

Reporting Summary

Nature Research 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 Research policies, see [Authors & Referees](#) 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 Data collection were obtained from Noldus Ethovision XT version 10.5.

Data analysis Data was analyzed using GraphPad Prism v7.0.

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/reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Research [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 list of figures that have associated raw data
- A description of any restrictions on data availability

The authors declare that all data supporting the results in this study are available within the paper and its Supplementary Information.

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](https://www.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	A total of 6–10 mice per behavioural group was considered sufficient for the described experiments. Each experiment described was designed to maximize the use of a single animal by ensuring a within-subjects design. Within-subjects designs help to reduce unaccounted for error between groups by comparing each data point generated from a specific animal to itself.
Data exclusions	No data were excluded from analyses.
Replication	Each experiment described was designed to maximize the use of a single animal by ensuring a within-subjects design. Within-subjects designs help to reduce unaccounted for error between groups by comparing each data point generated from a specific animal to itself.
Randomization	The experiments in Figure 4 e and 4f were not counterbalanced because the goal was to demonstrate the patency of the drug-delivery system. Whenever possible, test conditions were counterbalanced across mice to reduce the potential confound of ordering effects. This applies to the experiments described in Figure 4g and 4h, and in Figure 6 after multiple infusions. The experiment described in Figure 5 was not counterbalanced between animals because the goal was to show that multiple devices could be controlled within a single test session, and thus there was no opportunity to counterbalance conditions.
Blinding	All data, except for contraversive rotations, was calculated by Ethovision software and therefore were independent from the experimenters. Rotations were counted by a blind observer.

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
☐	☒ Animals and other organisms
☒	☐ Human research participants
☒	☐ Clinical data

Methods

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

Antibodies

Antibodies used	GFAP, Synaptic Systems, 173 004; Iba1, Wako Chemicals, 019-19741; Alexa Fluor 488 anti-rabbit IgG, Invitrogen, A-11034; Alexa Fluor 546 anti-guinea pig IgG, Invitrogen, A-11074; Neurotrace, Life Technologies, N21479
Validation	GFAP: https://www.sysy.com/products/gfap/facts-173004.php Iba1: https://labchem-wako.fujifilm.com/us/category/01213.html Alexa 488: https://www.thermofisher.com/antibody/product/Goat-anti-Rabbit-IgG-H-L-Highly-Cross-Adsorbed-Secondary-Antibody-Polyclonal/A-11034 Alexa 546: https://www.thermofisher.com/antibody/product/Goat-anti-Guinea-Pig-IgG-H-L-Secondary-Antibody-Polyclonal/A-11074 Neurotrace: https://www.thermofisher.com/order/catalog/product/N21479?SID=srch-srp-N21479

Animals and other organisms

Policy information about [studies involving animals](#); [ARRIVE guidelines](#) recommended for reporting animal research

Laboratory animals	Adult (25–35 g; 7–13weeks old) male C57BL/6J and vGAT::IRES-Cre backcrossed to C57BL/6J mice
Wild animals	The study did not involve wild animals.
Field-collected samples	The study did not involve samples collected from the field.
Ethics oversight	All procedures were approved by the Animal Care and Use Committee of Washington University and conformed to the United States National Institutes of Health guidelines.

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