nature portfolio

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Last updated by author(s): January 23, 2025

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	No software was used for data collection.
Data analysis	Main analyses were performed using SAS version 9.4 and analyses for individual dietary factors were performed using R versions 4.2.0.The analysis programs are publicly available at https://github.com/DrTessier/diets_healthyaging.

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

Because of participant confidentiality and privacy concerns, data are available upon written request. According to standard controlled access procedure, applications to use NHS/HPFS resources will be reviewed by our External Collaborators Committee for scientific aims, evaluation of the fit of the data for the proposed methodology, and verification that the proposed use meets the guidelines of the Ethics and Governance Framework and the consent that was provided

by the participants. Investigators can expect initial responses within 4 weeks of request submission. Further information including the procedures for obtaining and accessing data from the Nurses' Health Studies and Health Professionals' Follow-up Study is described at https://www.nurseshealthstudy.org/researchers (email: nhsaccess@channing.harvard.edu) and https://sites.sph.harvard.edu/hpfs/for-collaborators.The Harvard University Food Composition tables are publicly available at https://hsph.harvard.edu/department/nutrition/nutrition-questionnaire-service-center/#nutrient-data.

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	Both sexes (self-reported) are included in this study. Detailed participants' characteristics by sex are shown in Extended Data Table 1 and 2. We included sex as a covariate in our main analyses. Additionally, we conducted subgroup analyses by sex and effect estimate are reported in Figure 2. The results were consistent in both groups.
Reporting on race, ethnicity, or other socially relevant groupings	Reported in Table 1.
Population characteristics	he study included 70,091 women from the Nurses' Health Study and 34,924 men from the Health Professionals Follow-up Study free of 11 chronic diseases at baseline and with detailed dietary assessment. A detailed description of the population characteristics can be found in the Results and Methods sections as well as in Table 1 and Extended Data Tables 1 and 2 of the manuscript.
Recruitment	The Nurses health studies (NHS) and NHSII include registered women nurses. The Health Professionals Follow-up study (HPFS) includes men health professionals (veterinarians, dentists, pharmacists, optometrists, osteopath, physicians, and podiatrists). Questionnaires were sent to participants in these cohorts to collect and update their lifestyle and medical history every two years. Participants provided data on their dietary intake during the preceding year using an extensively validated semi-quantitative food frequency questionnaire every four years. The follow-up rates were approximately 90% in all cohorts.
Ethics oversight	This is an observational study. The study protocol was approved by the Institutional Review Board (IRBs) of the Brigham and Women's Hospital, Harvard T.H. Chan School of Public Health, and participating registries (IRB Protocol number: 2001P001945/BWH and 10372. The IRBs allowed participants' completion of questionnaires to be considered as implied consent for participation in these studies of health professionals. Written informed consent was required for biomarkers collection and for medical record acquisition. The study was performed in accordance with the Declaration of Helsinki.

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 study population is preexisting. We documented 9,771 cases of healthy agers, allowing us to detect the major findings of the present study with statistical power of >90% from a post hoc analysis
Data exclusions	We excluded participants who had not returned a food frequency questionnaire between 1986-2010, those with implausible energy intake, those with one or more of the 11 chronic diseases, those with missing healthy aging phenotype in 2016.
Replication	The validity and reproducibility of questionnaires and outcome ascertainment have been reported previously and described in the Methods. Moderate correlations were observed for foods, nutrients, and dietary patterns comparing the estimates from food frequency questionnaires with those from multiple one-week diet records. Participants who reported a new diagnosis of major chronic disease were asked for permission to obtain their medical records and pathological reported. The Subjective Cognitive Decline (SCD), Short-Form 36 and the Geriatric Depression Scale have all shown good validity at measuring self-perceived cognitive decline, physical limitations, and depressive symptoms, respectively. Deaths were identified through the next-of-kin or portal office when questionnaires were mailed and through searches of the National Death Index. Death ascertainment using National Death Index was reported to have a high sensitivity (98%) and specificity (100%).Replication of these analyses was not applicable and therefore not conducted.
Randomization	Not applicable. This study is an observational study without an intervention.
Blinding	Not applicable. This study is an observational study without an intervention.

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	NA
Novel plant genotypes	NA
Authentication	NA