nature neuroscience

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# Main Figures:	3
# Supplementary Figures:	10
# Supplementary Tables:	1
# Supplementary Videos:	0

Reporting Checklist for Nature Neuroscience

This checklist is used to ensure good reporting standards and to improve the reproducibility of published results. For more information, please read Reporting Life Sciences Research.

Please note that in the event of publication, it is mandatory that authors include all relevant methodological and statistical information in the manuscript.

▶ Statistics reporting, by figure

- Please specify the following information for each panel reporting quantitative data, and where each item is reported (section, e.g. Results, & paragraph number).
- Each figure legend should ideally contain an exact sample size (n) for each experimental group/condition, where n is an exact number and not a range, a clear definition of how n is defined (for example x cells from x slices from x animals from x litters, collected over x days), a description of the statistical test used, the results of the tests, any descriptive statistics and clearly defined error bars if applicable.
- For any experiments using custom statistics, please indicate the test used and stats obtained for each experiment.
- Each figure legend should include a statement of how many times the experiment shown was replicated in the lab; the details of sample collection should be sufficiently clear so that the replicability of the experiment is obvious to the reader.
- For experiments reported in the text but not in the figures, please use the paragraph number instead of the figure number.

Note: Mean and standard deviation are not appropriate on small samples, and plotting independent data points is usually more informative. When technical replicates are reported, error and significance measures reflect the experimental variability and not the variability of the biological process; it is misleading not to state this clearly.

	FIGURE NUMBER	TEST USED		n			DESCRIPTIVE STATS (AVERAGE, VARIANCE)		P VALUE		DEGREES OF FREEDOM & F/t/z/R/ETC VALUE	
		WHICH TEST?	SECTION & PARAGRAPH #	EXACT VALUE	DEFINED?	SECTION & PARAGRAPH #	REPORTED?	SECTION & PARAGRAPH #	EXACT VALUE	SECTION & PARAGRAPH #	VALUE	SECTION & PARAGRAPH #
example	1a	one-way ANOVA	Fig. legend	9, 9, 10, 15	mice from at least 3 litters/group	Methods para 8	error bars are mean +/- SEM	Fig. legend	p = 0.044	Fig. legend	F(3, 36) = 2.97	Fig. legend
example	results, para 6	unpaired t-test	Results para 6	15	slices from 10 mice	Results para 6	error bars are mean +/- SEM	Results para 6	p = 0.0006	Results para 6	t(28) = 2.808	Results para 6
+ -	1b	one-way ANOVA	Fig. legend	3-4	mice	Fig. legend	error bars are mean+SD	Fig. legend	p<0.0001	Fig. legend	F=50.34 df=9	not reprted in text

	FIGURE NUMBER	TEST USED		n			DESCRIPTIVE STATS (AVERAGE, VARIANCE)		P VALUE		DEGREES OF FREEDOM & F/t/z/R/ETC VALUE	
		WHICH TEST?	SECTION & PARAGRAPH #	EXACT VALUE	DEFINED?	SECTION & PARAGRAPH #	REPORTED?	SECTION & PARAGRAPH #	EXACT VALUE	SECTION & PARAGRAPH #	VALUE	SECTION & PARAGRAPH #
+ -	1c	Student's two-tailed t test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	p=0.0415	Fig. legend	t=2.112, df=2	not reprted in text
+ -	1e	Bonferroni's post hoc test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	2: P=0.7236 7: P=0.6356 18: P=0.0321 24: P=0.0065	Fig. legend	t=0.1205 t=1.709 t=3.139 t=3.923	not reprted in text
+ -	1e	Two-way ANOVA	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	Interaction: P= 0.0698 Brain region effect: P= 0.0006 Age effect: P= 0.0221	not reported	F= 2.992 F= 20.17 F= 4.526	not reprted in text
+ -	1e	one-way ANOVA	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	0.0416	not reported	F= 4.730, df= 3	not reprted in text
+ -	1g	Student's two-tailed t test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	0.0356	Fig. legend	t=2.513 df=3	not reprted in text
+ -	2a	Student's two-tailed t test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	0.0058	Fig. legend	t=5.376 df=4	not reprted in text
+ -	2b	Student's two-tailed t test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	p<0.0001	Fig. legend	t=21.265, df=4	not reprted in text
+ -	2c	Bonferroni's post hoc test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	6: p=0.0242 18:p=0.0141 34: p=0.0359 48: p=0.0006	Fig. legend	6:t=4.111 18:t=4.322 34:t=3.053 48:t=7.145	not reprted in text
+ -	2c	Two-way ANOVA	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	Interaction: P= 0.0152 Genotype: P= 0.0033 Age: P< 0.0001	not reported	F= 6.536 F= 17.09 F= 40.13	not reprted in text
+ -	2d	Bonferroni's post hoc test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	26: p=0.3221 48:p=0.0412 77:p=0.0081	Fig. legend	26:t=0.9740 48:t=2.893 77: t=4.782	not reprted in text
+ -	2d	Two-way ANOVA	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	Interaction: P= 0.0424 Genotype: P= 0.0007 Age: P= 0.0056	not reported	F= 4.070 F= 19.70 F= 7.929	not reprted in text
+ -	3b	Bonferroni's post hoc test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	9: p=0.0005 15: p=0.0007 37:p=0.0003	Fig. legend	9: t=7.359 15:t=10.94 37: t=16.95	not reprted in text
+ -	3b	Two-way ANOVA	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	nteraction: P= 0.0021 Treatment effect:P< 0.0001 Age effect: P= 0.0002	not reported	F=13.25 F=389.2 F=26.53	not reprted in text

+ −	3c	Student's two-tailed t test	Fig. legend	5	mice	Fig. legend	error bars are mean+SD	Fig. legend	P=0.0078	Fig. legend	t=4.289 df=5	not reprted in text
+ −	3d	Two-way ANOVA, Bonferroni's post hoc test	Fig. legend	5	mice	Fig. legend	error bars are mean+SD	Fig. legend	nteraction: P< 0.0001 Treatment effect:P< 0.0001 Age effect: P<0.0001, 9: p=0.0007 15: P=1.256 23: P=2.352 37:P=0.0425	Fig. legend	F=14.96 F=26.93 F=14.96 9: t=8.092 15: t=0.000 23: t=0.000 37: t=1.326	not reprted in text
+ −	3e	One-way ANOVA	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	P=0.0017	Fig. legend	F=21,93, df=8	not reprted in text
+ −	3f	Bonferroni's post hoc test	Fig. legend	4	mice	Fig. legend	error bars are mean+SD	Fig. legend	2 months: p=0.9232 7 months: p=0.0002 10 months: p<0.0001	Fig. legend	2 months: t=0.04653 7months: t=9.653 10months: t=16.18	not reprted in text
+ −	3f	Two-way ANOVA	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	Interaction: P<0.0001 Genotype effect:P< 0.0001 Age effect: P<0.0001	not reported	F=66.66 F= 221.6 F= 127.0	not reprted in text
+ −	S1a	One-way ANOVA	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	P= 0.0024	Fig. legend	F= 19.47	not reprted in text
+ −	S1a	Student's two-tailed t test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	p=0.0256	Fig. legend	t=6.019 df=2	not reprted in text
+ −	S1b	Student's two-tailed t test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	P<0.0001	Fig. legend	t=21.85, df=3	not reprted in text
+ −	S2a	Kruskal-Wallis test	Fig. legend	4	mice	Fig. legend	error bars are mean+SD	Fig. legend	P=0.016	Fig. legend	Chi-Quadrat=10.385 df=3	not reprted in text
+ −	S2b	One-way ANOVA	Fig. legend	4	mice	Fig. legend	error bars are mean+SD	Fig. legend	P<0.0001	Fig. legend	F=20.24, df= 39	not reprted in text
+ −	S2c	Bonferroni's post hoc test	Fig. legend	4	mice	Fig. legend	error bars are mean+SD	Fig. legend	7: P= 0.2119 9: P=0.0006 24: P= 0.0213	Fig. legend	t=2.280 t=5.180 t=3.505	not reprted in text
+ −	S2c	Two-way ANOVA	Fig. legend	4	mice	Fig. legend	error bars are mean+SD	Fig. legend	Interaction: P=0.2110 Region effect: P<0.0001 Age effect: P= 0.1725	not reported	F= 1.776 F= 39.04 F= 2.042	not reprted in text
+ −	S2c	One-way ANOVA	Fig. legend	4	mice	Fig. legend	error bars are mean+SD	Fig. legend	P= 0.0006	Fig. legend	F= 15.75, df= 12	not reprted in text
+ −	S3b	Student's two-tailed t test	Fig. legend	7	mice	Fig. legend	error bars are mean+SD	Fig. legend	Microglia 8 vs 22: P= 0.1136 Macrophage 8 vs 22: P=0.2037	Fig. legend	t=1.707 df=12 t=1.344 df=12	not reprted in text

+ -	S4b	One-way ANOVA	Fig. legend	4 40	mice cells	Fig. legend	error bars are mean+SD	Fig. legend	P<0.0001	Fig. legend	F= 54.62, df=113	not reprted in text
+ -	S4c	Two-way ANOVA	Fig. legend	4 40	mice cells	Fig. legend	error bars are mean+SD	Fig. legend	Interaction: P=0.3102 Region effect: P=0.0026 Age effect: P= 0.1450	not reported	F= 1.348 F= 45.10 F= 3.267	not reprted in text
+ -	S4c	Bonferroni's post hoc test	Fig. legend	4	slices	Fig. legend	error bars are mean+SD	Fig. legend	18: P= 0.0362 24: P= 0.0325	Fig. legend	t=3.928 t=5.570	not reprted in text
+ -	S5b	Student's two-tailed t test	Fig. legend	8-10	slices	Fig. legend	error bars are mean+SD	Fig. legend	P= 0.0073	Fig. legend	t=3.737 df=7	not reprted in text
+ -	S5d	Student's two-tailed t test	Fig. legend	4	mice	Fig. legend	error bars are mean+SD	Fig. legend	P=0.0133	Fig. legend	t=2.591 df=4	not reprted in text
+ -	S6e	Two-way ANOVA, Bonferroni's post hoc test	Fig. legend	4	mice	Fig. legend	error bars are mean+SD	Fig. legend	Interaction: P<0.0001 genotype effect: P<0.0001 Age effect: P= 0.0003, 6: P=0.0008 10: P=0.0005 18: P=0.0007 26: P=0.0425	Fig. legend	F=24.18 F=421.5 F=11.64 6: t=13.35 10: t=13.65 18: t=10.95 26: t=3.115	not reprted in text
+ -	S7a	Student's two-tailed t test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	P= 0.0162	Fig. legend	t=2.475 df=2	not reprted in text
+ -	S7c	Bonferroni's post hoc test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	6: P= 0.2365 18: P= 0.0255	Fig. legend	6: t=1.422 18: t= 4.436	not reprted in text
+ -	S7c	Two-way ANOVA	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	teraction: P= 0.2055 Genotype: P= 0.0192 Age: P= 0.9071	Fig. legend	F=2.281 F=14.37 F=0.01545	not reprted in text
+ -	S7d	Bonferroni's post hoc test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	48: p=0.0471 77: p=0.0412	Fig. legend	48: t=4.275 77: t=3.922	not reprted in text
+ -	S7d	Two-way ANOVA	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	nteraction: P= 0.4497 Genotype effect: P=0.0175 Age effect: P= 0.3216	not reported	F= 0.6245 F= 8.425 F= 1.1	not reprted in text
+ -	S9c	Student's two-tailed t test	Fig. legend	3	mice	Fig. legend	error bars are mean+SD	Fig. legend	P= 0.0465	Fig. legend	t=2.148, df=4	not reprted in text
+ -	S9d	Student's two-tailed t test	Fig. legend	3 9-12	mice slices	Fig. legend	error bars are mean+SD	Fig. legend	P= 0.0156	Fig. legend	t=7.911 df=2	not reprted in text

▶ Representative figures

1. Are any representative images shown (including Western blots and immunohistochemistry/staining) in the paper?

   If so, what figure(s)?

   Fig. 1, Fig. 2, Fig. 3, Fig. S2a, d

2. For each representative image, is there a clear statement of how many times this experiment was successfully repeated and a discussion of any limitations in repeatability?

   If so, where is this reported (section, paragraph #)?

   The number of experiments are indicated in the figure legends

▶ Statistics and general methods

1. Is there a justification of the sample size?

   If so, how was it justified?

   Where (section, paragraph #)?

   Even if no sample size calculation was performed, authors should report why the sample size is adequate to measure their effect size.

   not justified, only standard statistical analysis were used

2. Are statistical tests justified as appropriate for every figure?

   Where (section, paragraph #)?

   The statistics were used based on the properties on the data points. Details are included in the figure legends.

   a. If there is a section summarizing the statistical methods in the methods, is the statistical test for each experiment clearly defined?

   The statistical test is defined in the legends

   b. Do the data meet the assumptions of the specific statistical test you chose (e.g. normality for a parametric test)?

   Where is this described (section, paragraph #)?

   Based on previous literature we assumed that the data points have a normal distributions and used t-test or ANOVA in these cases.

   c. Is there any estimate of variance within each group of data?

   Is the variance similar between groups that are being statistically compared?

   Where is this described (section, paragraph #)?

   no

   d. Are tests specified as one- or two-sided?

   The tests are two-sides

   e. Are there adjustments for multiple comparisons?

   no

3. Are criteria for excluding data points reported?

   Was this criterion established prior to data collection?

   Where is this described (section, paragraph #)?

   no data were exclude

4. Define the method of randomization used to assign subjects (or samples) to the experimental groups and to collect and process data.

   If no randomization was used, state so.

   Where does this appear (section, paragraph #)?

   N/A

5. Is a statement of the extent to which investigator knew the group allocation during the experiment and in assessing outcome included?

   If no blinding was done, state so.

   Where (section, paragraph #)?

   The quantification was performed blinded

6. For experiments in live vertebrates, is a statement of compliance with ethical guidelines/regulations included?

   Where (section, paragraph #)?

   no

7. Is the species of the animals used reported?

   Where (section, paragraph #)?

   yes

8. Is the strain of the animals (including background strains of KO/transgenic animals used) reported?

   Where (section, paragraph #)?

   yes

9. Is the sex of the animals/subjects used reported?

   Where (section, paragraph #)?

   no

10. Is the age of the animals/subjects reported?

    Where (section, paragraph #)?

    yes, legends

11. For animals housed in a vivarium, is the light/dark cycle reported?

    Where (section, paragraph #)?

    yes

12. For animals housed in a vivarium, is the housing group (i.e. number of animals per cage) reported?

    Where (section, paragraph #)?

    no

13. For behavioral experiments, is the time of day reported (e.g. light or dark cycle)?

    Where (section, paragraph #)?

    N/A

14. Is the previous history of the animals/subjects (e.g. prior drug administration, surgery, behavioral testing) reported?

    Where (section, paragraph #)?

    N/A

    a. If multiple behavioral tests were conducted in the same group of animals, is this reported?

       Where (section, paragraph #)?

       N/A

15. If any animals/subjects were excluded from analysis, is this reported?

    Where (section, paragraph #)?

    No animals were excluded

a. How were the criteria for exclusion defined?

    Where is this described (section, paragraph #)?

    N/A

b. Specify reasons for any discrepancy between the number of animals at the beginning and end of the study.

    Where is this described (section, paragraph #)?

    N/A

▶ Reagents

1. Have antibodies been validated for use in the system under study (assay and species)?

    All antibodies are well established and reported by the companies that provide the antibodies

    a. Is antibody catalog number given?

        Where does this appear (section, paragraph #)?

        no

    b. Where were the validation data reported (citation, supplementary information, Antibodypedia)?

        Where does this appear (section, paragraph #)?

        no

2. Cell line identity

    a. Are any cell lines used in this paper listed in the database of commonly misidentified cell lines maintained by ICLAC and NCBI Biosample?

        Where (section, paragraph #)?

        N/A

    b. If yes, include in the Methods section a scientific justification of their use--indicate here in which section and paragraph the justification can be found.

        N/A

    c. For each cell line, include in the Methods section a statement that specifies:

        - the source of the cell lines

        - have the cell lines been authenticated? If so, by which method?

        - have the cell lines been tested for mycoplasma contamination?

        Where (section, paragraph #)?

        N/A

▶ Data deposition

Data deposition in a public repository is mandatory for:

    a. Protein, DNA and RNA sequences
    b. Macromolecular structures
    c. Crystallographic data for small molecules
    d. Microarray data

Deposition is strongly recommended for many other datasets for which structured public repositories exist; more details on our data policy are available here. We encourage the provision of other source data in supplementary information or in unstructured repositories such as Figshare and Dryad.

We encourage publication of Data Descriptors (see Scientific Data) to maximize data reuse.

1.   Are accession codes for deposit dates provided?

    Where (section, paragraph #)?

> N/A

▶ Computer code/software

Any custom algorithm/software that is central to the methods must be supplied by the authors in a usable and readable form for readers at the time of publication. However, referees may ask for this information at any time during the review process.

1.   Identify all custom software or scripts that were required to conduct the study and where in the procedures each was used.

> N/A

2. If computer code was used to generate results that are central to the paper's conclusions, include a statement in the Methods section under "**Code availability**" to indicate whether and how the code can be accessed. Include version information as necessary and any restrictions on availability.

> N/A

▶ Human subjects

1.   Which IRB approved the protocol?

    Where is this stated (section, paragraph #)?

> N/A

2.   Is demographic information on all subjects provided?

    Where (section, paragraph #)?

> N/A

3.   Is the number of human subjects, their age and sex clearly defined?

    Where (section, paragraph #)?

> N/A

4.   Are the inclusion and exclusion criteria (if any) clearly specified?

    Where (section, paragraph #)?

> N/A

5. How well were the groups matched?

    Where is this information described (section, paragraph #)?

    N/A

6. Is a statement included confirming that informed consent was obtained from all subjects?

    Where (section, paragraph #)?

    N/A

7. For publication of patient photos, is a statement included confirming that consent to publish was obtained?

    Where (section, paragraph #)?

    N/A

▶ fMRI studies

For papers reporting functional imaging (fMRI) results please ensure that these minimal reporting guidelines are met and that all this information is clearly provided in the methods:

1. Were any subjects scanned but then rejected for the analysis after the data was collected?

    N/A

    a. If yes, is the number rejected and reasons for rejection described?

        Where (section, paragraph #)?

        N/A

2. Is the number of blocks, trials or experimental units per session and/or subjects specified?

    Where (section, paragraph #)?

    N/A

3. Is the length of each trial and interval between trials specified?

    N/A

4. Is a blocked, event-related, or mixed design being used? If applicable, please specify the block length or how the event-related or mixed design was optimized.

    N/A

5. Is the task design clearly described?

    Where (section, paragraph #)?

    N/A

6. How was behavioral performance measured?

    N/A

7. Is an ANOVA or factorial design being used?

    N/A

8. For data acquisition, is a whole brain scan used?

    If not, state area of acquisition.

    N/A

    a. How was this region determined?

        N/A

9. Is the field strength (in Tesla) of the MRI system stated?

N/A

    a. Is the pulse sequence type (gradient/spin echo, EPI/spiral) stated?

N/A

    b. Are the field-of-view, matrix size, slice thickness, and TE/TR/flip angle clearly stated?

N/A

10. Are the software and specific parameters (model/functions, smoothing kernel size if applicable, etc.) used for data processing and pre-processing clearly stated?

N/A

11. Is the coordinate space for the anatomical/functional imaging data clearly defined as subject/native space or standardized stereotaxic space, e.g., original Talairach, MNI305, ICBM152, etc? Where (section, paragraph #)?

N/A

12. If there was data normalization/standardization to a specific space template, are the type of transformation (linear vs. nonlinear) used and image types being transformed clearly described? Where (section, paragraph #)?

N/A

13. How were anatomical locations determined, e.g., via an automated labeling algorithm (AAL), standardized coordinate database (Talairach daemon), probabilistic atlases, etc.?

N/A

14. Were any additional regressors (behavioral covariates, motion etc) used?

N/A

15. Is the contrast construction clearly defined?

N/A

16. Is a mixed/random effects or fixed inference used?

N/A

    a. If fixed effects inference used, is this justified?

N/A

17. Were repeated measures used (multiple measurements per subject)?

N/A

    a. If so, are the method to account for within subject correlation and the assumptions made about variance clearly stated?

N/A

18. If the threshold used for inference and visualization in figures varies, is this clearly stated?

N/A

19. Are statistical inferences corrected for multiple comparisons?

N/A

    a. If not, is this labeled as uncorrected?

N/A

20. Are the results based on an ROI (region of interest) analysis?

N/A

    a. If so, is the rationale clearly described?

N/A

    b. How were the ROI's defined (functional vs anatomical localization)?

N/A

21. Is there correction for multiple comparisons within each voxel?

N/A

22. For cluster-wise significance, is the cluster-defining threshold and the corrected significance level defined?

N/A

▶ Additional comments

Additional Comments