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Last updated by author(s): Sep 13, 2026

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
<i>Only common tests should be described solely by name; describe more complex techniques in the Methods section.</i> |
| ☐ | ☒ | 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
<i>Give P values as exact values whenever suitable.</i> |
| ☒ | ☐ | 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 Zotero 10 Software, Linux 64-bit; Zotero Connector Google Chrome

Data analysis software JASP 0.97.0 Linux

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 extraction sheets, analytical code (JASP routines), and PRISMA checklists have been compiled into anonymized documents and provided to the editorial team and reviewers via the Supplementary Materials. All data and analysis scripts will be deposited into an open-access public repository (e.g., Protocol Exchange, OSF) if the manuscript will be accepted for publication.

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

Participant sex and/or gender was not collected directly by the authors, but was systematically extracted from participant demographic descriptions reported in the primary publications as the percentage of female participants per sample. In the primary literature, sex and gender were predominantly treated interchangeably as binary categories (female/male) based on self-report. To test whether sample sex/gender composition influenced the relationship between self-transcendent experiences (STEs) and positive psychological outcomes, we conducted a meta-regression using the percentage of female participants as a continuous moderator in our three-level random-effects model. Sample sex/gender composition was not a statistically significant moderator of effect size magnitudes ($p > .05$).

Reporting on race, ethnicity, or other socially relevant groupings

Across the primary studies, reporting of racial and ethnic identity was inconsistent and frequently omitted, precluding formal quantitative meta-regressions or subgroup disaggregations by specific racial or ethnic groups. To account for broader cross-cultural and regional variation, primary studies were categorized by geographical region into four broad sociodemographic strata: Global/Unspecified, North/Central/South American, Asian/Australian, and European. Categorical moderator analyses revealed no statistically significant differences in effect sizes across these geographic/cultural regions ($p > .05$), demonstrating that the positive psychological benefits of STEs remain broadly stable across the sampled global regions. Furthermore, participant developmental cohort was extracted and operationalized as a socially relevant grouping: Youth/Undergraduate Students ($k = 58$) versus Older Adults ($k = 32$). Subgroup analysis revealed this grouping to be a significant moderator ($p = .030$), with stronger associations observed among student-aged cohorts ($r = 0.39$) relative to general adult populations ($r = 0.28$).

Population characteristics

Across the included evidence base, the primary populations exhibited the following demographic profiles:

Age: Participant age ranged across developmental strata, operationalized at the study level into two distinct cohorts: Youth/Undergraduate Students and General Adults. Mean participant age extracted across studies with available continuous reporting was evaluated via meta-regression and was not a statistically significant continuous moderator.

Sex/Gender Distribution: across reporting primary samples, samples comprised mixed-gender cohorts, with the extracted percentage of female participants evaluated as a continuous moderator via meta-regression (non-significant predictor of effect size magnitude).

Geographical and Cultural Backgrounds: primary samples were drawn from diverse international contexts, categorized into four broad regional groupings: American, East-Asian/Australian, European, and Global/Cross-National or Unspecified.

Clinical and Health Status: primary study cohorts consisted predominantly of non-clinical, community-dwelling volunteers, university students, and tourists/visitors in natural or cultural settings, alongside targeted samples evaluating clinical/subclinical populations in psychedelic-assisted trials (e.g., individuals facing life-threatening illness distress).

Recruitment

Primary empirical studies were identified and retrieved through systematic multi-database searches across PubMed, PsycINFO, Web of Science, and Scopus, supplemented by records from Google Scholar and reference backward-chaining, following a preregistered PROSPERO protocol. This search yielded 90 eligible primary studies ($N = 58,501$) meeting predefined eligibility criteria. Within the included primary evidence base, participant recruitment strategies varied across study designs:

Laboratory & Virtual Reality Experiments: Participants were predominantly recruited via University research subject pools (undergraduate convenience samples receiving course credits) or community volunteer advertisements.

Field & Ecological Interventions: Participants were recruited in situ as active visitors or tourists at scenic natural landscapes, parks, museums, or cultural events.

Online Surveys & Naturalistic Studies: Participants were recruited via online crowdsourcing platforms (e.g., Prolific, MTurk) or community/interest-group forums.

Clinical & Psychedelic Trials: Participants were recruited via clinical trial registries, clinician referrals, or targeted public advertisements for therapeutic protocols involving monitored administration.

Potential sampling biases: The primary evidence base exhibits common convenience-sampling constraints, characterized by an overrepresentation of highly educated undergraduate student cohorts and self-selected volunteers with pre-existing interest in nature, mindfulness, or cultural engagement. These sampling constraints and self-selection tendencies were systematically addressed via study quality appraisal (QualSyst framework) and tested via categorical subgroup moderation (student-aged vs. general adult samples) and small-study effect evaluations.

Ethics oversight

This is a meta-analysis of previously published, publicly accessible aggregate literature. The authorial team did not directly collect primary data or intervene with human or animal participants. Consequently, formal Institutional Review Board (IRB) ethical approval and informed consent were not required.

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

Field-specific reporting

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☐ 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 is a three-level multivariate random-effects meta-analysis evaluating the association between state-level self-transcendent experiences (STEs) and positive psychological functioning. The final database synthesizes 90 primary empirical studies comprising 223 nested effect sizes across 58,501 participants. Primary effect sizes were converted into a common correlation metric (Pearson's r) to quantify relationships across three core outcome domains: hedonic well-being, eudaimonic well-being, and prosociality. Mixed-effects subgroup models and meta-regressions were conducted to evaluate theoretical and methodological moderators.
Research sample	The sample comprises secondary aggregate data from 90 eligible primary empirical studies with 223 nested effect sizes, totaling $N = 58,501$ participants. Primary studies were selected via systematic literature searches across PubMed, PsycINFO, Web of Science, and Scopus to represent state-level self-transcendent experiences across diverse induction contexts and positive psychological outcomes.
Sampling strategy	Studies were sampled via systematic multi-database searches across PubMed ($n = 459$), PsycINFO ($n = 1200$), Web of Science ($n = 2041$), and Scopus ($n = 2159$), supplemented by five records from Google Scholar and reference backward-chaining. From 3,073 de-duplicated records, 252 full texts were appraised, yielding 90 eligible primary empirical studies ($N = 58,501$; 223 nested effect sizes).
Data collection	Data collection involved extracting secondary quantitative and descriptive variables from primary empirical studies into a standardized coding spreadsheet. Extractors and Blinding: Two independent reviewers extracted publication metadata, sample demographics (sample size, mean age, percentage female, geographical origin, age cohort), methodological variables (induction modality, source type, scale length, data type/design, measurement timing), and statistical parameters needed for effect size calculation (zero-order Pearson's r, cell means, standard deviations, or contrast test statistics). Reviewers were not blinded to study authors or publication outlets. Discrepancies and Missing Data: Disagreements regarding extracted data were resolved through consensus discussions. Where zero-order correlation coefficients were missing from primary texts or supplements, corresponding authorial teams were contacted via email to obtain raw correlation matrices or correlation coefficients were converted from effect sizes or simple linear regressions when possible. Quality Appraisal: Methodological quality and risk of bias were independently evaluated across all included studies using the 14-item QualSyst checklist for quantitative studies.
Timing	The initial systematic literature search across PubMed, PsycINFO, Web of Science, and Scopus was conducted in March 2025. An updated, comprehensive search across all databases and registers was executed in November 2025 to capture recently indexed literature. Study screening, full-text appraisal, double-independent data extraction, corresponding author inquiries for missing correlation matrices, and QualSyst methodological quality scoring were completed between November 2025 and May 2026. Statistical modeling (three-level multivariate meta-analyses, mixed-effects subgroup evaluations, and publication bias diagnostics) was conducted between April and June 2026. Primary empirical studies included in the final synthesis spanned publication years from 1994 to 2025.
Data exclusions	Eligibility required peer-reviewed publication, state-level measurement of self-transcendent experiences (e.g., awe, wonder, mystical states), assessment of at least one positive psychological outcome (hedonic well-being, eudaimonic well-being, or prosociality), and extractable quantitative data convertible to Pearson's r (zero-order correlations or experimental/quasi-experimental contrasts against neutral conditions). Studies measuring purely dispositional traits, psychic/paranormal phenomena, strong doctrinal religious experiences, or psychopathological/symptom-reduction markers were excluded, alongside purely qualitative studies, articles not published in peer-reviewed journals or studies with unfit data for correlation extraction.
Non-participation	Full-text inspection of the 252 reports resulted in the exclusion of 195 papers due to: absence of eligible positive psychological outcomes ($n = 58$), lack of a relevant self-transcendence relation ($n = 41$), absence of state-level STE measures ($n = 35$), non-extractable statistical data or unfulfilled data requests ($n = 53$), and qualitative or non-empirical formats ($n = 8$). The remaining 57 publications yielded 90 eligible primary studies. In the primary empirical literature, participant dropout and non-response were appraised as part of the QualSyst methodological quality evaluation. Studies were excluded if missing data or selective attrition rendered the computation of correlation coefficients or standardized mean differences mathematically impossible. Disaggregated participant dropouts could not be modeled independently due to the lack of individual-participant data in the published primary reports.
Randomization	Random allocation was not performed by the authors because this investigation is a meta-analysis. Across the 90 included primary studies, experimental manipulation and allocation procedures varied by study design: primary experimental investigations typically utilized random assignment of participants to experimental self-transcendent experience conditions (e.g., awe-eliciting nature videos, or guided inductions) versus emotionally neutral control conditions. Cross-sectional correlational surveys and longitudinal

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

Methods

n/a	Involved in the study	n/a	Involved in the study
☒	☐ Antibodies	☒	☐ ChIP-seq
☒	☐ Eukaryotic cell lines	☒	☐ Flow cytometry
☒	☐ Palaeontology and archaeology	☒	☐ MRI-based neuroimaging
☒	☐ Animals and other organisms		
☒	☐ Clinical data		
☒	☐ Dual use research of concern		
☒	☐ Plants		

Plants

Seed stocks	Report on the source of all seed stocks or other plant material used. If applicable, state the seed stock centre and catalogue number. If plant specimens were collected from the field, describe the collection location, date and sampling procedures.
Novel plant genotypes	Describe the methods by which all novel plant genotypes were produced. This includes those generated by transgenic approaches, gene editing, chemical/radiation-based mutagenesis and hybridization. For transgenic lines, describe the transformation method, the number of independent lines analyzed and the generation upon which experiments were performed. For gene-edited lines, describe the editor used, the endogenous sequence targeted for editing, the targeting guide RNA sequence (if applicable) and how the editor was applied.
Authentication	Describe any authentication procedures for each seed stock used or novel genotype generated. Describe any experiments used to assess the effect of a mutation and, where applicable, how potential secondary effects (e.g. second site T-DNA insertions, mosaicism, off-target gene editing) were examined.