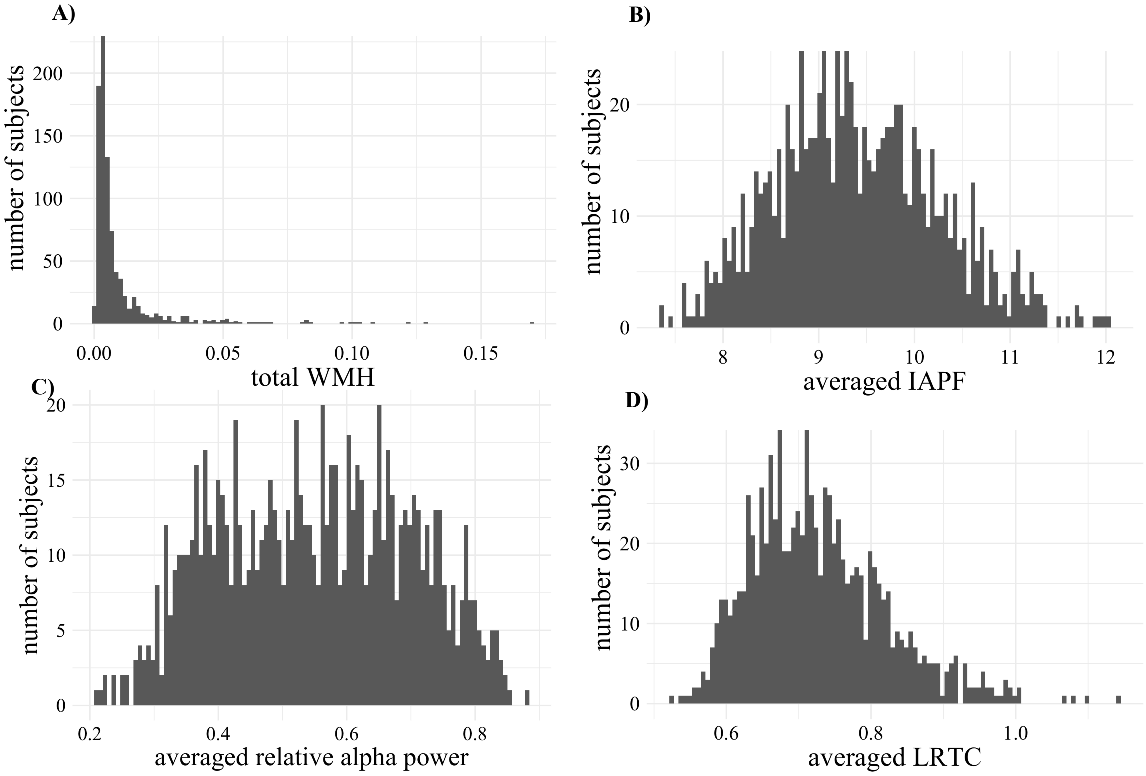
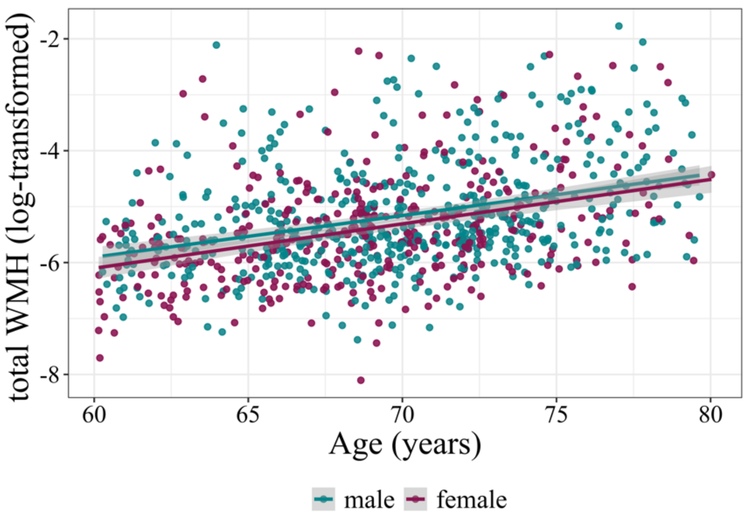
Supplementary Material

All variables are presented as mean (M) ± standard deviation (SD). Before the statistical analyses, we used the Box-Cox method (λ value) (Sakia, 1992) to determine the type transformation on the parameters of alpha oscillations. Since the majority of the variables after the necessary transformation did not pass Shapiro-Wilk normality tests at the 0.05 significance level, we decided to keep the original values.

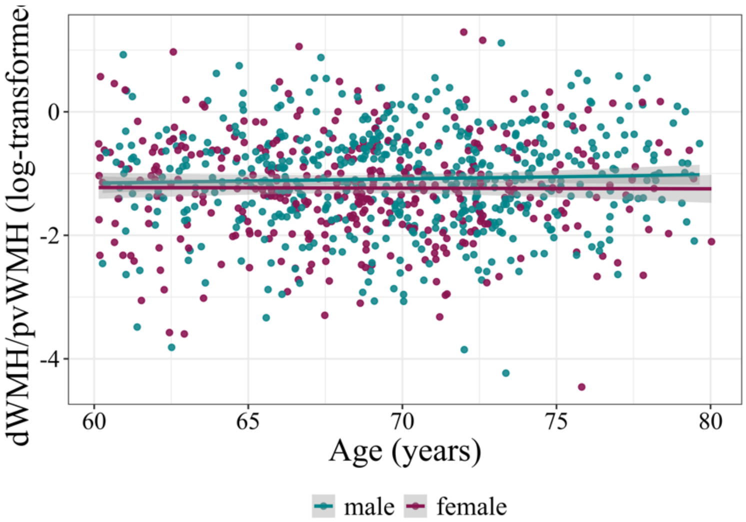
Supplementary Figure 1 (Figure e-1). The four histograms show the distribution of **A)** total white matter hyperintensity (WMH), **B)** averaged individual alpha peak frequency (IAPF), **C)** relative alpha power, and **D)** long-range temporal correlation (LRTC) across 31 EEG channels.



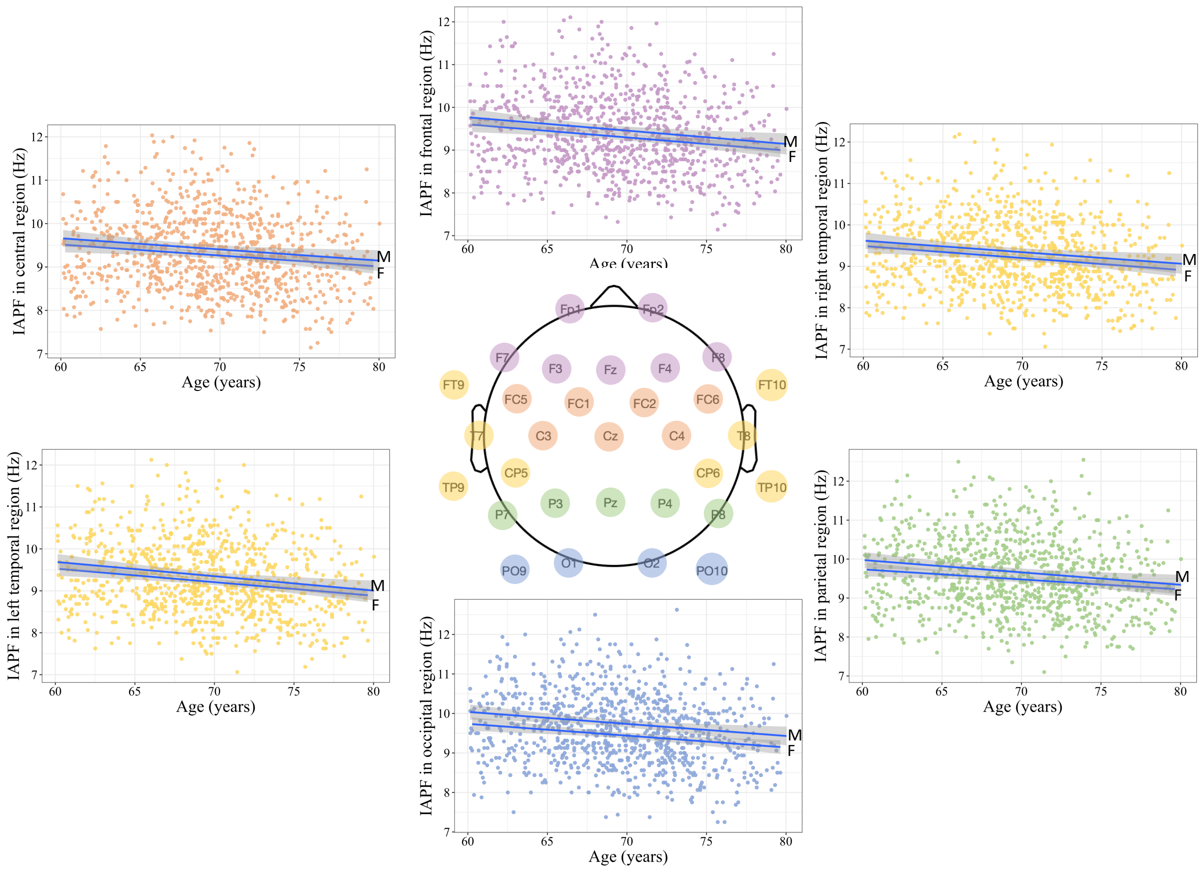
Supplementary Figure 2 (Figure e-2). Association between age (x-axis) and total white matter hyperintensity (WMH, y-axis) in LIFE-Adult sample (N=907). There was a significant correlation between age and total WMH (overall, r = 0.374, p < 0.001; females, r = 0.376, p < 0.001; males, r = 0.355, p < 0.001)



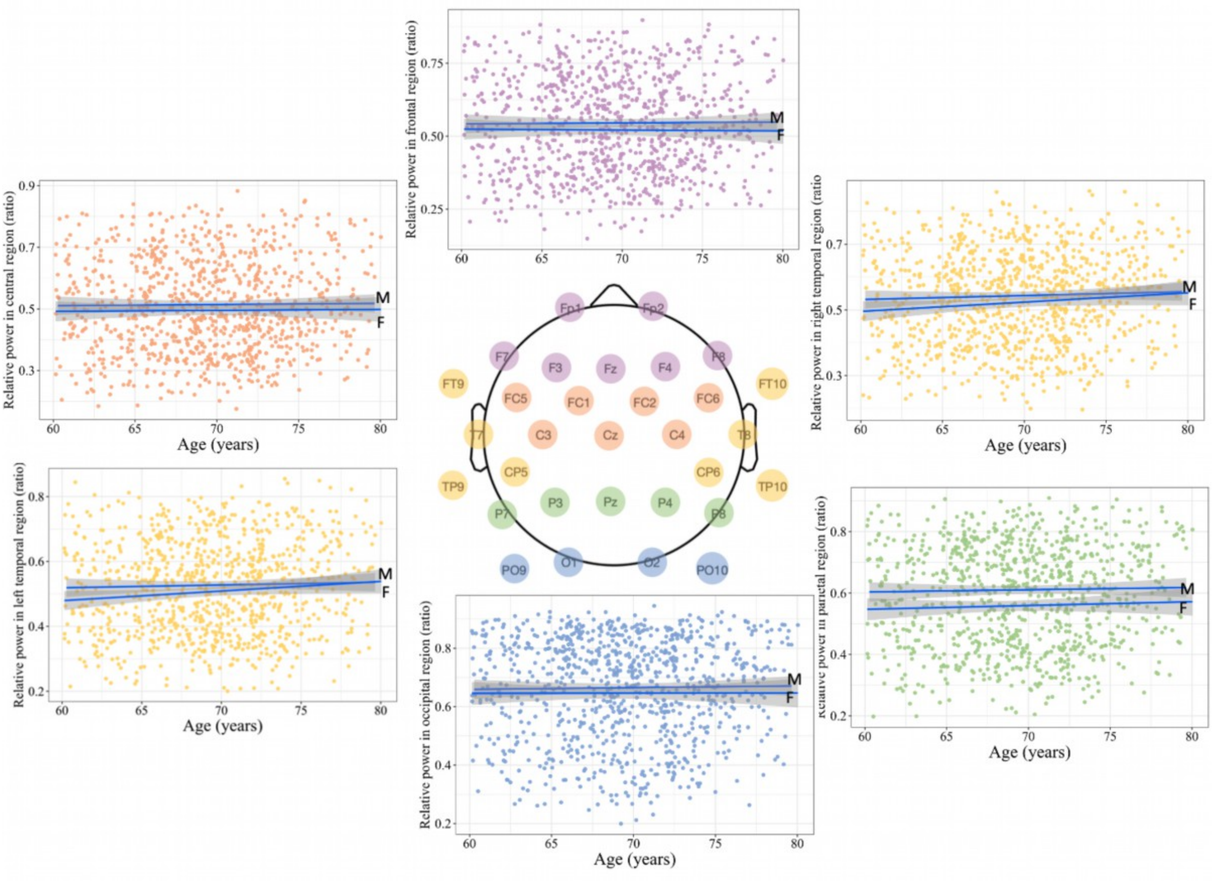
Supplementary Figure 3 (Figure e-3). Association between age (x-axis) and regional white matter hyperintensity as the ratio of deep WMH and periventricular WMH (y-axis) in LIFE-Adult sample (N=907) (overall, r = 0.03; females, r = -0.005; males, r = 0.038, p >0.05)



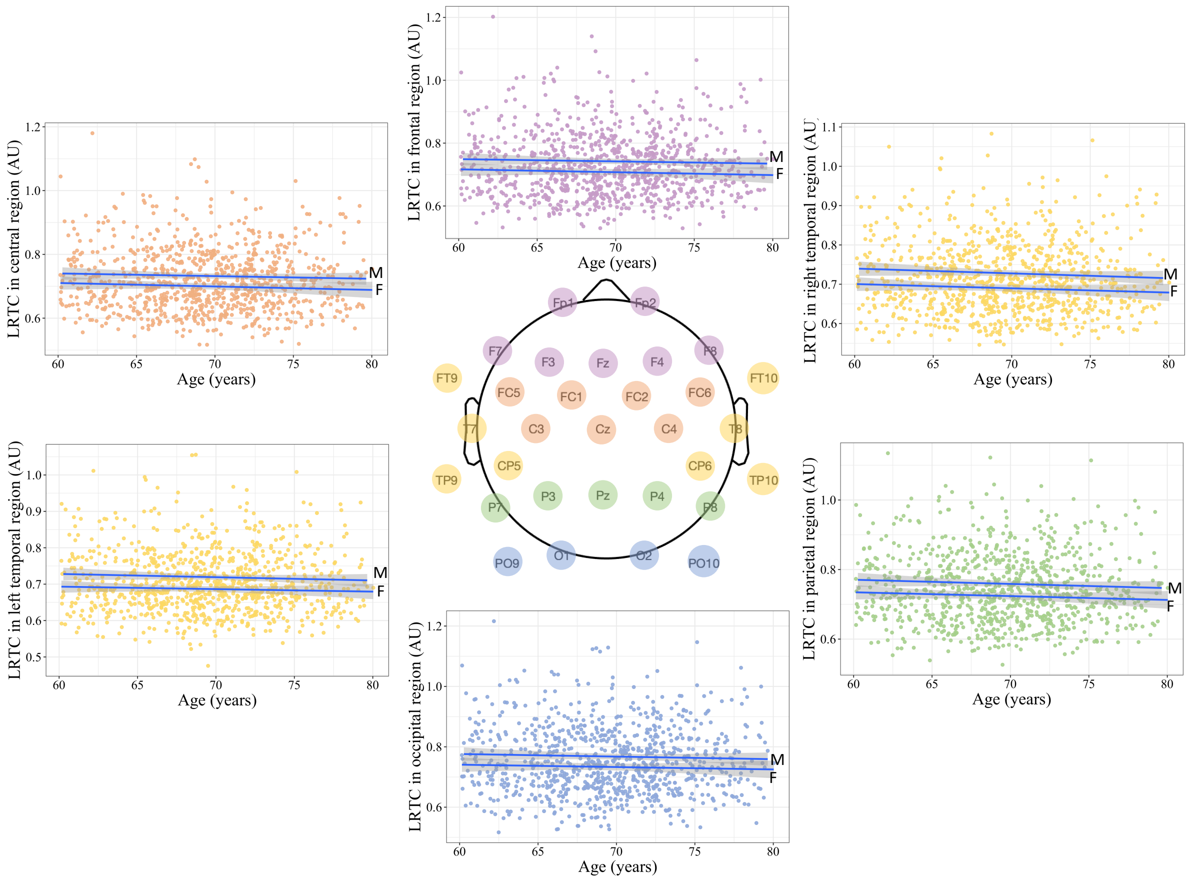
Supplementary Figure 4 (Figure e-4). Association between age (x-axis) and individual alpha peak frequency (IAPF, y-axis) in EEG different regions. The correlations between two measures were significant after FDR correction (frontal, r = -0.17, females, r = -0.15, males, r = -0.16; central, r = -0.14; females, r = -0.13, males, r = -0.13, left temporal, r = -0.17, females, r = -0.17, males, r = -0.17; right temporal, r = -0.16, females, r = -0.14; males, r = -0.16; parietal, r = -0.15, females, r = -0.15, males, r = -0.13; occipital, r = -0.17, females, r = -0.15, males, r = -0.15). None of the pairwise correlations differed from each other. Abbr.: F- female, M-male



Supplementary Figure 5 (Figure e-5). Association between age (x-axis) and relative alpha power (y-axis) in different EEG regions. The correlations between two measures were not significant after FDR correction (frontal, r = 0.010, females, r = -0.008, males, r = 0.008; central, r = 0.010; females, r = 0.019, males, r = 0.012, left temporal, r = 0.068, females, r = 0.098, males, r = 0.027; right temporal, r = 0.071, females, r = 0.090; males, r = 0.040; parietal, r = 0.03, females, r = 0.03, males, r = 0.02; occipital, r = 0.016, females, r = 0.001, males, r = 0.016). None of the pairwise correlations differed from each other. Abbr.: F- female, M-male



Supplementary Figure 6 (Figure e-6). Association between age (x-axis) and scaling exponent for long-range temporal correlations (LRTC, y-axis) in different EEG regions. Association between age (x-axis) and relative alpha power (y-axis) in different regions (represented in different colors). The correlations between two measures were not significant after FDR correction (frontal, r = -0.02, females, r = -0.04, males, r = -0.04; central, r = -0.03; females, r = -0.05, males, r = -0.04, left temporal, r = -0.02, females, r = -0.04, males, r = -0.05; right temporal, r = -0.04, females, r = -0.06; males, r = -0.07; parietal, r = -0.05, females, r = -0.04, males, r = -0.06; occipital, r = -0.02, females, r = -0.03, males, r = -0.03). None of the pairwise correlations differed from each other. Abbr.: F- female, M-male



Supplementary Figure 7 (Figure e-7). Grand-average topographic maps of alpha band measures in EEG.

A) Individual alpha peak frequency; **B)** Relative alpha power; **C)** Long-range temporal correlations. **D)** Grand-average of relative alpha power at EEG source space across 68 regions based on Desikan-Killiany Atlas.