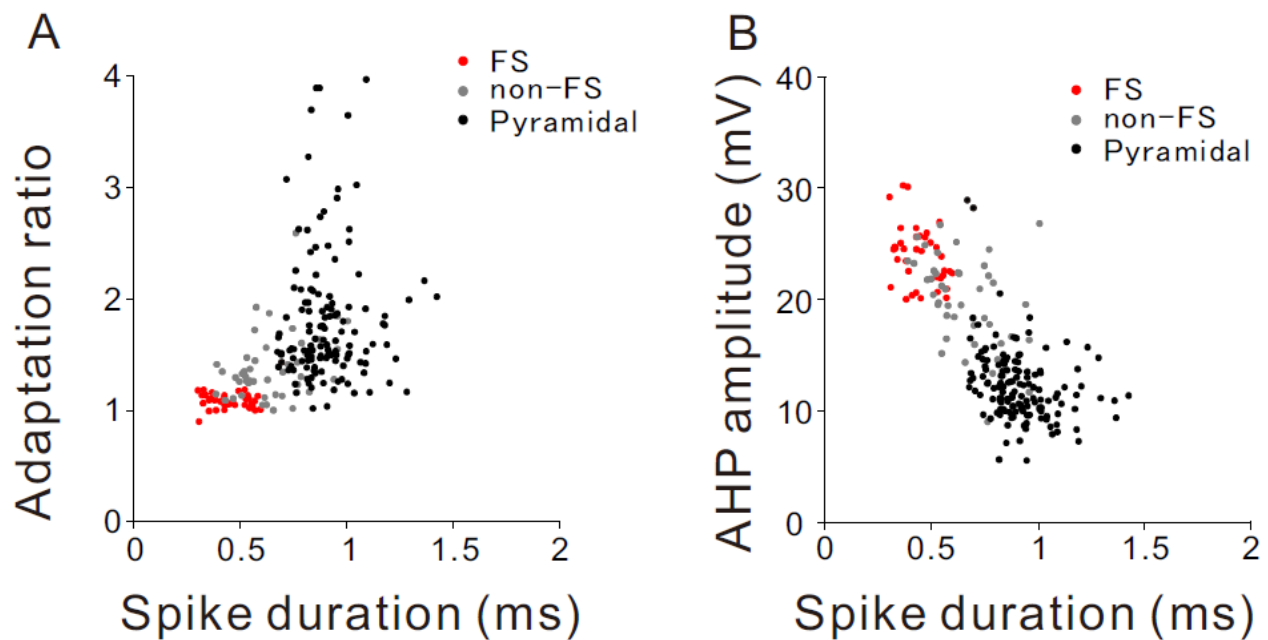


## Supplementary Material

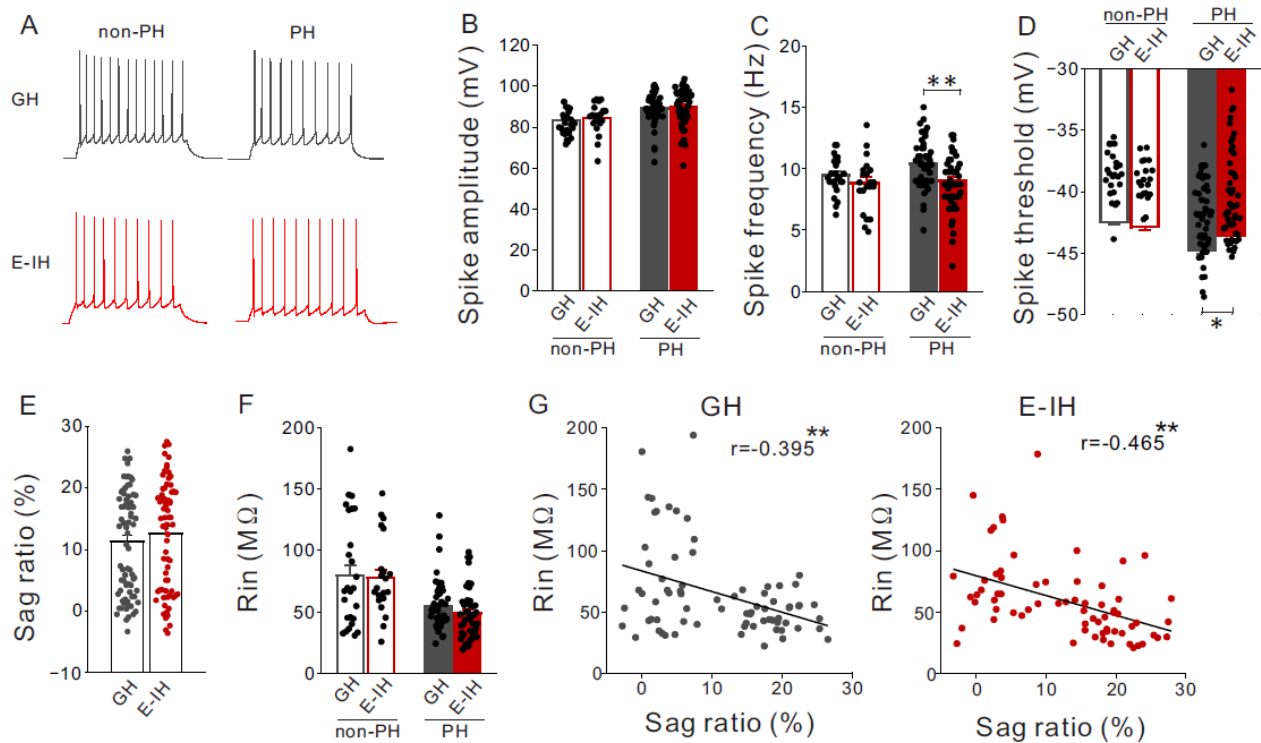
### 1 Supplementary Figures

#### 1.1 Supplementary Figure 1



**Supplementary Figure 1.** We identified prefrontal cortex (PFC) pyramidal cells, fast-spiking (FS) interneurons, and non-fast spiking (non-FS) interneurons based on their firing patterns and morphological properties. **(A)** Left: the adaptation ratio (last interspike interval/first interspike interval, see Materials and Methods) plotted as a function of spike duration at half peak amplitude for 142 pyramidal cells (black), 38 FS neurons (red), and 45 non-FS cells (gray). Right: plot of the after hyperpolarization (AHP) amplitude versus spike duration at half-width. Cells classified as FS (see Materials and Methods) had a spike duration  $\leq 0.6$  ms, AHP amplitude  $\geq 15$  mV, and adaptation ratio  $\leq 1.2$ .

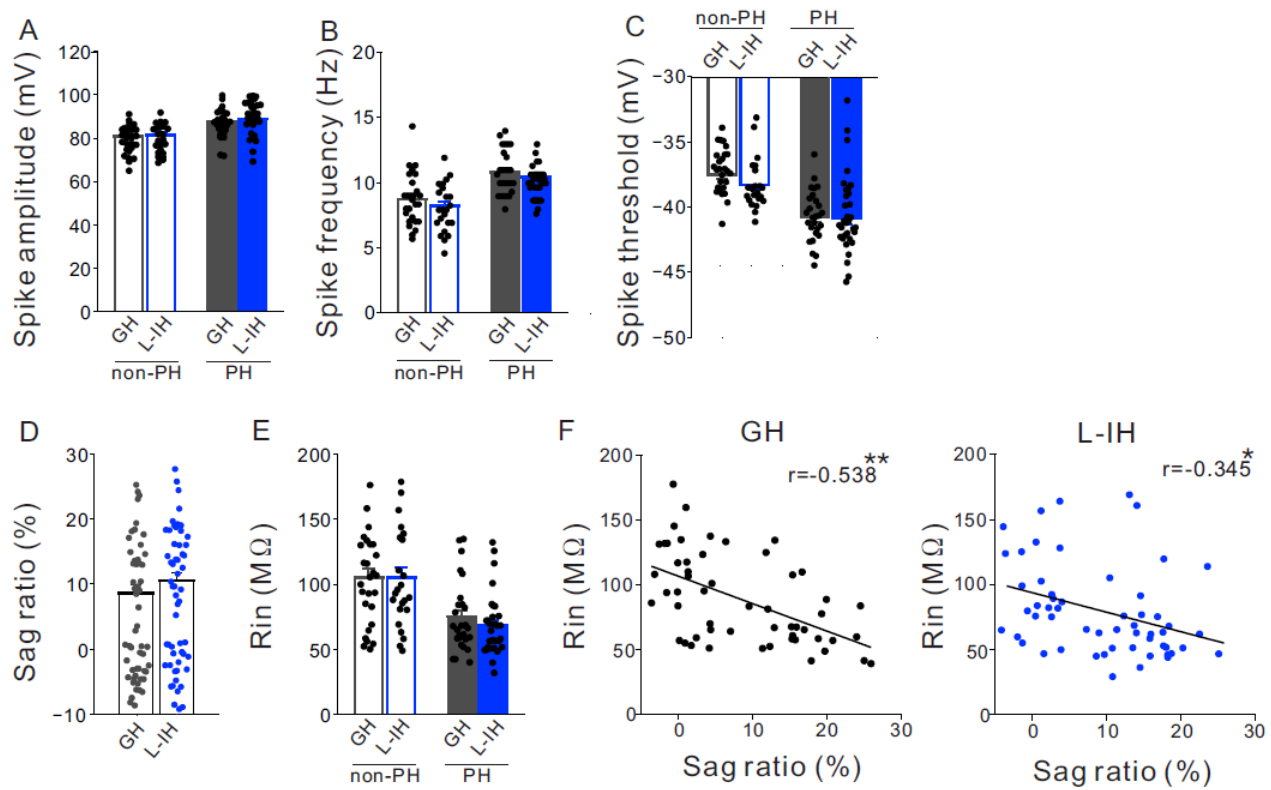
## 1.2 Supplementary Figure 2



**Supplementary Figure 2.** Juvenile social isolation reduced intrinsic excitability only in prominent h-current (PH) cells but not non-PH cells. **(A)** Representative spike traces at 100pA injection recorded from PH (right) and non-PH cells (left) in the group-housing (GH) (upper) and early isolation housing (E-IH) (lower) mice. **(B)** There was no significant between-group difference in the spike amplitude in both PH and non-PH cells (2-way analysis of variance (ANOVA), effect of housing,  $F_{(1,138)} = 0.417$ ,  $p = 0.520$ , effect of h-current,  $F_{(1,138)} = 15.78$ ,  $***p < 0.001$ , housing  $\times$  h-current,  $F_{(1,138)} = 0.0159$ ,  $p = 0.901$ ). However, the spike amplitude in non-PH cells was significantly lower than that in PH cells. **(C)** For PH cells, the spike frequency in the E-IH mice was significantly lower than that in the GH mice (Tukey's HSD test:  $p < 0.01$ ). However, for non-PH cells, there were no significant between-group differences in the spike frequency (2-way ANOVA, effect of housing,  $F_{(1,138)} = 8$ ,  $**p = 0.005$ , effect of h-current,  $F_{(1,138)} = 2.246$ ,  $p = 0.136$ , housing  $\times$  h-current,  $F_{(1,138)} = 1.1$ ,  $p = 0.296$ ). **(D)** For PH cells, the spike threshold in the E-IH mice was significantly higher than that in the GH mice (Tukey's HSD test:  $P < 0.05$ ). However, for non-PH cells, there were no significant between-group differences in the spike threshold. However, the spike threshold in non-PH cells was significantly higher than that in PH cells in the GH mice (2-way ANOVA, effect of housing,  $F_{(1,138)} = 1.167$ ,  $p = 0.282$ , effect of h-current,  $F_{(1,138)} = 18.71$ ,  $***p < 0.001$ , housing  $\times$  h-current,  $F_{(1,138)} = 5.452$ ,  $*p = 0.02$ ). (Number of cells in B, C, D: 25 non-PH and 48 PH from 6 GH mice; 21 non-PH and 48 PH from 6 E-IH mice) **(E)** There was no significant between-group

difference in the sag ratio of layer (L) 5 pyramidal cells ( $t_{141} = -1.025$ ,  $p = 0.767$ ; Student's t-test). (Number of cells: 73 from 6 GH mice / 69 from 6 E-IH mice) **(F)** There was no significant between-group difference in the input resistance in either PH or non-PH cells. However, the input resistance in non-PH cells was significantly higher than that in PH cells (2-way ANOVA, effect of housing,  $F_{(1,138)} = 0.498$ ,  $p = 0.481$ , effect of h-current,  $F_{(1,138)} = 29.39$ ,  $***p < 0.001$ , housing  $\times$  h-current,  $F_{(1,138)} = 0.117$ ,  $p = 0.733$ ). (Number of cells: 25 non-PH and 48 PH from 6 GH mice: 21 non-PH and 48 PH from 6 E-IH mice) **(G)** There was a significant negative correlation between input resistance and sag ratio in both the GH mice (left) and the E-IH mice (right) (GH;  $r = -0.395$   $**p < 0.01$ , E-IH;  $r = -0.465$   $**p < 0.01$ ; Pearson correlation). (Number of cells: 73 from 6 GH mice: 69 from 6 E-IH mice)

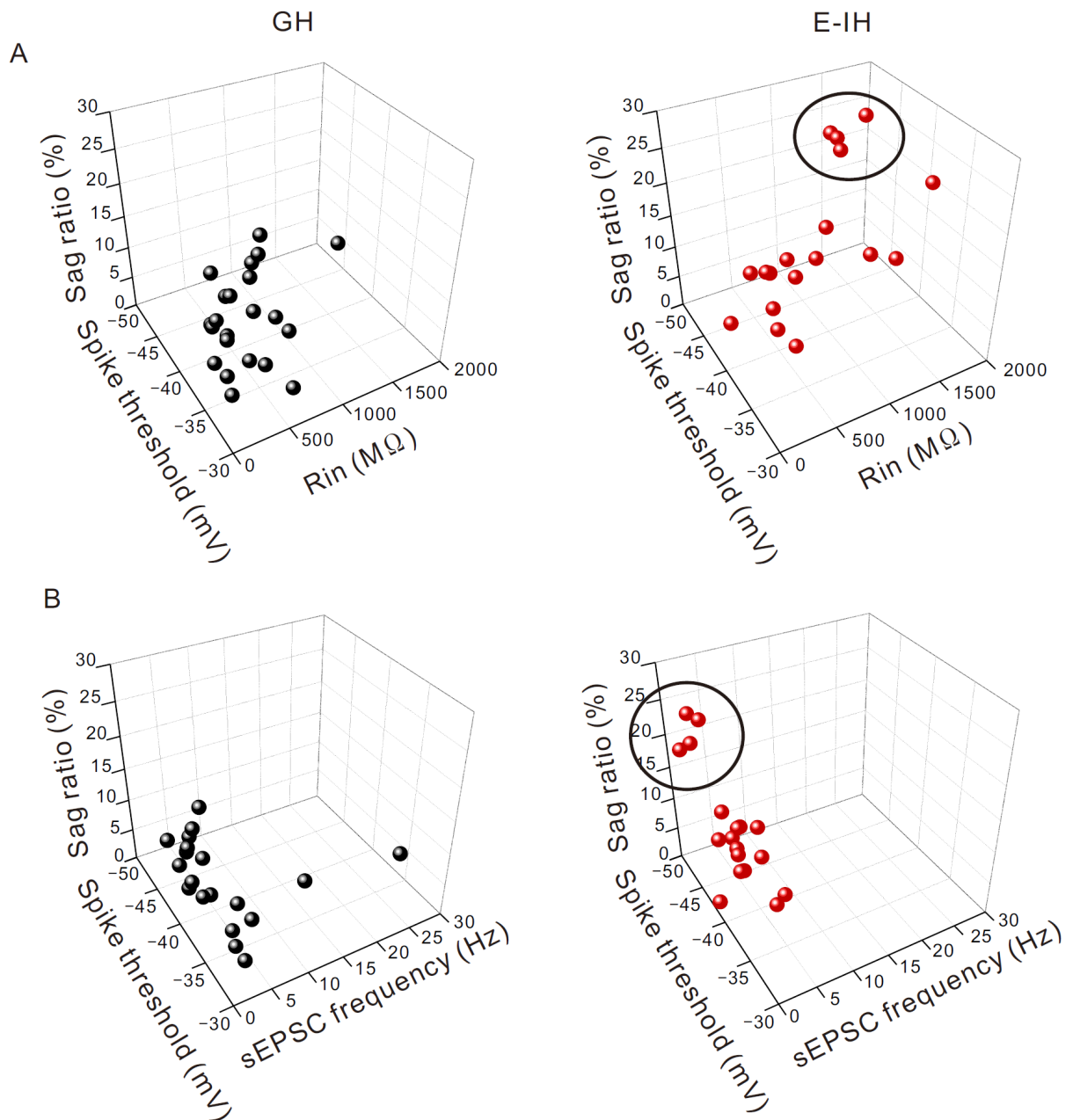
### 1.3 Supplementary Figure 3



**Supplementary Figure 3.** Late social isolation did not alter intrinsic excitability of layer (L) 5 pyramidal cell. **(A)** There was no significant between-group difference in the spike amplitude in prominent h-current (PH) or non-PH cells. However, the spike amplitude in non-PH cells was significantly lower than that in PH cells (2-way analysis of variance (ANOVA), effect of housing,  $F_{(1,106)} = 0.732$ ,  $p = 0.394$ , effect of h-current,  $F_{(1,106)} = 30.05$ ,  $***p < 0.001$ , housing  $\times$  h-current,  $F_{(1,106)} = 0.070$ ,  $p = 0.792$ ). **(B)** There was no significant between-group difference in the spike frequency in PH or non-PH cells. However, the spike number in non-PH cells was significantly lower than that in PH cells (2-way ANOVA, effect of housing,  $F_{(1,106)} = 2.288$ ,  $p = 0.133$ , effect of h-current,  $F_{(1,106)} = 46.95$ ,  $***p < 0.001$ , housing  $\times$  h-current,  $F_{(1,106)} = 0.059$ ,  $p = 0.808$ ). **(C)** There was

no significant between-group difference in the spike threshold in the PH or non-PH cells. However, the spike threshold in non-PH cells was significantly higher than that in PH cells (2-way ANOVA, effect of housing,  $F_{(1,106)} = 0.873$ ,  $p = 0.352$ , effect of h-current,  $F_{(1,106)} = 44.92$ ,  $***p < 0.001$ , housing  $\times$  h-current,  $F_{(1,106)} = 0.781$ ,  $p = 0.379$ ). (Number of cells in A, B, C: 27 non-PH and 27 PH from 6 GH mice: 23 non-PH and 33 PH from 6 L-IH mice) **(D)** There was no significant between-group difference in the sag ratio of L5 pyramidal cells ( $t_{108} = -1.159$ ,  $p = 0.249$ ; Student's t-test). (Number of cells: 54 from 6 GH mice: 56 from 6 L-IH mice) **(E)** There was no significant between-group difference in the input resistance in PH or non-PH cells. However, the input resistance in non-PH cells was significantly higher than that in PH cells (2-way ANOVA, effect of housing,  $F_{(1,106)} = 0.297$ ,  $p = 0.587$ , effect of h-current,  $F_{(1,106)} = 31.74$ ,  $***p < 0.001$ , housing  $\times$  h-current,  $F_{(1,106)} = 0.303$ ,  $p = 0.583$ ). (Number of cells: 27 non-PH and 27 PH from 6 GH mice: 23 non-PH and 33 PH from 6 L-IH mice) **(F)** There was a significant negative correlation between input resistance and sag ratio in both the group-housing (GH) mice (left) and early isolation (L-IH) mice (right) (GH;  $r = -0.538$   $***p < 0.01$ , L-IH;  $r = -0.345$   $*p < 0.05$ ; Pearson correlation). (Number of cells: 54 from 6 GH mice : 56 from 6 L-IH mice)

## 1.4 Supplementary Figure 4



**Supplementary Figure 4.** The social isolation-induced alterations of factors relative to intrinsic excitability simultaneously occur in one fast-spiking (FS) interneuron. **(A)** Each FS interneuron plotted according to their values of spike threshold, sag ratio, and input resistance in a three-dimensional graph. In the early isolation (E-IH) mice (right), there was an FS interneuron subgroup (shown in a circle) that simultaneously had lower spike threshold, larger sag ratio, and higher input resistance, compared with those in the group-housing (GH) mice. **(B)** Each FS interneuron plotted according to their values of spike threshold, sag ratio, and spontaneous excitatory postsynaptic

current (sEPSC) frequency in a three-dimensional graph. In the E-IH mice (right), there is an FS interneuron subgroup (shown in a circle) that simultaneously had lower spike threshold, larger sag ratio, and lower sEPSC frequency, compared with those in the GH mice.