

Figure S1

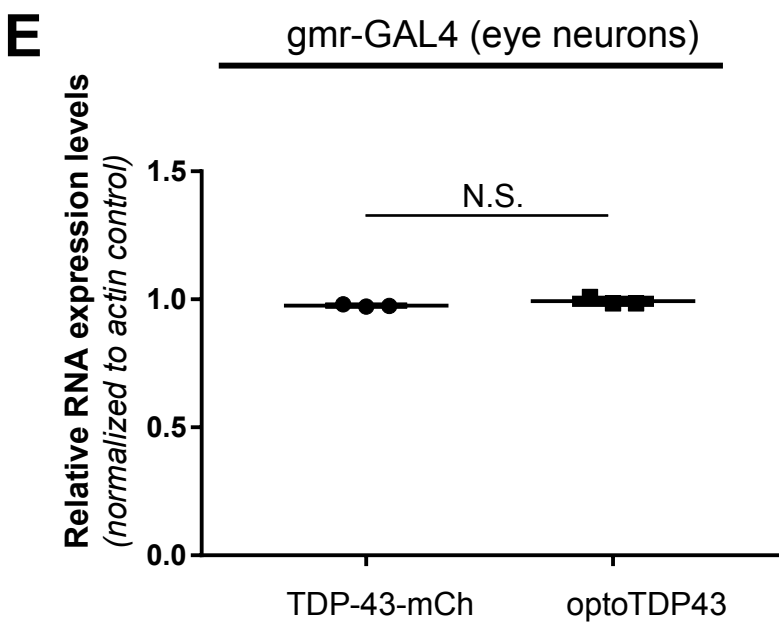
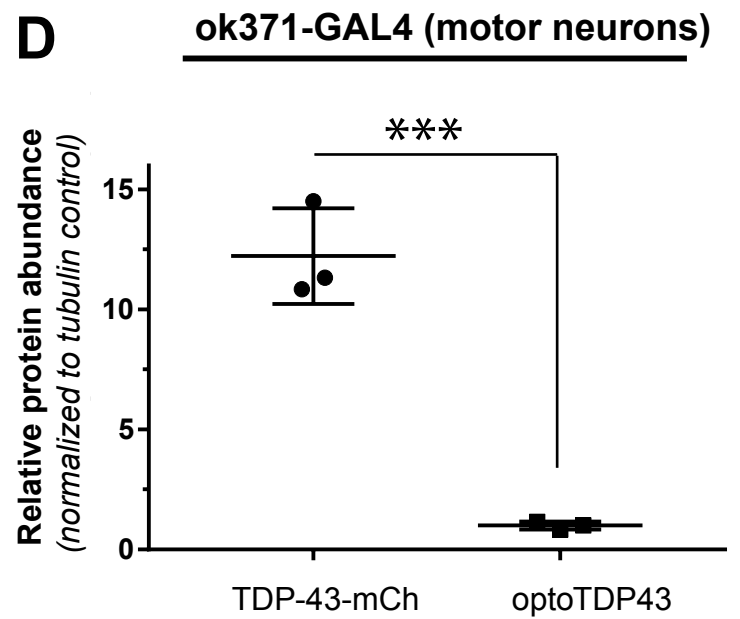
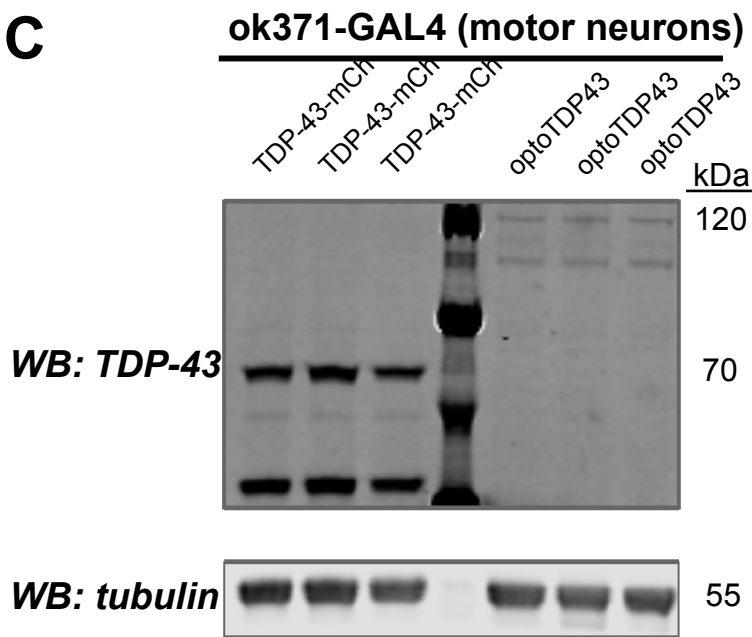
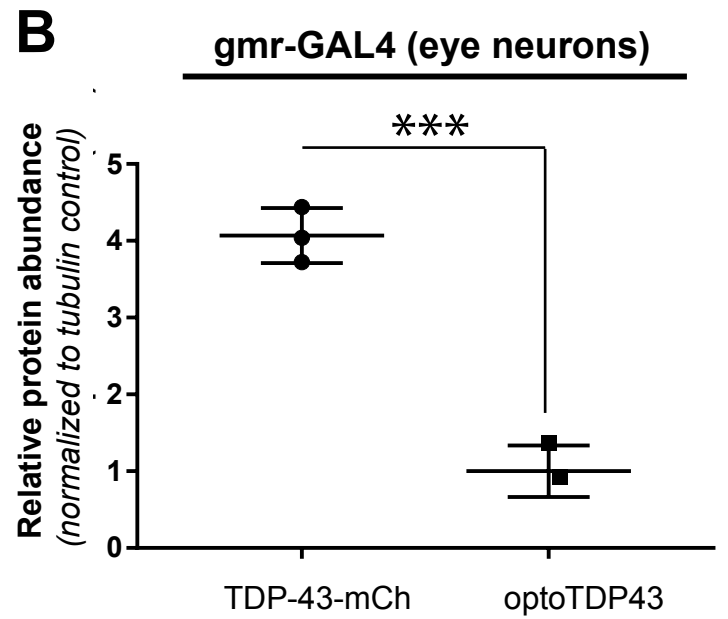
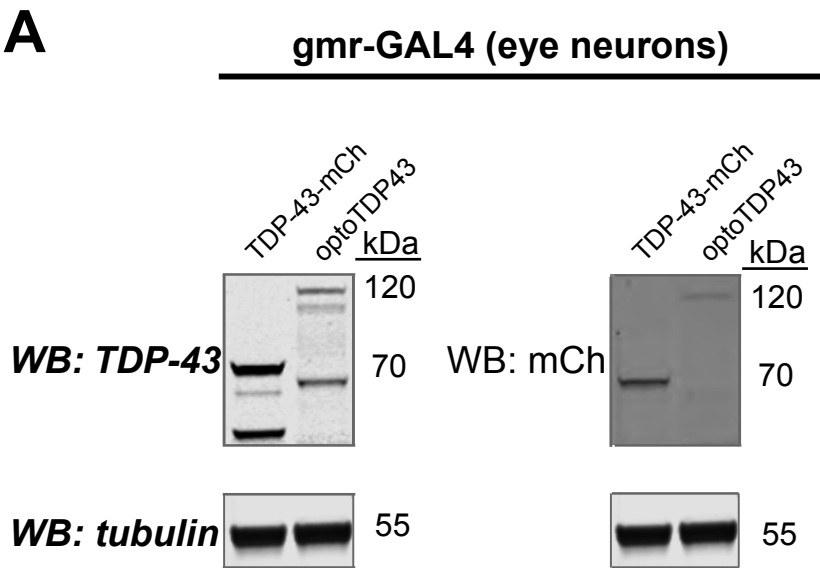
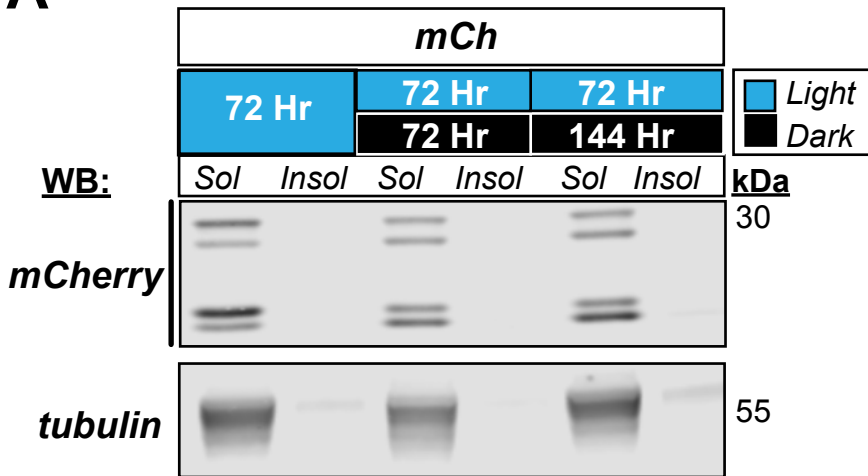


Fig. S1. A. Representative western blots of expression levels of gmr-GAL4;UAS-optoTDP43 and gmr-GAL4;UAS-TDP-43-mCh blotted for TDP-43 and mCherry. **B.** Quantification of TDP-43 relative protein abundance, n = 3 biological replicates per condition. *** p<.001 error bars +/- SD. Data was analyzed by Wilcoxon sum-rank test. **C.** Representative western blot of relative protein abundance of ok371-GAL4;UAS-TDP-43-mCh and gmr-GAL4;UAS-optoTDP43 larvae. **D.** Quantification of TDP-43 protein levels in ok371-GAL4;UAS-TDP-43-mCh and gmr-GAL4;UAS-optoTDP43 larvae, n = 3 biological replicates per condition. *** p<.001. error bars +/- SD. Data was analyzed by Wilcoxon sum-rank test. **E.** Quantification of qPCR data for mCherry RNA levels in gmr-GAL4;UAS-optoTDP43 and gmr-GAL4;UAS-TDP-43-mCh flies. n = 3 biological replicates per condition. p = n.s. error bars +/- SD. Data were analyzed by Wilcoxon sum-rank test.

Figure S2

A



B

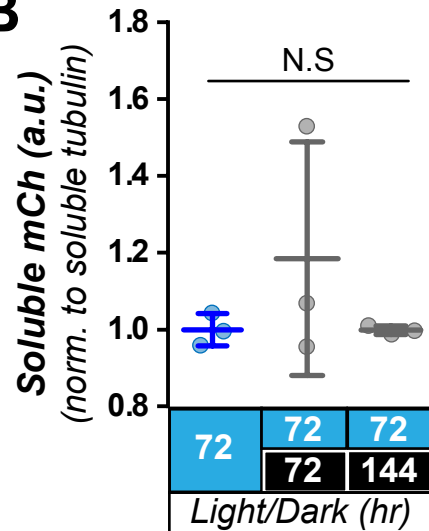


Fig. S2. A. Representative western blot of *gmr-GAL4;UAS-mCherry* soluble/insoluble (S/I) fractionation demonstrating unchanged mCherry expression levels from 3 days of light exposure to 3 and 6 days afterwards. **B.** Quantification of $n = 3$ biological replicates per condition, error bars \pm SD. Data were assumed normal and analyzed by 1-way ANOVA with multiple comparisons to each other condition of mean.

Figure S3

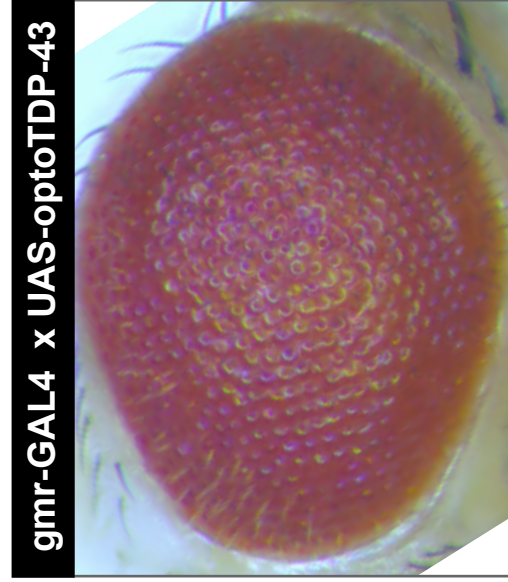
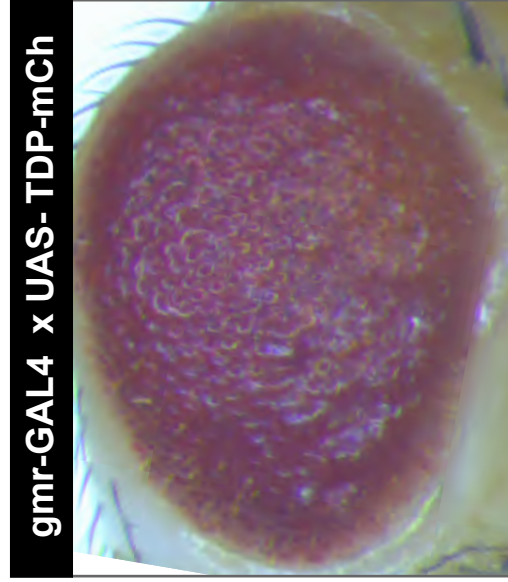
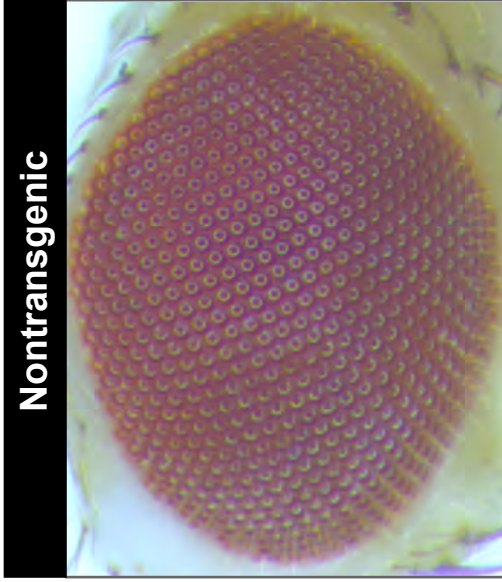
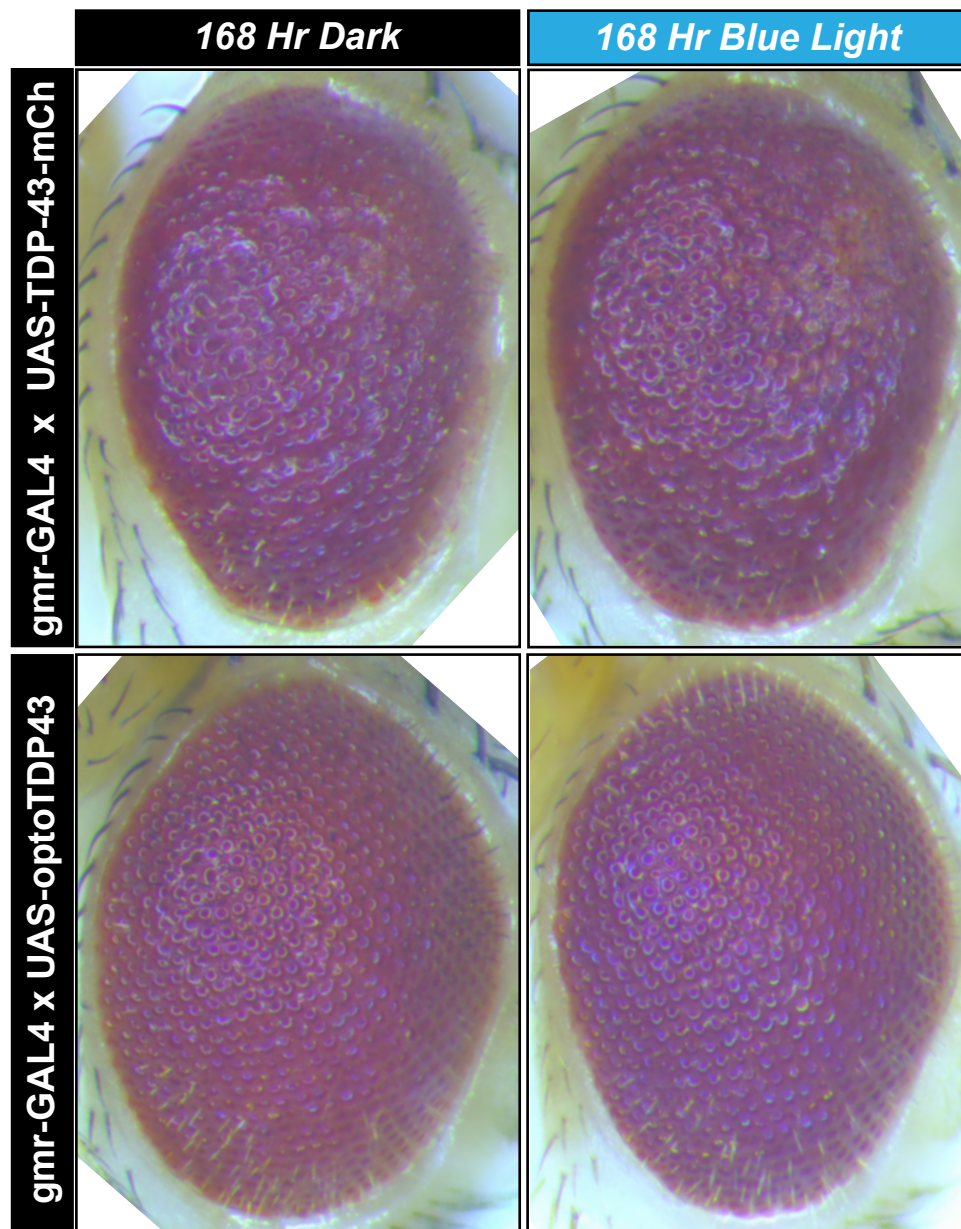


Fig. S3. A. Representative image of external eye phenotypes of 0-1 day old *gmr-GAL4;UAS-TDP-43-mch* and *gmr-GAL4;UAS-optoTDP43* flies raised at 29 °C.

Figure S4

A



B

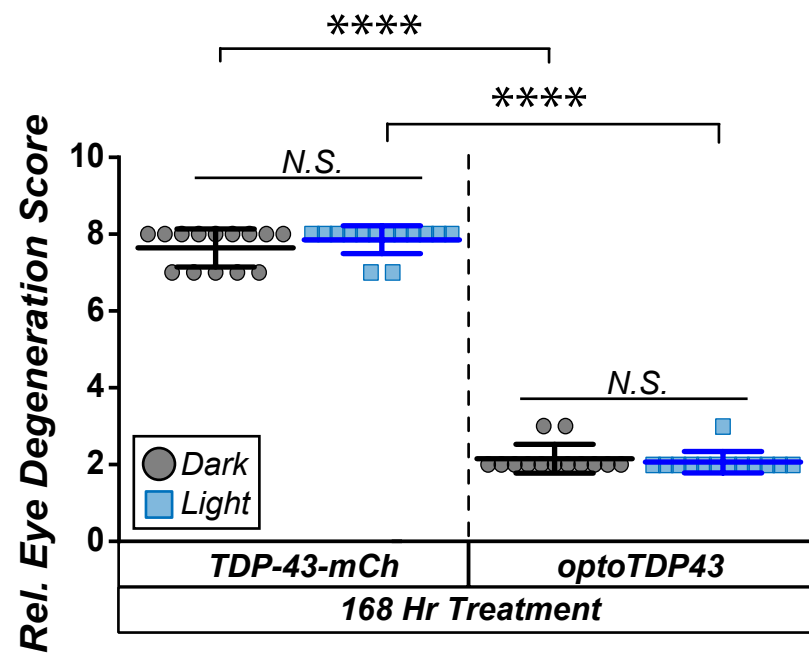


Fig. S4. A. Representative images of external eyes of *gmr-GAL4;UAS-TDP-43-mCh* and *gmr-GAL4;UAS-optoTDP43* flies after 7 days of blue light exposure or 7 days in the dark. **B.** Quantification of external eye degeneration in *gmr-GAL4;UAS-TDP-43-mCh* and *gmr-GAL4;UAS-optoTDP43* flies after 7 days blue light or darkness, n = 15 flies per light condition. $p < .05$. Data were assumed normal and analyzed by student's t-test.

Figure S5

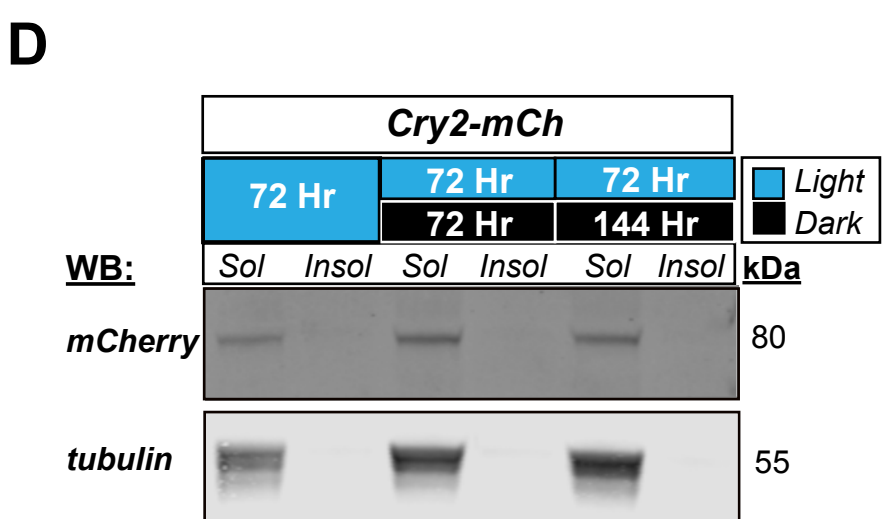
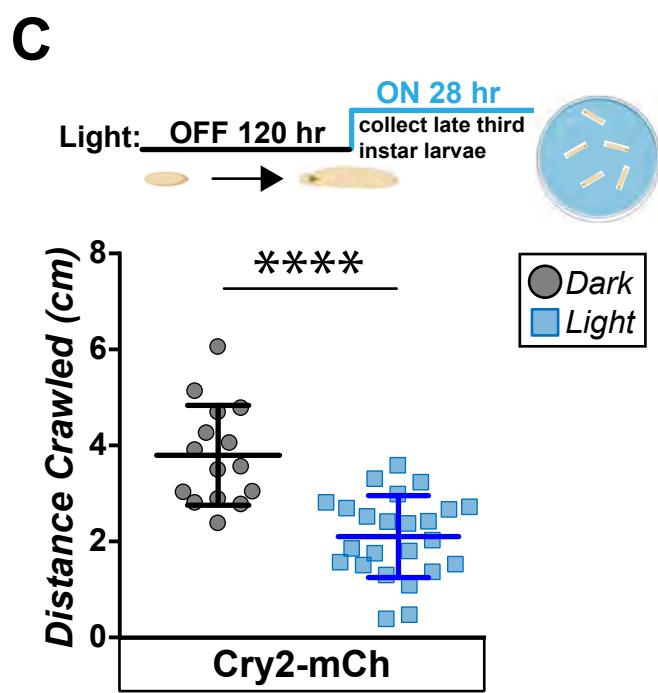
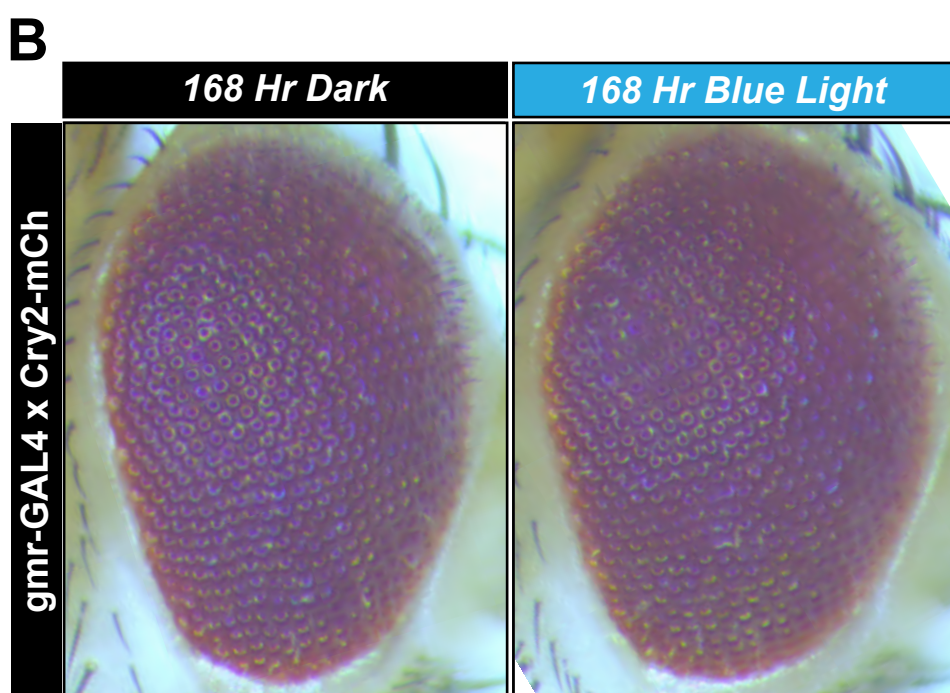
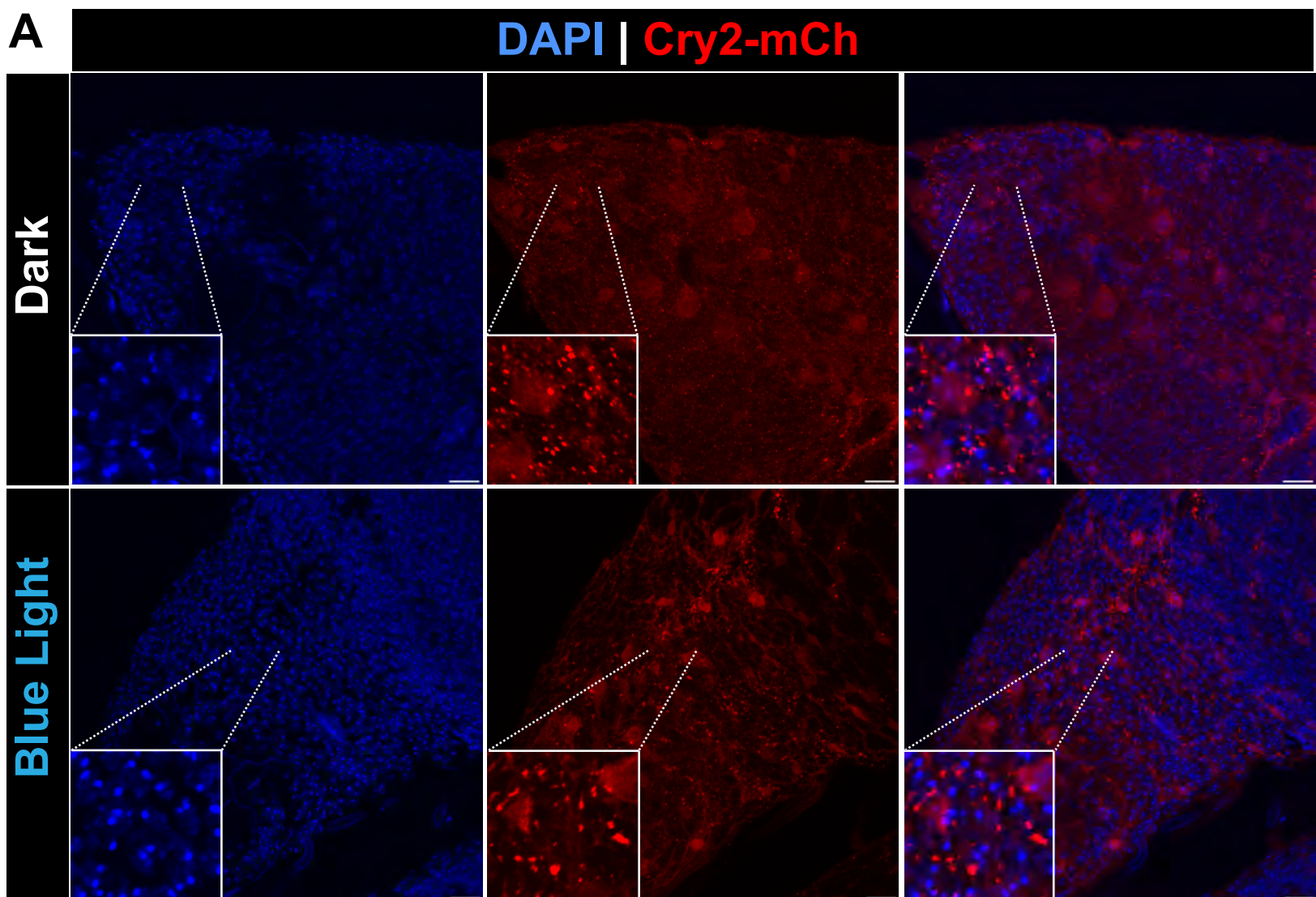


Fig. S5. A. 24 hours of blue light stimulation does not cause any obvious changes in puncta size, number, or cellular distribution of mCherry staining in *ok371-GAL4;UAS-Cry2-mCherry* flies. **B.** 7 days light exposure induces no changes in external eye structure in *gmr-GAL4;UAS-Cry2-mCherry* flies. **C.** *ok371-GAL4;UAS-Cry2-mCh* larvae exhibit reduced crawling distance in response to 28 hours of chronic blue light exposure $n = 20-25$ flies. **** $p < .0001$. error bars +/- SD. Data were assumed normal and analyzed by a one-way student's t-test. **D.** Representative western blots of soluble/insoluble fractionation of *gmr-GAL4;UAS-Cry2-mCherry* adult heads staining for TDP-43 after 3 days of light stimulation, 3 days of light followed by 3 days of dark, and 3 days of light followed by 6 days of dark.

Supplemental Video Legends:

Supplemental Video S1 Related to Figure 5. Climbing assessment of *Drosophila* expressing mCherry in motor neurons Day 1 post larval illumination. Quantification of mCherry expressing adult *Drosophila* climbing at Day 1 after third instar larvae were illuminated for 30 hr (L, left) or kept in darkness (D, right).

Supplemental Video S2 Related to Figure 5. Climbing assessment of *Drosophila* expressing Cry2-mCherry in motor neurons Day 1 post larval illumination. Quantification of Cry2-mCherry expressing adult *Drosophila* climbing at Day 1 after third instar larvae were illuminated for 30 hr (L, left) or kept in darkness (D, right).

Supplemental Video S3 Related to Figure 5. Climbing assessment of *Drosophila* expressing optoTDP43 in motor neurons Day 1 post larval illumination. Quantification of optoTDP43 expressing adult *Drosophila* climbing at Day 1 after third instar larvae were illuminated for 30 hr (L, left) or kept in darkness (D, right).

Supplemental Video S4 Related to Figure 5. Climbing assessment of *Drosophila* expressing mCherry in motor neurons Day 12 post larval illumination. Quantification of mCherry expressing adult *Drosophila* climbing at Day 12 after third instar larvae were illuminated for 30 hr (L, left) or kept in darkness (D, right).

Supplemental Video S5 Related to Figure 5. Climbing assessment of *Drosophila* expressing Cry2-mCherry in motor neurons Day 12 post larval illumination. Quantification of Cry2-mCherry expressing