SUPPLEMENTARY FILES
Joint associations of device-measured physical activity and abdominal obesity with incident cardiovascular disease: a prospective cohort study

Supplementary Table 1. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist of items that should be included in reports of cohort studies.

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Supplementary Figure 1. Directed acyclic diagram of the associations under study.

Supplementary Figure 2. Flowchart of the inclusion and exclusion process.

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Supplementary Table 4. Stratified associations between waist circumference (WC) categories from World Health Organization's cut-offs and incident cardiovascular disease by tertiles of physical activity.

Supplementary Table 5. Stratified associations between waist circumference (WC) categories of WC-for-BMI residuals and incident cardiovascular disease by tertiles of physical activity.

Supplementary Table 6. Sex-stratified joint associations between waist circumference (WC) categories from World Health Organization's cut-offs, physical activity tertiles, and incident cardiovascular disease.

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Supplementary Figure 4. Joint associations between body mass index categories, tertiles of physical activity, and incident cardiovascular disease.

Supplementary Figure 5. Sensitivity analysis of joint associations between waist circumference (WC) categories from World Health Organization's cut-offs, physical activity and incident cardiovascular disease without adjustment for the body mass index.

Supplementary Figure 6. Sensitivity analysis, excluding the first 5 years of follow-up, of joint associations between waist circumference (WC) categories from World Health Organization's cut-offs, physical activity and incident cardiovascular disease.

Supplementary Table 1. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist of items that should be included in reports of cohort studies.

	Item No	Recommendation	Location
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Title page (page 1)
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Abstract (page 3)
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Introduction, paragraphs 1-4 (page 6)
Objectives	3	State specific objectives, including any prespecified hypotheses	Introduction, last paragraph (page 6-7)
Methods			
Study design	4	Present key elements of study design early in the paper	Methods, *Data source and study population* subsection (page 7)
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Methods, *Data source and study population* subsection (page 7)
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	Methods, *Data source and study population* (page 7) *Analytical sample* (page 10), and *Statistical analyses* (pages 10-11) subsections
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed	Not applicable
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Methods, *Exposures* (pages 5-6), *Incident CVD* (pages 6-7), and *Covariates* (page 7) subsections
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Methods, *Exposures* (pages 7-8), *Incident CVD* (pages 8-9), and *Covariates* (pages 9-10) subsections; Supplementary Table 1
Bias	9	Describe any efforts to address potential sources of bias	Methods, *Statistical analyses* subsection (pages 10-11)
Study size	10	Explain how the study size was arrived at	Methods, *Analytical sample* subsection (page 10)
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Methods, *Statistical analyses* subsection (pages 10-11); Supplementary Table 1
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Methods, *Statistical analyses* subsection (pages 10-11)
		(*b*) Describe any methods used to examine subgroups and interactions	Methods, *Statistical analyses* subsection (pages 10-11)
		(*c*) Explain how missing data were addressed	Methods, *Analytical sample* subsection (page 10)
		(*d*) If applicable, explain how loss to follow-up was addressed	Methods, *Analytical sample* (page 10) and *Statistical analyses* (pages 10-11) subsections
		(*e*) Describe any sensitivity analyses	Methods, *Statistical analyses* subsection (pages 10-11)
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Results, first paragraph (page 12); Supplementary Figure 2

		(b) Give reasons for non-participation at each stage	Supplementary Figure 2
		(c) Consider use of a flow diagram	Supplementary Figure 2
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Table 1; Supplementary Figure 1; Supplementary Table 3
		(b) Indicate number of participants with missing data for each variable of interest	Supplementary Figure 2
		(c) Summarise follow-up time (eg, average and total amount)	Results, first paragraph (page 12)
Outcome data	15*	Report numbers of outcome events or summary measures over time	Results, first paragraph (page 12)
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Results, pages 12-13
		(*b*) Report category boundaries when continuous variables were categorized	Table 1; Table 2; Supplementary Table 3
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Results (pages 14-15) and Supplementary files
Discussion			
Key results	18	Summarise key results with reference to study objectives	Discussion , first paragraph (page 15)
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Discussion, L*imitations* subsection (page 18)
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Discussion, pages 15-19
Generalisability	21	Discuss the generalisability (external validity) of the study results	Discussion, *Implications for clinical practice and health policy* subsection (page 18)
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based.	Page 20

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

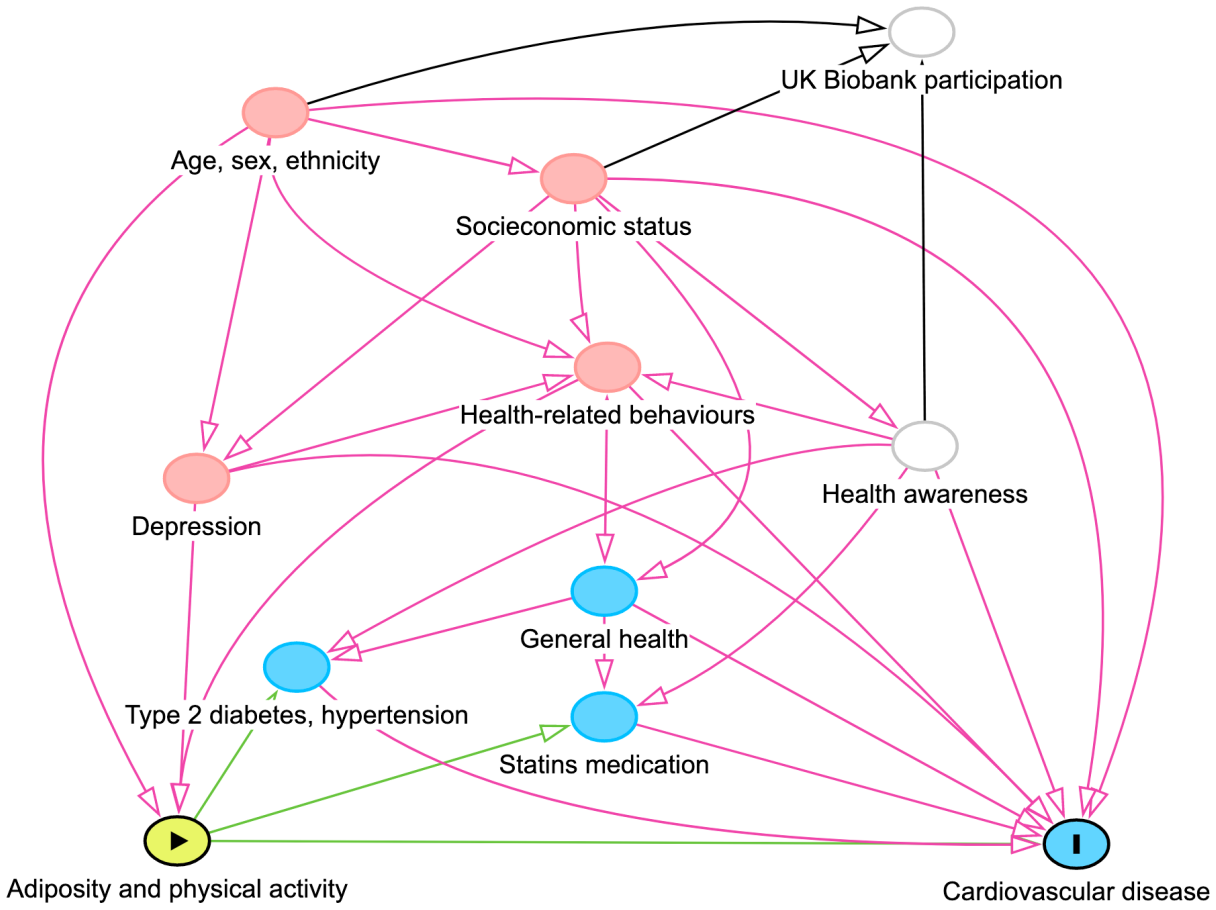
Supplementary Table 2. Description of variables used and data processing from the UK Biobank data showcase.

Variable	Data processing	Used UK Biobank field/s
Light intensity physical activity (minutes per week)	Overall average proportion of time spent doing light intensity activity across the monitoring period, based on machine-learning methods, multiplied by 10,080 minutes per week, and categorized in tertiles.	40048
Vigorous intensity physical activity (minutes per week)	Overall average proportion of time spent in accelerations above 400 *mg* across the monitoring period, multiplied by 10,080 minutes per week, and categorized in tertiles.	Variable *cutPointVPA-overall-avg* in Return 2040
Moderate-to-vigorous intensity physical activity (minutes per week)	Overall average proportion of time spent doing moderate-to-vigorous intensity activity across the monitoring period, based on machine-learning methods, multiplied by 10,080 minutes per week, and categorized in tertiles.	40049
Total physical activity per week	Direct categorization of overall acceleration average (*mg*) in tertiles	90012
Body Mass Index	From measured height and weight and categorized as normal weight (18.5-24.9 kg/m^2), overweight (25-29.9 kg/m^2) and obese (≥30 kg/m^2).	21001
Waist Circumference	For clinical categories: Categorization as low (if below 88 cm in women and 102 cm in men) or high (equal-to or above the cut-offs). For categories based on WC-for-BMI residuals: Using the residuals from regressing the waist circumference (cm) on the BMI (kg/m^2) and categorization as low, medium, and high, maintaining the sex-specific distribution in the BMI categories.	48, 21001
Incident cardiovascular disease (fatal and non-fatal)	Cardiovascular death (ICD-10 codes I00-I99) or the first hospital diagnosis of ischemic heart disease (ICD-10 codes I20-25), heart failure (I50) or stroke (I60-I64).	41270, 41280
Follow-up	From date when the participants stopped wearing the accelerometer to incident CVD, death, or lost to follow-up.	41280, 90011, 191, 30
Age	Difference between date of birth and date when they stopped wearing the accelerometer	34
Sex	Men/women	31
Townsend deprivation index	Marker of area-based socioeconomic status, derived from postcode of residence and census data on housing, employment, social class, and car availability	189
Ethnicity	White, Asian, Black, Others	21000
Education	No qualifications, not college or university degree, and college or university degree	6138
Living/not living with partner	Yes/no	709, 6414

Dietary Quality	Meeting or not each recommendation: 1) ≤3 weekly servings of red meat and ≤1 servings/week of processed meat; 2) ≥2 servings per week of fish, at least one as oily fish; 3) ≥400 grams per day of fruits and vegetables. Meeting each recommendation is 1 point.	Oily fish: 1329 Non-oily fish:1339 Fruit/vegetable:1289,1299, 1309, 1319 Processed meat: 1349 Red meat:1369, 1379, 1389
Alcohol intake	Never, previous, current and <3 times/week, and current and ≥3 times/week	20117, 1558
Smoking	Never, previous, current smoker	20160
Employment	Employed, unemployed, retired	6142
History of depression	Yes/no.	20002
Prevalent diabetes	Yes/no	Algorithm from Eastwood et al. 2016: https://doi.org/10.1371/journal.pone.0162388
Hypertension	Yes/no. Combination of: Self-reported high blood Pressure, self-reported blood pressure medication Measured, manual or automated systolic and diastolic blood pressure Self-reported hypertension, essential hypertension.	6150, 6153 (women), 6177 (men), 4080, 4079, 93, 94, 20002
Statins medication	Yes/no	20003
Anorexia, bulimia or other eating disorder	Anorexia/bulimia/other eating disorder	20002
Attendance/disability/mobility allowance	Attendance, disability or mobility allowance	6146
Prevalent cancer (by the end of the accelerometer assessment)	Categorization: yes/no Sources: (Questionnaire) self-reported (Interview) self-reported cancer excluding non-melanoma skin cancer (Cancer Registry) Any cancer-type (C-D48) excluding non-melanoma skin cancers (ICD-10; C44, ICD-9; 173)	2453, 20001, 40006
Prevalent CVD (by the end of the accelerometer assessment)	Categorization: yes/no Sources: (Algorithmically defined outcomes) Myocardial infarction (ICD-10 codes I21, I22, I23, I24.1, I25.2, and ICD-9 codes 410, 411, 412.X, 429.79) Stroke (ICD-10 codes I60, I61, I63, I64, and ICD-9 codes 430.X, 431.X, 434.X, 434.0, 434.1, 434.9, 436.X) (Hospital inpatient data) Angina (ICD-10 codes I20.0, I20.1, I20.8, I20.9, and ICD-9 code 4139) Heart failure (ICD-10 codes I11.0, I11.9, I13.0, I13.2, I13.9, I50.0, I50.1, I50.9, and ICD-9 codes 4280, 4281, 4289)	42000, 42006

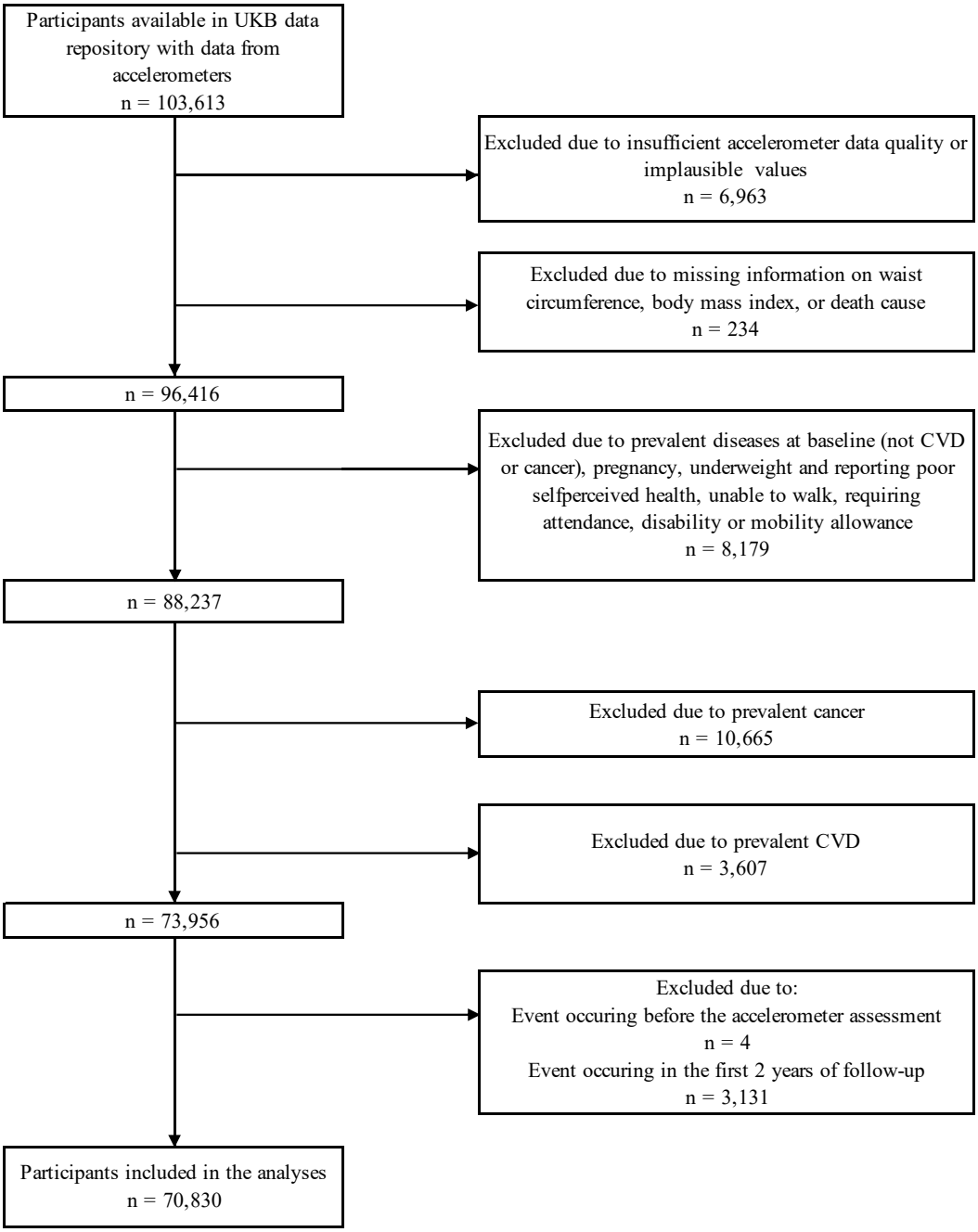
Chronic immunological or sistemic diseases	yes/no Sources: (Interview) Self-reported rheumatoid arthritis, vasculitis, giant cell/temporal arteritis, polymyalgia rheumatica, Wegners granulmatosis, microscopic polyarteritis, polyartertis nodosa, systemic lupus erythematosis/sle, sjogren's syndrome/sicca syndrome, dermatopolymyositis, dermatomyositis, polymyositis, scleroderma/systemic sclerosis, chronic fatigue syndrome, antiphospholipid syndrome	20002_0_0 – 20002_0_28
Chronic respiratory diseases (not including Chronic obstructive pulmonary disease)	yes/no Sources: (Interview) Self-reported bronchiectasis, interstitial lung disease, asbestosis, pulmonary fibrosis, fibrosing alveolitis/unspecified alveolitis, respiratory failure	20002_0_0 – 20002_0_28
Chronic widespread pain	yes/no Sources: (Questionnaire) "Have you had pains all over the body for more than 3 months?"	2956_0_0
Chronic/degenerative neurological problem	yes/no Sources: (Interview) self-reported chronic/degenerative neurological problem, Parkinson's disease, dementia/Alzheimer's/cognitive impairment, motor neuron disease, myasthenia gravis, multiple sclerosis, other demyelinating disease (not multiple sclerosis)	20002_0_0 – 20002_0_28
Chronic obstructive pulmonary disease	yes/no Sources: Algorithmically defined outcomes and COPD from self-report or hospital admission	42016
Liver failure/cirrhosis	yes/no Sources: (Interview) self-reported liver failure/cirrhosis, primary biliary cirrhosis, alcoholic liver disease / alcoholic cirrhosis	20002
Pregnancy	yes/no Sources: (interview)	3140
Psychological or psychriatic problems	yes/no Sources: (Interview) self-reported schizophrenia, mania/bipolar disorder/manic depression, deliberate self-harm/suicide attempt, post-traumatic stress disorder	20002
Substance abuse/dependency	yes/no Sources: (Interview) self-reported alcohol dependency, opioid dependency, other substance abuse/dependency	20002

Supplementary Figure 1. Directed acyclic diagram of the association under study.



Health-related behaviors include sedentary time, diet pattern, smoking, alcohol intake. Socioeconomic status include education, marital status, employment status and Townsend deprivation index. Direct arrows from ethnicity and sex to physical activity/adiposity represent potential influences of unmeasured societal factors (e.g., feeling of insecurity to be physically active at night or in some places, religious beliefs conditioning education and not covered by our education variable, etc). Direct arrow from socioeconomic status to cardiovascular disease represent other unmeasured/additional health-related exposures not only mediated by awareness, like unhealthy factors at work or in the area of living, having access to places to be physically active, etc).

Supplementary Figure 2. Flowchart of the inclusion and exclusion process. Exclusions due to prevalent diseases at baseline included cancer (excluding non-melanoma skin cancer), cardiovascular diseases, chronic neurological degenerative problems, widespread pain, respiratory diseases (including chronic obstructive pulmonary disease), liver failure or cirrhosis, psychological or psychiatric problems, substance abuse or dependency, or eating disorders.

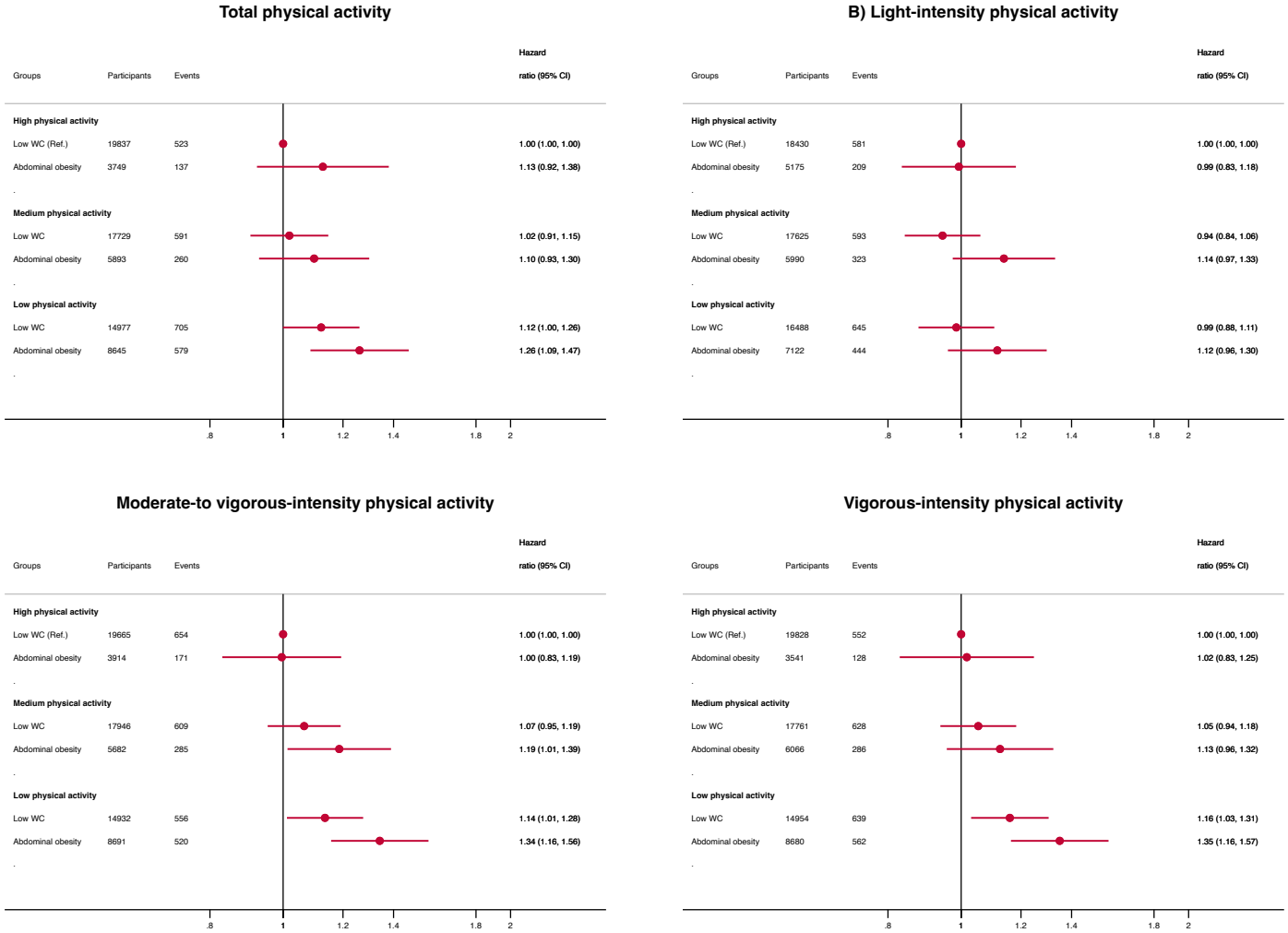


Supplementary Table 3. Descriptive physical activity and sedentary time data in the total sample, by physical activity tertiles, and waist circumference categories based on the World Health Organization's cut-off points.

	Total sample	Physical activity tertiles			Waist circumference categories	
		Low	Medium	High	Low	Abdominal obesity
Total volume of physical activity (average acceleration, mg)	27.7 (5.9-97.2)	21.4 (5.9-24.7)	27.7 (24.7-31.0)	35.9 (31.0-97.2)	28.6 (7.7-97.21)	25.15 (5.9-89.5)
Light-intensity physical activity (minutes/week)	2089.0 (28.0-5799.5)	1489.0 (28.0-1808.0)	2089.1 (1808.1-2390.3)	2794.3 (2390.4-5799.5)	2122.2 (28.0-5799.5)	1995.2 (47.0-5702.6)
Moderate-to-vigorous-intensity physical activity (minutes/week)	247.0 (0.0-2999.7)	87.5 (0.0-164.0)	247.1 (164.1-349.1)	511.9 (349.2-2999.7)	273.1 (0.0-2999.7)	174.5 (0.0-2388.3)
Vigorous-intensity physical activity (minutes/week)	6.0 (0.0-756.7)	1.0 (0.0-2.7)	6.1 (2.8-13.0)	31.7 (13.1-756.7)	8.0 (0.0-756.7)	3.0 (0.0-480.0)

All values are median (range). Low waist circumference represents <88cm in women and <102 cm in men.

Supplementary Figure 3. Results from model 3 for the joint associations between waist circumenference (WC) categories based on World Health Organization's cut-off points, tertiles of physical activity, and incident cardiovascular disease. Model was adjusted for age (as timescale), sex, body mass index, ethnicity, education, living/not living with partner, employment, Townsend, diet quality, alcohol intake, smoking, depression, prevalent type 2 diabetes, hypertension, and use of statins medication. Low WC was defined as <88 cm in women and <102 cm of WC in men, and high otherwise.



Supplementary Table 4. Stratified associations between waist circumference (WC) categories from World Health Organization's cut-offs and incident cardiovascular disease by tertiles of physical activity.

Groups	n total	n events	Hazard ratio (95% CI)
Total physical activity			
High			
Low WC	19,837	523	1.00 (Reference)
Abdominal obesity	3,749	137	1.13 (0.88, 1.45)
Medium			
Low WC	17,729	591	1.00 (Reference)
Abdominal obesity	5,893	260	1.04 (0.86, 1.27)
Low			
Low WC	14,977	705	1.00 (Reference)
Abdominal obesity	8,645	579	1.19 (1.03, 1.39)
Light intensity physical activity			
High			
Low WC	18,430	581	1.00 (Reference)
Abdominal obesity	5,175	209	1.12 (0.91, 1.40)
Medium			
Low WC	17,625	593	1.00 (Reference)
Abdominal obesity	5,990	323	1.20 (0.99, 1.45)
Low			
Low WC	16,488	645	1.00 (Reference)
Abdominal obesity	7,122	444	1.12 (0.95, 1.32)
Moderate-to-vigorous intensity physical activity			
High			
Low WC	19,665	654	1.00 (Reference)
Abdominal obesity	3,914	171	0.99 (0.79, 1.24)
Medium			
Low WC	17,946	609	1.00 (Reference)
Abdominal obesity	5,682	285	1.19 (0.98, 1.44)
Low			
Low WC	14,932	556	1.00 (Reference)
Abdominal obesity	8,691	520	1.19 (1.01, 1.40)
Vigorous intensity physical activity			
High			
Low WC	19,828	552	1.00 (Reference)
Abdominal obesity	3,541	128	1.01 (0.79, 1.31)
Medium			
Low WC	17,761	628	1.00 (Reference)
Abdominal obesity	6,066	286	1.01 (0.83, 1.22)
Low			
Low WC	14,954	639	1.00 (Reference)
Abdominal obesity	8,680	562	1.25 (1.07, 1.46)

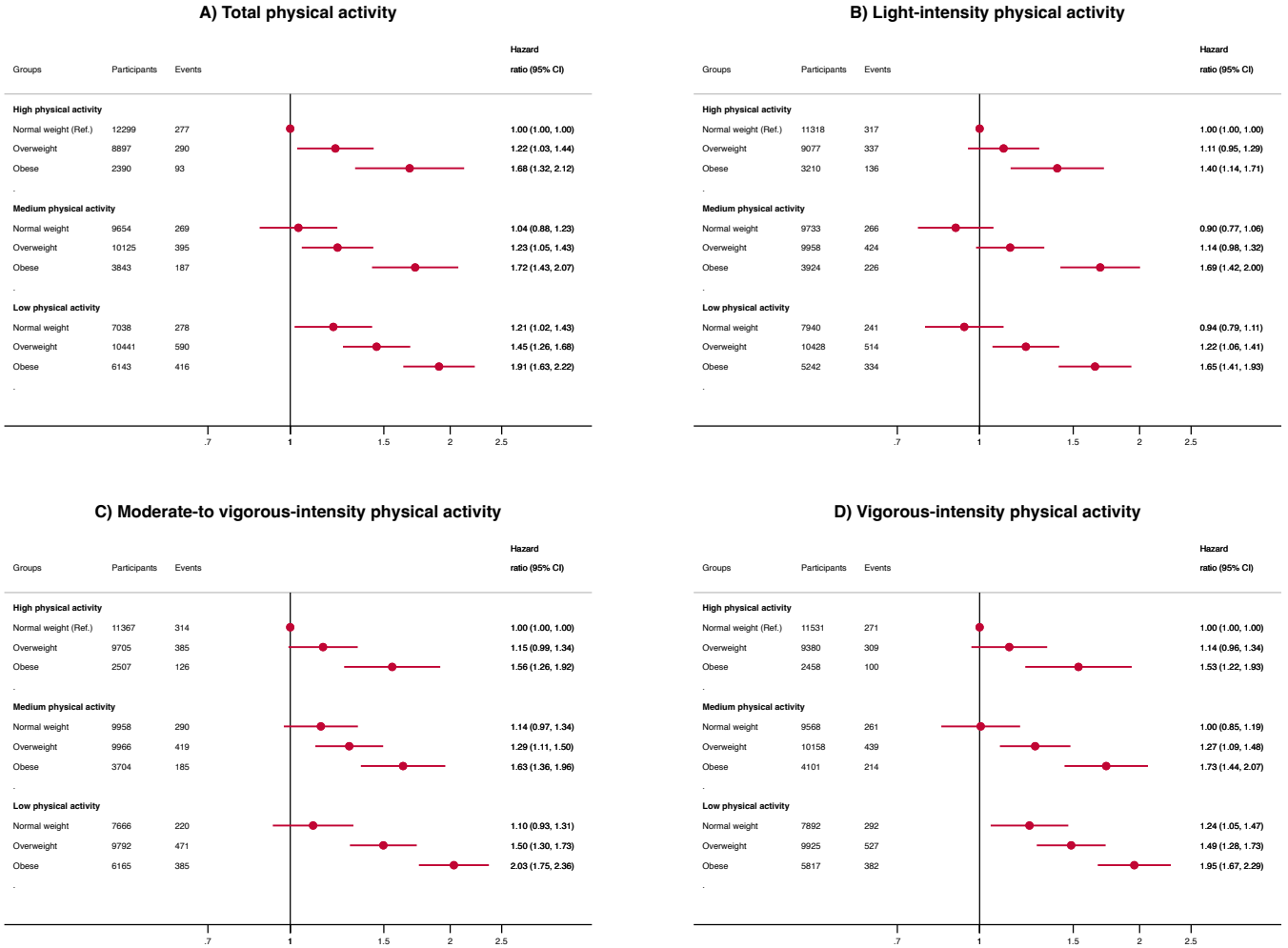
Results are from main model, adjusted for age (as timescale), sex, body mass index, ethnicity, education, living/not living with partner, employment, Townsend, diet quality, alcohol intake, smoking and depression.

Supplementary Table 5. Stratified associations between waist circumference (WC) categories of WC-for-BMI residuals and incident cardiovascular disease by tertiles of physical activity.

Groups	n total	n events	Hazard ratio (95% CI)
Total physical activity			
High			
Low WC	11,058	253	1.00 (Reference)
Medium WC	9,505	305	1.11 (0.93, 1.31)
High WC	3,023	102	1.13 (0.90, 1.43)
Medium			
Low WC	9,693	286	1.00 (Reference)
Medium WC	9,845	390	1.06 (0.91, 1.24)
High WC	4,084	175	1.10 (0.91, 1.33)
Low			
Low WC	8,242	355	1.00 (Reference)
Medium WC	10,136	566	1.01 (0.88, 1.15)
High WC	5,244	363	1.20 (1.03, 1.39)
Light intensity physical activity			
High			
Low WC	10,564	283	1.00 (Reference)
Medium WC	9,412	354	1.13 (0.96, 1.32)
High WC	3,629	153	1.22 (1.00, 1.49)
Medium			
Low WC	9,824	290	1.00 (Reference)
Medium WC	9,704	412	1.08 (0.93, 1.26)
High WC	4,087	214	1.27 (1.06, 1.52)
Low			
Low WC	8,605	321	1.00 (Reference)
Medium WC	10,370	495	0.98 (0.85, 1.13)
High WC	4,635	273	1.09 (0.93, 1.28)
Moderate-to-vigorous intensity physical activity			
High			
Low WC	9,821	271	1.00 (Reference)
Medium WC	10,229	413	1.12 (0.96, 1.31)
High WC	3,529	141	1.04 (0.84, 1.27)
Medium			
Low WC	9,632	294	1.00 (Reference)
Medium WC	9,924	387	0.95 (0.81, 1.11)
High WC	4,072	213	1.17 (0.98, 1.40)
Low			
Low WC	9,540	329	1.00 (Reference)
Medium WC	9,333	461	1.08 (0.94, 1.25)
High WC	4,750	286	1.24 (1.05, 1.46)
Vigorous intensity physical activity			
High			
Low WC	10,877	275	1.00 (Reference)
Medium WC	9,635	299	0.94 (0.79, 1.11)
High WC	2,857	106	1.06 (0.84, 1.33)
Medium			
Low WC	9,533	303	1.00 (Reference)
Medium WC	10,058	423	1.00 (0.86, 1.17)
High WC	4,236	188	1.03 (0.85, 1.23)
Low			
Low WC	8,583	316	1.00 (Reference)
Medium WC	9,793	539	1.16 (1.00, 1.33)
High WC	5,258	346	1.32 (1.13, 1.54)

Results are from main model, adjusted for age (as timescale), sex, ethnicity, education, living/not living with partner, employment, Townsend, diet quality, alcohol intake, smoking and depression.

Supplementary Figure 4. Joint associations between body mass index categories, tertiles of physical activity, and incident cardiovascular disease. Models were adjusted for age (as timescale), sex, ethnicity, education, living/not living with partner, employment, Townsend, diet quality, alcohol intake, smoking, and depression.



Supplementary Table 6. Sex-stratified joint associations between waist circumference (WC) categories from World Health Organization's cut-offs, physical activity tertiles, and incident cardiovascular disease.

	Women			Men		
Groups	**n total**	**n events**	**Hazard ratio (95% CI)**	**n total**	**n events**	**Hazard ratio (95% CI)**
Total physical activity						
High						
Low WC (reference)	11,439	185	1.00	8,398	338	1.00
Abdominal obesity	2,420	58	1.14 (0.83, 1.56)	1,329	79	1.20 (0.93, 1.56)
Medium						
Low WC	10,009	214	1.05 (0.86, 1.28)	7,720	377	1.02 (0.88, 1.18)
Abdominal obesity	3,750	117	1.18 (0.91, 1.53)	2,143	143	1.11 (0.89, 1.38)
Low						
Low WC	7,421	215	1.18 (0.97, 1.45)	7,556	490	1.15 (0.99, 1.32)
Abdominal obesity	4,924	253	1.54 (1.21, 1.96)	3,721	326	1.22 (1.01, 1.47)
Light intensity physical activity						
High						
Low WC (reference)	12,646	290	1.00	5,784	291	1.00
Abdominal obesity	3,820	119	0.99 (0.78, 1.26)	1,355	90	1.05 (0.81, 1.35)
Medium						
Low WC	10,022	211	0.94 (0.79, 1.12)	7,603	382	0.95 (0.82, 1.11)
Abdominal obesity	3,904	150	1.16 (0.92, 1.46)	2,086	173	1.19 (0.96, 1.47)
Low						
Low WC	6,201	113	0.88 (0.70, 1.09)	10,287	532	1.03 (0.89, 1.19)
Abdominal obesity	3,370	159	1.42 (1.11, 1.81)	3,752	285	1.07 (0.88, 1.29)
Moderate-to-vigorous intensity physical activity						
High						
Low WC (reference)	8,477	145	1.00	11,188	509	1.00
Abdominal obesity	1,748	44	1.04 (0.73, 1.49)	2,166	127	1.02 (0.82, 1.26)
Medium						
Low WC	10,429	215	1.05 (0.85, 1.29)	7,517	394	1.10 (0.97, 1.26)
Abdominal obesity	3,327	107	1.21 (0.92, 1.60)	2,355	178	1.24 (1.02, 1.50)
Low						
Low WC	9,963	254	1.14 (0.93, 1.41)	4,969	302	1.18 (1.02, 1.37)
Abdominal obesity	6,019	277	1.49 (1.16, 1.91)	2,672	243	1.33 (1.10, 1.61)
Vigorous intensity physical activity						
High						
Low WC (reference)	9,378	141	1.00	10,450	411	1.00
Abdominal obesity	1,826	42	1.11 (0.77, 1.60)	1,715	86	1.02 (0.79, 1.30)
Medium						
Low WC	9,685	201	1.04 (0.84, 1.30)	8,076	427	1.09 (0.95, 1.24)

Abdominal obesity	3,431	91	1.02 (0.76, 1.36)	2,635	195	1.26 (1.03, 1.53)
Low						
Low WC	9,806	272	1.10 (0.89, 1.35)	5,148	367	1.27 (1.10, 1.47)
Abdominal obesity	5,837	295	1.49 (1.17, 1.91)	2,843	267	1.33 (1.10, 1.61)

Results are from main model, adjusted for age (as timescale), body mass index, ethnicity, education, living/not living with partner, employment, Townsend, diet quality, alcohol intake, smoking and depression.

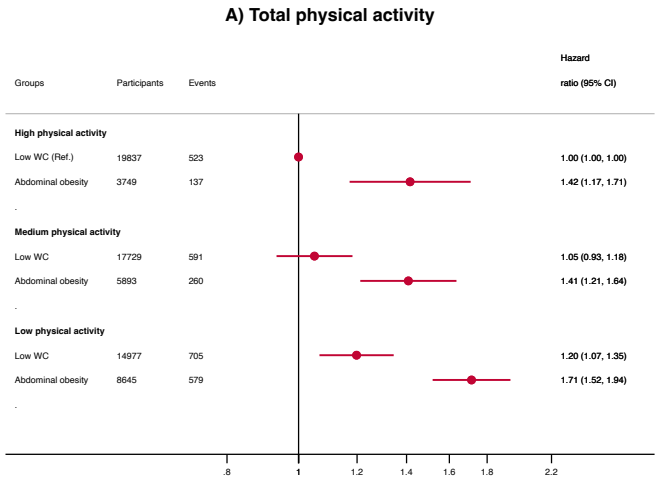
Supplementary Table 7. Sex-stratified joint associations between waist circumference (WC) categories of WC-for-BMI residuals, physical activity tertiles, and incident cardiovascular disease.

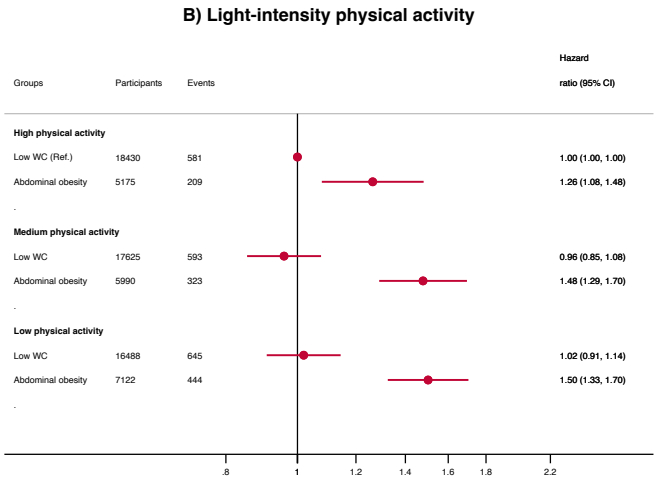
	Women			Men		
Groups	**n total**	**n events**	**Hazard ratio (95% CI)**	**n total**	**n events**	**Hazard ratio (95% CI)**
Total physical activity						
High						
Low WC (reference)	7,299	102	1.00	3,759	151	1.00
Medium WC	4,791	94	1.27 (0.96, 1.68)	4,714	211	1.00 (0.81, 1.23)
High WC	1,769	47	1.60 (1.13, 2.26)	1,254	55	0.87 (0.64, 1.19)
Medium						
Low WC	6,599	143	1.27 (0.98, 1.63)	3,094	143	0.98 (0.78, 1.24)
Medium WC	4,853	121	1.32 (1.01, 1.72)	4,992	269	1.04 (0.85, 1.27)
High WC	2,307	67	1.41 (1.03, 1.92)	1,777	108	1.05 (0.82, 1.35)
Low						
Low WC	5,415	161	1.45 (1.13, 1.87)	2,827	194	1.25 (1.01, 1.55)
Medium WC	4,430	176	1.75 (1.36, 2.24)	5,706	390	1.12 (0.92, 1.35)
High WC	2,500	131	2.13 (1.64, 2.78)	2,744	232	1.31 (1.06, 1.62)
Light intensity physical activity						
High						
Low WC (reference)	8,118	166	1.00	2,446	117	1.00
Medium WC	5,857	162	1.23 (0.99, 1.53)	3,555	192	0.99 (0.79, 1.25)
High WC	2,491	81	1.33 (1.02, 1.74)	1,138	72	1.06 (0.79, 1.42)
Medium						
Low WC	6,729	144	1.09 (0.87, 1.36)	3,095	146	0.96 (0.76, 1.23)
Medium WC	4,873	133	1.21 (0.96, 1.52)	4,831	279	1.01 (0.81, 1.26)
High WC	2,324	84	1.45 (1.11, 1.88)	1,763	130	1.16 (0.90, 1.49)
Low						
Low WC	4,466	96	1.18 (0.91, 1.52)	4,139	225	1.14 (0.91, 1.42)
Medium WC	3,344	96	1.35 (1.05, 1.74)	7,026	399	1.04 (0.85, 1.28)
High WC	1,761	80	1.82 (1.39, 2.39)	2,874	193	1.09 (0.86, 1.37)

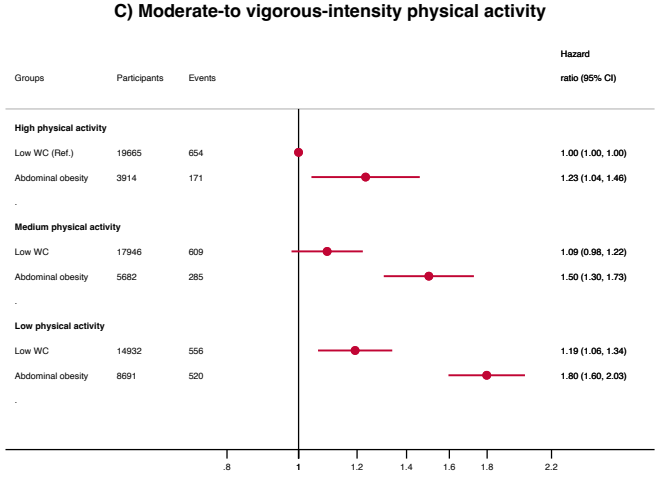
Moderate-to-vigorous intensity physical activity						
High						
Low WC (reference)	5,224	79	1.00	4,597	192	1.00
Medium WC	3,590	72	1.18 (0.86, 1.63)	6,639	341	1.09 (0.92, 1.30)
High WC	1,411	38	1.42 (0.96, 2.09)	2,118	103	0.93 (0.73, 1.18)
Medium						
Low WC	6,632	128	1.13 (0.85, 1.50)	3,000	166	1.29 (1.05, 1.59)
Medium WC	4,948	128	1.34 (1.01, 1.78)	4,976	259	1.07 (0.89, 1.29)
High WC	2,176	66	1.46 (1.05, 2.03)	1,896	147	1.42 (1.14, 1.76)
Low						
Low WC	7,457	199	1.39 (1.07, 1.81)	2,083	130	1.38 (1.10, 1.72)
Medium WC	5,536	191	1.60 (1.23, 2.09)	3,797	270	1.33 (1.11, 1.61)
High WC	2,989	141	1.99 (1.50, 2.63)	1,761	145	1.43 (1.15, 1.78)
Vigorous intensity physical activity						
High						
Low WC (reference)	6,220	87	1.00 (1.00, 1.00)	4,657	188	1.00 (1.00, 1.00)
Medium WC	3,711	62	1.08 (0.78, 1.49)	5,924	237	0.88 (0.72, 1.06)
High WC	1,273	34	1.58 (1.06, 2.35)	1,584	72	0.89 (0.68, 1.17)
Medium						
Low WC	6,353	126	1.09 (0.83, 1.43)	3,180	177	1.12 (0.91, 1.38)
Medium WC	4,636	110	1.21 (0.91, 1.61)	5,422	313	1.06 (0.88, 1.27)
High WC	2,127	56	1.22 (0.87, 1.72)	2,109	132	1.07 (0.86, 1.35)
Low						
Low WC	6,740	193	1.26 (0.98, 1.63)	1,843	123	1.17 (0.93, 1.48)
Medium WC	5,727	219	1.54 (1.19, 1.98)	4,066	320	1.27 (1.05, 1.52)
High WC	3,176	155	1.85 (1.41, 2.42)	2,082	191	1.39 (1.13, 1.71)

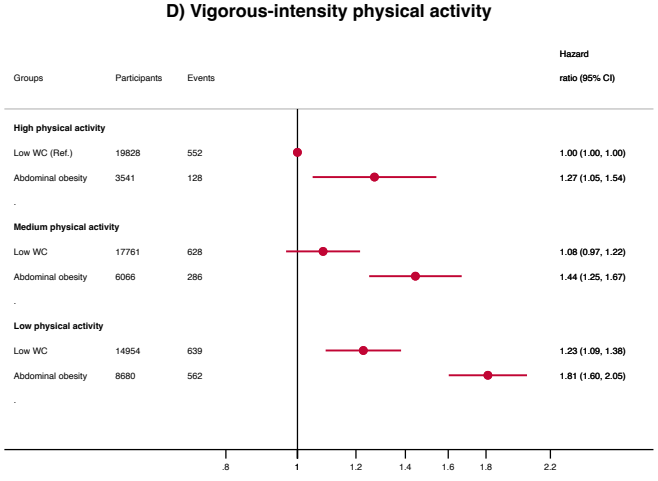
Results are from main model, adjusted for age (as timescale), ethnicity, education, living/not living with partner, employment, Townsend, diet quality, alcohol intake, smoking and depression.

Supplementary Figure 5. Sensitivity analysis of joint associations between waist circumference (WC) categories from World Health Organization's cut-offs, physical activity and incident cardiovascular disease without adjustment for the body mass index. Results are adjusted for age (as timescale), sex, ethnicity, education, living/not living with partner, employment, Townsend, diet quality, alcohol intake, smoking and depression. Ref: reference.









Supplementary Figure 6. Sensitivity analysis, excluding the first 5 years of follow-up, of joint associations between waist circumference (WC) categories from from World Health Organization's cut-offs, physical activity and incident cardiovascular disease. Results are from main model, adjusted for age (as timescale), sex, body mass index, ethnicity, education, living/not living with partner, employment, Townsend, diet quality, alcohol intake, smoking and depression. Ref: reference.