a

Conditioned place preference/aversion

Pre-test → Conditioning → Test
×3 d
CNO side

b

fDIO-hM3D   *Retro-FLEX-FlpO*

NAc   VM

D1-Cre

hM3D
NAc
D1^NAc-VM

c

D1^NAc-VM

CPP score (s)

Control   hM3D

Pre-test   Test

d

fDIO-hM3D   *Retro-FLEX-FlpO*

NAc   VP

D1-Cre

hM3D
NAc
D1^NAc-VP

e

D1^NAc-VP

CPP score (s)

Control   hM3D

Pre-test   Test

f

Real-time CPP/A

Laser

g

Con/Fon-ChR2   *Retro-FlpO*

Laser
NAc   VM

D1-Cre

ChR2
NAc
D1^NAc-VM

h

Laser On

Control

ChR2

MAX
MIN

D1^NAc-VM

Preference score (s)

Control   ChR2

i

Con/Fon-ChR2   *Retro-FlpO*

Laser
NAc   VP

D1-Cre

ChR2
NAc
D1^NAc-VP

j

Laser On

Control

ChR2

MAX
MIN

D1^NAc-VP

Preference score (s)

Control   ChR2

Supplementary information, Fig. 6 Activation of D1^{NAc-VM} neurons produce CPP and activation of D1^{NAc-VP} neurons produce CPA.

a, Schematic of CPP/A task. After three-day CNO paired conditioning, the CPP/A test was performed. **b,d,** Viral infection and representative images of hM3D-mCherry$^+$ D1^{NAc-VM} (**b**) or D1^{NAc-VP} (**d**) neurons in the NAc. *AAV$_9$-hEF1a-fDIO-hM3D-mCherry* was injected into the NAc and *AAV$_{2/retro}$-CAG-FLEX-FlpO* was injected into the VM or VP of *D1-Cre* mice. Scale bar: 100 μm. **c,e,** Bar graphs of CPP score. [Two-way RM ANOVA. VM: Saline n = 15, CNO n = 14, $F_{treatment×session}$ (1,57) = 21.326, $p < 0.001$; VP: Saline n = 12, CNO n = 12, $F_{treatment×session}$ (1,47) = 67.686, $p < 0.001$]. $^{***}p < 0.001$ vs Control, $^{###}p < 0.001$ vs Pre-test. **f,** Schematic of RTPP/A task. **g,i,** Viral infection and representative images of the optical fiber tip and ChR2-EYFP expression in the NAc. *AAV$_9$-hSyn-Con/Fon-ChR2-EYFP* or *AAV$_9$-hSyn-Con/Fon-EYFP* was injected into the NAc and *AAV$_{2/retro}$-hSyn-FlpO* was injected into the VM or VP of *D1-Cre* mice. An optical fiber was implanted over the NAc and the RTPP/A test was performed. **h,j,** Representative locomotor heat maps of Test and bar graph of Preference score. [VM: Control n = 10, ChR2 n = 12, Two-tail *Student's* *t*-test, $t(20) = -9.406$, $p < 0.001$; VP: Control n = 10, ChR2 n = 12, $t(20) = 4.436$, $p = 0.0002$] $^{***}p < 0.001$. Related to Figure 4.