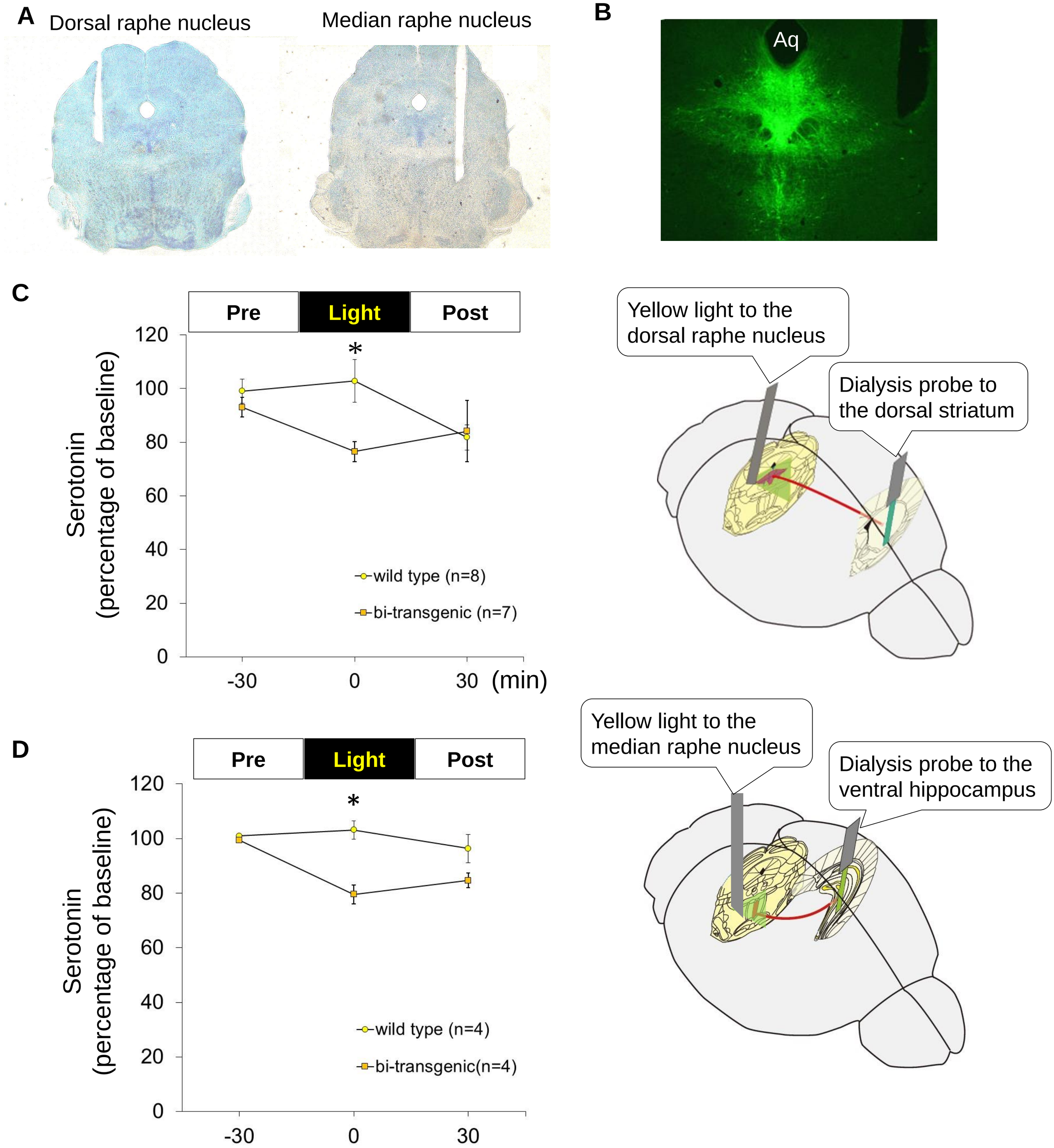
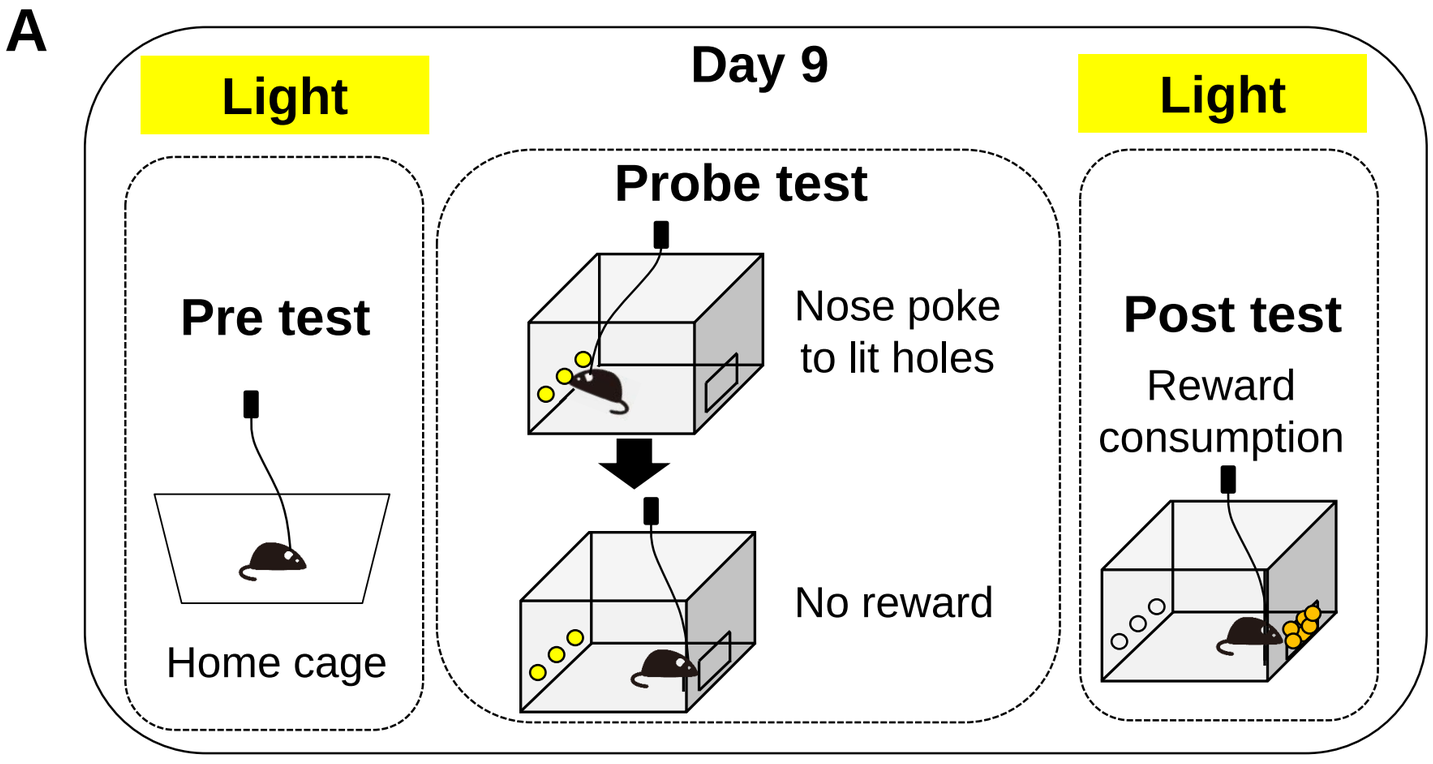
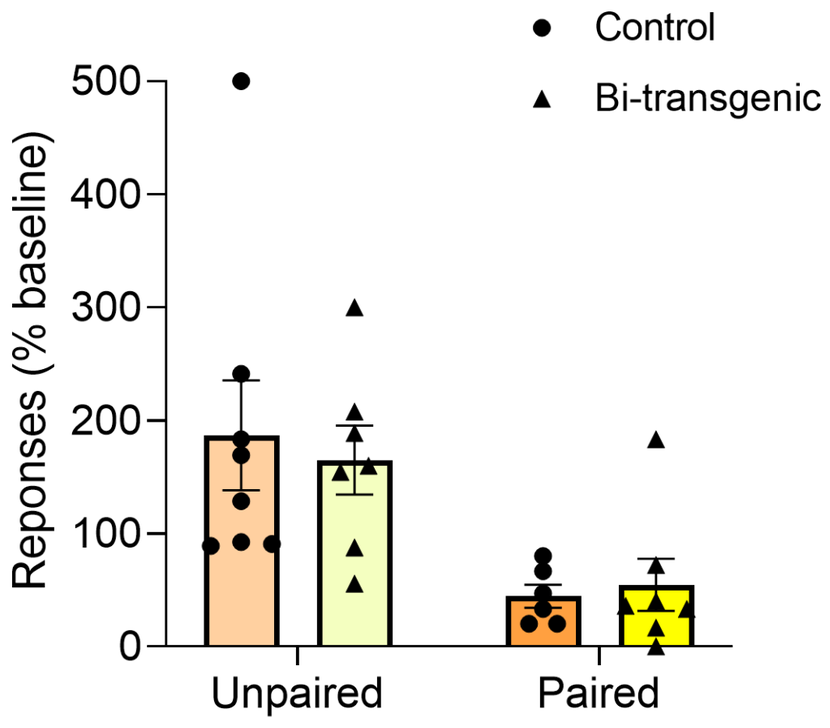
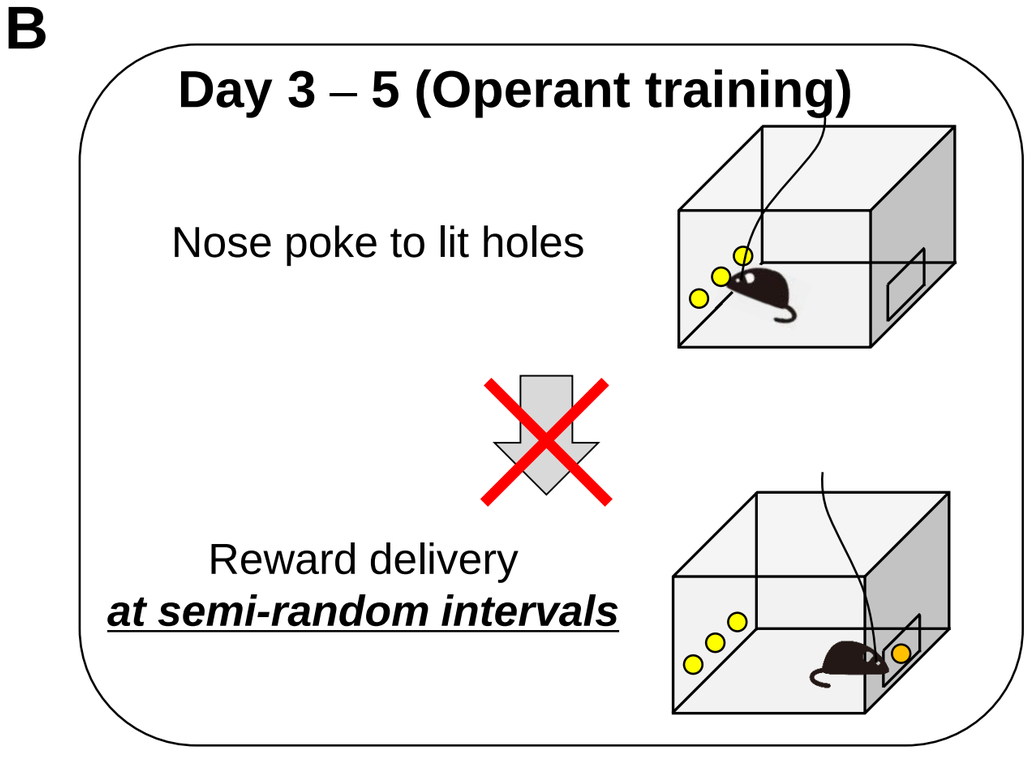
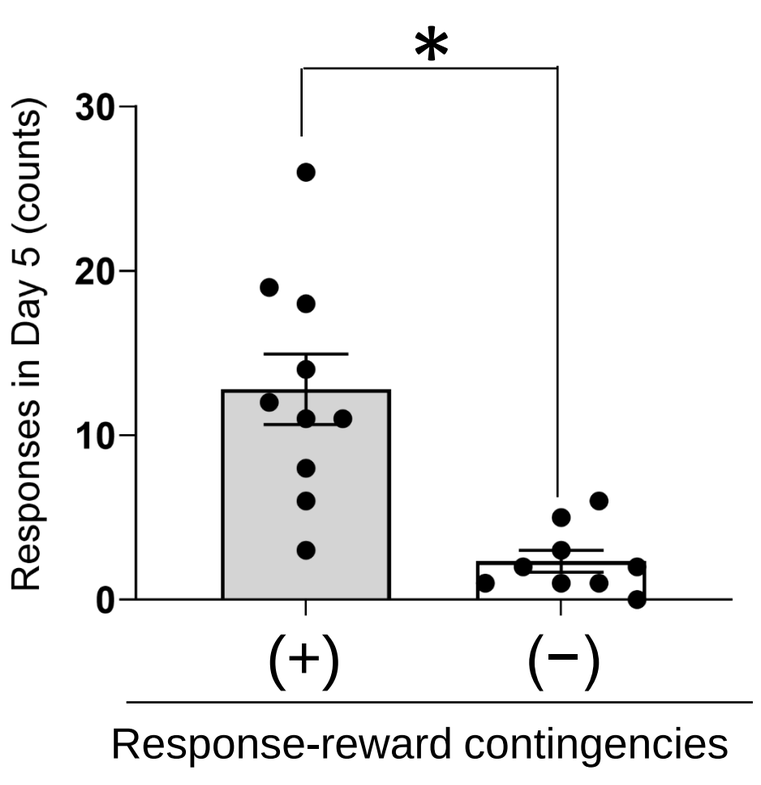


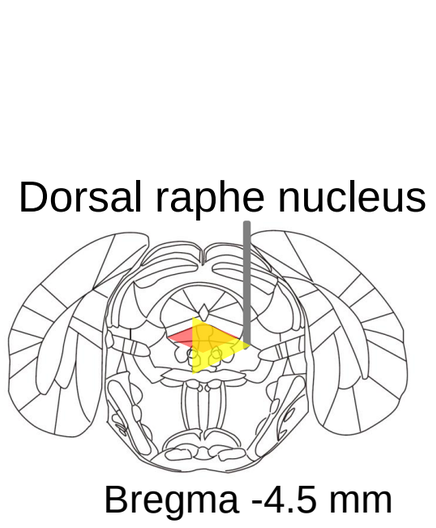
Figure S1. Representative fiber placements and phototoxic properties. Related to Figure 2.
(A) Representative photographs show fiber placements for the dorsal raphe nucleus and median raphe nucleus. **(B)** A photograph shows Enhanced Yellow Fluorescent Protein (EYFP) expression in the dorsal raphe nucleus after continuous yellow light illumination for 30 min. No evident loss of EYFP was observed. Aq: aqueduct. **(C)** Mice received continuous yellow light applications (30 min) to the dorsal raphe nucleus, and extracellular serotonin levels in the dorsal striatum were monitored by microdialysis with high performance liquid chromatography and electrochemical detection (HPLC-ECD). Two-factor analysis of variance (ANOVA) revealed a significant interaction between the genotype and time ($F_{2, 26} = 4.24$, $P = 0.025$), and following simple main effect analysis for each time revealed that yellow light illumination reduced serotonin release in the dorsal striatum of bi-transgenic mice only during the light period ($F_{1,13} = 8.18$, $P = 0.013$). **(D)** Mice received continuous yellow light applications (30 min) to the median raphe nucleus, and extracellular serotonin levels in the ventral hippocampus were monitored by microdialysis with HPLC-ECD. Two-factor ANOVA revealed a significant interaction between the genotype and time ($F_{2, 12} = 4.99$, $P = 0.026$), and following simple main effect analysis for each time revealed that yellow light illumination reduced serotonin release in the ventral hippocampus of bi-transgenic mice only during the light period ($F_{1,6} = 13.75$, $P = 0.010$). The data are presented as the means ± standard error of the mean. *$P < .05$.

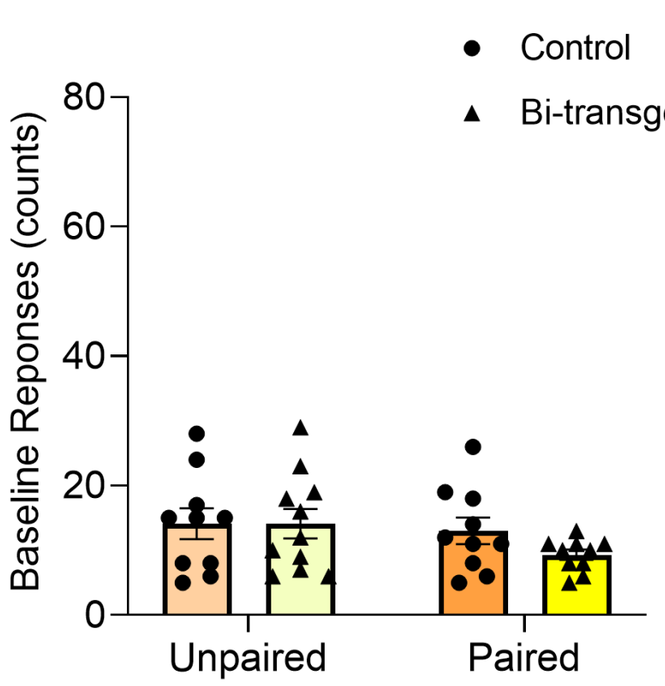


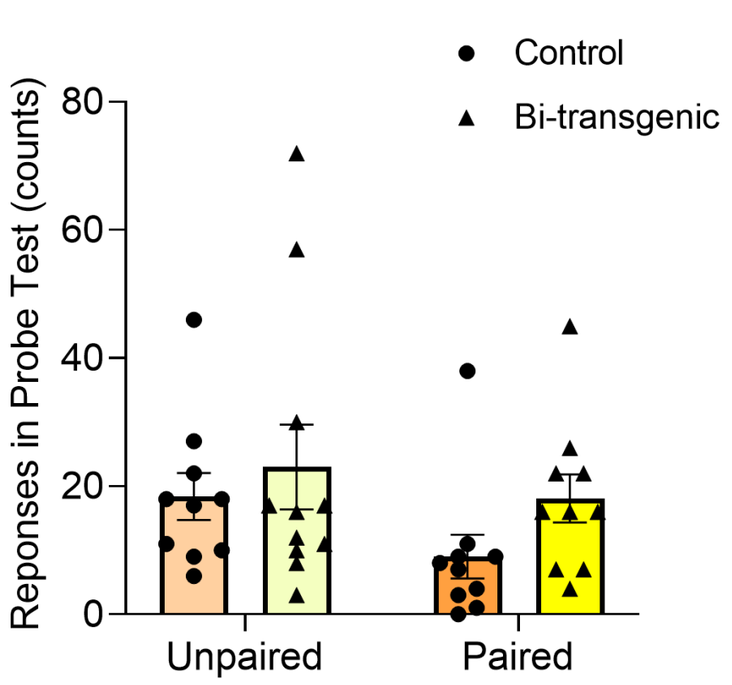


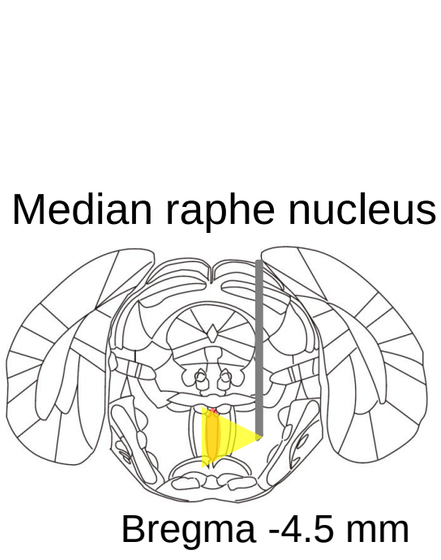


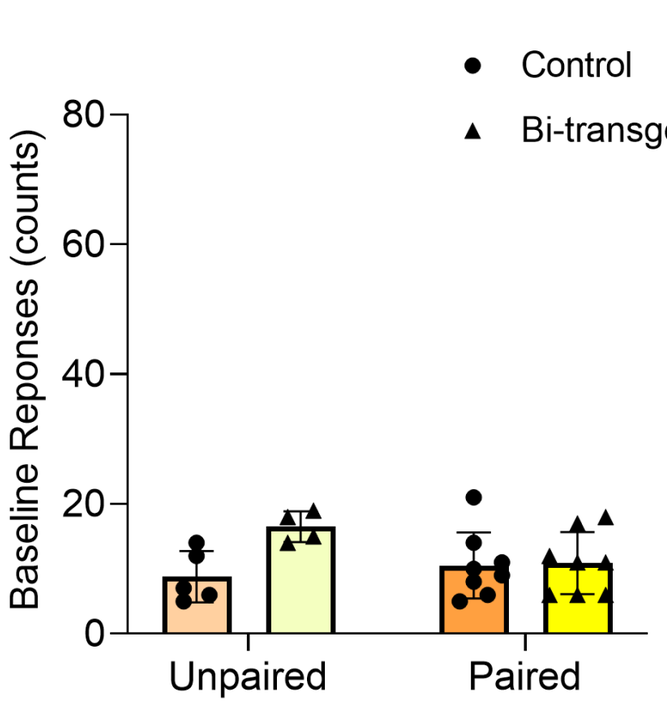












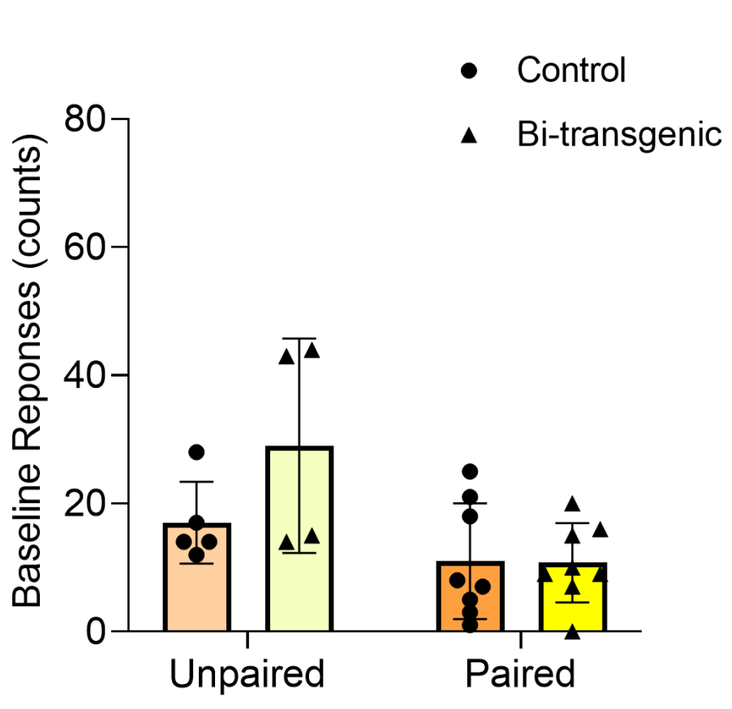
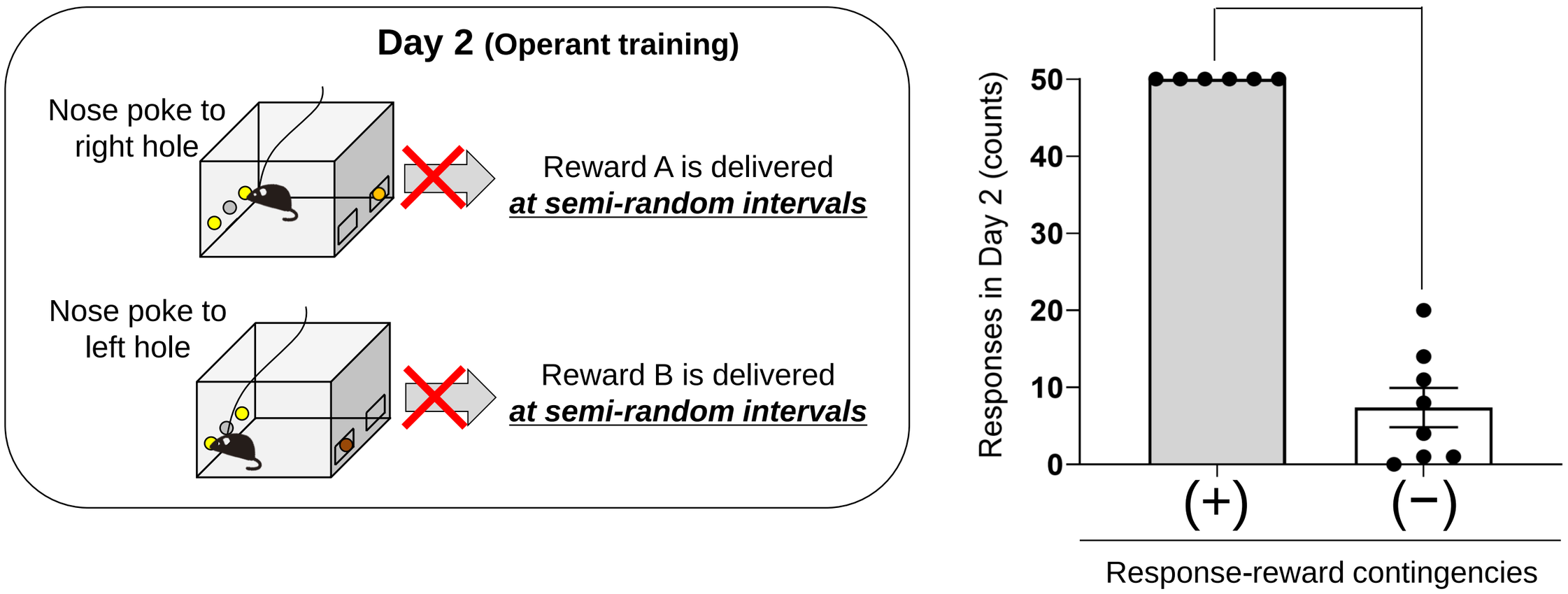


Figure S2. C**ontrol experiments and actual number of responses in the outcome devaluation task. Related to Figure 2. (A)** Pre-test light application to the dorsal raphe nucleus for 15 min did not reverse suppressed responses in the paired lithium injection group during the probe test (genotype × paired/unpaired interaction effect, $F_{1, 24} = 0.22$, $P = 0.65$; a main effect of paired/unpaired injection, $F_{1, 24} = 13.50$, $P = 0.0012$). **(B)** A nose poke response resulted in a reward delivery in a group of mice (+) (see Figure 2A), while responses did not result in reward deliveries, but rewards were delivered at semi-random intervals in another group of mice (−). The latter group failed to develop nose poke responding to lit holes ($t_{10.71} = 4.66$, $p = 0.0007$). **(C)** The number of baseline responses in Day 5 (see Figures 2A and 2C). **(D)** The number of responses in the probe test of Day 9 (see Figures 2A and 2C). **(E)** The number of baseline responses in Day 5 (see Figures 2A and 2E). **(F)** The number of responses in the probe test of Day 9 (see Figures 2A and 2E). The data are presented as the means ± standard error of the mean.

Figure S3. Effects of the inhibition of serotonin neurons on Y-maze performance and pharmacological validation of the Y-maze test. Related to Figures 2, 3, and 4.

(A) Bi-transgenic mice (n = 8) received continuous yellow light applications to the dorsal raphe nucleus during the Y-maze test. Yellow light application to the dorsal raphe nucleus did not affect **(B)** the number of entries into arms, a measure of locomotor activity ($t_7 = 1.79$, $P = 0.12$), or **(C)** the percentage of spontaneous alternation, a measure of working memory ($t_7 = 0.44$, $P = 0.67$). To check whether the Y-maze in our setup could detect working memory deficit, we injected saline or scopolamine (1 mg/kg, i.p.) to adult male (10-12 weeks old) wild type mice (n = 7) 1 hour before the test. **(D)** Scopolamine did not affect the number of entries into arms, a measure of locomotor activity ($t_6 = 1.16$, $P = 0.29$). **(E)** Scopolamine reduced the percentage of spontaneous alternation, a measure of working memory ($t_6 = 2.84$, $P = 0.03$). The data are presented as the means ± standard error of the mean. *$P < .05$.

A



B

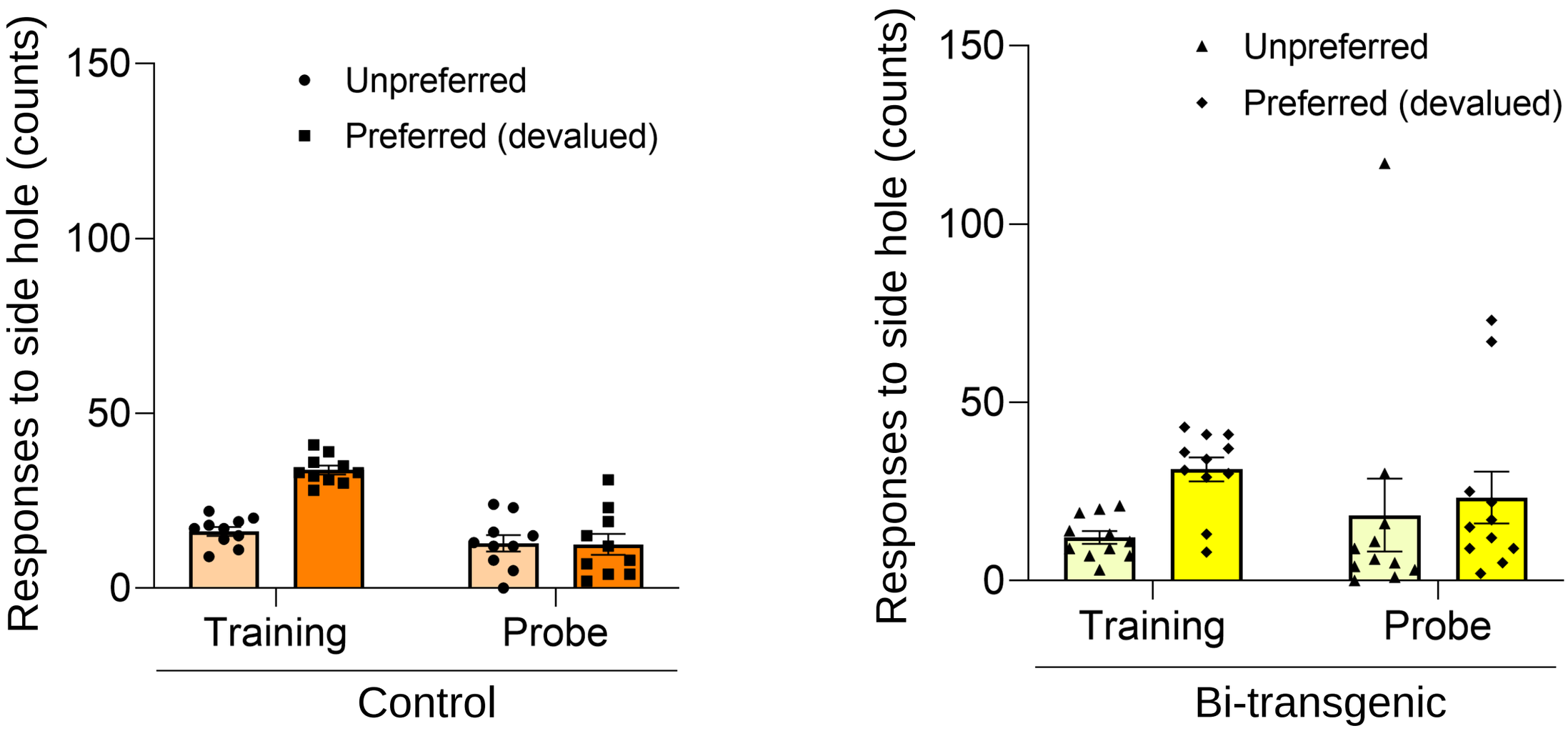


Figure S4. Response-reward non-contingency control experiment and actual numbers of responses in the reward-specific outcome devaluation task. Related to Figure 4. (A) A nose poke response to the right or left hole resulted in a reward delivery in a group of mice (+) (see Figure 4A), while responses did not result in reward deliveries, but rewards were delivered at semi-random intervals in another group of mice (−). The latter group failed to develop nose poke responding to right and left holes. Because all the value in the former group are identical, we used one-sample Wilcoxon test (W = -36.0, p = 0.0078).**(B)** The actual numbers of responses during the training (Day 2) and probe tests (Day 5) of the reward-specific outcome devaluation task (see Figures 4A and 4C). The data are presented as the means ± standard error of the mean. *P < .05.