

## Supplemental material.

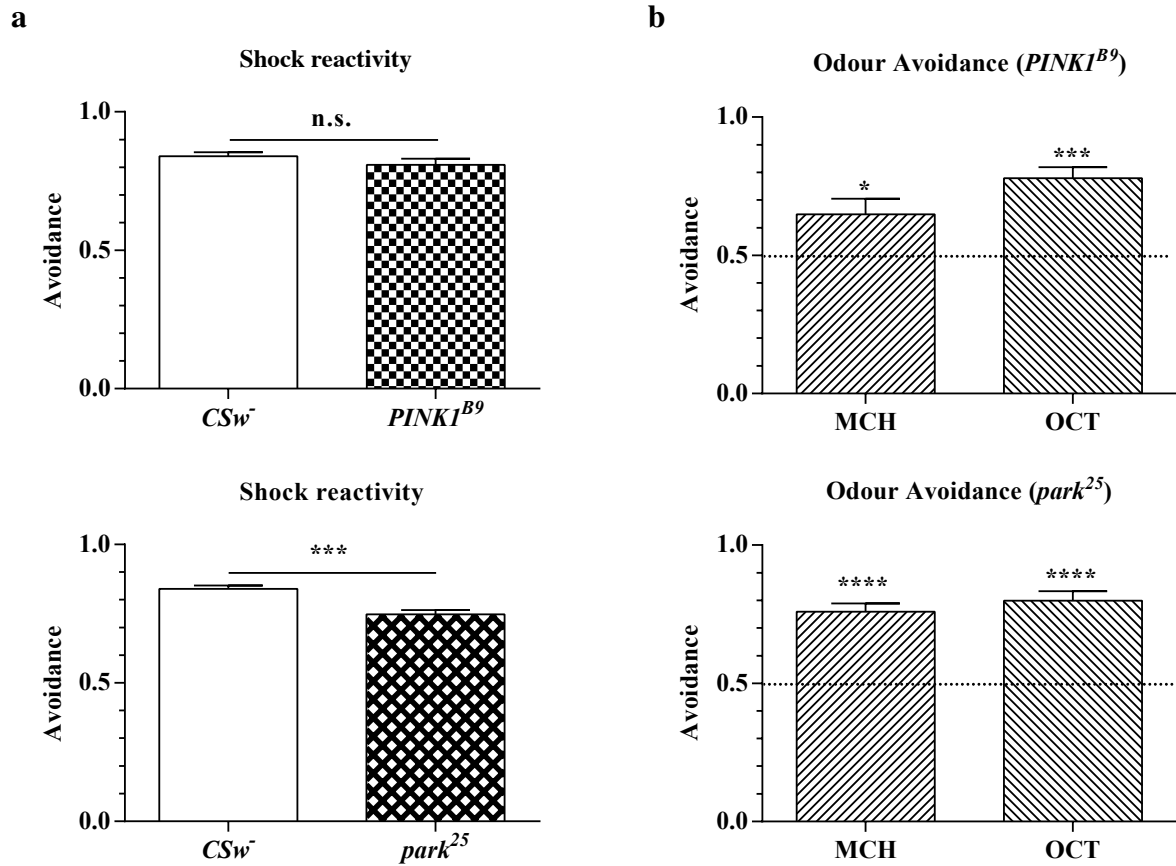


Figure S1: Controls for learning and memory experiments. **(a)** Shock avoidance scores for wild type and mutant flies. There was no significant difference in avoidance between wild type and *PINK1<sup>B9</sup>* flies (n=14) and a small but significant reduction in avoidance in *park<sup>25</sup>* flies (n=16). Data were analysed using a paired t-test. **(b)** Odour avoidance scores of mutant flies. Comparing mean avoidance with a score of 0.5 (corresponding to chance) showed that both mutant genotypes significantly avoided both MCH and OCT, indicating they can smell the odours. Data were analysed using a one-sample t-test (n=8; \* p<0.05; \*\*\* p<0.001; \*\*\*\* p<0.0001; error bars indicate SEM).

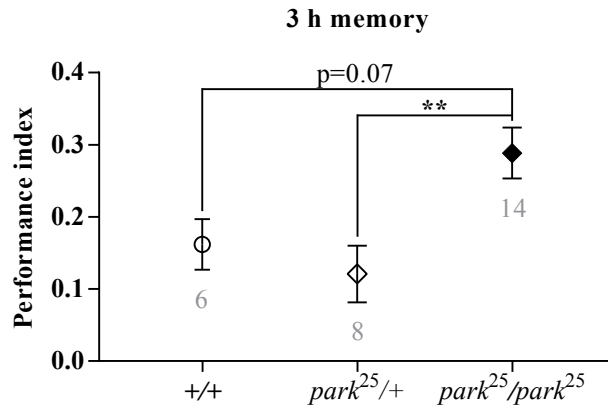


Figure S2: 3 h memory performance in *park*<sup>25</sup> mutants, and wild type and heterozygous controls. There was a significant difference between genotypes ( $p=0.0081$ ). Data were analysed using one-way ANOVA and Bonferroni's multiple comparisons (n as shown; \*\*  $p<0.01$ ; error bars indicate SEM).

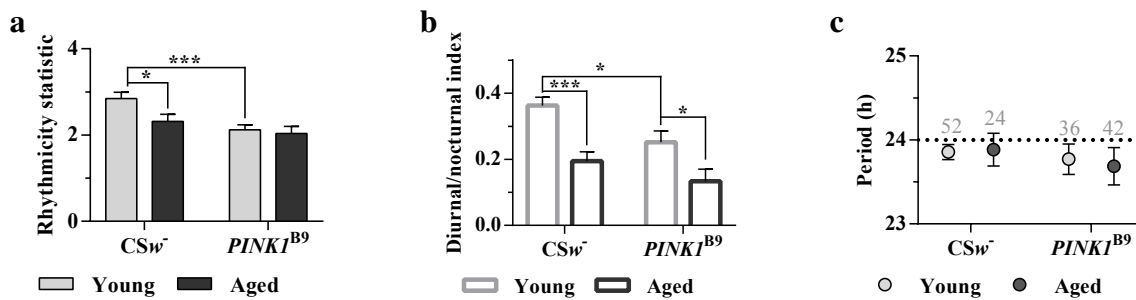


Figure S3: Analysis of circadian rhythms in young (1-3 days) and aged (8-14 days) *CSw*<sup>-</sup> wild type (n=57 young; n=34 aged) and *PINK1*<sup>B9</sup> mutants (n=57 young; n=42 aged). **(a)** RS values. There was a significant effect of both genotype ( $p=0.001$ ) and age ( $p=0.0450$ ). **(b)** D/Ni values. There was a significant effect of both genotype ( $p=0.0089$ ) and age ( $p<0.0001$ ). **(c)** Period of rhythmicity for rhythmic and weakly rhythmic flies. There was no significant effect of either genotype ( $p=0.3934$ ) or age ( $p=0.8711$ ). Data were analysed using two-way ANOVA and Bonferroni's multiple comparisons. (\*  $p<0.05$ ; \*\*\*  $p<0.001$ ; error bars indicate SEM)

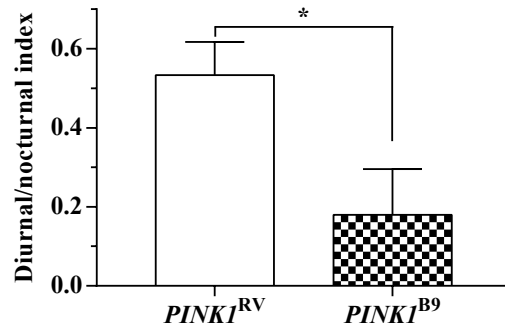


Figure S4: D/NI values for activity in DD of young (1-3 days) *PINK1<sup>RV</sup>* revertant allele controls (n=14) and *PINK1<sup>B9</sup>* mutants (n=8). Values were significantly lower in mutant flies (p=0.0209). Data were analysed using an unpaired t-test. (\* p<0.05; error bars indicate SEM)

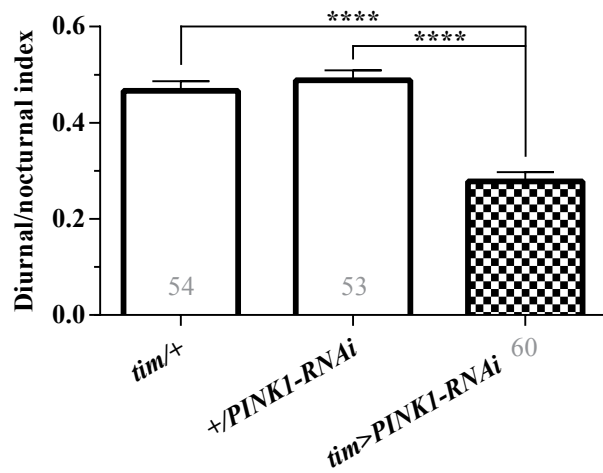


Figure S5: D/NI values for activity in DD of young (1-3 days) flies expressing *PINK1-RNAi* in clock neurons using the *tim-GAL4* driver. There was a significant difference between genotypes (p<0.0001). Data were analysed using Kruskal-Wallis tests and Dunn's multiple comparisons). (n as shown; \*\*\*\* p<0.0001; error bars indicate SEM; number in grey are n).