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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	Fiber photometry data was collected using TDT, RZ5P system and the envelopes of the 531-Hz and 211-Hz signals were extracted in real-time by the TDT program Synapse Version 95 at a sampling rate of 1017.25 Hz. Patch-clamp electrophysiology data acquisition was completed using Clampex 11.4 software (Molecular Devices). For ex vivo fast-scan cyclic voltammetry data was collected with a modified electrochemical headstage (CB-7B/EC retrofit with 5 MΩ resistor) using a Multiclamp 700B amplifier (Molecular Devices) after being low-pass filtered at 10 kHz and digitized at 100 kHz using custom-written software Igor Pro 7 (version 7.0.6.1, Wavemetrics) running mafPC 2019 software (courtesy of M.A. Xu-Friedman) For operant conditioning experiments data were collected using Med Associates operant-conditioning chambers (Med Associates, Fairfax, VT Med-PC 5 software). For thermal hyperalgesia we used Hargreaves Plantar Test (IITC Life Science) to collect the data. For locomotor studies AnyMaze 6.06 (64-bit) behavioral tracking software was used
Data analysis	For statistical analysis GraphPad Prism 8.1.0 (Graph Pad Software, Inc., USA), MatLab, Image J 1.53a and custom-written analysis software in Igor Pro 7 were used. Custom MatLab code for photometry analysis and custom-written Igor Pro 7 and mafPC for ex vivo fast-scan cyclic voltammetry are made available via Github and Bitbucket. Access links are included in Code and software availability section of the manuscript

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 collected during this study are available from the corresponding author upon request.

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	No statistical methods were used to per-determine sample sizes but our sample sizes are similar to those reported in previous publications (PMID: 30878290; PMID: 26338332; PMID: 27170097)
Data exclusions	No data was excluded from analysis
Replication	All experiments were performed at least twice, including each treatment condition to prevent an unspecific day/condition effect. Each replicate experiment successfully recapitulated original findings
Randomization	Treatment groups were randomly assigned to animals prior to testing.
Blinding	All investigators were blinded to group allocation during data collection and analysis.

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
☒	☐ Human research participants
☒	☐ Clinical data
☒	☐ Dual use research of concern

Methods

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

Antibodies

Antibodies used

Mouse anti-TH, Millipore, MAB318; RRID:AB_2201528; dilution 1:1000
Rabbit anti- mCherry; ab167453, Abcam, Cambridge, MA; RRID: AB_2571870; dilution 1:500
Mouse anti-GAD67, 1:5,000; MAB5406, EMDMillipore, Billerica, MA; RRID:AB_2278725; dilution 1:5000
Biotin-SP Donkey anti-Mouse; Cat. 715-065-150; RRID: AB_2307438; Jackson; dilution 1:200
Donkey anti-Mouse AF488; Cat. 115-545-150; RRID: AB_2340846; Jackson; dilution 1:200
Donkey anti-Rabbit Cy3; Cat. 711-165-152; RRID: AB_2307443; Jackson; dilution 1:200
Streptavidin AF488; Cat. 016-540-184; RRID: AB_2337249; Jackson; dilution 1:200
Rabbit anti-cFos, ab190289, Abcam; dilution 1:2000
Chicken anti-mCherry, ab205402, Abcam; dilution 1:500
Donkey anti-Rabbit; RRID: AB_2340616; Jackson; dilution 1:200

	Donkey anti-Chicken; RRID: AB_2340363; Jackson; dilution: 1:200
Validation	Mouse anti-TH (e.g. PMID 19748892) Rabbit anti- mCherry (e.g. PMID: 30984001)

Animals and other organisms

Policy information about studies involving animals; ARRIVE guidelines recommended for reporting animal research

Laboratory animals	Male and female Long Evans Wild Type, TH-cre and GAD-cre rats (250-350g for behavioral studies), and DAT IRES-cre mice crossed with Cre driven expression of ChR2 mice (AiCop4) were used for this study. All animals were 4 to 10 weeks old at the beginning of the experiments. Rats were group housed with two to three animals per cage on a 12/12 hours dark/light cycle (lights on at 7:00 AM) and acclimated to the animal facility holding rooms for at least 7 days before any manipulation. All experiments were performed during the light cycle. Mice were housed up to 4 animals per cage. The temperature for the holding rooms of all animals ranged from 69-75°F while the humidity was between 30-70%.
Wild animals	The study did not involve wild animals.
Field-collected samples	This study did not involve samples collected from the field.
Ethics oversight	All procedures were approved by Washington University and the National Institute on Alcohol Abuse and Alcoholism (NIAAA) Animal Care and Use Committee in accordance with the National Institutes of Health Guidelines for the Care and Use of Laboratory Animals.

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