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Supplemental information

Structural neuroplasticity after sleep loss modifies behavior and requires neurexin and neuroligin

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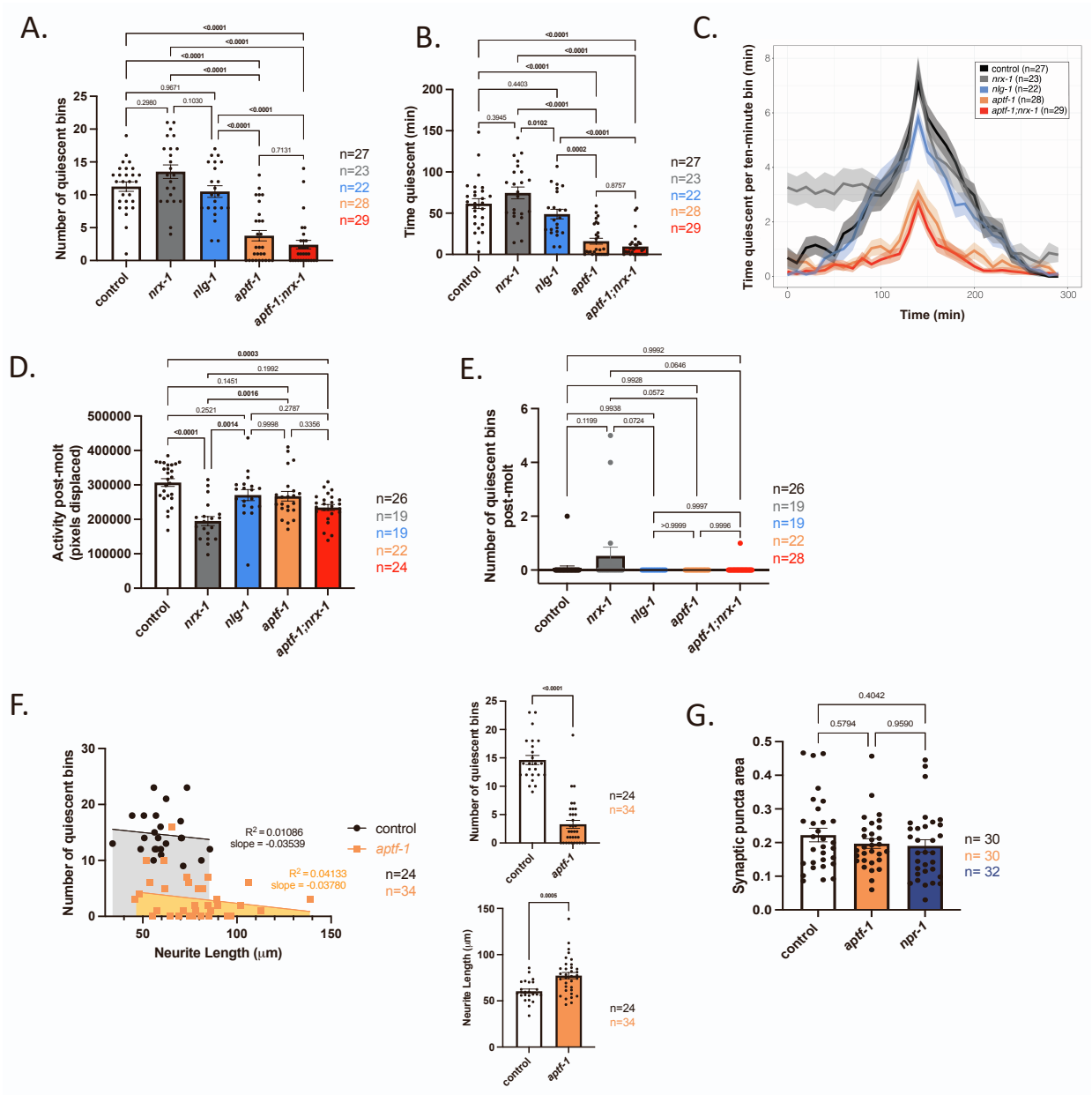
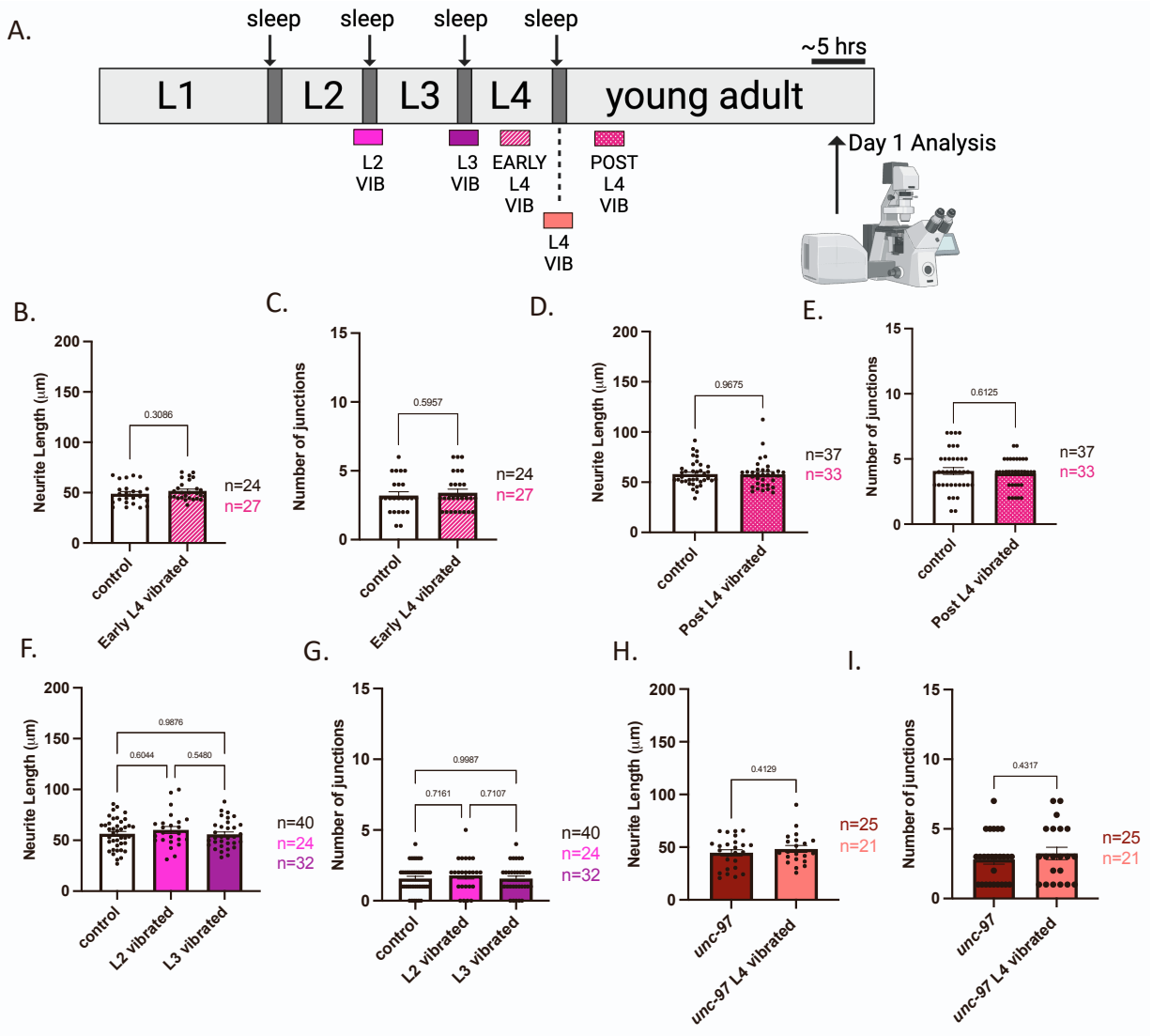


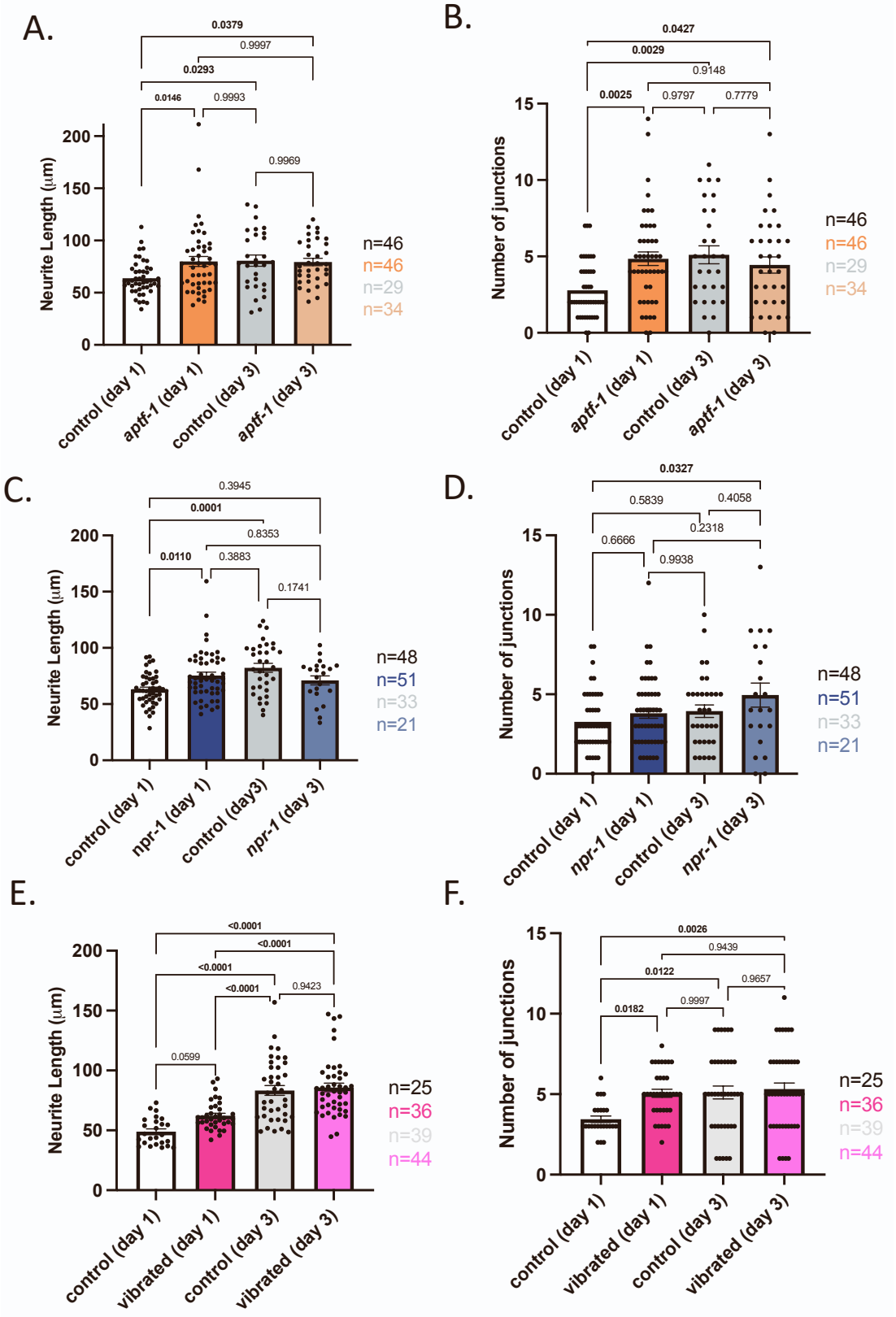
Supplemental Figure 1. Sleep and quiescence of mutant *C. elegans*. Related to Figures 1 and 4. A) Quantification of number of quiescent bins during the L4 to adult molt in control, *nrx-1*, *nlg-1*, *aptf-1*, and *aptf-1;nrx-1* males. A bin was considered quiescent if the *C. elegans* spent more than 2.5 minutes immobile per ten-minute bin. **B)** Graph showing total time, in minutes, spent quiescent for control, *nrx-1, nlg-1, aptf-1*, and *aptf-1;nrx-1* males during the L4 molt. Time per ten-minute bin was summed per animal for bins with more than 2.5 quiescent minutes. **C)** Graph showing the quiescence amount in control, *nrx-1, nlg-1, aptf-1*, and *aptf-1;nrx-1* males from t=0 to t=300 minutes, with peak quiescence aligned. **D)** Average activity of control, *nrx-1,nlg-1, aptf-1*, and *aptf-1;nrx-1*

males. Activity was quantified two full hours after the end of lethargus and averaged across two hours **E)** Number of quiescent bins that occur within a two-hour period in control, *nrx-1, nlg-1, aptf-1*, and *aptf-1;nrx-1* males, quantified two hours after the end of lethargus. **F)** Quantification of neurite length plotted against number of quiescent bins for individual *C. elegans* among controls and *aptf-1* mutant males. While the two genotypes show distinct clusters for neurite length and number of quiescent bins, the relationship between these factors is not linear (R^2 = 0.01086 and 0.04133). Graph comparing neurite length in controls and *aptf-1* males and graph comparing number of quiescent bins in controls and *aptf-1* males are also shown. **G)** *cla-1::gfp* puncta area in DVB in controls, sleep deprived *aptf-1,* and sleep deprived *npr-1* males at day 1. Number of individual animals is indicated by “n”, p-values from one-way ANOVA with Tukey’s post-hoc test shown.



Supplemental Figure 2. DVB morphology is not impacted by vibration before or after larval sleep. Related to Figure 2. A) Schematic of *C. elegans* developmentally timed sleep stages in between each larval stage with timing of vibration application indicated. Hot pink represents L2 molt vibration, magenta represents L3 molt vibration, striped fill represents early L4 vibration application, and polka dot fill represents post-L4 vibration application. L4 molt vibration in *unc-97* animals is represented in coral. Quantification of DVB **(B)** total neurite length and **(C)** number of junctions in controls and early L4 vibrated males. Graph of DVB neurite length **(D)** and number of junctions **(E)** in controls and post-L4 vibrated males. **(F)** Neurite length and **(G)** number of DVB junctions in controls, L2 vibrated, and L3 vibrated males. Comparison of neurite length **(H)** and number of junctions **(I)** in *unc-97* mutants and *unc-97* mutants that underwent L4

vibration. Number of individual animals is indicated by “n”, p-values from two-tailed unpaired t-test shown.



Supplemental Figure 3. DVB morphology at day 3 after larval sleep disruption. Related to Figure 5. Graph showing **(A)** DVB neurite length and **(B)** junctions in

controls and *aptf-1* males at days 1 and day 3. **C)** DVB neurite length and **(D)** number of DVB junctions in controls and *npr-1* males at day 1 and day 3. **(E)** DVB neurite length and **(F)** number of junctions in males that underwent L4 vibration and controls at day 1 and day 3. Data combined from figure 1, figure 2 and figure 5. Day 1 and day 3 data collected on separate days. Number of individual animals is indicated by “n”, p-values from one-way ANOVA with Tukey’s post-hoc test shown.