Supplementary Table S1 | Main, extended data, and supplementary data figures statistics

Experiment	Measure	Statistical Test	Comparison	Statistic (F or t or q or U)	° of freedom	p	*	Fig.
EEG/EMG recordings	Total time per day in Wake	Unpaired *t*-test, two-tailed	2:Ctrl vs. 2:AD	2.185	15	0.0452	*	1e
	Total time per day in NREM			2.197	15	0.0441	*	
	Total time per day in REM			0.446	15	0.6622	-	
	Mean bout duration per day in Wake			0.518	15	0.6119	-	1f
	Mean bout duration per day in NREM			3.040	15	0.0083	**	
	Mean bout duration per day in REM			2.393	15	0.0303	*	
	Total time per day in Wake		12:Ctrl vs. 12:AD	1.624	14	0.1267	-	1g
	Total time per day in NREM			3.414	14	0.0042	**	
	Total time per day in REM			1.204	14	0.2487	-	
	Mean bout duration per day in Wake			1.738	14	0.1041	-	1h
	Mean bout duration per day in NREM			1.487	14	0.1592	-	
	Mean bout duration per day in REM			0.118	14	0.9081	-	
	Delta power (AUC) during NREM		2:Ctrl vs. 2:AD	0.047	15	0.9628	-	1j
			12:Ctrl vs. 12:AD	3.665	14	0.0025	**	1l
	-	Simple linear regression	Hippocampal plaque burden vs. Average NREM time per day	9.220	1, 6	0.0229	*	1o
	-		Cortical plaque burden vs. Average NREM time per day	4.972	1, 6	0.0673	-	1p
EPM: Sundown (males)	Total open arm time	Two-way ANOVA	Age	49.300	2, 88	<0.0001	****	2d
			Genotype	9.775	1, 88	0.0024	**	
			Age x Genotype	3.859	2, 88	0.0247	*	
		Tukey's multiple comparisons tests	2:Ctrl vs. 2:AD	0.368	88	0.9998	-	
			2:Ctrl vs. 12:Ctrl	3.029	88	0.2759	-	
			2:Ctrl vs. 12:AD	4.344	88	0.0327	*	
			2:Ctrl vs. 24:Ctrl	6.750	88	0.0001	***	
			2:Ctrl vs. 24:AD	13.770	88	<0.0001	****	
			2:AD vs. 12:Ctrl	2.642	88	0.4286	-	
			2:AD vs. 12:AD	3.977	88	0.0649	-	
			2:AD vs. 24:Ctrl	6.428	88	0.0002	***	
			2:AD vs. 24:AD	13.400	88	<0.0001	****	
			12:Ctrl vs. 12:AD	1.550	88	0.8816	-	
			12:Ctrl vs. 24:Ctrl	4.403	88	0.0291	*	
			12:Ctrl vs. 24:AD	11.480	88	<0.0001	****	
			12:AD vs. 24:Ctrl	2.940	88	0.3078	-	
			12:AD vs. 24:AD	9.423	88	<0.0001	****	
			24:Ctrl vs. 24:AD	5.325	88	0.0040	**	
EPM: Sundown (females)		Two-way ANOVA	Age	22.550	2, 70	<0.0001	****	2e
			Genotype	14.920	1, 70	0.0002	***	
			Age x Genotype	5.487	2, 70	0.0061	**	
		Tukey's multiple comparisons tests	2:Ctrl vs. 2:AD	0.291	70	0.8379	-	
			12:Ctrl vs. 12:AD	3.471	70	0.0166	*	
			24:Ctrl vs. 24:AD	5.780	70	0.0001	***	
			2:Ctrl vs. 12:Ctrl	1.081	70	0.7260	-	
			2:Ctrl vs. 24:Ctrl	3.442	70	0.0455	-	
			12:Ctrl vs. 24:Ctrl	2.621	70	0.1600	-	
			2:AD vs. 12:AD	4.556	70	0.0054	**	
			2:AD vs. 24:AD	9.933	70	<0.0001	****	
			12:AD vs. 24:AD	5.974	70	0.0002	***	
OF: Sundown (males)	Distance traveled	Two-way ANOVA	Age	2.095	2, 49	0.1340	-	2h
			Genotype	21.270	1, 49	<0.0001	****	
			Age x Genotype	1.860	2, 49	0.1665	-	
		Tukey's multiple comparisons tests (conducted based on trends observed and a priori interest)	2:Ctrl vs. 2:AD	1.796	49	0.2101	-	
			12:Ctrl vs. 12:AD	3.805	49	0.0097	**	
			24:Ctrl vs. 24:AD	6.334	49	<0.0001	****	
			2:Ctrl vs. 12:Ctrl	1.544	49	0.5235	-	
			2:Ctrl vs. 24:Ctrl	1.023	49	0.7509	-	
			12:Ctrl vs. 24:Ctrl	0.626	49	0.8978	-	
			2:AD vs. 12:AD	0.385	49	0.9600		
			2:AD vs. 24:AD	2.486	49	0.1946		
			12:AD vs. 24:AD	3.249	49	0.0655		
	Rearing No.	Two-way ANOVA	Age	4.571	2, 39	0.0165	*	2i
			Genotype	3.428	1, 39	0.0717	-	
			Age x Genotype	2.179	2, 39	0.1267	-	
		Tukey's multiple comparisons tests (conducted based on trends observed and a priori interest)	2:Ctrl vs. 2:AD	0.494	39	0.7288	-	
			12:Ctrl vs. 12:AD	1.484	39	0.3006	-	
			24:Ctrl vs. 24:AD	4.112	39	0.0060	**	
			2:Ctrl vs. 12:Ctrl	0.029	39	0.9998	-	
			2:Ctrl vs. 24:Ctrl	0.887	39	0.8062	-	
			12:Ctrl vs. 24:Ctrl	0.937	39	0.7864	-	
			2:AD vs. 12:AD	1.894	39	0.3826	-	
			2:AD vs. 24:AD	4.824	39	0.0042	**	
			12:AD vs. 24:AD	2.559	39	0.1799	-	
OF: Sundown (females)	Distance traveled	Two-way ANOVA	Age	7.067	2, 59	0.0018	**	2j
			Genotype	7.535	1, 59	0.0080	**	
			Age x Genotype	7.666	2, 59	0.0011	**	
		Tukey's multiple comparisons tests	2:Ctrl vs. 2:AD	0.372	59	0.9998	-	
			2:Ctrl vs. 12:Ctrl	1.984	59	0.7253	-	
			2:Ctrl vs. 12:AD	1.791	59	0.8018	-	
			2:Ctrl vs. 24:Ctrl	0.944	59	0.9848	-	
			2:Ctrl vs. 24:AD	6.177	59	0.0007	***	
			2:AD vs. 12:Ctrl	1.763	59	0.8120	-	
			2:AD vs. 12:AD	1.546	59	0.8821	-	
			2:AD vs. 24:Ctrl	0.596	59	0.9982	-	
			2:AD vs. 24:AD	6.384	59	0.0004	***	
			12:Ctrl vs. 12:AD	0.152	59	>0.9999	-	
			12:Ctrl vs. 24:Ctrl	1.390	59	0.9217	-	
			12:Ctrl vs. 24:AD	5.990	59	0.0011	**	
			12:AD vs. 24:Ctrl	1.136	59	0.9658	-	
			12:AD vs. 24:AD	5.740	59	0.0020	**	
			24:Ctrl vs. 24:AD	6.731	59	0.0002	***	
		Two-way ANOVA	Age	15.280	2, 49	<0.0001	****	
			Genotype	1.716	1, 49	0.1964	-	
			Age x Genotype	4.451	2, 49	0.0167	*	
			2:Ctrl vs. 2:AD	0.122	49	>0.9999	-	
			2:Ctrl vs. 12:Ctrl	0.915	49	0.9867	-	
			2:Ctrl vs. 12:AD	0.100	49	>0.9999	-	
			2:Ctrl vs. 24:Ctrl	2.526	49	0.4839	-	

	Rearing No.	Tukey's multiple comparisons tests	2:Ctrl vs. 24:AD	5.985	49	0.0013	**	2k
			2:AD vs. 12:Ctrl	1.180	49	0.9596	-	
			2:AD vs. 12:AD	0.252	49	>0.9999	-	
			2:AD vs. 24:Ctrl	2.988	49	0.2979	-	
			2:AD vs. 24:AD	6.731	49	0.0002	***	
			12:Ctrl vs. 12:AD	0.982	49	0.9817	-	
			12:Ctrl vs. 24:Ctrl	2.161	49	0.6482	-	
			12:Ctrl vs. 24:AD	6.522	49	0.0004	***	
			12:AD vs. 24:Ctrl	2.937	49	0.3161	-	
			12:AD vs. 24:AD	6.908	49	0.0002	***	
			24:Ctrl vs. 24:AD	4.635	49	0.0224	*	
EPM: Sunrise (males)	Total open arm time	Two-way ANOVA	Age	5.484	2, 56	0.0067	**	2n
			Genotype	1.203	1, 56	0.2773	-	
			Age x Genotype	0.731	2, 56	0.4858	-	
EPM: Sunrise (females)		Two-way ANOVA	Age	1.360	2, 26	0.7128	-	2o
			Genotype	0.343	1, 26	0.7468	-	
			Age x Genotype	0.107	2, 26	0.2743	-	
OF: Sunrise (males)	Distance traveled	Two-way ANOVA	Age	1.046	2, 37	0.3614	-	2r
			Genotype	0.237	1, 37	0.6293	-	
			Age x Genotype	2.565	2, 37	0.0905	-	
	Rearing No.	Two-way ANOVA	Age	5.245	2, 38	0.0097	**	2s
			Genotype	0.755	1, 38	0.3905	-	
			Age x Genotype	2.012	2, 38	0.1477	-	
OF: Sunrise (females)	Distance traveled	Two-way ANOVA	Age	2.616	2, 47	0.0837	-	2t
			Genotype	0.865	1, 47	0.3570	-	
			Age x Genotype	0.907	2, 47	0.4106	-	
	Rearing No.	Two-way ANOVA	Age	0.065	2, 47	0.9374	-	2u
			Genotype	0.366	1, 47	0.5480	-	
			Age x Genotype	0.937	2, 47	0.3990	-	
EPM: Sunrise or Sundown (12-month-old females)	Total open arm time	Two-way ANOVA	Period	8.961	1, 91	0.0036	**	3b
			Genotype	19.020	1, 91	<0.0001	****	
			Period x Genotype	1.738	1, 91	0.1907	-	
		Šídák's multiple comparisons tests (conducted based on trends observed and a priori interest)	Sunrise:Ctrl vs. Sunrise:AD	2.080	91	0.1518	-	
			Sundown:Ctrl vs. Sundown:AD	4.164	91	0.0003	***	
			Sunrise:AD vs. Sundown:AD	3.017	91	0.0132	*	
			Sunrise:Ctrl vs. Sundown:Ctrl	1.197	91	0.6562	-	
OF: Sunrise or Sundown (12-month-old females)	Distance traveled	Two-way ANOVA	Period	2.064	1, 39	0.1588	-	3c
			Genotype	5.204	1, 39	0.0281	*	
			Period x Genotype	4.317	1, 39	0.0444	*	
		Šídák's multiple comparisons tests	Sunrise:Ctrl vs. Sunrise:AD	3.014	39	0.0179	*	
			Sundown:Ctrl vs. Sundown:AD	0.147	39	0.9998	-	
			Sunrise:AD vs. Sundown:AD	0.431	39	0.9879	-	
			Sunrise:Ctrl vs. Sundown:Ctrl	2.625	39	0.0483	*	
KPMS EPM analysis	Normalized syllable frequency	Three-way ANOVA	Syllable	8.808	18	0.0000	****	3f
			Genotype	9.092	1	0.0026	**	
			Period	12.174	1	0.0005	***	
			Syllable x Genotype	4.245	18	0.0000	****	
			Syllable x Period	5.980	18	0.0000	****	
			Genotype X Period	5.592	1	0.0183	*	
			Syllable x Genotype x Period	2.846	18	0.0001	****	
	Normalized syllable 0	Mann-Whitney U test with FDR correction	AD Sunrise vs. AD Sundown	77.000	20	0.2789	-	
	Normalized syllable 1			49.000	20	0.5865	-	
	Normalized syllable 2			84.000	20	0.1397	-	
	Normalized syllable 3			83.000	20	0.1495	-	
	Normalized syllable 4			84.000	20	0.1397	-	
	Normalized syllable 5			78.000	20	0.2651	-	
	Normalized syllable 6			57.000	20	0.9479	-	
	Normalized syllable 7			15.000	20	0.0103	*	
	Normalized syllable 8			13.000	20	0.0091	**	
	Normalized syllable 9			19.000	19	0.0275	*	
	Normalized syllable 10			86.000	18	0.0103	*	
	Normalized syllable 11			15.000	20	0.0103	*	
	Normalized syllable 12			17.000	20	0.0103	*	
	Normalized syllable 13			85.000	18	0.0119	*	
	Normalized syllable 14			87.000	18	0.0103	*	
	Normalized syllable 15			33.000	18	0.3920	-	
	Normalized syllable 16			9.000	20	0.0037	**	
	Normalized syllable 17			82.000	18	0.0275	*	
	Normalized syllable 18			9.000	20	0.0037	**	
	Normalized syllable 0	Mann-Whitney U test with FDR correction	Ctrl Sundown vs. AD Sundown	88.000	22	0.3484	-	
	Normalized syllable 1			58.000	22	0.6689	-	
	Normalized syllable 2			85.000	22	0.4022	-	
	Normalized syllable 3			64.000	22	0.9070	-	
	Normalized syllable 4			91.000	22	0.3001	-	
	Normalized syllable 5			65.000	22	0.9070	-	
	Normalized syllable 6			58.000	22	0.6689	-	
	Normalized syllable 7			47.000	22	0.3484	-	
	Normalized syllable 8			28.000	22	0.0575	-	
	Normalized syllable 9			36.000	21	0.2498	-	
	Normalized syllable 10			93.000	19	0.0276	*	
	Normalized syllable 11			36.000	22	0.1512	-	
	Normalized syllable 12			29.000	22	0.0575	-	
	Normalized syllable 13			80.000	18	0.0575	-	
	Normalized syllable 14			108.000	21	0.0276	*	
	Normalized syllable 15			32.000	18	0.4022	-	
	Normalized syllable 16			25.000	22	0.0479	*	
	Normalized syllable 17			76.000	19	0.2498	-	
	Normalized syllable 18			21.000	22	0.0276	*	
	Syllable 10 frequency	Two-way ANOVA	Period	7.875	1, 45	0.0409	*	3g
			Genotype	7.925	1, 45	0.0074	**	
			Period x Genotype	4.429	1, 45	0.0072	**	
		Tukey's multiple comparisons tests	Sunrise:Ctrl vs. Sunrise:AD	0.730	45	0.9548	-	
			Sunrise:Ctrl vs. Sundown:Ctrl	0.745	45	0.9522	-	
			Sunrise:Ctrl vs. Sundown:AD	5.241	45	0.0031	**	
			Sunrise:AD vs. Sundown:Ctrl	0.010	45	>0.9999	-	
			Sunrise:AD vs. Sundown:AD	4.656	45	0.0101	*	
			Sundown:Ctrl vs. Sundown:AD	4.797	45	0.0077	**	
	Syllable 13 frequency	Two-way ANOVA	Period	8.528	1, 45	0.0054	**	3h
			Genotype	8.018	1, 45	0.0069	**	
			Period x Genotype	3.869	1, 45	0.0554	-	
		Tukey's multiple comparisons tests (conducted based on trends observed and a priori interest)	Sunrise:Ctrl vs. Sunrise:AD	0.888	45	0.9226	-	
			Sunrise:Ctrl vs. Sundown:Ctrl	1.012	45	0.8904	-	
			Sunrise:Ctrl vs. Sundown:AD	5.363	45	0.0024	**	
			Sunrise:AD vs. Sundown:Ctrl	0.096	45	0.9999	-	
			Sunrise:AD vs. Sundown:AD	4.634	45	0.0106	*	
			Sundown:Ctrl vs. Sundown:AD	4.679	45	0.0097	**	
		Two-way ANOVA	Period	8.506	1, 45	0.0055	**	
			Genotype	7.405	1, 45	0.0092	**	
			Period x Genotype	4.181	1, 45	0.0467	*	

	Syllable 14 frequency	Tukey's multiple comparisons tests	Sunrise:Ctrl vs. Sunrise:AD	0.695	45	0.9607	-	3i
			Sunrise:Ctrl vs. Sundown:Ctrl	0.925	45	0.9135	-	
			Sunrise:Ctrl vs. Sundown:AD	5.256	45	0.0030	**	
			Sunrise:AD vs. Sundown:Ctrl	0.212	45	0.9988	-	
			Sunrise:AD vs. Sundown:AD	4.704	45	0.0092	**	
			Sundown:Ctrl vs. Sundown:AD	4.647	45	0.0103	*	
SCN subpopulation analysis	Core c-Fos+ cells / mm3 (x 1000)	Two-way ANOVA	Period	15.390	1, 21	0.0008	***	4o
			Genotype	0.051	1, 21	0.8238	-	
			Period x Genotype	2.353	1, 21	0.1399	-	
	Shell c-Fos+ cells / mm3 (x 1000)	Two-way ANOVA	Period	8.719	1, 21	0.0076	**	4p
			Genotype	2.274	1, 21	0.1465	-	
			Period x Genotype	0.132	1, 21	0.7205	-	
	Core VIP+ cells / mm3 (x 1000)	Two-way ANOVA	Period	0.758	1, 21	0.3937	-	4q
			Genotype	1.610	1, 21	0.2184	-	
			Period x Genotype	0.823	1, 21	0.3746	-	
	Shell AVP+ cells / mm3 (x 1000)	Two-way ANOVA	Period	0.511	1, 21	0.4825	-	4r
			Genotype	0.016	1, 21	0.9011	-	
			Period x Genotype	1.281	1, 21	0.2705	-	
	(VIP+c-Fos+)/ VIP+	Two-way ANOVA	Period	2.152	1, 21	0.0197	*	4s
			Genotype	6.370	1, 21	0.2355	-	
			Period x Genotype	1.491	1, 21	0.1572	-	
	(AVP+c-Fos+)/AVP+	Two-way ANOVA	Period	16.340	1, 21	0.0006	***	4t
			Genotype	8.236	1, 21	0.0092	**	
			Period x Genotype	5.240	1, 21	0.0325	*	
		Tukey's multiple comparisons tests	Sunrise:Ctrl vs. Sunrise:AD	5.296	21	0.0061	**	
			Sunrise:Ctrl vs. Sundown:Ctrl	5.971	21	0.0020	**	
			Sunrise:Ctrl vs. Sundown:AD	7.095	21	0.0003	***	
			Sunrise:AD vs. Sundown:Ctrl	1.143	21	0.8498	-	
			Sunrise:AD vs. Sundown:AD	1.873	21	0.5584	-	
			Sundown:Ctrl vs. Sundown:AD	0.567	21	0.9777	-	
Brain-wide activity mapping at Sundown and Sunrise	Total open arm time	Mixed (Two-way repeated measures) ANOVA	Period	4.670	1, 12	0.0516	-	5b
			Genotype	5.544	1, 12	0.0364	*	
			Period x Genotype	0.890	1, 12	0.3642	-	
			Subject	0.998	12, 12	0.5014	-	
		Fischer's LSD (conducted based on trends observed and a priori interest)	Sunrise:Ctrl vs. Sunrise:AD	0.997	24	0.3288	-	
			Sundown:Ctrl vs. Sundown:AD	2.331	24	0.0285	*	
			Sunrise:Ctrl vs. Sundown:Ctrl	0.806	12	0.4362	-	
			Sunrise:AD vs. Sundown:AD	2.371	12	0.0353	*	
	All regions (eYFP$^+$): absolute correlation coefficient (Pearson's r)	Unpaired t-test, two-tailed	Ctrl vs. AD	36.040	18791	<0.0001	****	5h
	Cluster 1 regions (eYFP$^+$): absolute correlation coefficient (Pearson's r)	Unpaired t-test, two-tailed	Ctrl vs. AD	6.027	1637	<0.0001	****	5k
Piezo-sleep recordings	Amplitude	Two-way ANOVA	Age	8.188	3, 163	<0.0001	****	Extended data figure 1f
			Genotype	0.149	1, 163	0.6999	-	
			Age x Genotype	4.856	3, 163	0.0029	**	
		Tukey's multiple comparisons tests	2:Ctrl vs. 2:AD	4.062	163	0.0046	**	
			6:Ctrl vs. 6:AD	1.352	163	0.3403	-	
			12:Ctrl vs. 12:AD	3.054	163	0.0323	*	
			24:Ctrl vs. 24:AD	1.301	163	0.3588	-	
			2:Ctrl vs. 6:Ctrl	0.051	163	>0.9999	-	
			2:Ctrl vs. 12:Ctrl	0.320	163	0.9959	-	
			2:Ctrl vs. 24:Ctrl	1.781	163	0.5900	-	
			6:Ctrl vs. 12:Ctrl	0.283	163	0.9971	-	
			6:Ctrl vs. 24:Ctrl	1.822	163	0.5716	-	
			12:Ctrl vs. 24:Ctrl	1.599	163	0.6713	-	
			2:AD vs. 6:AD	2.659	163	0.2406	-	
			2:AD vs. 12:AD	7.283	163	<0.0001	****	
			2:AD vs. 24:AD	6.285	163	<0.0001	****	
			6:AD vs. 12:AD	4.271	163	0.0154	*	
			6:AD vs. 24:AD	3.811	163	0.0386	*	
			12:AD vs. 24:AD	0.214	163	0.9988	-	
		Tukey's multiple comparisons tests (age only)	2 vs. 6	1.998	163	0.4933	-	
			2 vs. 12	5.502	163	0.0008	***	
			2 vs. 24	5.938	163	0.0003	***	
			6 vs. 12	3.426	163	0.0769	-	
			6 vs. 24	4.121	163	0.0210	*	
			12 vs. 24	1.169	163	0.8418	-	
	Acrophase	Two-way ANOVA	Age	2.284	3, 162	0.0810	-	Extended data figure 1g
			Genotype	0.001	1, 162	0.9698	-	
			Age x Genotype	2.157	3, 162	0.0951	-	
	Light Cycle Sleep (%)	Two-way ANOVA	Age	10.780	3, 164	<0.0001	****	Extended data figure 1h
			Genotype	5.320	1, 164	0.0223	*	
			Age x Genotype	3.775	3, 164	0.0118	*	
		Tukey's multiple comparisons tests	2:Ctrl vs. 2:AD	2.437	164	0.0868	-	
			6:Ctrl vs. 6:AD	2.374	164	0.0951	-	
			12:Ctrl vs. 12:AD	3.393	164	0.0176	*	
			24:Ctrl vs. 24:AD	3.147	164	0.0274	*	
			2:Ctrl vs. 6:Ctrl	5.103	164	0.0023	**	
			2:Ctrl vs. 12:Ctrl	0.173	164	0.9993	-	
			2:Ctrl vs. 24:Ctrl	1.021	164	0.8884	-	
			6:Ctrl vs. 12:Ctrl	5.360	164	0.0012	**	
			6:Ctrl vs. 24:Ctrl	4.093	164	0.0222	*	
			12:Ctrl vs. 24:Ctrl	0.926	164	0.9137	-	
			2:AD vs. 6:AD	0.053	164	>0.9999	-	
			2:AD vs. 12:AD	5.466	164	0.0009	***	
			2:AD vs. 24:AD	4.338	164	0.0133	*	
			6:AD vs. 12:AD	5.297	164	0.0014	**	
			6:AD vs. 24:AD	4.258	164	0.0158	*	
			12:AD vs. 24:AD	0.224	164	0.9986	-	
		Tukey's multiple comparisons tests (age only)	2 vs. 6	3.481	164	0.0700	-	
			2 vs. 12	3.845	164	0.0361	*	
			2 vs. 24	2.659	164	0.2405	-	
			6 vs. 12	7.510	164	<0.0001	****	
			6 vs. 24	5.874	164	0.0003	***	
			12 vs. 24	0.752	164	0.9513	-	
	Dark Cycle Sleep (%)	Two-way ANOVA	Age	4.991	3, 164	0.0024	**	Extended data figure 1i
			Genotype	5.364	1, 164	0.0218	*	
			Age x Genotype	1.357	3, 164	0.2580	-	
		Tukey's multiple comparisons tests (age only)	2 vs. 6	4.384	164	0.0121	*	
			2 vs. 12	4.654	164	0.0066	**	
			2 vs. 24	4.288	164	0.0148	*	
			6 vs. 12	0.072	164	>0.9999	-	
			6 vs. 24	0.260	164	0.9978	-	
			12 vs. 24	0.204	164	0.9989	-	
		Two-way ANOVA	Age	16.070	3, 164	<0.0001	****	
			Genotype	15.340	1, 164	0.0001	***	
			Age x Genotype	4.266	3, 164	0.0062	**	

	Light Cycle Sleep Bout (s)	Tukey's multiple comparisons tests	2:Ctrl vs. 2:AD	0.876	164	0.5367	-	Extended data figure 1j
			6:Ctrl vs. 6:AD	6.277	164	<0.0001	****	
			12:Ctrl vs. 12:AD	3.022	164	0.0341	*	
			24:Ctrl vs. 24:AD	2.755	164	0.0531	-	
			2:Ctrl vs. 6:Ctrl	3.867	164	0.0347	*	
			2:Ctrl vs. 12:Ctrl	2.090	164	0.4532	-	
			2:Ctrl vs. 24:Ctrl	4.045	164	0.0244	*	
			6:Ctrl vs. 12:Ctrl	6.418	164	<0.0001	****	
			6:Ctrl vs. 24:Ctrl	8.177	164	<0.0001	****	
			12:Ctrl vs. 24:Ctrl	2.247	164	0.3877	-	
			2:AD vs. 6:AD	3.301	164	0.0946	-	
			2:AD vs. 12:AD	5.675	164	0.0005	***	
			2:AD vs. 24:AD	6.889	164	<0.0001	****	
			6:AD vs. 12:AD	2.074	164	0.4600	-	
			6:AD vs. 24:AD	3.845	164	0.0362	*	
			12:AD vs. 24:AD	2.191	164	0.4108	-	
		Tukey's multiple comparisons tests (age only)	2 vs. 6	0.171	164	0.9994	-	
			2 vs. 12	5.555	164	0.0007	***	
			2 vs. 24	7.875	164	<0.0001	****	
			6 vs. 12	5.754	164	0.0004	***	
			6 vs. 24	8.054	164	<0.0001	****	
			12 vs. 24	3.113	164	0.1272	-	
	Dark Cycle Sleep Bout (s)	Two-way ANOVA	Age	1.608	3, 165	0.1895	-	Extended data figure 1k
			Genotype	17.550	1, 165	<0.0001	****	
			Age x Genotype	0.834	3, 165	0.4769	-	
EEG/EMG recordings	Mean no. bouts per day in Wake	Unpaired *t*-test, two-tailed	2:Ctrl vs. 2:AD	2.314	15	0.0353	*	Extended data figure 2c
	Mean no. bouts per day in NREM			2.428	15	0.0282	*	
	Mean no. bouts per day in REM			2.334	15	0.0339	*	
	Wake-NREM transitions per day			2.451	15	0.0270	*	Extended data figure 2d
	NREM-REM transitions per day			2.426	15	0.0283	*	
	NREM-Wake transitions per day			0.353	15	0.7288	-	
	REM-NREM transitions per day			1.540	15	0.1444	-	
	REM-Wake transitions per day			2.292	15	0.0368	*	
	Time per light cycle in Wake			2.013	15	0.0625	-	Extended data figure 2e
	Time per light cycle in NREM			2.008	15	0.0630	-	
	Time per light cycle in REM			0.900	15	0.3824	-	
	Time per dark cycle in Wake			2.109	15	0.0522	-	Extended data figure 2f
	Time per dark cycle in NREM			2.175	15	0.0461	*	
	Time per dark cycle in REM			0.423	15	0.6780	-	
	Bouts per light cycle in Wake			3.417	15	0.0038	**	Extended data figure 2g
	Bouts per light cycle in NREM			3.347	15	0.0044	**	
	Bouts per light cycle in REM			2.639	15	0.0186	*	
	Bouts per dark cycle in Wake			0.457	15	0.6544	-	Extended data figure 2h
	Bouts per dark cycle in NREM			0.540	15	0.5971	-	
	Bouts per dark cycle in REM			1.242	15	0.2332	-	
	Mean bout duration per light cycle in Wake			0.989	15	0.3383	-	Extended data figure 2i
	Mean bout duration per light cycle in NREM			3.414	15	0.0038	**	
	Mean bout duration per light cycle in REM			2.352	15	0.0327	*	
	Mean bout duration per dark cycle in Wake			1.303	15	0.2122	-	Extended data figure 2j
	Mean bout duration per dark cycle in NREM			2.446	15	0.0273	*	
	Mean bout duration per dark cycle in REM			2.121	15	0.0510	-	
	Mean no. bouts per day in Wake		12:Ctrl vs. 12:AD	0.481	14	0.6379	-	Extended data figure 2m
	Mean no. bouts per day in NREM			0.790	14	0.4425	-	
	Mean no. bouts per day in REM			1.004	14	0.3326	-	
	Wake-NREM transitions per day			1.409	14	0.1807	-	Extended data figure 2d
	NREM-REM transitions per day			2.256	14	0.0406	-	
	NREM-Wake transitions per day			0.029	14	0.9769	-	
	REM-NREM transitions per day			0.296	14	0.7719	-	
	REM-Wake transitions per day			2.367	14	0.0329	-	
	Time per light cycle in Wake			0.568	14	0.5794	-	Extended data figure 2o
	Time per light cycle in NREM			2.839	14	0.0131	*	
	Time per light cycle in REM			1.931	14	0.0740	-	
	Time per dark cycle in Wake			2.258	14	0.0405	*	Extended data figure 2p
	Time per dark cycle in NREM			3.593	14	0.0029	**	
	Time per dark cycle in REM			0.106	14	0.9171	-	
	Bouts per light cycle in Wake			0.612	14	0.5501	-	Extended data figure 2q
	Bouts per light cycle in NREM			0.329	14	0.7468	-	
	Bouts per light cycle in REM			1.620	14	0.1276	-	
	Bouts per dark cycle in Wake			1.402	14	0.1826	-	Extended data figure 2e
	Bouts per dark cycle in NREM			1.764	14	0.0995	-	
	Bouts per dark cycle in REM			0.105	14	0.9176	-	
	Mean bout duration per light cycle in Wake			0.006	14	0.9956	-	Extended data figure 2s
	Mean bout duration per light cycle in NREM			1.910	14	0.0768	-	
	Mean bout duration per light cycle in REM			0.161	14	0.8746	-	
	Mean bout duration per dark cycle in Wake			1.899	14	0.0784	-	Extended data figure 2t
	Mean bout duration per dark cycle in NREM			1.055	14	0.3091	-	
	Mean bout duration per dark cycle in REM			0.273	14	0.7890	-	
	Theta power (AUC) during NREM		2:Ctrl vs. 2:AD	1.072	15	0.3009	-	Extended data figure 3c
			12:Ctrl vs. 12:AD	0.921	14	0.3726	-	Extended data figure 3d
	Alpha power (AUC) during NREM		2:Ctrl vs. 2:AD	1.521	15	0.1490	-	Extended data figure 3e
			12:Ctrl vs. 12:AD	5.115	14	0.0002	***	Extended data figure 3f
	Beta power (AUC) during NREM		2:Ctrl vs. 2:AD	1.646	15	0.1206	-	Extended data figure 3g
			12:Ctrl vs. 12:AD	4.624	14	0.0004	***	Extended data figure 3h
	Gamma power (AUC) during NREM		2:Ctrl vs. 2:AD	2.745	15	0.0150	*	Extended data figure 3i
			12:Ctrl vs. 12:AD	1.854	14	0.0849	-	Extended data figure 3j
	Delta power (AUC) during REM		2:Ctrl vs. 2:AD	0.072	15	0.9435	-	Extended data figure 3k

	Beta power (AUC) during REM		12:Ctrl vs. 12:AD	1.001	14	0.3337	-	Extended data figure 3l
	Theta power (AUC) during REM		2:Ctrl vs. 2:AD	0.054	15	0.9577	-	Extended data figure 3m
			12:Ctrl vs. 12:AD	2.252	14	0.0409	*	Extended data figure 3n
	Alpha power (AUC) during REM		2:Ctrl vs. 2:AD	2.483	15	0.0254	*	Extended data figure 3o
			12:Ctrl vs. 12:AD	5.238	14	0.0001	***	Extended data figure 3p
	Beta power (AUC) during REM		2:Ctrl vs. 2:AD	2.374	15	0.0314	*	Extended data figure 3q
			12:Ctrl vs. 12:AD	5.866	14	<0.0001	****	Extended data figure 3r
	Gamma power (AUC) during REM		2:Ctrl vs. 2:AD	1.157	15	0.2654	-	Extended data figure 3s
			12:Ctrl vs. 12:AD	1.628	14	<0.1257	-	Extended data figure 3t
EPM: Sundown (males)	Distance Traveled	Two-way ANOVA	Age	1.925	2, 89	0.0002	***	Extended data figure 4a
			Genotype	9.330	1, 89	0.5507	-	
			Age x Genotype	0.359	2, 89	0.1519	-	
		Tukey's multiple comparisons tests	2 vs. 12	3.068	89	0.0821	-	
			2 vs. 24	3.157	89	0.0713	-	
			12 vs. 24	6.091	89	0.0001	***	
EPM: Sundown (females)		Two-way ANOVA	Age	2.930	2, 70	0.0600	-	Extended data figure 4b
			Genotype	0.008	1, 70	0.9273	-	
			Age x Genotype	0.711	2, 70	0.4945	-	
OF: Sundown (males)	Center Time	Two-way ANOVA	Age	2.813	2, 49	0.0697	-	Extended data figure 4d
			Genotype	0.395	1, 49	0.5328	-	
			Age x Genotype	0.606	2, 49	0.5494	-	
OF: Sundown (females)			Age	0.803	2, 59	0.4527	-	Extended data figure 4f
			Genotype	5.283	1, 59	0.0251	*	
			Age x Genotype	2.288	2, 59	0.1104	-	
OF: Sunrise (males)	Center Time		Age	1.046	2, 37	0.3614	-	Extended data figure 4j
			Genotype	0.237	1, 37	0.6293	-	
			Age x Genotype	2.565	2, 37	0.0905	-	
OF: Sunrise (females)			Age	2.616	2, 47	0.0837	-	Extended data figure 4l
			Genotype	0.865	1, 47	0.3570	-	
			Age x Genotype	0.907	2, 47	0.4106	-	
EPM: Sunrise (males)	Distance Traveled	Two-way ANOVA	Age	36.350	2, 57	<0.0001	****	Extended data figure 4g
			Genotype	2.712	1, 57	0.1051	-	
			Age x Genotype	3.242	2, 57	0.0464	*	
		Tukey's multiple comparisons tests	2:Ctrl vs. 2:AD	1.642	57	0.8532	-	
			2:Ctrl vs. 12:Ctrl	0.800	57	0.9928	-	
			2:Ctrl vs. 12:AD	0.658	57	0.9971	-	
			2:Ctrl vs. 24:Ctrl	6.750	57	0.0002	***	
			2:Ctrl vs. 24:AD	9.473	57	<0.0001	****	
			2:AD vs. 12:Ctrl	0.888	57	0.9885	-	
			2:AD vs. 12:AD	2.183	57	0.6379	-	
			2:AD vs. 24:Ctrl	4.568	57	0.0239	*	
			2:AD vs. 24:AD	7.399	57	<0.0001	****	
			12:Ctrl vs. 12:AD	1.413	57	0.9164	-	
			12:Ctrl vs. 24:Ctrl	5.857	57	0.0015	**	
			12:Ctrl vs. 24:AD	8.664	57	<0.0001	****	
			12:AD vs. 24:Ctrl	7.117	57	<0.0001	****	
			12:AD vs. 24:AD	9.742	57	<0.0001	****	
			24:Ctrl vs. 24:AD	3.466	57	0.1566	-	
EPM: Sunrise (females)		Two-way ANOVA	Age	2.682	2, 27	0.0866	-	Extended data figure 4h
			Genotype	3.490	1, 27	0.0726	-	
			Age x Genotype	0.691	2, 27	0.5098	-	
OF: Sunrise or Sundown (12-month-old females)	Center Time	Two-way ANOVA	Period	0.344	1, 39	0.5611	-	Extended data figure 5b
			Genotype	0.274	1, 39	0.6038	-	
			Period x Genotype	0.656	1, 39	0.4227	-	
EPM: Sunrise or Sundown (12-month-old females)	Distance Traveled	Two-way ANOVA	Period	0.692	1, 92	0.4075	-	Extended data figure 5d
			Genotype	7.746	1, 92	0.0065	**	
			Period x Genotype	4.615	1, 92	0.0343	*	
		...idák's multiple comparisons te...	Sunrise:Ctrl vs. Sunrise:AD	3.348	92	0.0047	**	
			Sundown:Ctrl vs. Sundown:AD	0.469	92	0.9832	-	
			Sunrise:AD vs. Sundown:AD	0.905	92	0.8402	-	
			Sunrise:Ctrl vs. Sundown:Ctrl	2.170	92	0.1240	-	
	Headdips (no.)	Two-way ANOVA	Period	2.606	1, 45	0.1134	-	Extended data figure 5e
			Genotype	16.100	1, 45	0.0002	***	
			Period x Genotype	1.894	1, 45	0.1755	-	
KPMS EPM analysis	-	Simple linear regression	Syllable 10 frequency vs. Headdips	115.000	1, 39	<0.0001	****	1
	-		Syllable 13 frequency vs. Headdips	96.920	1, 36	<0.0001	****	Extended data figure 5g
	-		Syllable 14 frequency vs. Headdips	114.900	1, 41	<0.0001	****	Extended data figure 5h
	-		Syllable 10 frequency vs. Headdips (high performers removed)	17.880	1, 37	0.0001	***	Extended data figure 5i
	-		Syllable 13 frequency vs. Headdips (high performers removed)	15.800	1, 34	0.0003	***	Extended data figure 5j
	-		Syllable 14 frequency vs. Headdips (high performers removed)	15.970	1, 39	0.0003	***	Extended data figure 5k
	Syllable 8 frequency	Two-way ANOVA	Period	9.408	1, 45	0.0037	**	Extended data figure 5l
			Genotype	2.840	1, 45	0.0989	-	
			Period x Genotype	9.403	1, 45	0.0037	**	
		Tukey's multiple comparisons tests	Sunrise:Ctrl vs. Sunrise:AD	1.419	45	0.7484	-	
			Sunrise:Ctrl vs. Sundown:Ctrl	0.001	45	>0.9999	-	
			Sunrise:Ctrl vs. Sundown:AD	4.431	45	0.0155	*	
			Sunrise:AD vs. Sundown:Ctrl	1.499	45	0.7151	-	
			Sunrise:AD vs. Sundown:AD	5.815	45	0.0009	***	
			Sundown:Ctrl vs. Sundown:AD	4.633	45	0.0106	*	
	Syllable 12 frequency	Two-way ANOVA	Period	2.639	1, 45	0.1112	-	Extended data figure 5m
			Genotype	2.100	1, 45	0.1543	-	
			Period x Genotype	4.557	1, 45	0.0383	*	
		Tukey's multiple comparisons tests	Sunrise:Ctrl vs. Sunrise:AD	0.704	45	0.9591	-	
			Sunrise:Ctrl vs. Sundown:Ctrl	0.542	45	0.9807	-	
			Sunrise:Ctrl vs. Sundown:AD	2.866	45	0.1937	-	
			Sunrise:AD vs. Sundown:Ctrl	0.191	45	0.9991	-	
			Sunrise:AD vs. Sundown:AD	3.564	45	0.0702	-	
			Sundown:Ctrl vs. Sundown:AD	3.494	45	0.0784	-	
	Syllable 16 frequency	Two-way ANOVA	Period	17.460	1, 45	0.0001	***	Extended data figure 5m
			Genotype	1.894	1, 45	0.1756	-	
			Period x Genotype	6.476	1, 45	0.0144	*	
		Tukey's multiple comparisons tests	Sunrise:Ctrl vs. Sunrise:AD	1.200	45	0.8309	-	
			Sunrise:Ctrl vs. Sundown:Ctrl	1.734	45	0.6136	-	
			Sunrise:Ctrl vs. Sundown:AD	5.179	45	0.0035	**	
			Sunrise:AD vs. Sundown:Ctrl	3.041	45	0.1532	-	

			Sunrise:AD vs. Sundown:AD	6.375	45	0.0003	***	
			Sundown:Ctrl vs. Sundown:AD	3.823	45	0.0459	*	
	Syllable 18 frequency	Two-way ANOVA	Period	9.726	1, 45	0.0032	**	Extended data figure 5o
			Genotype	3.675	1, 45	0.0616	-	
			Period x Genotype	4.245	1, 45	0.0452	*	
		Tukey's multiple comparisons tests	Sunrise:Ctrl vs. Sunrise:AD	0.147	45	0.9996	-	
			Sunrise:Ctrl vs. Sundown:Ctrl	1.123	45	0.8566	-	
			Sunrise:Ctrl vs. Sundown:AD	4.695	45	0.0094	**	
			Sunrise:AD vs. Sundown:Ctrl	1.304	45	0.7933	-	
			Sunrise:AD vs. Sundown:AD	4.910	45	0.0061	**	
			Sundown:Ctrl vs. Sundown:AD	3.878	45	0.0418	*	
PLSC: sundown-active (eYFP+) ensembles	Fixed Inertia	Permutation analysis	Overall relationship between behavioral and brain variables	112.765	-	0.0002	***	Extended data figure 6b, c
	1st eigenvalue		Relationship between behavioral and brain variables for latent dimension	80.457	-	0.0001	***	
	2nd eigenvalue			17.418	-	0.8888	-	
	3rd eigenvalue			5.245	-	1.0000	-	
	4th eigenvalue			5.199	-	1.0000	-	
	5th eigenvalue			2.663	-	1.0000	-	
	6th eigenvalue			0.860	-	1.0000	-	
	7th eigenvalue			0.528	-	1.0000	-	
	8th eigenvalue			0.212	-	1.0000	-	
	9th eigenvalue			0.105	-	1.0000	-	
	10th eigenvalue			0.075	-	0.9996	-	
	11th eigenvalue			0.004	-	0.9982	-	
PLSC: sunrise-active (c-Fos+) ensembles	Fixed Inertia	Permutation analysis	Overall relationship between behavioral and brain variables	145.655	-	0.0007	***	Extended data figure 6g, h
	1st eigenvalue		Relationship between behavioral and brain variables for latent dimension	90.173	-	0.0001	***	
	2nd eigenvalue			21.787	-	0.9562	-	
	3rd eigenvalue			12.749	-	1.0000	-	
	4th eigenvalue			10.366	-	0.9992	-	
	5th eigenvalue			5.586	-	1.0000	-	
	6th eigenvalue			2.631	-	1.0000	-	
	7th eigenvalue			1.290	-	1.0000	-	
	8th eigenvalue			0.460	-	1.0000	-	
	9th eigenvalue			0.310	-	1.0000	-	
	10th eigenvalue			0.290	-	0.9834	-	
	11th eigenvalue			0.011	-	0.9946	-	
Brain-wide activity mapping at Sundown and Sunrise	Sensorimotor regions (eYFP$^+$): absolute correlation coefficient (Pearson's r)	Unpaired t-test, two-tailed	Ctrl vs. AD	7.514	208	<0.0001	****	Extended data figure 7c
	All regions (c-Fos$^+$): absolute correlation coefficient (Pearson's r)			9.138	26350	<0.0001	****	Extended data figure 7h
	Sensorimotor regions (c-Fos$^+$): absolute correlation coefficient (Pearson's r)			0.308	208	0.7585	-	Extended data figure 7k
EEG/EMG recordings	-	Simple linear regression	Hippocampal plaque burden vs. NREM delta power	0.004	1, 6	0.9519	-	Supplementary figure 1d
	-		Cortical plaque burden vs. NREM delta power	0.037	1, 6	0.8543	-	Supplementary figure 1e
Brexpirazole behavioral testing	OF distance traveled	Two-way ANOVA	Genotype	2.834	1, 19	0.1086	-	Supplementary figure 2b
			Dose	9.092	1, 19	0.0071	**	
			Genotype x Dose	4.685	1, 19	0.0434	*	
		Tukey's multiple comparisons tests	Veh Ctrl vs. Veh AD	5.095	19	0.0094	**	
			Veh Ctrl vs. Brex Ctrl	0.453	19	0.9883	-	
			Veh Ctrl vs. Brex AD	1.355	19	0.7744	-	
			Veh AD vs. Brex Ctrl	4.622	19	0.0194	*	
			Veh AD vs. Brex AD	4.119	19	0.0407	*	
			Brex Ctrl vs Brex AD	0.866	19	0.9270	-	
	EPM open arms time	Two-way ANOVA	Genotype	2.834	1, 19	0.1086	-	Supplementary figure 2c
			Dose	9.092	1, 19	0.0071	**	
			Genotype x Dose	4.685	1, 19	0.0434	*	
		Tukey's multiple comparisons tests	Veh Ctrl vs. Veh AD	5.095	19	0.0094	**	
			Veh Ctrl vs. Brex Ctrl	0.453	19	0.9883	-	
			Veh Ctrl vs. Brex AD	1.355	19	0.7744	-	
			Veh AD vs. Brex Ctrl	4.622	19	0.0194	*	
			Veh AD vs. Brex AD	4.119	19	0.0407	*	
			Brex Ctrl vs Brex AD	0.866	19	0.9270	-	