Supplemental Figure 1: Synaptic density. Examples of laser scanning confocal microscopic images of synaptophysin immunoreactivity in the frontal cortex. Control immunoreactivity in **A)** WT and **B)** α7KO mice. **C)** Decreased immunoreactivity in APP mice. **D)** Restored synaptophysin immunoreactivity in the frontal cortex of APPα7KO mice. Scale bar: 20 μm.

Supplemental Figure 2: Dendritic density. Examples of laser scanning confocal microscopic images of MAP2 immunoreactivity in the frontal cortex. Control immunoreactivity in **A)** WT and **B)** α7KO mice. **C)** Decreased immunoreactivity in APP mice. **D)** Restored MAP2 immunoreactivity in the frontal cortex of APPα7KO mice. Scale bar: 20 μm.

Supplemental Figure 3: Astrogliosis. Examples of light microscopic images of GFAP immunoreactivity in the frontal cortex. Control immunoreactivity in **A)** WT and **B)** α7KO mice. **C)** Increased immunoreactivity in APP mice. **D)** Partially restored GFAP immunoreactivity in the frontal cortex of APPα7KO mice. Scale bar: 30 μm.

Supplemental Figure 4: Amyloid deposition and plaques density. Examples of laser scanning confocal microscopic images of Aβ immunoreactivity in the frontal cortex and hippocampus. **A)** and **B)** Absence of plaques in control, WT and α7KO mice, respectively. **C)** and **D)** Similar high levels of plaque load in both, APP and APPα7KO mice, respectively. Scale bar: 100 μm.

Supplemental Figure 5: APP and APPα7KO mice express A) same ratio level of $A\beta_{42}/A\beta_{40}$ in the SDS-soluble fraction and, B) same levels of of $A\beta_{42}$ in the FA-soluble fraction of dissected cortex plus hippocampus. ($p>0.05$).

Supplemental Figure 6: APP and APPα7KO mice express same levels of glutamate receptor subunits NR1 and NR2b in dissected cortex plus hippocampus, assessed by western blot. A) Western blot of total receptor subunits in control (WT and α7KO mice), APP and APPα7KO mice. B) Quantification of immunoblots. Twenty µg per lane of cytosolic and particulate fractions, assayed by the BCA method (Pierce Biotechnology), were loaded into 4-12% SDS-PAGE gels and blotted onto polyvinylidene fluoride (PVDF) membranes. Glutamate receptor subunits were labeled with antibodies against NR1 (mouse monoclonal, Anti-NR1, CT, 1:1000, Millipore, Temecula, CA) and NR2b (rabbit polyclonal, 1:1000, Millipore), followed by secondary antibodies tagged with horseradish peroxidase (1:5000, Santa Cruz Biotechnology, Inc.) and visualized by enhanced chemiluminescence and analyzed with a Versadoc XL imaging apparatus (BioRad). Analysis of actin levels was used as a loading control. ($p>0.05$).