

Additional material: supplementary figure legends

S1: A-C Histogram report mean time spent exploring the object (Obj) and the conspecific stranger (S1) during the sociability phase of the TC test in DREADDS-infused PV_Wt/Veh and vehicle-infused PV_Wt/CNO. No differences were detected in exploration of the stranger and of the object among groups (Object exploration: PV_Wt/Veh vs PV_Wt/CNO: $t_{(21)}=0.70$, $p=0.48$; Stranger exploration PV_Wt/Veh vs PV_Wt/CNO: $t_{(21)}=1.654$, $p=0.1$). **B** Histogram report mean-time spent exploring the familiar female (S1) and the novel female (S2) during the social novelty phase of the TC test in DREADDS-infused PV_Wt/Veh and vehicle-infused PV_Wt/CNO. No differences were detected in exploration of the familiar female or of the novel female among groups (familiar exploration: PV_Wt/Veh vs PV_Wt/CNO: $U=37,5$, 0.36 ; Novel female exploration PV_Wt/Veh vs PV_Wt/CNO: $t_{(21)}=0.56$, $p=0.57$). **C** Histogram reporting the mean recognition index (RI) calculated during the social novelty phase of TC in DREADDS-infused PV_Wt/Veh and vehicle-infused PV_Wt/CNO. No differences were detected in RI among groups ($t_{(21)}=0.64$, $p=0.52$. (PV_Wt/Veh (N=17), PV_Wt/CNO (N=6)).

S1: D Table showing the velocity (cm/s) and distance (cm) traveled by Veh-injected PV_Wt and Veh- or CNO-injected PV_A females during the habituation phase of NOR test. No differences are detected among groups. Data are reported as mean $\pm$ s.e.m.

S1: E-G. E Histogram report mean time spent exploring the two identical objects (Object 1 (Obj1) and Identical Object (Obj I)) during the object exploration phase of the NOR test in DREADDS-infused PV_Wt/Veh and vehicle-infused PV_Wt/CNO. Data indicate that regardless of treatment all mice similarly explore the identical objects (Obj1: PV_Wt/Veh vs PV_Wt/CNO $U=51.5$ $p=0.62$; ObjI: PV_Wt/Veh vs PV_Wt/CNO $t_{(22)}=0.21$, $p=0.83$). **F** Histogram report mean time spent exploring the familiar object (ObjF) and the novel object (Obj N) during the test phase of the NOR by DREADDS-infused PV_Wt/Veh and vehicle-infused PV_Wt/CNO. No differences were detected among the two groups in the exploration of the familiar object or in the exploration of the novel object. (ObjF: PV_Wt/Veh vs PV_Wt/CNO $t_{(22)}=1,65$, $p=0.13$; ObjN: PV_Wt/Veh vs PV_Wt/CNO

$t_{(22)}=0.81$ $p=0.4$). **G** Histogram reporting the mean recognition index (RI) calculated during the test phase of NOR test in DREADDS-infused PV_Wt/Veh and vehicle-infused PV_Wt/CNO. No differences in the RI were detected among groups ($t_{(22)}=1.65$ $p=0.10$) (PV_Wt/Veh (N=17), PV_Wt/CNO (N=7)).

S1: H Table showing the velocity (cm/s) and the distance (cm) traveled by Veh-injected Wt and Veh- or CNO-injected A females during the habituation phase of NOR test. No differences are detected among groups. Data are reported as mean $\pm$ s.e.m.

S2: A,B Histograms reporting the percentage of stubby (**A**) and long thin (**B**) spines in PV_Wt/Veh, PV_A/Veh and PV_A/CNO female. No differences are detected among the three groups [PV_Wt/Veh (N=4, neurons: 8; segments: 29), PV_A/Veh (N=4, neurons: 8; segments: 27), PV_A/CNO (N=4, neurons: 8; segments: 22). Stubby: Kruskal-Wallis, $H=4.2$, $p=0.12$; long thin: $H=0.4$, $p=0.78$].

C,D Histograms report relative expression ($2^{-\Delta\Delta Ct}$) of estrogen receptors α (ERs α , Panel **C**) and β (ERs β , Panel **D**) in the hippocampus of A and Wt male mice. No differences in their ER basal levels are shown between the two groups. Wt (N=4), A (N=4); For ER α : WT vs A: $t_{(6)}=0.056$; $p=0.95$; For ER β : WT vs A: $t_{(6)}=0.179$; $p=0.86$. Data are expressed as mean $\pm$ s.e.m.