

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 We used Excel 2016 for data collection.

Data analysis All statistical analyses were performed using Stata statistical software version 14.2 (StataCorp LLC, College Station, TX, USA). GRADE grading is done in GRADEprofiler.

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](#)

All included literature is available in PubMed, Web of Science, and Embase.

Human research participants

Policy information about [studies involving human research participants and Sex and Gender in Research](#).

Reporting on sex and gender	The present study is a systematic review and meta-analysis, and all the information was collected from original studies. There was no patient or public involvement in setting the research question or the outcome measures, nor in developing the study plans or in interpreting or writing up the results. But, we collected the information of gender from original studies, and conducted meta-analysis by different genders.
Population characteristics	We collected the population characteristics from original studies. There was no patient or public involvement in setting the research question or the outcome measures, nor in developing the study plans or in interpreting or writing up the results.
Recruitment	There was no patient or public involvement in setting the research question or the outcome measures, nor in developing the study plans or in interpreting or writing up the results.
Ethics oversight	There was no patient or public involvement in setting the research question or the outcome measures, nor in developing the study plans or in interpreting or writing up the results. There are no plans to involve patients in the dissemination of research results. Therefore, there are no ethical issues involved.

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	Systematic review and meta-analysis
Research sample	We searched PubMed, Web of Science, and Embase for all studies published in English and included all studies that met the inclusion criteria
Sampling strategy	Prior to literature search, we formulated clear inclusion and exclusion criteria and included all studies that met the criteria. According to the set search terms for automatic retrieval, and then, using the "snowball" method for manual retrieval.
Data collection	Before literature retrieval, we used excel to make a literature feature extraction table to collect the required data. Data were extracted independently by two researchers (Y.G. and Z.H.) from original studies. Any disagreement was resolved in discussion or by a project supervisor. Because the article type was systematic review and meta-analysis, there was no blinding involved.
Timing	From April 2022 to October 2022.
Data exclusions	The exclusion criteria were: 1) commentaries, editorials, letters, reviews, unpublished studies or meta-analyses; 2) studies in which SI or loneliness was not considered as an independent variable; 3) studies performed patients with HIV; 4) studies reporting effect sizes of mixed risk factors for disease and mortality.
Non-participation	Following a full-text review, 81 articles were further excluded for the following reasons: 28 studies did not consider SI or loneliness as an independent variable, 17 studies did not analyze mortality as an outcome variable, 20 studies had duplicated data, 13 studies had insufficient data, two studies enrolled patients with HIV and HIV-infected/uninfected older veterans, and one study was conducted among elderly patients in the intensive care unit.
Randomization	Since the types of articles are systematic review and meta-analysis, the included and excluded articles have clear inclusion and exclusion criteria, so randomization was not applicable to the study.

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

Methods

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