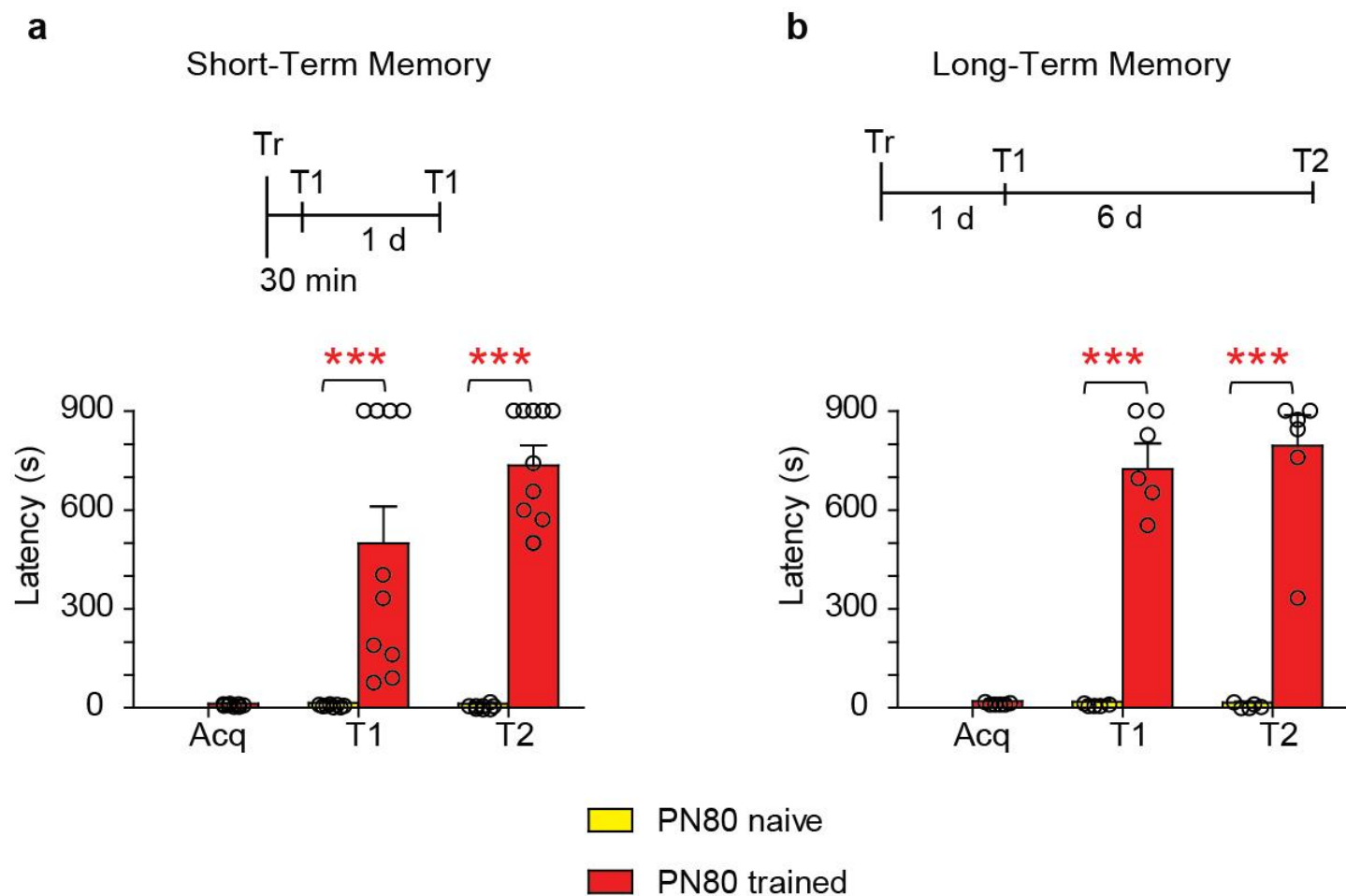
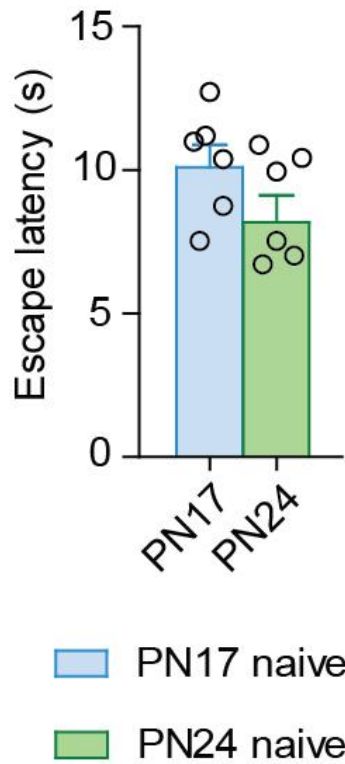




**Supplementary Figure 1**

**Short- and long-term memory retentions of adult rats.**

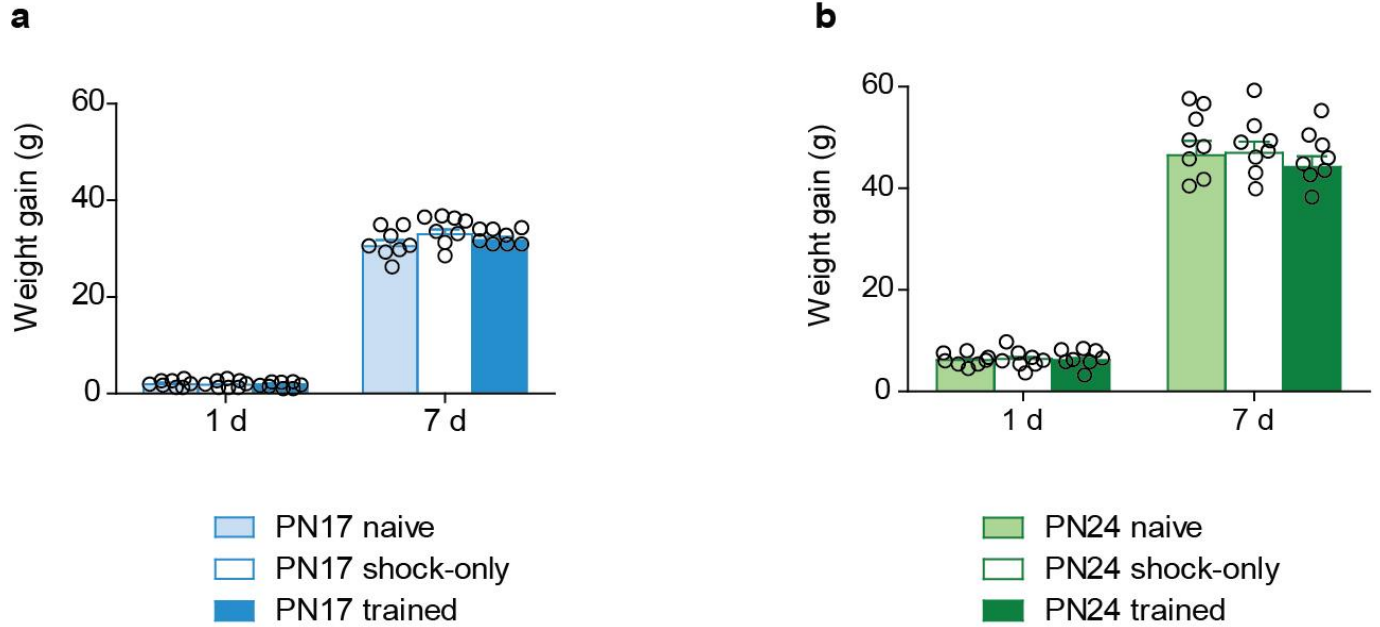
Experimental schedule is shown above each panel. Acquisition (Acq.) and memory retention are expressed as mean latency  $\pm$  s.e.m. (in seconds, s). (a) Mean latency  $\pm$  s.e.m. of naïve and rats trained at PN80 (adults) and tested: (a) 30min (T1) and 1d after training (T2) [n= 11, 10, Two-way ANOVA followed by Bonferroni post hoc, Treatment  $F(1,38)= 98.74$ ,  $P < 0.0001$ . Testing  $F(1,38)= 3.718$ ,  $P=0.0613$ , Interaction  $F(1,38)=3.894$ ,  $P=0.0558$ ; 3 independent experiments], and (b) 1d (T1) and 7d after training (T2) [n=5, 6, Two-way ANOVA followed by Bonferroni post hoc, Treatment  $F(1,18)= 121.1$ ,  $P < 0.0001$ , Testing  $F(1,18)= 0.2594$ ,  $P= 0.6167$ , Interaction  $F(1,18)= 0.2921$ ,  $P= 0.5955$ ; 2 independent experiments]. \*\*\* $P < 0.001$ . Latency score in Supplementary Table 10.



**Supplementary Figure 2**

**Nociception of naive PN17 and PN24 rats.**

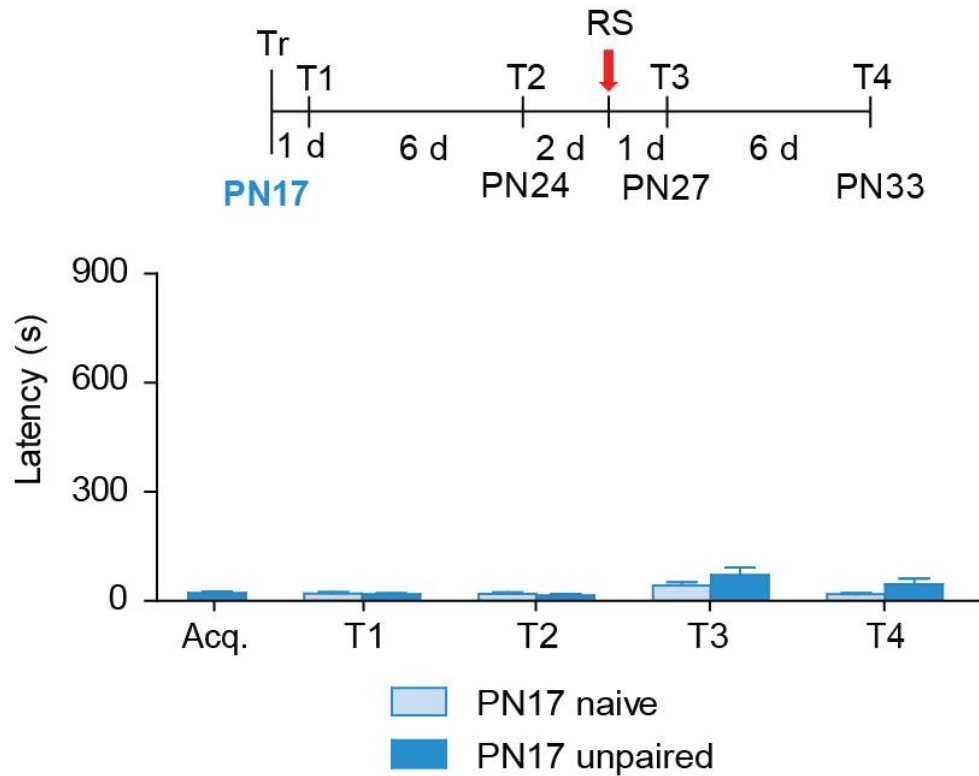
Escape latency is expressed as mean  $\pm$  s.e.m. (in seconds, s). Pain threshold in infant rats was measured by the escape latency to withdrawal from a  $53 \pm 1^\circ\text{C}$  hotplate. The escape latency was averaged from four sessions, with an inter-session interval of 15-min. Student's t-test revealed no significant difference between PN17 ( $10.1 \pm 0.8$  seconds,  $n=6$ ) and PN24 rats ( $8.2 \pm 0.9$  seconds,  $n=6$ ) (two-tailed t test,  $t=1.562$ ,  $df=10$ ,  $P=0.7028$ ).



### Supplementary Figure 3

#### Effect of training or shock-only on rat weight gain.

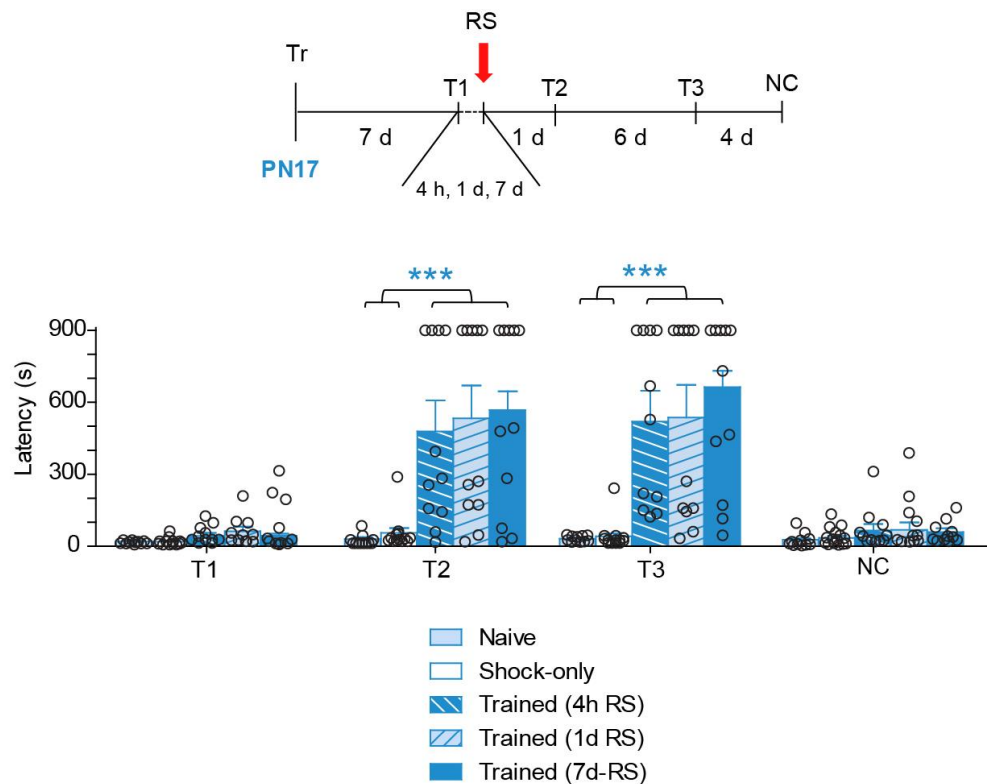
Gain weight compared to the weight taken immediately before training is expressed as mean  $\pm$  s.e.m. (in grams, g). Training and shock-only at **(a)** PN17 [ $n = 8, 8, 8$ , Two-way ANOVA followed by Bonferroni post hoc, Treatment  $F(2,42) = 1.332$ ,  $P > 0.05$ , Testing  $F(1,42) = 2515$ ,  $P < 0.0001$ , Interaction  $F(1,42) = 1.656$ ,  $P > 0.05$ ; 3 independent experiments] or **(b)** PN24 [ $n = 8, 8, 8$ , Two-way ANOVA followed by Bonferroni post hoc, Treatment  $F(2,42) = 0.4406$ ,  $P > 0.05$ , Testing  $F(1,42) = 801.7$ ,  $P < 0.0001$ , Interaction  $F(1,42) = 0.3349$ ,  $P > 0.05$ ; 3 independent experiments] did not alter the average gain weight measured 1 d and 7 d later. Numeric values in Supplementary Table 11.



**Supplementary Figure 4**

**The unpaired context–shock protocol failed to reinstate memory.**

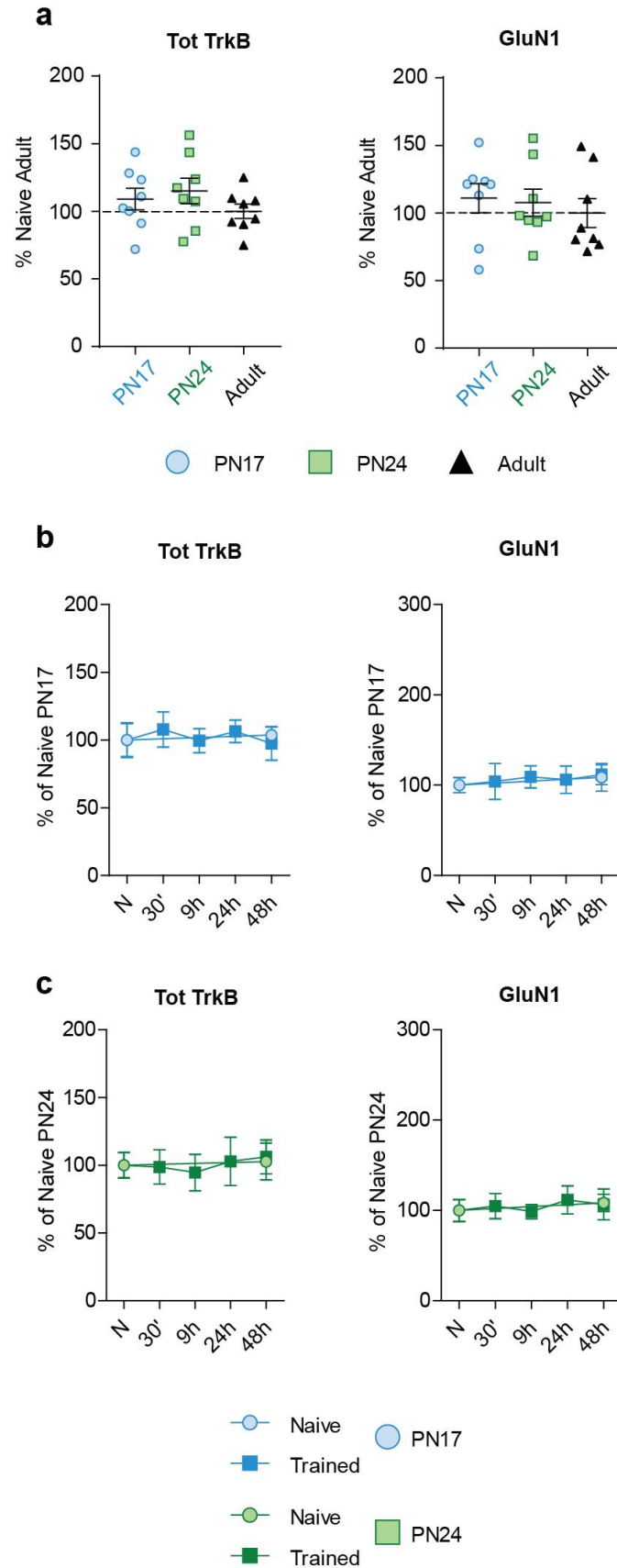
Experimental schedule is shown above the panel. Acquisition (Acq.) and memory retention are expressed as mean latency  $\pm$  s.e.m. (in seconds, s). In the unpaired protocol, rats were exposed to the IA context similarly to the trained rats but did not receive a footshock in the dark chamber. They were returned to their home cage and, one hour later, were placed directly onto the grid floor of the dark chamber and immediately shocked (1.0 mA). The unpaired protocol failed to reinstate memory ( $n=8, 8$ , Two-way ANOVA followed by Bonferroni post hoc, Condition  $F(1,56)=1.901$ ,  $P=0.1735$ , Testing  $F(3,56)=4.720$ ,  $P=0.0053$ , Interaction  $F(3,56)=1.245$ ,  $P=0.3021$ ; 3 independent experiments). Latency score in Supplementary Table 12.



**Supplementary Figure 5**

**Memory reinstatement following different time intervals between test and reminder shock.**

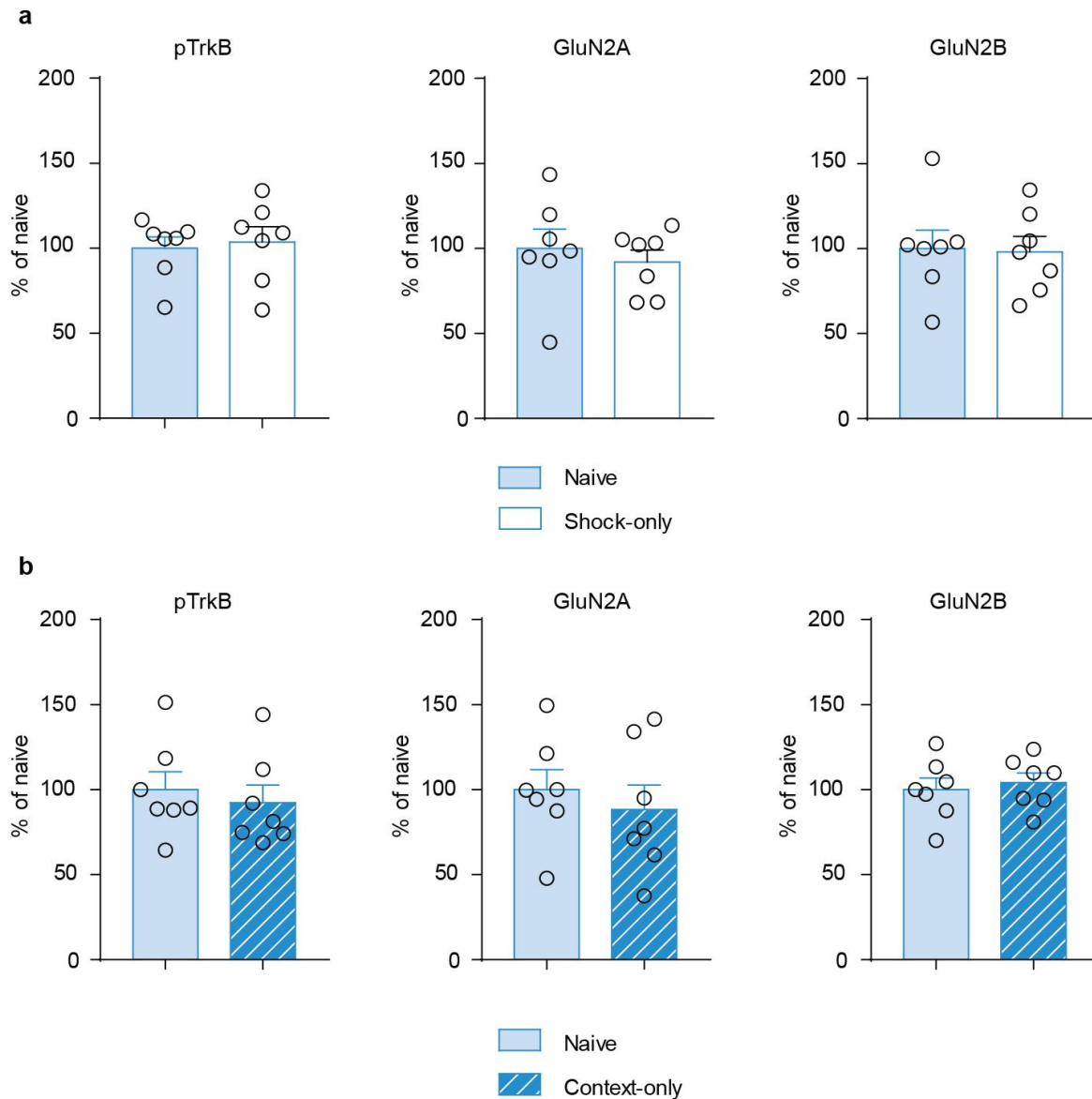
Experimental schedule is shown above the panel. Acquisition (Acq.) and memory retention are expressed as mean latency  $\pm$  s.e.m. (in seconds, s). Mean latency  $\pm$  s.e.m. of naïve, shock-only and rats trained at PN17, tested 7d later (T1) and given a reminder shock (RS) 4h, 1d or 7d after the test (T1). Memory retention was tested 1d (T2) and 7d (T3) after RS, and, 4d later, in a new context (NC) [n= 11, 13, 11, 11, 11, Two-way ANOVA followed by Bonferroni post hoc, Treatment  $F(4,208)=18.27$ ,  $P<0.0001$ , Testing  $F(3,208)=26.93$ ,  $P<0.0001$ , Interaction  $F(12,208)=4.269$ ,  $P<0.0001$ ; 3 independent experiments]. Latency score in Supplementary Table 13.



## Supplementary Figure 6

### Hippocampal molecular changes either in untrained (naïve) conditions or following IA training at PN17 or PN24.

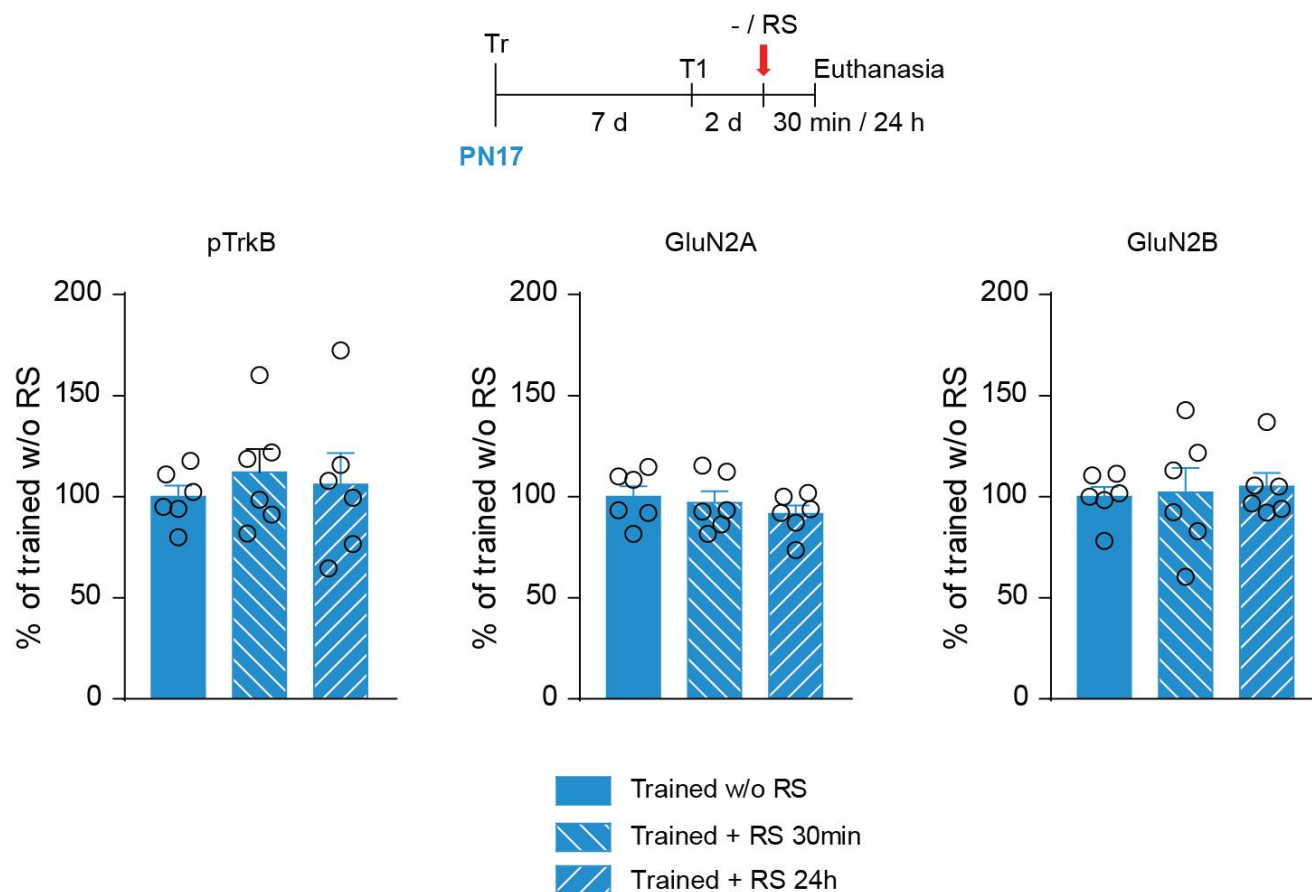
(a) Representative examples and densitometric western blot analyses of dorsal hippocampal total extracts from naïve rats euthanized at PN17, PN24 or PN80 (adult) (n=8, 8, 8). Data are expressed as mean percentage  $\pm$  s.e.m. of adult naïve rats [One-way ANOVA followed by Newman-Keuls Multiple Comparison Test, TrkB  $F(2,21)=0.6080$ ,  $P=0.5537$ ; GluN1  $F(2,21)=0.1954$ ,  $P=0.8240$ , 3 independent experiments]. (b-c) Representative examples and densitometric western blot analyses of dHC total extracts from rats trained in IA at (b) PN17 or (c) PN24, and euthanized 30min, 9h, 24h or 48h after training (n=6-10/group). To account for developmental differences, two groups of naïve were used [(b) PN17 and PN19 or (c) PN24 and PN26]. Data are expressed as mean percentage  $\pm$  s.e.m. of (b) PN17 [n= 8, 6, 10, 7, 6, 6, One-way ANOVA followed by Dunnett's Multiple Comparison Test, TrkB  $F(3,27)=0.1618$ ,  $P=0.9211$ ; GluN1  $F(3,27)=0.08967$ ,  $P=0.9650$ ; 3 independent experiments] or (c) PN24 naïve rats [n=8, 6, 6, 7, 7, 8, One-way ANOVA followed by Dunnett's Multiple Comparison Test, TrkB  $F(3,23)=0.06099$ ,  $P=0.9798$ ; GluN1  $F(3,23)=0.2067$ ,  $P=0.8907$ ; 3 independent experiments]. The numeric values are reported in Supplementary Table 3.



**Supplementary Figure 7**

**Hippocampal molecular changes after shock- or context-only.**

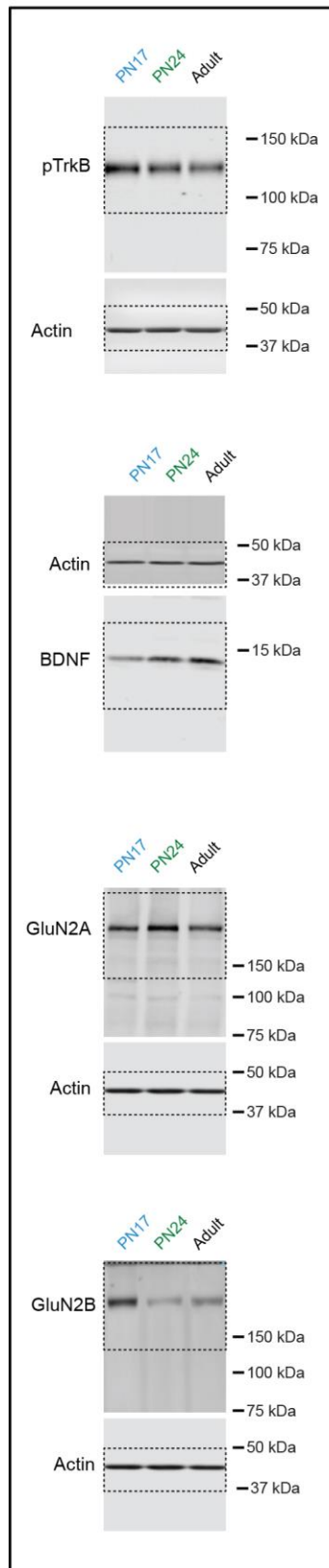
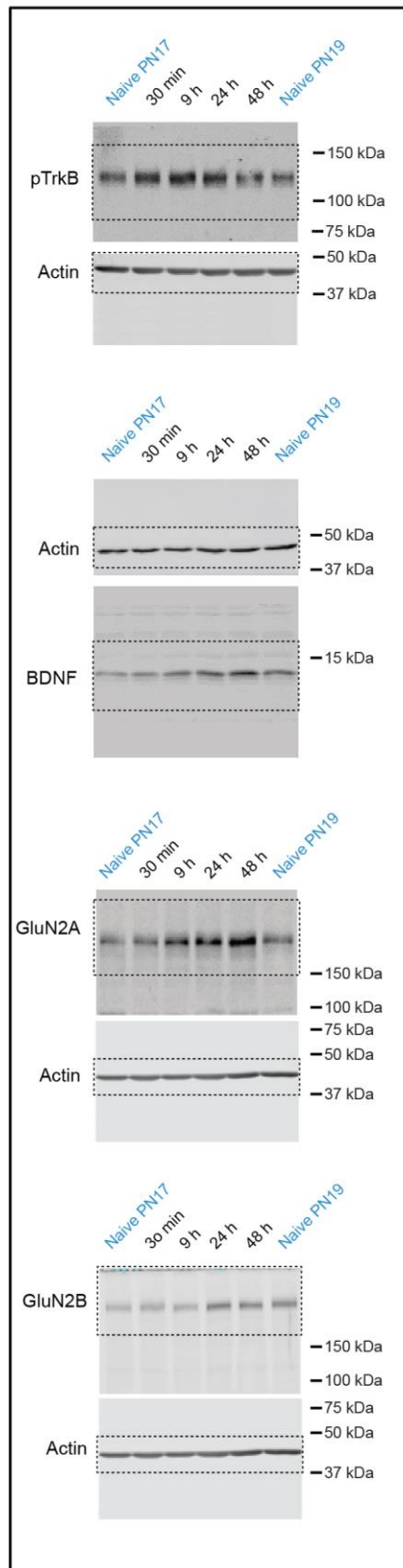
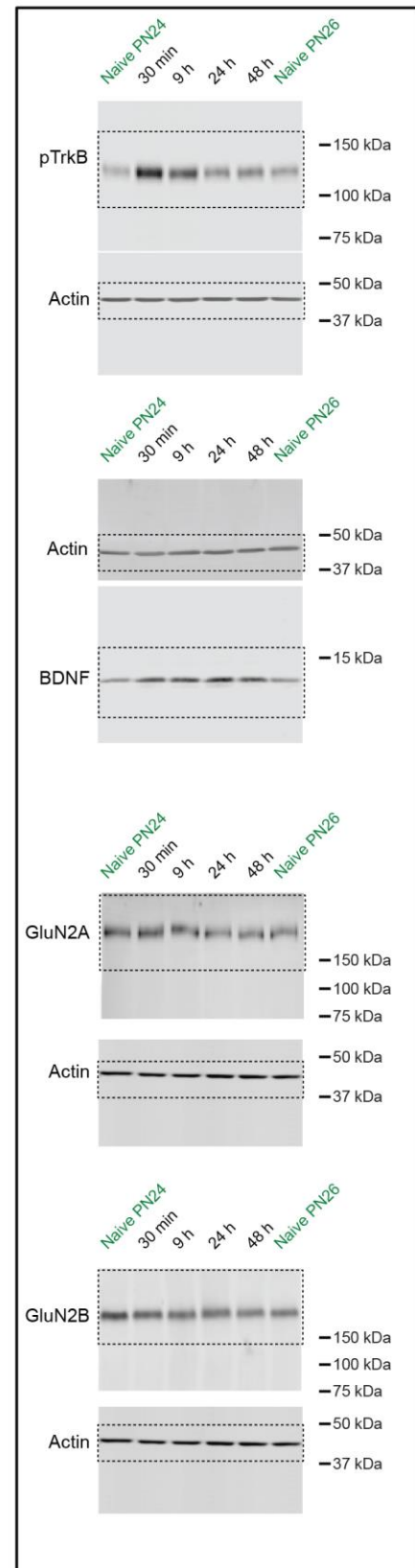
Densitometry of western blot analyses of dorsal hippocampal total extracts from rats euthanized 24 hours after (a) receiving a footshock immediately after being placed on a shock grid (shock-only) [n= 7, 7, Unpaired two-tailed Student's t-test, pTrkB  $t=0.3263$   $df=12$ ,  $P = 0.7498$ ; GluN2A  $t=0.5967$   $df=12$ ,  $P = 0.5618$ ; GluN2B  $t=0.1414$   $df=12$ ,  $P = 0.8899$ ; 2 independent experiments] or (b) exposed to the IA context without receiving the footshock (context-only) [n= 7, 7, Unpaired two-tailed Student's t-test, pTrkB  $t=0.5199$   $df=12$ ,  $P = 0.6126$ ; GluN2A  $t=0.6308$   $df=12$ ,  $P = 0.5400$ ; GluN2B  $t=0.4679$   $df=12$ ,  $P = 0.6482$ ; 2 independent experiment]. Data are expressed as mean percentage  $\pm$  s.e.m. of naive rats euthanized at the matched time point (i.e. PN18). The numeric values are reported in Supplementary Table 14.



**Supplementary Figure 8**

### Hippocampal molecular changes after memory reinstatement.

Experimental schedule is shown above the panel. Densitometric western blot analyses of dorsal hippocampal total extracts obtained from rats trained (Tr) at PN17, 7 days later exposed to the reinstatement protocol [test (T1) and 2d later reminder shock (RS)] and euthanized 30min or 24 hours later. Data are expressed as mean percentage  $\pm$  s.e.m. of rats trained at PN17, tested (T1) but not exposed to RS and euthanized at the matched time point [ $n=6$ /group, One-way ANOVA followed by Newman-Keuls Multiple Comparison Test, pTrkB  $F(2,17)=0.27$ ,  $P=0.77$ ; GluN2A  $F(2,17)=0.72$ ,  $P=0.50$ ; GluN2B  $F(2,17)=0.08$ ,  $P=0.82$ ; 2 independent experiment). The numeric values are reported in Supplementary Table 15.

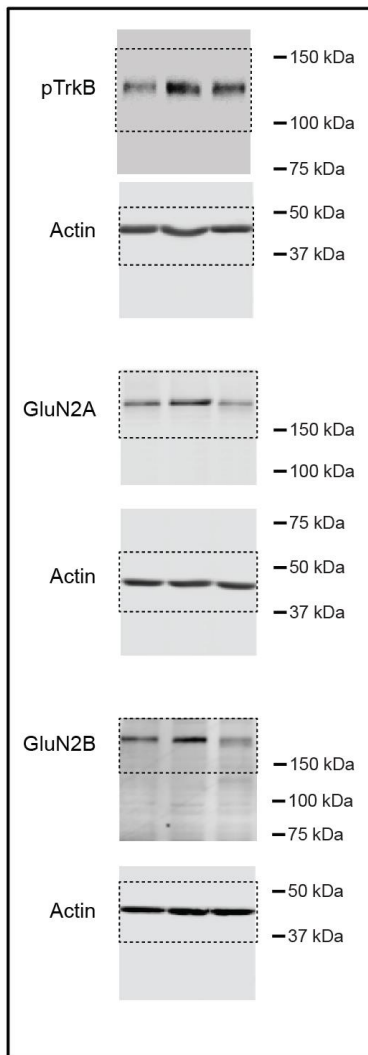
**Fig. 3a****Fig. 3b****Fig. 3c**

## **Supplementary Figure 9**

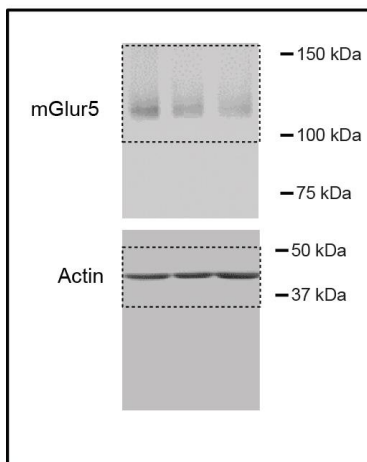
**Full-length pictures of the blots presented in the main figures.**

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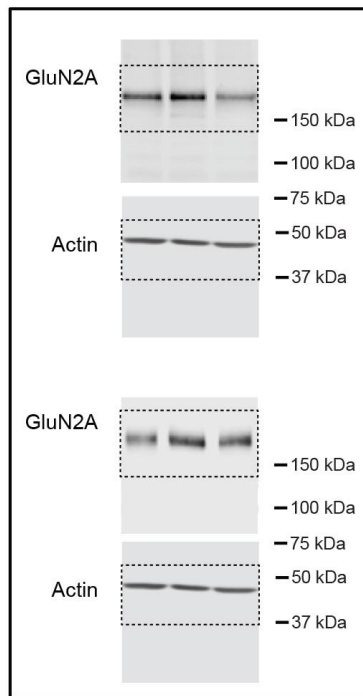
**Fig. 4b**



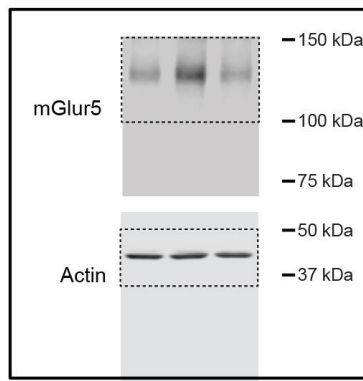
**Fig. 5c**



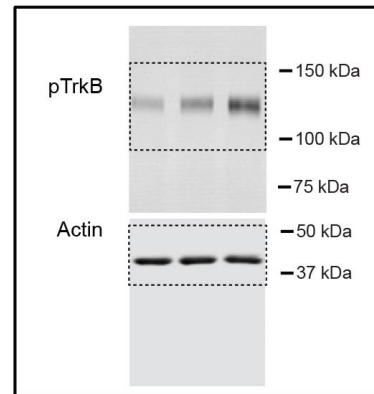
**Fig. 5d**



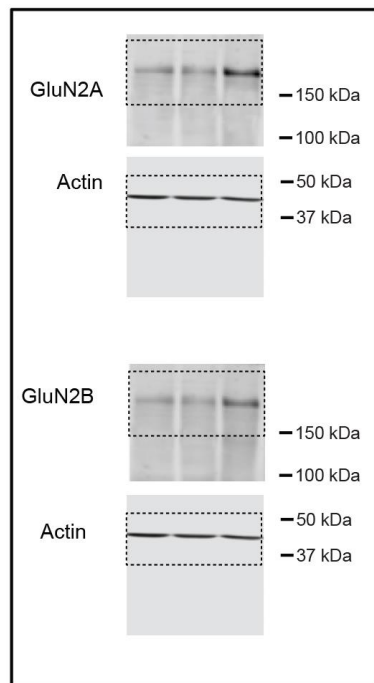
**Fig. 5g**



**Fig. 6b**



**Fig. 6b**



## **Supplementary Figure 10**

**Full-length pictures of the blots presented in the main figures**

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