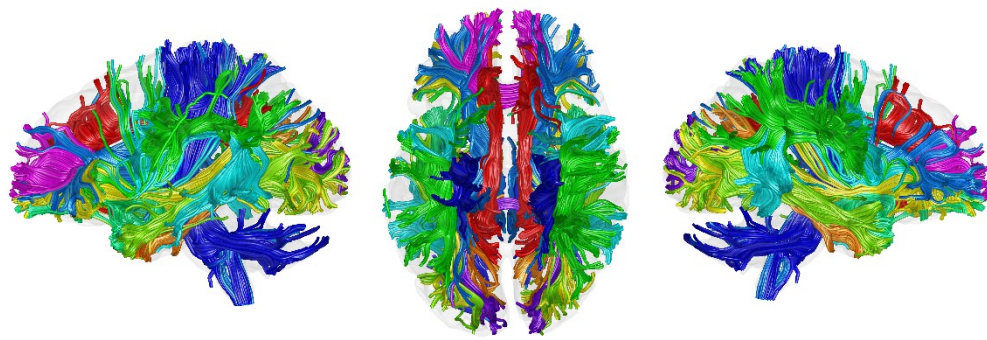
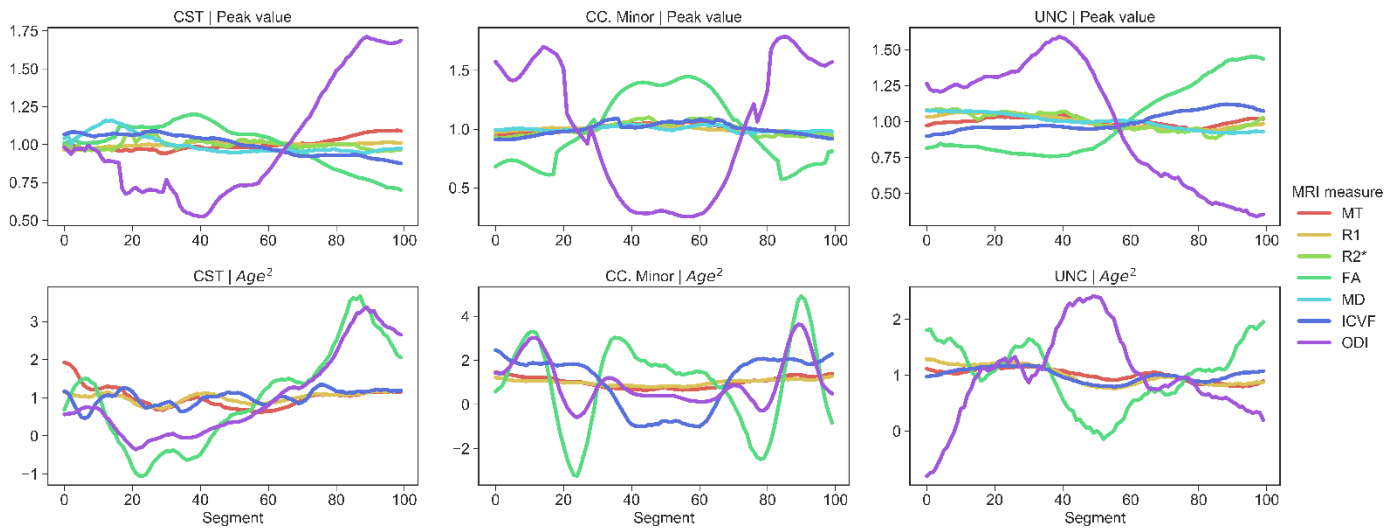


Supplementary Figure 1. Correlational relationships across tissue measurements in three example tracts. Pearson correlations (left) and partial-correlations (right) were estimated across subjects in the cingulum cingulate, cortico-spinal tract and uncinate fasciculus for all tract-parameter combinations.

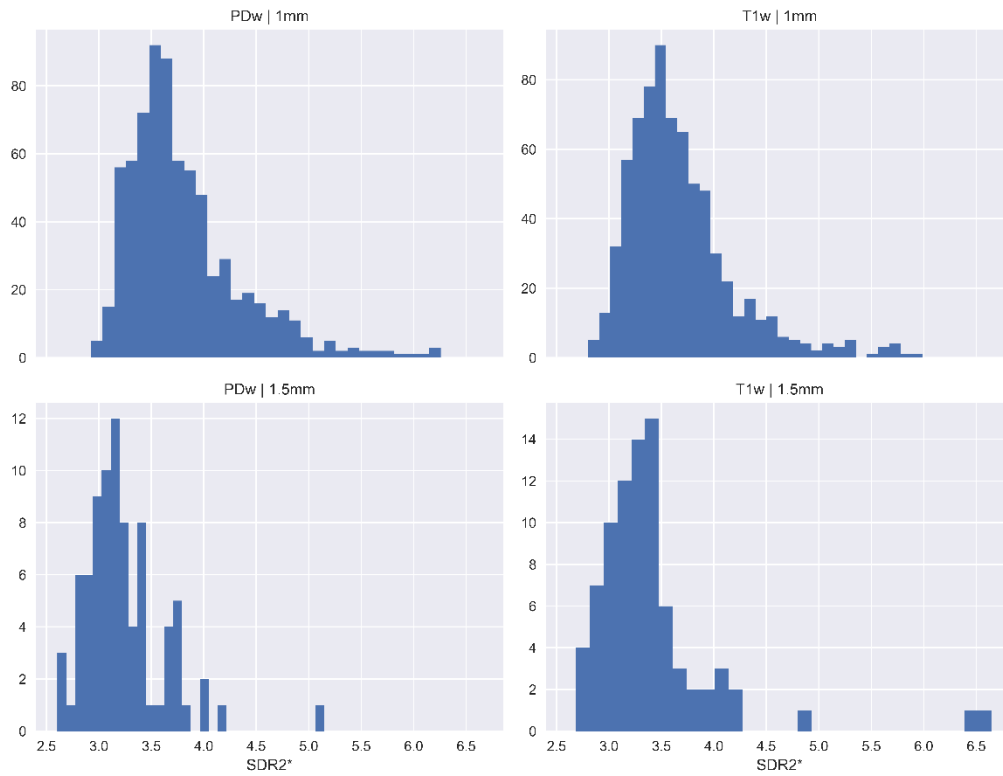


- | | |
|------------------------|--------------------------|
| ● Cingulum Cingulate | ● Arcuate |
| ● Cingulum Hippocampus | ● Thalamic Radiation |
| ● IFOF | ● Corticospinal Tract |
| ● ILF | ● Callosum Forceps Major |
| ● SLF | ● Callosum Forceps Minor |
| ● Uncinate | |

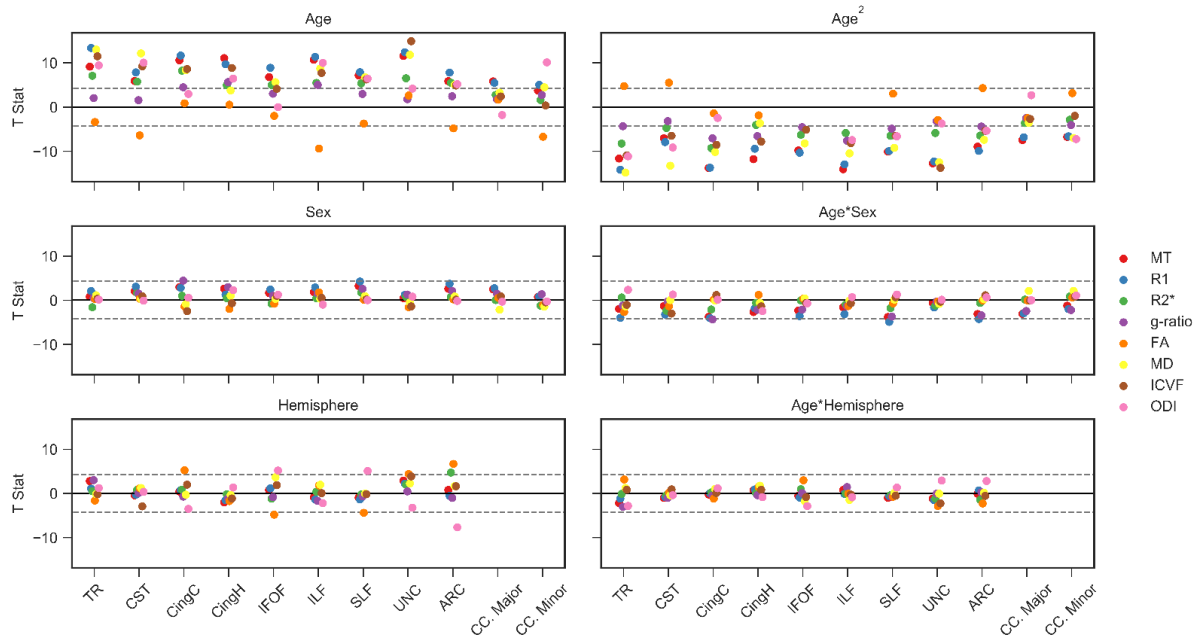
Supplementary Figure 2. Tract segmentations in a representative individual. Tracts dissected using an automated fibre identification procedure on whole brain tractograms. Tracts are rendered in left-lateral, superior and right-lateral views.



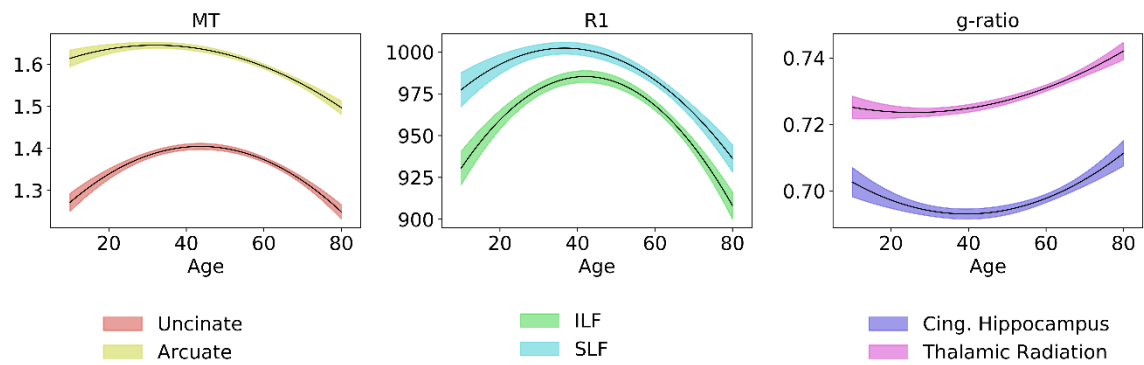
Supplementary Figure 3. Consistency of aging parameters along tract profiles. MRI tissue measurements were sampled along the length of three representative tracts (the cortico-spinal, corpus callosum forceps minor and the uncinata fasciculus) before fitting the same aging models used to fit the tract averaged measures. Peak value and Age^2 (quadratic aging) effects at each segment along a tract were normalised by the average estimate along the tract length, providing a measure of deviation from the tract average at any point along the length.



Supplementary Figure 4. SDR2* values in white matter computed from the PDw and T1w data in the 1mm and 1.5mm datasets. This parameter is a measure of intra-scan motion artefact, validated against the history of the motion during the scans. SDR2* values below $4s^{-1}$ are typically observed in the absence of head motion at $1.5mm^3$ resolutions and below $4.35s^{-1}$ at $1mm^3$ resolution.



Supplementary Figure 5. Tissue measurement associations with age, sex and hemisphere in all subjects imaged at the higher resolution ($n = 718$). GLMs were used to estimate T-statistics for MT, R1, R2*, g-ratio, FA, MD, ICVF and ODI with age, sex, hemisphere and their interactions with age. Associations were highly consistent to models results when including the additional low-resolution subjects (see Fig. 7). Male and left hemisphere coded as 0. The valence of the g-ratio and MD associations have been reflected for visualization purposes across each of the panels. Horizontal dashed grey lines display the FWE-corrected significance level at $p \leq 0.001$.



Supplementary Figure 6. Side-by-side comparisons of tract aging trajectories for three example tissue measures. The data used to visualize these curves is the same as that used in Figures 3-6. We provide these additional representations to help highlight the differences in maturational timing and extent for the aging curves of different white matter tracts. Cing. Hippocampus: cingulum-hippocampus; SLF: superior longitudinal fasciculus; ILF: inferior longitudinal fasciculus; UNC: uncinata fasciculus; ARC: arcuate fasciculus.