

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
<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 SMART VIDEO TRACKING Software (Panlab) was applied to analyze mouse positions for Y maze.

Data analysis SPSS 22.0 or GraphPad Prism 6.0 software was used for all statistical analyses.

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

All data supporting this study are available in supplemental Materials or upon request from the corresponding author.

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)

Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	Studies in both children and mice are quantitative experimental data
Research sample	C57BL/6J adult male mice between the ages of 8 to 10 weeks and weanling mice between the ages of 3 to 4 weeks were purchased from National Laboratory Animal Center in Taiwan. The study participants were recruited from five preschools in Hsinchu City, Taiwan. 164 children from two preschools (88 boys and 76 girls, average age, 67.18 ± 9.09 months) participated in behavioral studies. Another 175 children from three of the other preschools (102 boys and 73 girls; average age, 66.52 ± 8.33 months) participated in inventory studies.
Sampling strategy	Similar sample sizes were used for different groups in the same experimental regime. The Shapiro-Wilkinson normality test was used to analyze the distribution of the data before applying parametric test (t-test) or nonparametric test (Mann-Whitney or Wilcoxon test). All data referred to as significant has p<0.05.
Data collection	Mouse behaviors were digitally recorded and analyzed by experimenters manually or with behavioral analysis software (SMART VIDEO TRACKING). Social hierarchy and memory abilities of children was determined by behavioral games and Teacher questionnaires. A total of fifteen teachers carried out the evaluations (6 for the behavioral studies and 9 for the inventory studies), and the chief teacher of each preschool helped to check for differences in ratings across the teachers and made the final decision.
Timing	The data for either human or mouse studies was collected in 2019 and 2020. The age of children and mice are described in the Method section.
Data exclusions	No data were excluded.
Non-participation	No participants dropped out.
Randomization	All sample allocations were random.

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

Animals and other organisms

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

Laboratory animals	C57BL/6J adult male mice between the ages of 8 to 10 weeks and weanling mice between the ages of 3 to 4 weeks
Wild animals	This study did not involve wild animals
Field-collected samples	This study did not involve samples collected from the field.
Ethics oversight	Institutional Animal Care and Use Committee of National Tsing Hua University

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

Human research participants

Policy information about [studies involving human research participants](#)

Population characteristics	164 children from two preschools (88 boys and 76 girls, average age, 67.18 ± 9.09 months) participated in behavioral studies. 12 of them participated in ERP studies. Another 175 children from three of the other preschools (102 boys and 73 girls; average age, 66.52 ± 8.33 months) participated in inventory studies.
Recruitment	The study participants were recruited from five preschools in Hsinchu City, Taiwan, with informed consent from parents.
Ethics oversight	Research Ethics Committee of National Tsing Hua University

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