| Housing condition	Cage No.	Individual No.	Mouse ID	Strain	Age (weeks)	Mean ± SE
B6-Only	1	B6-1-1	G	B6	11	11.0 ± 0.0
		B6-1-2	K	B6	11	
		B6-1-3	P	B6	11	
		B6-1-4	V	B6	11	
	2	B6-2-1	B	B6	19	18.8 ± 0.3
		B6-2-2	K	B6	19	
		B6-2-3	M	B6	19	
		B6-2-4	VI	B6	18	
	3	B6-3-1	B	B6	9	9.0 ± 0.0
		B6-3-2	K	B6	9	
		B6-3-3	M	B6	9	
		B6-3-4	VI	B6	9	
BTBR-Only	1	BTBR-1-1	G	BTBR	12	12.0 ± 0.0
		BTBR-1-2	K	BTBR	12	
		BTBR-1-3	P	BTBR	12	
		BTBR-1-4	V	BTBR	12	
	2	BTBR-2-1	B	BTBR	18	17.5 ± 0.3
		BTBR-2-2	K	BTBR	17	
		BTBR-2-3	M	BTBR	17	
		BTBR-2-4	VI	BTBR	18	
	3	BTBR-3-1	B	BTBR	21	21.3 ± 0.3
		BTBR-3-2	K	BTBR	22	
		BTBR-3-3	M	BTBR	21	
		BTBR-3-4	VI	BTBR	21	
	4	BTBR-4-1	B	BTBR	9	8.8 ± 0.3
		BTBR-4-2	K	BTBR	9	
		BTBR-4-3	M	BTBR	9	
		BTBR-4-4	VI	BTBR	8	
B6-BTBR-mix	1	Mix-1-1	G	BTBR	12	12.0 ± 0.0
		Mix-1-2	K	B6	12	
		Mix-1-3	P	BTBR	12	
		Mix-1-4	V	B6	12	
	2	Mix-2-1	B	BTBR	17	17.5 ± 0.3
		Mix-2-2	K	B6	18	
		Mix-2-3	M	B6	18	
		Mix-2-4	VI	BTBR	17	
	3	Mix-3-1	B	BTBR	22	22.3 ± 0.3
		Mix-3-2	K	BTBR	22	
		Mix-3-3	M	B6	23	
		Mix-3-4	VI	B6	22	
	4	Mix-4-1	B	B6	23	22.8 ± 0.3
		Mix-4-2	K	BTBR	23	
		Mix-4-3	M	B6	22	
		Mix-4-4	VI	BTBR	23	
	5	Mix-5-1	B	B6	24	23.5 ± 0.3
		Mix-5-2	K	BTBR	23	
		Mix-5-3	M	BTBR	23	
		Mix-5-4	VI	B6	24	
	6	Mix-6-1	B	BTBR	10	9.3 ± 0.5
		Mix-6-2	K	BTBR	9	
		Mix-6-3	M	B6	10	
		Mix-6-4	VI	B6	8	

Supplementary Table 1

List of mice ages (weeks) used in the MAPS experiments. Mean age (± SE) among an experimental cage are shown in the last column.
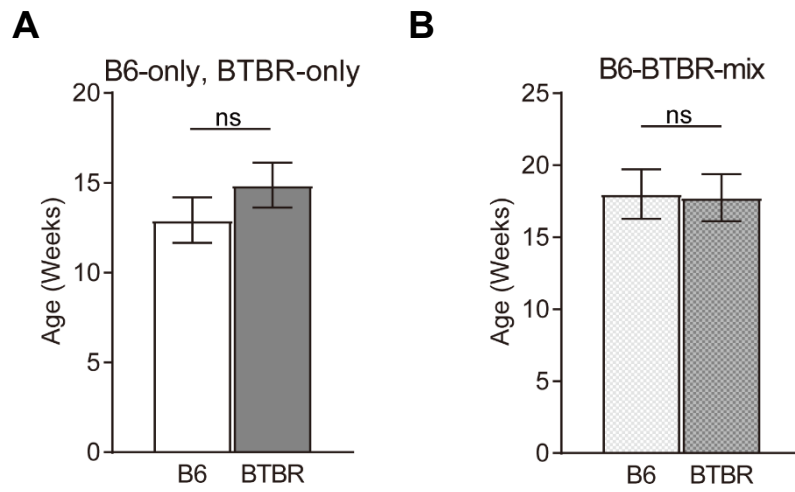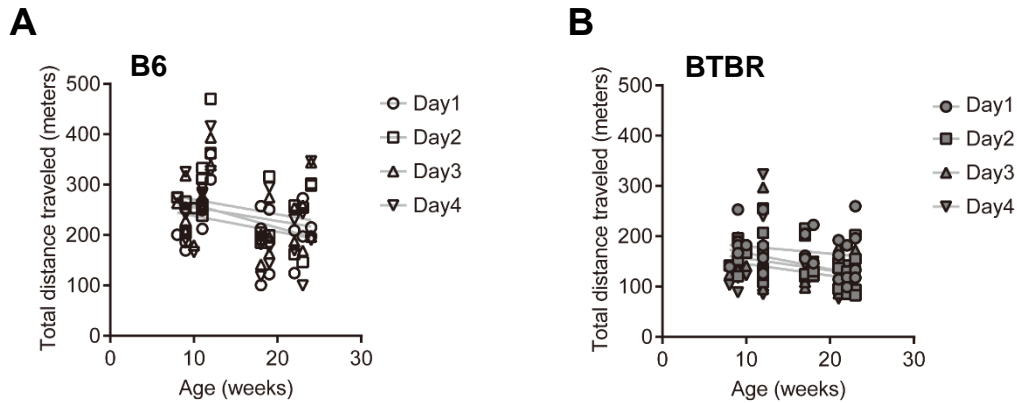
Supplementary Fig. 1

The mean age (± SE) of the B6 mice and BTBR mice in the B6-only and BTBR-only housing conditions (A); and the B6-BTBR-mix housing condition (B). Data were analyzed using the Welch two-sample *t*-test.
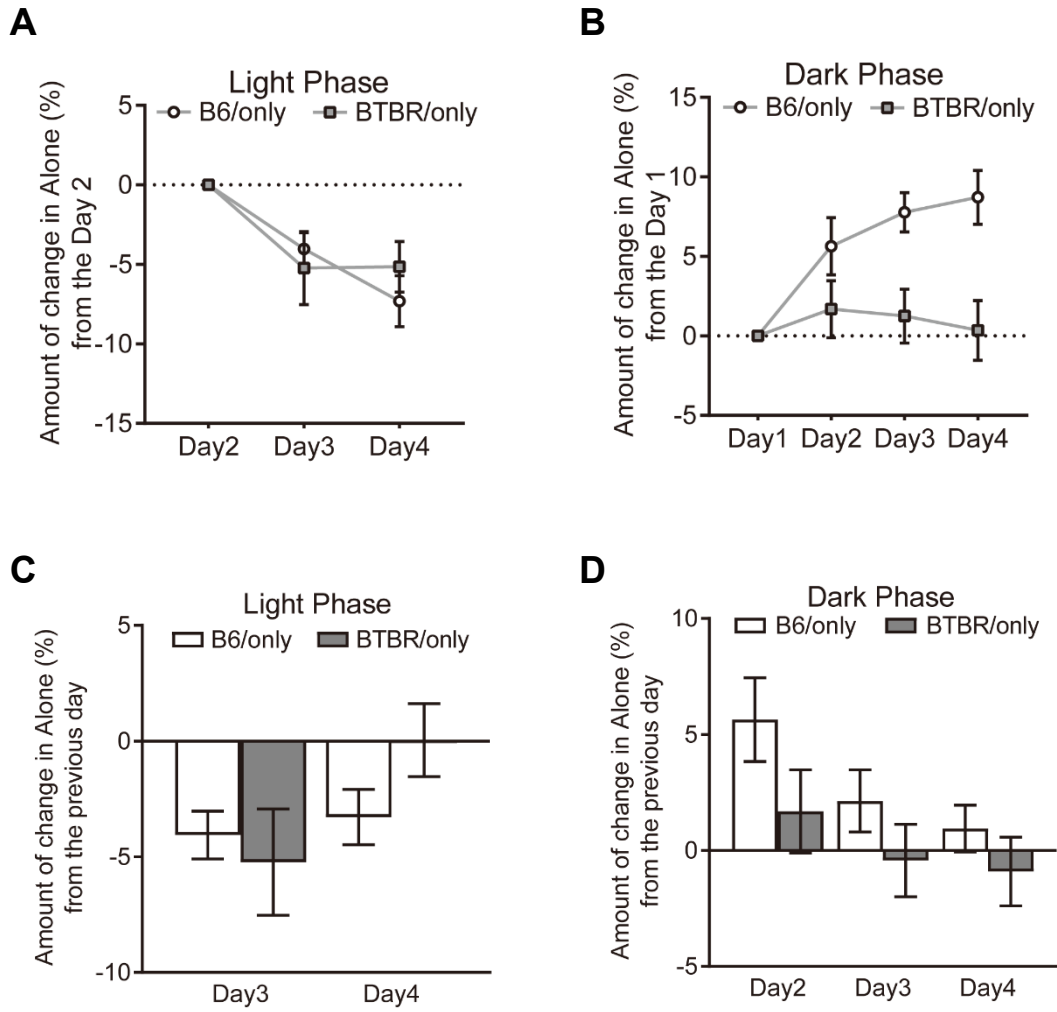
Supplementary Fig. 2

The change in time spent alone (%) on Day 2 during the light phase (A); on Day 1 during the dark phase (B); on the previous day during light phase (C); on the previous day during the dark phase (D) in the B6-only and BTBR-only housing conditions. Data are presented as mean ± SE.

Supplementary Fig. 3

(A–B) Correlation analyses of age (weeks) and total distance traveled (meters) in the B6 mice (A) and the BTBR mice (B) during the dark phase in all three housing conditions (B6-only, BTBR-only, and B6-BTBR-mix housing conditions). Data from each animal at each time point are presented.

Spearman correlation analysis of age and locomoter

Group	Day	r	95% CI	p value	n
B6	Day1	-0.16	-0.54 ～ 0.28	0.47	24
	Day2	-0.14	-0.52 ～ 0.29	0.52	24
	Day3	-0.19	-0.56 ～ 0.25	0.39	24
	Day4	-0.23	-0.59 ～ 0.20	0.28	24
BTBR	Day1	-0.17	-0.52 ～ 0.23	0.39	28
	Day2	-0.38	-0.67 ～ 0.0014	0.045*	28
	Day3	-0.23	-0.56 ～ 0.17	0.25	28
	Day4	-0.22	-0.55 ～ 0.18	0.27	28

CI: Confidence interval, *p < 0.05

Supplementary Table 2

Correlation analyses of age (weeks) and total distance traveled (meters) in the B6 and the BTBR mice during the dark phase in all three housing conditions. Data were analyzed by spearman correlation.
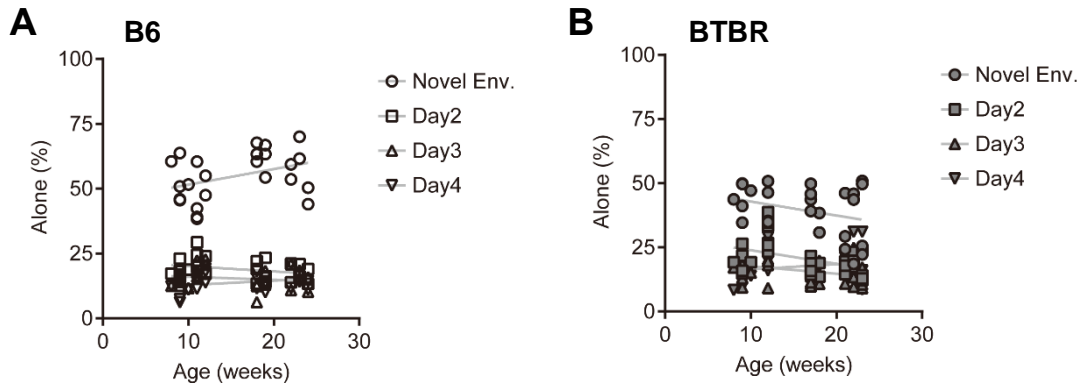
Supplementary Fig. 4

(A–B) Correlation analyses of age (weeks) and time spent alone (%) in the B6 mice (A) and the BTBR mice (B) during the light phase in all three housing conditions (B6-only, BTBR-only, and B6-BTBR-mix housing conditions). Data from each animal at each time point are presented.
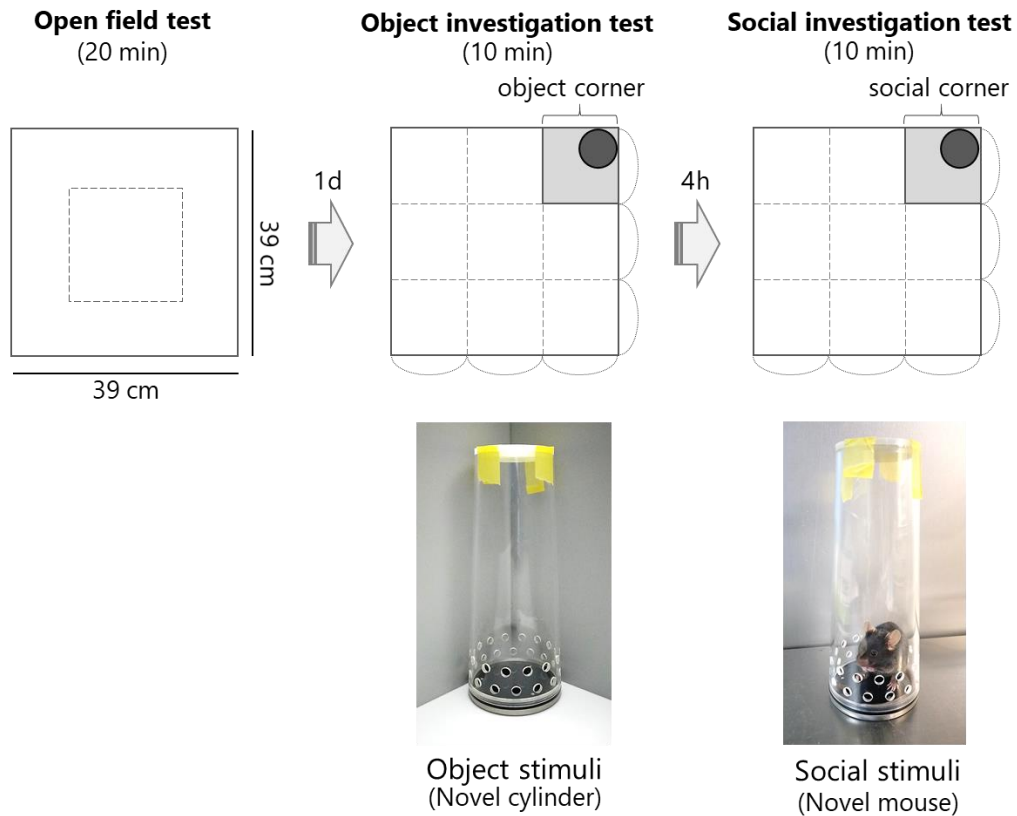
Spearman correlation analysis of age and time spent alone

| Group	Day	r	95% CI	p value	n
B6	Day1	0.24	-0.19 ～ 0.60	0.25	24
	Day2	-0.19	-0.56 ～ 0.24	0.36	24
	Day3	0.00044	-0.41 ～ 0.41	1.00	24
	Day4	0.23	-0.2 ～ 0.59	0.28	24
BTBR	Day1	-0.23	-0.57 ～ 0.16	0.23	28
	Day2	-0.41	-0.68 ～ -0.027	0.032*	28
	Day3	-0.24	-0.57 ～ 0.16	0.22	28
	Day4	0.15	-0.25 ～ 0.50	0.45	28

CI: Confidence interval, *p < 0.05

Supplementary Table 3

Correlation analyses of age (weeks) and time spent alone (%) in the B6 mice and the BTBR mice during the light phase in all three housing conditions. Data were analyzed by spearman correlation.

Open field test
(20 min)

Object investigation test
(10 min)
object corner

Social investigation test
(10 min)
social corner

39 cm

39 cm

1d

4h

Object stimuli
(Novel cylinder)

Social stimuli
(Novel mouse)

Supplementary Fig. 5

A schematic of the experimental procedures for conventional behavioral tests. We performed three conventional behavioral tests: the open-field test, the object investigation test, and the social investigation test. In the object investigation and social investigation tests, the floor of the apparatus was hypothetically divided into nine square sections (eight outer and one inner). The corner section where the cylinder was placed was defined as the object or social corner. The 'time spent in the object or social corner (%)' was calculated as the response to the object or social stimulus.
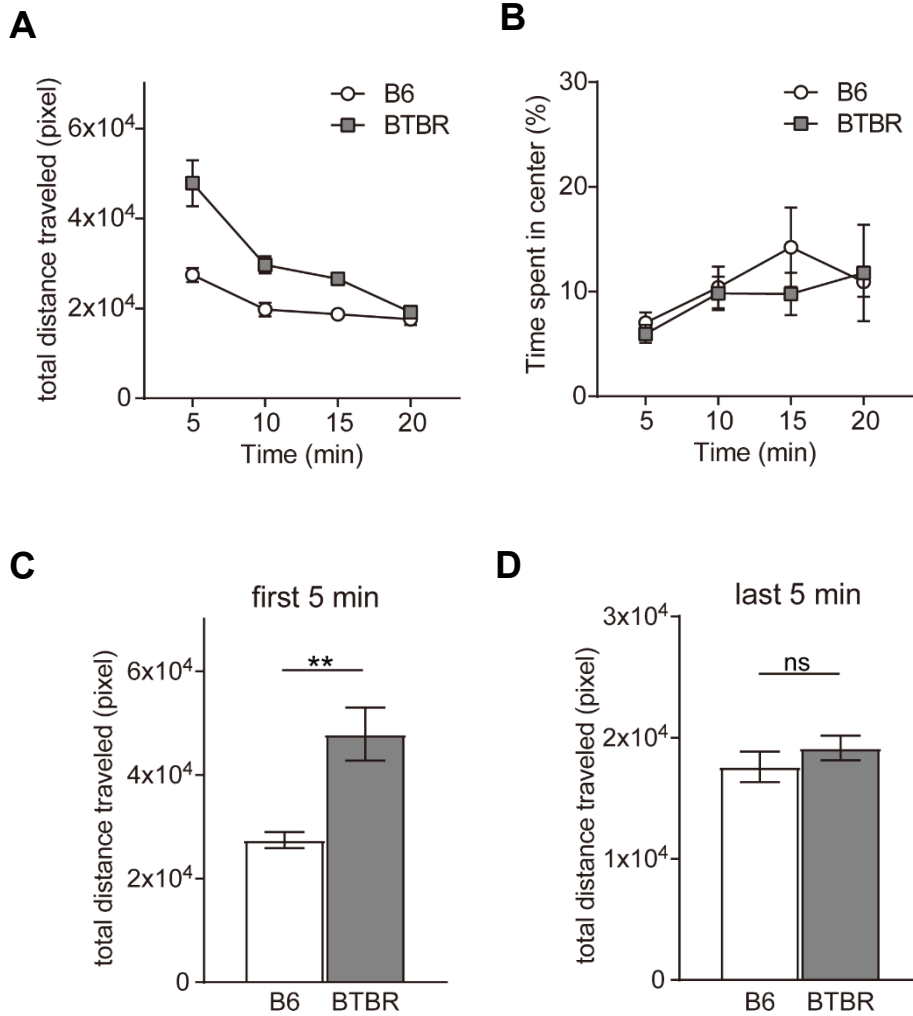
Supplementary Fig. 6

(A–D) The results of the open-field test. (A) The total distance traveled (pixel) was plotted every 5 min during the 20-min test period. (B) The time spent in the center (%) was plotted every 5 min during the 20-min test period. (C–D) The total distance traveled (pixel) in the first 5 min (C) and in the last 5 min (D) after introducing the mice to the open-field apparatus. All data are shown as mean ± SE. Data were analyzed using a Welch two-sample t-test (C–D). **$p < 0.01$.
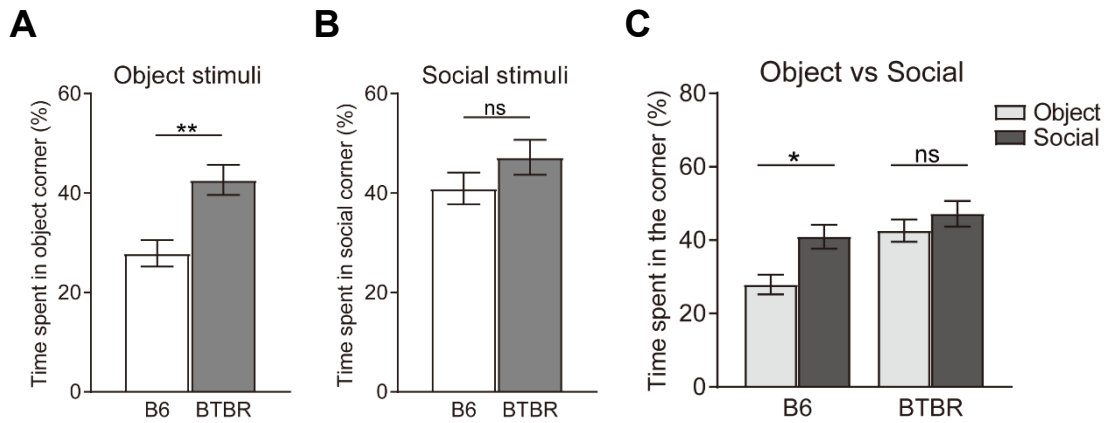
Supplementary Fig. 7

(A) The ratio of time that each mouse spent in the object corner. (B) The ratio of time that each mouse spent in the social corner. (C) The comparison of the time spent in the object and social corner in each group. Data are shown as mean ± SE and were analyzed using a Welch two-sample t-test (A–B) and two-way ANOVA followed by the Tukey's test (C). *$p < 0.05$, **$p < 0.01$.