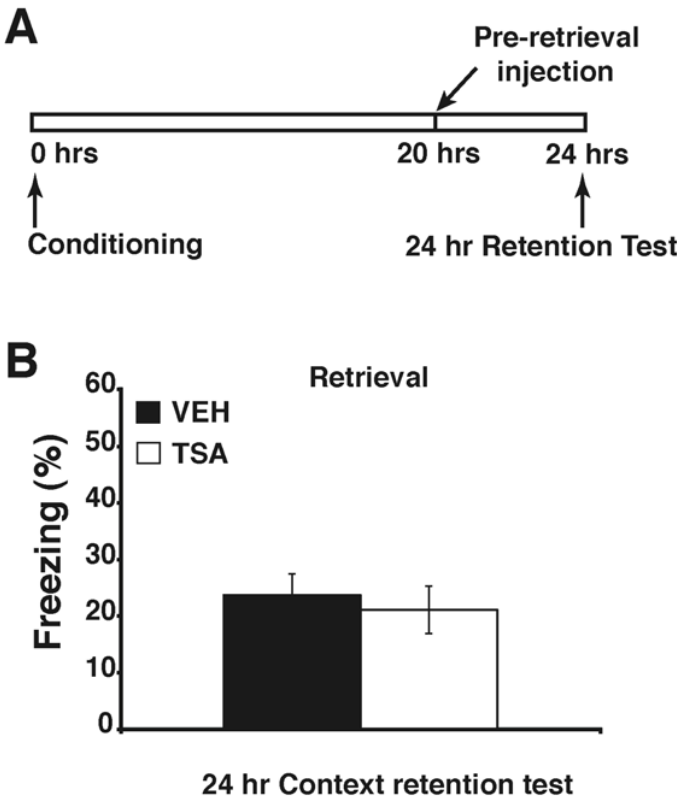
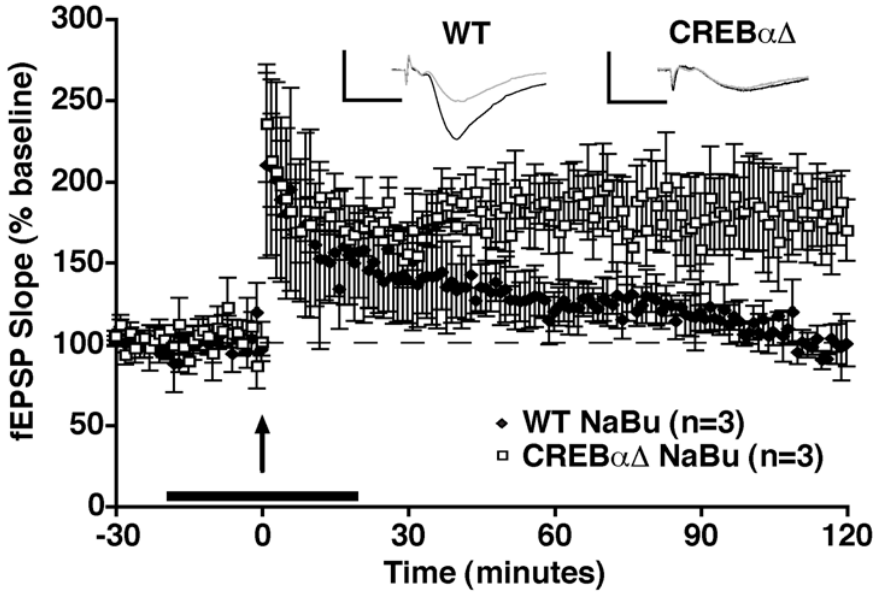
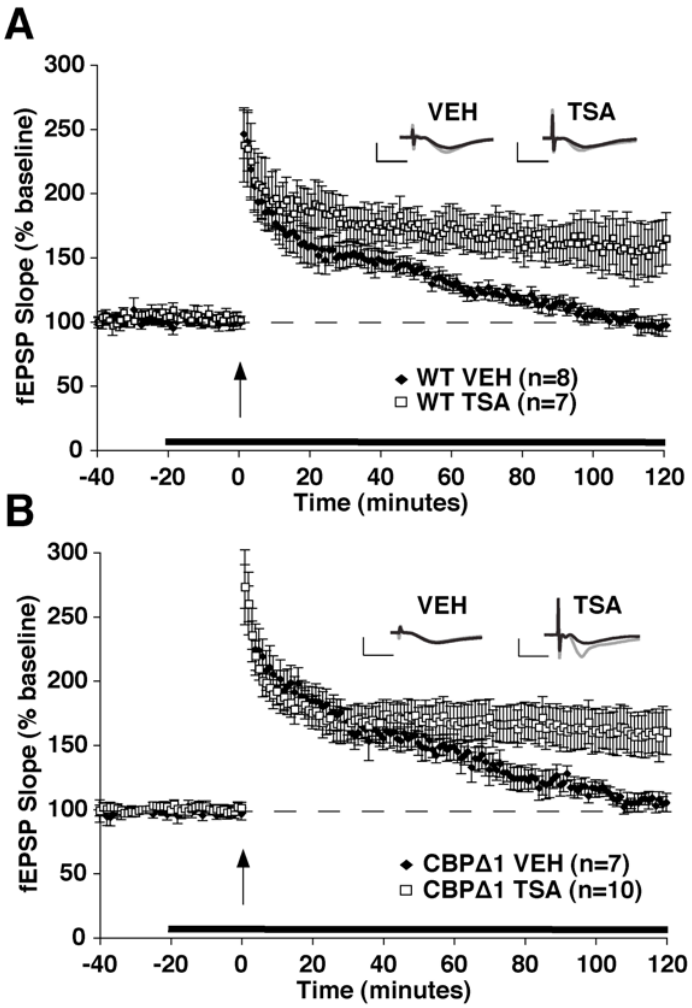


Supplemental Figure S1. Intrahippocampal injection of TSA before the retention test does not enhance memory for contextual fear. A) Schematic shows the training and testing procedure used in this experiment. C57BL/6J male mice fitted with intrahippocampal cannulae, received single-shock contextual fear conditioning, and were given a retention test 24 hours later in the same context. Four hours before testing, mice were injected with either vehicle (VEH) or trichostatin A (TSA; 16.5 mM TSA). B) Mice receiving TSA 4 hours before testing (n=11) showed no enhancement in freezing in a 24 hour retention test, as compared to mice receiving vehicle (n=11) ($p>0.05$).



Supplemental Figure S2. E-LTP enhanced by sodium butyrate is impaired in CREBαΔ knockout mice. Long-term potentiation was induced by a single 1 sec, 100 Hz train in the CA1 region of hippocampal slices from CREBαΔ mutant mice and wildtype (WT) littermates in the presence of sodium butyrate (NaBu; 300 μM). Slices were treated with NaBu (indicated by black line) for 40 minutes beginning 20 minutes prior to tetanization (indicated by an arrow). Slices from wildtype mice treated with NaBu (n=3 slices from 3 mice) showed a robust and long-lasting potentiation. In contrast, slices from CREBαΔ knockout mice treated with NaBu (n=3 slices from 3 mice) showed a transient potentiation that gradually decayed to baseline, and which was significantly reduced compared with wildtype littermates between 100 and 120 minutes post-tetanus ($p<0.05$). Insets show averaged sample sweeps from the first 5 and last 5 minutes of the recording. Y-axis scale bar is 5 mV, X-axis scale bar is 5 ms.



Supplemental Figure S3. TSA enhances LTP in CBPΔ1 mice. Long-term potentiation was induced by a single 1 sec, 100 Hz train in the CA1 region of hippocampal slices in the presence of vehicle (VEH) or TSA (1.65 μM). Hippocampal slices were treated with vehicle or TSA (indicated by black line) for 20 minutes prior to tetanization (indicated by an arrow) and throughout the recording period. A) Hippocampal slices from wildtype mice treated with vehicle (n=9 slices from 8 mice) showed a transient potentiation that gradually decreased to baseline. In contrast, wildtype slices treated with TSA (n=7 slices from 7 mice) showed a significantly more robust and longer-lasting potentiation (*post hoc* analysis: VEH vs. TSA within wildtype groups: $p<0.05$). B) TSA treatment in CBPΔ1 transgenic mutant mice (n=13 slices from 10 mice) was also able to enhance potentiation induced by 1 train stimulation as compared to vehicle-treated slices (n=8 slices from 7 mice) (*post hoc* analysis: VEH vs. TSA within CBPΔ1 transgenic groups: $p<0.05$). Thus, there was no difference between genotype (genotype *X* treatment interaction: $F(1,19)=0.02$, $p>0.05$) Insets show averaged sample sweeps from the first 5 and last 5 minutes of the recording. Y-axis scale bar is 5 mV, X-axis scale bar is 5 ms.

RT-PCR PRIMERS		
Gene	**Forward**	**Reverse**
Egr1	5'-CAAGGCCGAGATGCAATTG-3'	5'-GACTCTGTGGTCAGGTGCTCA-3'
Fos	5'-CCGAGAAGAGACACTTACCCCA-3'	5'-AAGTCGATCTGTCAGCTCCCTC-3'
Dusp1	5'-GGAGGATATGAAGCGTTTTCGG-3'	5'-GGATTCTGCACTGTCAGGCACA-3'
Nr4a1	5'-AAAATCCCTGGCTTCATTGAG-3'	5'-TTTAGATCGGTATGCCAGGCG-3'
Nr4a2	5'-CGGTTTCAGAAGTGCCTAGC-3'	5'- TTGCCTGGAACCTGGAATAG-3'
Jun	5'-CTTTAAAGAGGAACCGCAGACC-3'	5'-CGCTTTCGCTCCACTTTGAT-3'
Icer	5'-GGTGACATGCCAACTTACCAGA-3'	5'-TTGCGACTTGCTTCTTCTGC-3'
Nor1/Nr4a3	5'-GTGGCTCGACTCCATTAAAGAC-3'	5'-GTGCATAGCTCCTCCACTCTCT-3'
14-3-3-eta	5'-AATGTAGTTGGTGCCAGGCGAT-3'	5'-TGCCAGGTAGCGGTAGTAATCG-3'
Bdnf4	5'-TGCGAGTATTACCTCCGCCAT-3'	5'-TCACGTGCTCAAAAGTGTCAG-3'
Dynorphin	5'-GTCCTGAAGGAGCTGGAGAAA-3'	5'-CCTCTTGGGGTATTTGCGCAA-3'
Gadd45b	5'-AGACATTGGGCACAACCGAAG-3'	5'-TAGGGGACCCATTGGTTATTG-3'
Nrn1	5'-CCTGGACGACAAGACGAACAT-3'	5'-TGCCAGGTAGCGGTAGTAATCG-3'
ActinG	5'-CCGATCGCAATGGAAGAAG-3'	5'-CGTATGAGTCTTTCTGGCCCA-3'
Hprt	5'-TTGCTGACCTGCTGGATTACA-3'	5'-CCCCGTTGACTGATCATTACA-3'
Tubulin	5'-ATGCGCGAGTGCATTTCAG-3'	5'-CACCAATGGTCTTATCGCTGG-3'
ChIP PRIMERS		
Nr4a1	5'-GCATGAAAGAGATGGGGTGT-3'	5' TAAACAAGCGCCCACTACCT-3'
Nr4a2	5' CCGTTCCCACCTTAAAATCA-3'	5' CTGCCAACATGCACCTAAAG-3'

Supplemental Table S1. Listed are the genes and corresponding primer sequences used for quantitative real-time RT-PCR analysis as well as primers used for chromatin immunoprecipitations in experiments discussed in Figure 5.