, constipation, heartburn: paracetamol, Treatment with paracetamol, Reticulocyte count, Impedance of arm left, Impedance of whole body, Eosinophil count, Peak expiratory flow, Relative age voice broke, High light scatter reticulocyte count, Hand grip strength left, Invasive ovarian cancer,
	rs56194509	

	Frequency of tenseness or restlessness in last 2 weeks, Sum eosinophil basophil counts, Fed-up feelings, Impedance of arm right, Qualifications: college or university degree, High grade serous ovarian cancer, Neutrophil percentage of white cells, Mouth or teeth dental problems: mouth ulcers, Serous invasive ovarian cancer, Hand grip strength right, Nervous feelings, Alcohol intake frequency, Lymphocyte percentage of white cells, Height, Irritability, Daytime dozing or sleeping, Miserableness, Heel bone mineral density, Medication for pain relief, constipation, heartburn: none of the above, Comparative height size at age 10, Systolic blood pressure, High light scatter percentage of red cells, Worrier or anxious feelings, Illnesses of mother: parkinsons disease, Neuroticism
rs59499656	Trunk fat percentage, Trunk fat mass, Body fat percentage, Arm fat percentage left, Arm fat mass left, Whole body fat mass, Arm fat percentage right, Arm fat mass right, Leg fat mass right, Leg fat percentage right, Leg fat mass left, Waist circumference, Weight, Leg fat percentage left
rs6775319	Arm fat percentage right, Body fat percentage, Arm fat percentage left, Trunk fat percentage, Leg fat percentage left
rs148193266	n.a.
rs12517092	Getting up in morning
	Hair or balding pattern: pattern 4, Nap during day, Red blood cell count, Forced vital capacity, Forced vital capacity, best measure, Forced expiratory volume in 1-second, Sitting height, Relative age of first facial hair, Red cell distribution width, Forced expiratory volume in 1-second, best measure, Hematocrit, Hemoglobin concentration, Sensitivity or hurt feelings, Eosinophil percentage of granulocytes, Neutrophil percentage of granulocytes, Hair or balding pattern: pattern 3, Neuroticism score, Eosinophil percentage of white cells, Forced expiratory volume in 1-second, predicted percentage, Pain type experienced in last month: headache, Eosinophil count, Mood swings, Medication for pain relief, constipation, heartburn: paracetamol, Reticulocyte count, Impedance of arm left, Treatment with paracetamol, Impedance of whole body, Relative age voice broke, Sum eosinophil basophil counts, High light scatter reticulocyte count, Peak expiratory flow, C17orf69 expression in osteoblasts, Hand grip strength left, Invasive ovarian cancer, Impedance of arm right, Frequency of tenseness or restlessness in last 2 weeks, Neutrophil percentage of white cells, High grade serous ovarian cancer, Fed-up feelings, Qualifications: college or university degree, Mouth or teeth dental problems: mouth ulcers, Nervous feelings, Serous invasive ovarian cancer, Alcohol intake frequency, Height, Lymphocyte percentage of white cells, Hand grip strength right, Intracranial volume, Daytime dozing or sleeping, Medication for pain relief, constipation, heartburn: none of the above, Parkinsons disease, KANSL1 expression in lymphoblastoid cells, Irritability, Neuroticism,
rs17762954	Miserableness, Neuroticism, Comparative height size at age 10, Heel bone

		mineral density, Systolic blood pressure, Worrier or anxious feelings, High light scatter percentage of red cells, Mean platelet volume, Androgenetic alopecia early age of onset
	rs17485836	Impedance of arm right, Arm predicted mass right, Arm fat-free mass right,
	rs9293503	Impedance of arm left, Arm predicted mass left
		Arm predicted mass right, Impedance of arm right
MVPA	rs10145335	Intelligence multi trait analysis, Duration of vigorous activity
	rs1008833	n.a.
		Intelligence multi trait analysis, Number of days or week of vigorous physical activity 10+ minutes
	rs1043595	n.a.
	rs1186721	n.a.
	rs12912808	n.a.
	rs1921981	Job involves heavy manual or physical work
	rs1972763	Time spent using computer, Pulse rate
	rs1974771	n.a.
		Arm fat-free mass right, Arm fat-free mass left, Arm predicted mass left, Trunk fat-free mass, Arm predicted mass right, Whole body water mass, Trunk predicted mass, Whole body fat-free mass, Basal metabolic rate, Impedance of arm right, Impedance of arm left, Impedance of whole body, Leg predicted mass right, Leg fat-free mass right, Weight, Leg fat-free mass left, Leg predicted mass left
	rs2035562	
	rs2114286	Sitting height, Heel bone mineral density, Height, Basal metabolic rate
	rs2942127	n.a.
	rs2988004	n.a.
		Alzheimers disease, Illnesses of mother: alzheimers disease or dementia, Illnesses of father: alzheimers disease or dementia, Self-reported high cholesterol, Late onset Alzheimers disease, Treatment with cholesterol lowering medication, Dementia with Lewy bodies, Medication for cholesterol, blood pressure or diabetes: cholesterol lowering medication, Treatment with simvastatin, Advanced age related macular degeneration, Age-related macular degeneration, Treatment with atorvastatin, Cerebral amyloid deposition PET imaging, Illnesses of siblings: alzheimers disease or dementia, APOE apolipoprotein E, Parental lifespan, Coronary artery disease, Red cell distribution width, Low density lipoprotein, C-reactive protein, APOE apolipoprotein E females, Lifespan, Illnesses of mother: none of the above, group 1, Posterior cortical atrophy, Cerebral amyloid deposition positivity PET imaging, Total cholesterol, Alzheimers disease age of onset, Treatment with ezetimibe, Cerebrospinal AB1 42 levels in Alzheimers disease dementia, Treatment with lipitor 10mg tablet, Waist circumference, Medication for cholesterol, blood pressure or diabetes: none of the above, Plateletcrit, Mother still alive, Leg fat percentage left, HDL cholesterol, Leg fat mass left,
	rs429358	Cognitive decline age related, Illnesses of mother: diabetes, Leg fat percentage

	right, Weight change compared with 1 year ago, Alzheimers disease biomarkers, Cortical amyloid beta load, Self-reported dementia or alzheimers/cognitive impairment, Leg fat mass right, Treatment with rosuvastatin, Body mass index, No treatment with medication for cholesterol, blood pressure, diabetes, or take exogenous hormones, Blood protein levels, Body fat percentage, Whole body fat mass, Cognitive ageing females, Arm fat mass right, APOE apolipoprotein E males, Lewy body disease, Arm fat mass left, Cognitive ageing, Trunk fat mass, Type II diabetes, Trunk fat percentage, LDL cholesterol change with statins, Weight, Pulse rate, Cause of death: alzheimers disease, unspecified, Arm fat percentage left, Arm fat percentage right, Illnesses of father: none of the above, group 1, Chronic ischaemic heart disease, Platelet count, Treatment with ezetrol 10mg tablet, Fathers age at death, Mothers age at death, Illnesses of father: diabetes, Cause of death: unspecified dementia, Myocardial infarction, Frequency of stair climbing in last 4 weeks
rs4886868	Height, Comparative height size at age 10, Forced vital capacity, best measure, Sitting height, Forced vital capacity, Trunk predicted mass, Trunk fat-free mass, Hand grip strength left, Hand grip strength right
rs7326482	Overall health rating
	IgA deficiency, White blood cell count, Reticulocyte count, Sum eosinophil basophil counts, Myeloid white cell count, Lymphocyte count, Eosinophil count, Granulocyte count, Sum neutrophil eosinophil counts, Monocyte count, Rheumatoid arthritis, Reticulocyte fraction of red cells, Red blood cell count, Sum basophil neutrophil counts, Hemoglobin concentration, Neutrophil count, Hematocrit, High light scatter reticulocyte count, Schizophrenia, High light scatter percentage of red cells, Eosinophil percentage of white cells, Eosinophil percentage of granulocytes, Basophil count, Neutrophil percentage of granulocytes, Platelet count, Age-related macular degeneration, Red cell distribution width
rs2854277	
rs77742115	n.a.
rs10973183	n.a.
rs11724252	Time spent using computer, Pulse rate
rs12901206	n.a.
rs1637673	n.a.
	Arm fat-free mass right, Arm fat-free mass left, Trunk fat-free mass, Arm predicted mass left, Arm predicted mass right, Whole body water mass, Trunk predicted mass, Whole body fat-free mass, Basal metabolic rate, Impedance of arm right, Impedance of arm left, Impedance of whole body, Leg predicted mass right, Leg fat-free mass right, Weight, Leg fat-free mass left, Leg predicted mass left
rs2035561	
rs497309	Self-reported malabsorption or coeliac disease, Primary sclerosing cholangitis, Intestinal malabsorption, IgA deficiency, Self-reported hyperthyroidism or

	thyrotoxicosis, White blood cell count, Lymphocyte count, Sitting height, Monocyte count, Myeloid white cell count, Treatment with insulin product, Started insulin within one year diagnosis of diabetes, Sum eosinophil basophil counts, Granulocyte count, Sum neutrophil eosinophil counts, Eosinophil count, Sum basophil neutrophil counts, Reticulocyte count, Neutrophil count, Height, Whole body fat-free mass, Whole body water mass, Leg fat-free mass right, Trunk fat-free mass, Leg predicted mass right, Trunk predicted mass, Basal metabolic rate, Leg fat-free mass left, Leg predicted mass left, Treatment with levothyroxine sodium, Reticulocyte fraction of red cells, Self-reported hypothyroidism or myxoedema, Doctor diagnosed sarcoidosis, Arm predicted mass left, Arm fat-free mass right, Arm fat-free mass left, Arm predicted mass right, Treatment with insulin, Medication for cholesterol, blood pressure or diabetes: insulin, Self-reported sarcoidosis, Idiopathic membranous nephropathy, Hemoglobin concentration, Weight, Red blood cell count, High light scatter reticulocyte count, Asthma, Self-reported asthma, Schizophrenia, Self-reported adrenocortical insufficiency or addisons disease, Self-reported systemic lupus erythematosus or sle, Basophil count, Hematocrit, Treatment with fludrocortisone, Self-reported psoriasis, Platelet count, Hip circumference, Comparative body size at age 10, High light scatter percentage of red cells, Total cholesterol, Self-reported type 1 diabetes, Impedance of leg left, Impedance of leg right, Treatment with thyroxine product, Triglycerides, Comparative height size at age 10, Eosinophil percentage of granulocytes, Other serious medical condition or disability diagnosed by doctor, Eosinophil percentage of white cells, Diastolic blood pressure, Neutrophil percentage of granulocytes, Forced expiratory volume in 1-second, predicted percentage, Treatment with carbimazole, Plateletcrit, Self-reported sjogrens syndrome or sicca syndrome, Medication for pain relief, constipation, heartburn: none of the above, Unspecified haematuria, Medication for pain relief, constipation, heartburn: paracetamol, Long-standing illness, disability or infirmity, Diabetes diagnosed by doctor, Impedance of whole body, Mouth or teeth dental problems: dentures, Age at menopause, Insulin-dependent diabetes mellitus, Rheumatoid arthritis ACPA positive, Red cell distribution width, Eye problems or disorders: diabetes related eye disease, Thyrotoxicosis, Crohns disease progression, Potassium in urine, Self-reported graves disease, Number of days or week of moderate physical activity 10+ minutes, Treatment with ventolin 100micrograms inhaler
rs6944149	Intelligence
rs10261932	Monocyte percentage of white cells, Monocyte count
rs7804463rs877483	n.a.
rs921915	Monocyte percentage of white cells, Monocyte count

VPA	Trunk fat-free mass, Trunk predicted mass, Types of physical activity in last 4 weeks: other exercises, Arm predicted mass left, Comparative body size at age 10, Whole body water mass, Whole body fat-free mass, Arm fat-free mass left, Frequency of tiredness or lethargy in last 2 weeks, Arm fat-free mass right, Arm predicted mass right, Impedance of arm left, Past tobacco smoking, Impedance of whole body
rs1248860	Number of days or week of vigorous physical activity 10+ minutes, Intelligence, Number of days or week of moderate physical activity 10+ minutes
rs13243553	Basal metabolic rate, Whole body water mass, Whole body fat-free mass, Trunk predicted mass, Trunk fat-free mass, Arm fat-free mass left, Arm predicted mass left, Arm fat-free mass right, Arm predicted mass right, Weight, Leg fat-free mass left, Leg predicted mass left, Leg fat-free mass right, Leg predicted mass right, Height, Sitting height, Whole body fat mass, Leg fat mass left, Waist circumference, Trunk fat mass, Leg fat mass right, Hip circumference, Arm fat mass right, Arm fat mass left, Comparative height size at age 10, Body mass index, Impedance of whole body, Age at menarche, Impedance of arm right, Mean time to correctly identify matches, Fluid intelligence score, Leg fat percentage left, Body fat percentage, Trunk fat percentage, Leg fat percentage right
rs2764261	n.a.
rs328902	n.a.
rs3781411	n.a.
rs6667222	Number of days or week of vigorous physical activity 10+ minutes Self-reported malabsorption or coeliac disease, Intestinal malabsorption, Treatment with insulin product, Primary sclerosing cholangitis, Started insulin within one year diagnosis of diabetes, Self-reported hyperthyroidism or thyrotoxicosis, White blood cell count, Lymphocyte count, Reticulocyte count, Medication for cholesterol, blood pressure or diabetes: insulin, Reticulocyte fraction of red cells, Myeloid white cell count, High light scatter reticulocyte count, Self-reported sarcoidosis, Granulocyte count, Treatment with insulin, Sum neutrophil eosinophil counts, Sum eosinophil basophil counts, Monocyte count, High light scatter percentage of red cells, Sum basophil neutrophil counts, Neutrophil count, Eosinophil count, Self-reported type 1 diabetes, Insulin-dependent diabetes mellitus, Hemoglobin concentration, Treatment with levothyroxine sodium, Self-reported psoriasis, IgA deficiency
rs9276758	Arm fat-free mass right, Arm fat-free mass left, Trunk fat-free mass, Arm predicted mass right, Arm predicted mass left, Whole body water mass, Trunk predicted mass, Whole body fat-free mass, Basal metabolic rate, Impedance of arm right, Impedance of arm left, Impedance of whole body, Leg predicted mass right, Leg fat-free mass right, Weight, Leg fat-free mass left, Leg predicted mass left
rs1248858	

	Basal metabolic rate, Whole body water mass, Whole body fat-free mass, Trunk predicted mass, Arm fat-free mass left, Trunk fat-free mass, Arm predicted mass left, Arm fat-free mass right, Arm predicted mass right, Weight, Leg fat-free mass left, Leg predicted mass left, Leg fat-free mass right, Leg predicted mass right, Height, Sitting height, Whole body fat mass, Waist circumference, Leg fat mass left, Trunk fat mass, Leg fat mass right, Hip circumference, Arm fat mass right, Arm fat mass left, Comparative height size at age 10, Intelligence, Body mass index, Impedance of whole body, Impedance of arm left, Impedance of arm right, Age at menarche, Fluid intelligence score, Mean time to correctly identify matches, Leg fat percentage left, Body fat percentage, Qualifications: none, Platelet distribution width, Trunk fat percentage, Leg fat percentage right
rs2802288	
SSOE	Height, Mean corpuscular hemoglobin, Trunk fat mass, Weight, Sitting height, Trunk fat percentage, Whole body fat mass, Comparative height size at age 10, Mean corpuscular volume, Hip circumference, Basal metabolic rate, Leg fat-free mass left, Leg predicted mass left, Body fat percentage, Leg fat mass left, Leg fat mass right, Whole body fat-free mass, Hip circumference adjusted for BMI, Arm fat-free mass right, Whole body water mass, Arm fat-free mass left, Arm predicted mass left, Leg predicted mass right, Leg fat-free mass right, Arm predicted mass right, Trunk fat-free mass, Trunk predicted mass, Arm fat mass left, Arm fat mass right, Mouth or teeth dental problems: dentures, Leg fat percentage left, Mean corpuscular hemoglobin concentration, Red cell distribution width, Leg fat percentage right, Height in females, Waist circumference, Body height, Qualifications: college or university degree, Arm fat percentage left, Arm fat percentage right, Waist circumference adjusted for BMI, Time spent watching television, Forced expiratory volume in 1-second, predicted, Height tails, Height in males, Weight in females, Pack years of smoking preview only, Waist circumference adjusted for physical activity, Disorders of mineral metabolism, Vascular or heart problems diagnosed by doctor: none of the above, Waist circumference adjusted for smoking, Qualifications: A levels or as levels or equivalent, Hip circumference in males, Hayfever, allergic rhinitis or eczema, Pack years adult smoking as proportion of life span exposed to smoking, Height females, Waist circumference in physically active individuals, Vascular or heart problems diagnosed by doctor: high blood pressure, Birth weight, Self-reported hypertension, Waist circumference in non-smokers, Waist circumference adjusted for physical activity in males, Body mass index
rs10946808	
rs1200154	n.a.
rs1265178	n.a.
rs12973258	Height, Low density lipoprotein, Total cholesterol, Triglycerides, Comparative height size at age 10, Leg fat percentage left, Leg fat percentage right, Sitting

	height, Age at first live birth, Impedance of arm right, Red cell distribution width
rs159544	Qualifications: college or university degree, Qualifications: none, Schizophrenia, Years of educational attainment, Trunk fat-free mass, Trunk predicted mass
rs166840	Mean corpuscular hemoglobin, Mean corpuscular volume, Mean platelet volume, Types of physical activity in last 4 weeks: other exercises, Platelet count
rs111901094	Height, Comparative height size at age 10, Plateletcrit, Leg fat percentage left, Leg fat percentage right, Sitting height, Age at first live birth, Leg predicted mass right, Leg fat-free mass right
rs288070	n.a.
rs2994326	n.a.
rs4411372	Leg fat percentage right, Body fat percentage, Trunk fat percentage, Leg fat percentage left, Arm fat percentage left, Arm fat percentage right, Whole body fat mass, Leg fat mass right, Trunk fat mass
rs4865667	Heel bone mineral density
rs62253088	Types of physical activity in last 4 weeks: other exercises, Comparative body size at age 10, Suffer from nerves, Impedance of arm left, Impedance of arm right, Nervous feelings, Impedance of whole body, Arm fat-free mass right, Trunk fat-free mass, Trunk predicted mass, Arm predicted mass left
	Qualifications: college or university degree, Time spent watching television, Body mass index, Years of educational attainment, Leg fat mass right, Leg fat mass left, Weight, Arm fat mass right, Arm fat mass left, Impedance of arm right, Impedance of arm left, Whole body fat mass, High light scatter reticulocyte count, Arm predicted mass left, High light scatter percentage of red cells, Qualifications: A levels or as levels or equivalent, Leg fat percentage right, Arm fat-free mass left, Arm predicted mass right, Leg fat percentage left, Impedance of whole body, Basal metabolic rate, Years of educational attainment in females, Arm fat-free mass right, Reticulocyte count, Reticulocyte fraction of red cells, Trunk fat mass, Qualifications: none, Waist circumference, Arm fat percentage right, Whole body water mass, Leg predicted mass left, Whole body fat-free mass, Arm fat percentage left, Leg fat-free mass left, Job involves heavy manual or physical work, Body fat percentage, Overall health rating, Immature fraction of reticulocytes, Age at first live birth, Years of educational attainment in males, Trunk fat-free mass, Hip circumference, Trunk predicted mass, Age at menarche, Leg fat-free mass right, Age completed full time education, Leg predicted mass right, Age at last live birth, Age first birth, Inflammatory bowel disease, Trunk fat percentage, Types of physical activity in last 4 weeks: other exercises, Average weekly beer plus cider intake, Taking other prescription medications, Number of treatments or medications taken, Impedance of leg left, Miserableness
rs7627864	

rs896302	n.a.
rs159543	Qualifications: college or university degree, Qualifications: none, Schizophrenia, Trunk fat-free mass, Years of educational attainment, Trunk predicted mass
rs169412	Mean corpuscular hemoglobin, Mean corpuscular volume, Mean platelet volume, Platelet count, Types of physical activity in last 4 weeks: other exercises
rs1965449	Frequency of tiredness or lethargy in last 2 weeks, Fed-up feelings
rs7615206	Qualifications: college or university degree, Time spent watching television, Body mass index, Years of educational attainment, Leg fat mass right, Leg fat mass left, Weight, Arm fat mass right, Arm fat mass left, Impedance of arm right, Impedance of arm left, Whole body fat mass, High light scatter reticulocyte count, Arm predicted mass left, High light scatter percentage of red cells, Qualifications: A levels or as levels or equivalent, Leg fat percentage right, Arm fat-free mass left, Arm predicted mass right, Leg fat percentage left, Impedance of whole body, Basal metabolic rate, Years of educational attainment in females, Arm fat-free mass right, Reticulocyte count, Reticulocyte fraction of red cells, Trunk fat mass, Qualifications: none, Waist circumference, Arm fat percentage right, Whole body water mass, Leg predicted mass left, Whole body fat-free mass, Arm fat percentage left, Leg fat-free mass left, Job involves heavy manual or physical work, Immature fraction of reticulocytes, Overall health rating, Body fat percentage, Age at first live birth, Age at menarche, Years of educational attainment in males, Trunk fat-free mass, Hip circumference, Trunk predicted mass, Leg fat-free mass right, Age completed full time education, Leg predicted mass right, Age at last live birth, Ulcerative colitis, Inflammatory bowel disease, Age first birth, Trunk fat percentage, Types of physical activity in last 4 weeks: other exercises, Average weekly beer plus cider intake, Number of treatments or medications taken, Taking other prescription medications, Impedance of leg left, Miserableness
rs7627971	Drive faster than motorway speed limit, Risk taking, Impedance of arm left, Impedance of arm right, Impedance of whole body, Arm predicted mass left, Nervous feelings, Arm fat-free mass right, Arm fat-free mass left, Past tobacco smoking, Worrier or anxious feelings, Arm predicted mass right, Trunk fat-free mass, Whole body water mass, Trunk predicted mass, Whole body fat-free mass, Types of physical activity in last 4 weeks: other exercises, Comparative body size at age 10, Basal metabolic rate, Suffer from nerves, Ever smoked, Smoking status: previous, Alcohol intake frequency, Leg fat-free mass left, Leg predicted mass left
rs75930676	n.a.
overall activity	Leg fat mass right, Leg fat percentage right, Leg fat mass left, Leg fat percentage left, Waist circumference, Body mass index, Whole body fat mass,
rs11012732	

	Body fat percentage, Hip circumference, Trunk fat mass, Arm fat mass left, Arm fat mass right, Trunk fat percentage, Arm fat percentage left, Arm fat percentage right, Weight, Meningioma, Invasive ovarian cancer, Serous invasive ovarian cancer, High grade serous ovarian cancer, Arm predicted mass right, Arm fat-free mass left, Forced vital capacity, best measure, Arm predicted mass left, Sodium in urine, Arm fat-free mass right Hair or balding pattern: pattern 4, Nap during day, Forced vital capacity, Forced vital capacity, best measure, Forced expiratory volume in 1-second, Red blood cell count, Sitting height, Relative age of first facial hair, Forced expiratory volume in 1-second, best measure, Red cell distribution width, Sensitivity or hurt feelings, Hematocrit, Hemoglobin concentration, Neuroticism score, Hair or balding pattern: pattern 3, Eosinophil percentage of granulocytes, Neutrophil percentage of granulocytes, Eosinophil percentage of white cells, Forced expiratory volume in 1-second, predicted percentage, Mood swings, Pain type experienced in last month: headache, Medication for pain relief, constipation, heartburn: paracetamol, Treatment with paracetamol, Reticulocyte count, Impedance of arm left, Impedance of whole body, Eosinophil count, Peak expiratory flow, Relative age voice broke, High light scatter reticulocyte count, Hand grip strength left, Invasive ovarian cancer, Frequency of tenseness or restlessness in last 2 weeks, Sum eosinophil basophil counts, Fed-up feelings, Impedance of arm right, Qualifications: college or university degree, High grade serous ovarian cancer, Neutrophil percentage of white cells, Mouth or teeth dental problems: mouth ulcers, Serous invasive ovarian cancer, Hand grip strength right, Nervous feelings, Alcohol intake frequency, Lymphocyte percentage of white cells, Height, Irritability, Daytime dozing or sleeping, Miserableness, Heel bone mineral density, Medication for pain relief, constipation, heartburn: none of the above, Comparative height size at age 10, Systolic blood pressure, High light scatter percentage of red cells, Worrier or anxious feelings, Illnesses of mother:
rs56194509	parkinsons disease, Neuroticism
rs12522261	Getting up in morning
	Trunk fat percentage, Trunk fat mass, Body fat percentage, Arm fat percentage left, Arm fat mass left, Whole body fat mass, Arm fat percentage right, Arm fat mass right, Leg fat mass right, Leg fat percentage right, Leg fat mass left, Waist circumference, Weight, Leg fat percentage left
rs59499656	Red blood cell count, Red cell distribution width, Hematocrit, Hemoglobin concentration, Eosinophil percentage of granulocytes, Neutrophil percentage of granulocytes, Eosinophil percentage of white cells, Eosinophil count, Reticulocyte count, High light scatter reticulocyte count, Sum eosinophil basophil counts, Neutrophil percentage of white cells, Invasive ovarian cancer, Lymphocyte percentage of white cells, High grade serous ovarian cancer, Serous invasive ovarian cancer, Neuroticism, Mean platelet volume, High light
rs62055696	

	scatter percentage of red cells, Sum basophil neutrophil counts, Neutrophil count
rs6775319	Arm fat percentage right, Body fat percentage, Arm fat percentage left, Trunk fat percentage, Leg fat percentage left
rs12517092	Getting up in morning Hair or balding pattern: pattern 4, Nap during day, Red blood cell count, Forced vital capacity, Forced vital capacity, best measure, Forced expiratory volume in 1-second, Sitting height, Relative age of first facial hair, Red cell distribution width, Forced expiratory volume in 1-second, best measure, Hematocrit, Hemoglobin concentration, Sensitivity or hurt feelings, Eosinophil percentage of granulocytes, Neutrophil percentage of granulocytes, Hair or balding pattern: pattern 3, Neuroticism score, Eosinophil percentage of white cells, Forced expiratory volume in 1-second, predicted percentage, Pain type experienced in last month: headache, Eosinophil count, Mood swings, Medication for pain relief, constipation, heartburn: paracetamol, Reticulocyte count, Impedance of arm left, Treatment with paracetamol, Impedance of whole body, Relative age voice broke, Sum eosinophil basophil counts, High light scatter reticulocyte count, Peak expiratory flow, C17orf69 expression in osteoblasts, Hand grip strength left, Invasive ovarian cancer, Impedance of arm right, Frequency of tenseness or restlessness in last 2 weeks, Neutrophil percentage of white cells, High grade serous ovarian cancer, Fed-up feelings, Qualifications: college or university degree, Mouth or teeth dental problems: mouth ulcers, Nervous feelings, Serous invasive ovarian cancer, Alcohol intake frequency, Height, Lymphocyte percentage of white cells, Hand grip strength right, Intracranial volume, Daytime dozing or sleeping, Medication for pain relief, constipation, heartburn: none of the above, Parkinsons disease, KANSL1 expression in lymphoblastoid cells, Irritability, Neuroticism, Miserableness, Comparative height size at age 10, Heel bone mineral density, Systolic blood pressure, Worrier or anxious feelings, High light scatter percentage of red cells, Mean platelet volume, Androgenetic alopecia early age of onset
rs17762954	

n.a., not available; AccAve, overall acceleration average; PA, physical activity; MVPA, moderate-to-vigorous PA; VPA, vigorous PA; SSOE, strenuous sports or other exercises.

Supplementary Table 3. Mendelian randomization estimates between physical activity and memory performance adjusting for body mass index.

outcome	exposure	beta	SE	P value
prospective	AccAve	0.010	0.003	1.41E-04
memory	MVPA	0.170	0.054	0.002
	VPA	0.375	0.145	0.01
	SSOE	0.099	0.129	0.44
	overall activity	0.077	0.031	0.01
episodic	AccAve	0.013	0.006	0.03
memory	MVPA	0.181	0.107	0.09
	VPA	0.446	0.256	0.08
	SSOE	-0.074	0.212	0.73
	overall activity	0.129	0.060	0.03

AccAve, overall acceleration average; PA, physical activity; MVPA, moderate-to-vigorous PA; VPA, vigorous PA; SSOE, strenuous sports or other exercises.