nature portfolio

Corresponding author(s): Dr. Liron Rozenkrantz

Last updated by author(s): Jun 22, 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 *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	Behavioral data were collected using Qualtrics survey software plaftfom (Qualtrics, Provo, UT, USA). Physiological data were acquired with a PowerLab data acquisition system (ADInstruments, Dunedin, New Zealand), respiraion was recorded with Sniff Logic Ltd (Tel Aviv, Israel) device.
Data analysis	Physiological data were preprocessed using LabChart (ADInstruments, Dunedin, New Zealand). Statistical analyses were conducted in R (version 2025.05.0+496) and JASP (version 0.95.1).

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 data supporting the findings of this study are publicly available on the Open Science Framework (OSF) at: https://osf.io/ur6ez. 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 study included a total of N = 57 participants (Experiment 1: N = 37, 75% women; Experiment 2: N = 20, 60% women; Experiment 3: N = 17, 88.2% women). Biological sex and gender identity were self-reported by participants at enrollment. No planned sex- or gender-based analyses were conducted, as the experiments employed a within-subjects design. During the review process, these analyses were performed with mostly null results, as detailed in the supplementary document.
Reporting on race, ethnicity, or other socially relevant groupings	Participants were recruited from the general population. No further information on race or ethnicity was collected, as the study was designed as a within-participant study, with each participant serving as their own control. Therefore, no analyses based on race or ethnicity were conducted.
Population characteristics	A total of N=57 healthy participants were included (Exp.1: N=37, aged 21-42, M=26.8±4, Exp.2: N=20, aged 22-33, M=26.2 ±2.9, Exp.3: returning N=17, aged 21-31, M=24.2±2.9).
Recruitment	Participants were recruited through advertisements and word-of-mouth referrals. Participation was voluntary and compensated. This recruitment strategy may introduce self-selection bias, as individuals willing to participate in laboratory research may not be fully representative of the broader population. However, given the within-subject design, such biases are unlikely to explain differences between conditions, although they may affect the generalizability of the findings.
Ethics oversight	This study complied with all relevant ethical regulations. All participants provided written informed consent prior to participation. The study protocol was approved by the Helsinki Committee of Baruch Padeh Medical Center, Poriya (Northern Medical Center, Israel), approval no. POR-0045-23, and was conducted in accordance with the ethical principles of 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	Sample size calculation was conducted using G*Power tool, and was pre-registered per experiment, as is detailed in the manuscript and specified in the preregistration: In Exp.1, based on the results of a pilot study, we set an a priori medium effect size of 0.5 with a power of 80%. This provided us with a minimal required sample size of N=35 participants, and we therefore collected N=37. In Exp.2, provided the large effect size observed in Exp.1 (Cohen's d=1.3) with 80% power, the sample size estimation suggested only 6 participants. To enhance statistical reliability and account for potential variability in effect size, we performed an additional calculation with more conservative assumptions (d = 0.8, 95% power), which indicated a required sample size of N=19 for a one-sided hypothesis (distraction>internal attention). This corresponds to 90% power for a two-sided test, and we collected N=20. Finally, in Exp.3, the minimal required sample size (taking a conservative approach of d=0.8 and 80% power) was N=15, and we collected N=17.
Data exclusions	In Exp. 1 N=1 showed invalid GSR standard deviation values and N=3 had invalid HRV data. In Exp. 2, N=2 participants were excluded due to invalid HRV data.
Replication	All experiments were pre-registered, specifying sample size, inclusion and exclusion criteria, primary outcomes and hypotheses and analysis plan. Experiment 2 was a preregistered replication of Experiment 1 with an independent sample (N = 20), using the same measures (wheal and flare responses, manipulation checks, matched visual input/task structure). The replication confirmed that directing attention to bodily sensations reduced and regulated histamine-induced inflammation compared to distraction, with similar effect size and time course,

supporting the robustness of the findings.

Randomization

All experiments employed a within-subjects design. In Experiments 1 and 2, each participant completed all experimental conditions, with the order of conditions counterbalanced across participants. Experiment 3 was conducted with the same participants as Experiments 1 and 2, in a final session. Because participants served as their own controls, stable individual characteristics (e.g., age and sex) were inherently controlled for in the primary within-subject analyses. Nevertheless, we conducted additional exploratory analyses examining whether attentional effects varied according to age, sex, or attentional engagement (Section S9).

Blinding

The experimenter was blinded to experimental condition, with attention instructions delivered via pre-recorded audio to prevent knowledge of participants' assignments.

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

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, mosiacism, off-target gene editing) were examined.