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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	Data were collected by each public cohort's original research teams using standardized survey protocols.
Data analysis	All data analysis in this study was performed using standard, publicly available software tools, including STATA 16.0 and R version 4.4.2. No custom algorithms or original software were used in this research.

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

The datasets analyzed in this study are publicly available from the following sources: the Health and Retirement Study (HRS, https://hrs.isr.umich.edu/), the China Health and Retirement Longitudinal Study (CHARLS, https://charls.pku.edu.cn/), the Survey of Health, Ageing and Retirement in Europe (SHARE, https://share-eric.eu/), the English Longitudinal Study of Ageing (ELSA, https://www.elsa-project.ac.uk/), and the Mexican Health and Aging Study (MHAS, https://mhasweb.org/

Home/index.aspx). These datasets are accessible to researchers upon registration and compliance with the respective data use agreements. No proprietary data were used. The subset of processed data generated in this study for replication purposes has been deposited in Zenodo under the accession code https://doi.org/10.5281/zenodo.15287395. Data access via Zenodo is provided for reproducibility only and in accordance with the original data use agreements. Data supporting the findings of this study are also provided in the Supplementary Information and Source Data files.

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	Sex (male or female) was included as a covariate in all five cohorts, and gender information was not collected. Although not the primary variable of interest, we conducted subgroup analyses stratified by sex.
Reporting on race, ethnicity, or other socially relevant groupings	Considering the scientific nature of the research, the classification of race or ethnicity is not involved in the analysis.
Population characteristics	Age, education, employment, lifestyle behaviors (smoking, drinking), and marital status detailed in Table 1.
Recruitment	Participants were recruited by the original cohort study protocols, which followed rigorous population sampling strategies.
Ethics oversight	All data used in this study received ethical approval from the original survey institutions: HRS (approved by the National Institute on Aging and the Social Security Administration, NIA U01AG009740), CHARLS (approved by the Ethical Review Committee of Peking University, IRB00001052-11015), SHARE (approved by the Ethics Council of the Max Planck Society), ELSA (approved by the National Research Ethics Service Committee South Central-Berkshire), and MHAS (approved by the National Institutes of Health/National Institute on Aging, NIH R01AG018016), and MHAS (approved by the National Institutes of Health/National Institute on Aging, NIH R01AG018016). No additional approvals were required. All participants provided written informed consent.

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

Behavioural & social sciences study design

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

Study description	This study is a quantitative secondary analysis of existing data from five international longitudinal cohorts on aging (HRS, CHARLS, SHARE, ELSA, MHAS). No new data were collected. Statistical analyses were conducted to examine associations between frailty, depressive symptoms, and cardiovascular disease outcomes.
Research sample	We used data from five nationally or regionally representative cohorts (HRS, CHARLS, SHARE, ELSA, and MHAS), including participants aged 50 years and older. After exclusions, the final sample sizes were 12,624 (HRS), 10,288 (CHARLS), 36,954 (SHARE), 7,173 (ELSA), and 9,855 (MHAS). Demographic information, such as age and sex, was collected through self-report. These cohorts were chosen for their large, comparable samples and comprehensive measures of frailty, depression, and cardiovascular outcomes. For data sources, please refer to "Data" in the Reporting Summary or Data Availability in the paper.
Sampling strategy	Participants are selected based on the inclusion criteria of age 50 or older, complete data on frailty index, depressive symptoms, and covariates, and no CVD diagnosis at baseline. No probabilistic sampling was conducted by the authors; data were drawn from pre-established, nationally representative cohorts.
Data collection	This study was a secondary analysis of existing data from five longitudinal cohorts (HRS, CHARLS, SHARE, ELSA, MHAS). Data collection in these cohorts was conducted by trained personnel using standardized questionnaires and health assessments. Instruments included validated scales such as the Frailty Index (FI), CES-D, and Euro-D. Data were self-reported by participants or measured according to standardized protocols. No researchers involved in this study were present during the original data collection. Since this was a secondary data analysis, blinding was not applicable.
Timing	Data were collected from five international longitudinal cohorts over the following periods: HRS (2000–2018), CHARLS (2011–2018), SHARE (2011–2019), ELSA (2004–2018), and MHAS (2001–2018). Each cohort conducted multiple waves of data collection within these periods without major interruptions.
Data exclusions	Data were excluded based on pre-established criteria: participants younger than 50 years, with missing data on baseline frailty index,

Data exclusions	covariates, or follow-up CVD, and those diagnosed with CVD at baseline. The final analytic samples included 12,624 from HRS, 10,288 from CHARLS, 36,954 from SHARE, 7,173 from ELSA, and 9,855 from MHAS, as detailed in Supplementary Fig. 1.
Non-participation	Non-participation (e.g., drop-out or lost to follow-up) is addressed in sensitivity analyses and was not directly handled by the authors, as this is secondary data analysis. Attrition is reported in cohort documents and included in robustness tests
Randomization	This is a non-interventional, observational study using secondary data. No random assignment was applied.

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	Not applicable.
Novel plant genotypes	Not applicable.
Authentication	Not applicable.