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Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our Editorial Policies and the Editorial Policy Checklist.

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed	
☐	☒	The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement
☐	☒	A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒	The statistical test(s) used AND whether they are one- or two-sided *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☐	☒	A description of all covariates tested
☐	☒	A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒	A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☐	☒	For null hypothesis testing, the test statistic (e.g. *F*, *t*, *r*) with confidence intervals, effect sizes, degrees of freedom and *P* value noted *Give P values as exact values whenever suitable.*
☒	☐	For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☒	☐	For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☒	☐	Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated

Our web collection on statistics for biologists contains articles on many of the points above.

Software and code

Policy information about availability of computer code

Data collection	The data this study were derived from UK Biobank, including questionnaires, clinical laboratories, genetic risk score, accelerometer-derived physical activity data using wrist-worn triaxial accelerometer (Axivity AX3), health and death outcome link to Primary Care, Hospital inpatient, and Death Register.
Data analysis	All the analyses were conducted using R (version 4.3.3). R packages: 'survival' (3.8.3), 'rms' (6.8.0), 'mice' (3.17.0). The codes for data analysis are available upon request from corresponding authors.

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio guidelines for submitting code & software for further information.

Data

Policy information about availability of data

All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our policy

This research was conducted using the UK Biobank resource (application number #134551). The UK Biobank data are available upon application to the UK Biobank (https://www.ukbiobank.ac.uk/). Source data are provided with this paper.

Research involving human participants, their data, or biological material

Policy information about studies with human participants or human data. See also policy information about sex, gender (identity/presentation), and sexual orientation and race, ethnicity and racism.

Reporting on sex and gender	The sex of participants was derived from UK Biobank data-field 31. Our study focused on the sex differences in association of wearable accelerometer-derived physical activity with coronary heart disease (CHD) incidence risk in CHD-free population and all-cause mortality risk in established CHD population.
Reporting on race, ethnicity, or other socially relevant groupings	The ethnicity of participants was derived from UK Biobank data-field 21000, which was incorporated as a covariate in the multi-variable Cox models. Participants self-identified their ethnic background during baseline period (2006-2010), with further details within the UK Biobank.
Population characteristics	80,243 participants free of CHD [age 61.54 ± 7.84 years; female: 57.3%] were included in the CHD incidence study, and 5,169 CHD-established participants (age: 66.93 ± 5.90 years; 30.0% female) were included in the CHD mortality study. Overall, 48.46% of CHD-free participants met the minimum moderate-to-vigorous physical activity (MVPA) time (150 min/week) recommended by AHA/ESC/WHO, whereas only 30.51% of CHD patients achieved this target. Furthermore, females lag behind males in both MVPA duration and intensity, and had a lower adherence to guidelines
Recruitment	The UK Biobank is a large prospective study with over 500,000 participants aged 37–73 years were recruited between 2006 and 2010 from 22 assessment centers across England, Scotland, and Wales. Each participant completed a touch-screen questionnaire, underwent a nurse-led interview, had physical measurements taken, and provided biological samples. In the physical activity sub-study conducted between February 2013 and December 2015, 103,695 participants provided the weekly wrist-worn triaxial accelerometer (Axivity AX3) data.
Ethics oversight	UK Biobank had ethical approval from the North West Multicenter Research Ethics Committee (Ref: 11/NW/0382). All participants gave written informed consent. This study was conducted under the UK Biobank application number 134551.

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☒ Life sciences ☐ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Life sciences study design

All studies must disclose on these points even when the disclosure is negative.

Sample size	The sample size of this study was determined by the maximum number of eligible participants in the UK Biobank accelerometer-based physical activity sub-study. Among all 103,695 participants provided the weekly wrist-worn triaxial accelerometer (Axivity AX3) data, 83 withdraw consent, 4690 with unreliable data size, 4463 with insufficient wear time, 157 with poor calibration, 206 with implausible acceleration values, 8675 with missing covariates, and 8 developed CHD during the wearing period were excluded. Finally, 85,412 eligible participants were retained, among which, 80,243 without CHD were included in the CHD incidence study, and 5,169 with established CHD were included in the CHD mortality study.
Data exclusions	The exclusion criteria were shown in Figure S10, we excluded individuals who withdrawn consent, with unreliable data size, insufficient wear time, poor calibration, and implausible acceleration values. We further excluded individuals with missing covariates or who developed CHD during the wearing period.
Replication	This is a population-based cohort study using accelerometer-measured physical activity data. Due to the unavailability of suitable external data sources, we have not yet replicated our findings in an independent cohort. However, we conducted a series of sensitivity analyses to confirm the robustness of our results. Specifically, (a) we employed Fine and Gray subdistribution hazard models to account for the competing risk of death in CHD incidence study; (b) we additionally fitted Cox proportional hazards models with age as the time scale to further control for potential confounding by age; (c) we employed stratified Cox proportional hazards models by sex to account for sex-specific baseline

	hazards; (d) we examined multiple PA measures with varying thresholds; (e) we employed four models with progressively increasing covariate adjustment, and further conducted sensitivity analyses incorporating additional comorbidities (chronic kidney disease and arthritis) as well as family history (biological father, mother, and siblings) of heart disease, to account for potential confounders; (f) we excluded participants with events occurring within the first year of follow-up period to mitigate reverse causality; (g) we imputed the missing data using multiple imputation method with the R package mice.
Randomization	This is a population-based observational study, and randomization is not applicable. We employed multiple models with progressively increasing covariate adjustment to account for a wide range of potential covariates.
Blinding	This is a population-based observational study, and blinding is not applicable.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Plants

Seed stocks	n/a
Novel plant genotypes	n/a
Authentication	n/a