Supplementary Table 1. Correlations between age and cognitive function (partial r, adjusted for education), between age and global RSI metrics (Pearson’s correlation), and between global RSI metrics and cognitive test scores (partial r, adjusted for education), stratified by sex.

|                  | Women          | Men            |
|------------------|----------------|----------------|
|                  | Age 3MS Trails B BDR VRD LMD | Age 3MS Trails B BDR VRD LMD |
| White matter fibers |               |               |
| Age              | -0.50 -0.52* -0.63 -0.40 | -0.21 0.37 -0.12 -0.41 -0.47 |
| RI -0.70*        | 0.30 -0.42 0.46* 0.52 0.33 | -0.48 0.27 -0.47 -0.02 0.42 0.33 |
| ND -0.60*        | 0.32 -0.36 0.37* 0.51 0.35 | -0.29 0.27 -0.37 -0.07 0.34 0.20 |
| IF 0.72          | -0.47 0.49 -0.48* -0.60 -0.36 | 0.52 -0.36 0.46 -0.06 -0.56 -0.45 |
| RI -0.70         | 0.30 -0.36 0.34 0.49 0.30 | -0.37 0.28 -0.45 0.06 0.49 0.25 |
| ND -0.16         | 0.16 -0.06 0.11 0.22 0.14 | 0.12 0.10 -0.28 0.09 0.38 0.09 |
| IF 0.77*         | -0.46 0.51 -0.35 -0.59 -0.35 | 0.46 -0.41 0.46 -0.20 -0.60 -0.38 |
| HI -0.72*        | 0.47 -0.53 0.31 0.55 0.34 | -0.49 0.47 -0.39 0.27 0.57 0.38 |

Bold values indicate r>0.50.
* p<0.05 for sex difference (Fisher r-to-z transformation).
BDR, Buschke delayed recall; HI, hindered isotropic; IF, isotropic free water; LMD, logical memory delayed recall; ND, neurite density; RI, restricted isotropic; VRD, visual reproduction delayed recall.

Supplementary Table 2. Correlations between cognitive function and global RSI metrics (partial r), adjusted for education, marital status (unmarried/married), and living status (alone/cohabitating) for women.

|                  | 3MS | Trails B | BDR | VRD | LMD |
|------------------|-----|----------|-----|-----|-----|
| White matter fibers |     |          |     |     |     |
| RI               | 0.18 | -0.38    | 0.40 | 0.46 | 0.30 |
| ND               | 0.20 | -0.28    | 0.29 | 0.46 | 0.32 |
| IF               | -0.33 | 0.39    | -0.40 | -0.54 | -0.31 |
| RI               | 0.22 | -0.33 | 0.29 | 0.45 | 0.27 |
| Gray matter      |     |          |     |     |     |
| ND               | 0.10 | 0.01    | 0.06 | 0.19 | 0.11 |
| IF               | -0.37 | 0.46    | -0.27 | -0.55 | -0.31 |
| HI               | 0.37 | -0.47 | 0.23 | 0.51 | 0.29 |

Bold values indicate r>0.50.
Analyses for men were not conducted due to the low number (5%) of men who were unmarried or living alone.
BDR, Buschke delayed recall; HI, hindered isotropic; IF, isotropic free water; LMD, logical memory delayed recall; ND, neurite density; RI, restricted isotropic; VRD, visual reproduction delayed recall.
Supplementary Table 3. Partial correlations (partial $r$) between hippocampal and fiber tract RSI metrics and cognitive test scores, for immediate recall measures.

| Region                  | Measure | Women BTR  | Women VRI | Women LMI | Men BTR | Men VRI | Men LMI |
|-------------------------|---------|------------|-----------|-----------|---------|---------|---------|
| Hippocampus             | RI      | 0.27       | 0.31      | 0.15      | -0.06   | 0.18    | 0.09    |
|                         | ND      | 0.31 †     | 0.43      | 0.24      | -0.19   | 0.20    | 0.08    |
|                         | IF      | -0.44      | -0.22     | -0.31     | -0.17   | -0.25   | -0.56 * |
|                         | HI      | 0.28       | 0.03      | 0.20      | 0.23    | 0.18    | 0.44    |
| Fornix                  | RI      | 0.47 †     | 0.48      | 0.21      | 0.05    | 0.43 *  | 0.36    |
|                         | ND      | 0.36 †     | 0.46      | 0.19      | 0.01    | 0.36    | 0.38    |
|                         | IF      | -0.50 †    | -0.47     | -0.24     | -0.11   | -0.46 * | -0.44   |
| Cingulum                | RI      | 0.36 †     | 0.50      | 0.24      | -0.09   | 0.35    | 0.26    |
|                         | ND      | 0.17       | 0.03      | 0.20      | 0.04    | 0.33    | 0.05    |
|                         | IF      | -0.08      | -0.14     | -0.08     | -0.10   | -0.35   | -0.46 * |
| Parahippocampal Cingulum| RI      | 0.21       | 0.33      | 0.15      | -0.05   | 0.21    | 0.07    |
|                         | ND      | 0.10       | 0.24      | 0.11      | -0.25 † | -0.02   | -0.04   |
|                         | IF      | -0.18      | -0.08     | -0.06     | -0.19   | -0.34   | -0.33   |
| CST                     | RI      | 0.43 †     | 0.41      | 0.22      | -0.06   | 0.27    | 0.10    |
|                         | ND      | 0.08       | 0.26      | 0.16      | -0.06   | 0.12    | 0.17    |
|                         | IF      | -0.34 †    | -0.49     | -0.23     | 0.05    | -0.31   | -0.30   |
| ATR                     | RI      | 0.39 †     | 0.52      | 0.28      | -0.10   | 0.30    | 0.25    |
|                         | ND      | 0.37 †     | 0.41      | 0.25      | -0.11   | 0.25    | 0.21    |
|                         | IF      | -0.50 †    | -0.53     | -0.32     | -0.15   | -0.39   | -0.34   |
| Uncinate                | RI      | 0.30 †     | 0.44      | 0.26      | -0.14   | 0.23    | 0.15    |
|                         | ND      | 0.26       | 0.32      | 0.27      | 0.04    | 0.24    | 0.09    |
|                         | IF      | -0.45 †    | -0.39     | -0.35     | 0.00    | -0.26   | -0.31   |
| ILF                     | RI      | 0.31 †     | 0.38      | 0.22      | -0.03   | 0.33    | 0.19    |
|                         | ND      | 0.28       | 0.28      | 0.23      | -0.01   | 0.22    | 0.15    |
|                         | IF      | -0.38 †    | -0.42     | -0.25     | 0.01    | -0.40 * | -0.43 * |
| IFO                     | RI      | 0.37 †     | 0.47      | 0.28      | -0.11   | 0.26    | 0.16    |
|                         | ND      | 0.34       | 0.38      | 0.31      | 0.05    | 0.20    | 0.23    |
|                         | IF      | -0.44 †    | -0.53     | -0.26     | -0.10   | -0.38   | -0.39   |
| Forceps major           | RI      | 0.35 †     | 0.48      | 0.20      | 0.00    | 0.27    | 0.18    |
|                         | ND      | 0.35       | 0.38      | 0.30      | 0.18    | 0.48 *  | 0.27    |
|                         | IF      | -0.48 †    | -0.54     | -0.24     | -0.11   | -0.42   | -0.40   |
| Forceps minor           | RI      | 0.42 †     | 0.41      | 0.32      | -0.19   | 0.28    | 0.24    |
|                         | ND      | 0.41 †     | 0.47      | 0.34      | -0.16   | 0.29    | 0.23    |
|                         | IF      | -0.47 †    | -0.40     | -0.36     | 0.04    | -0.26   | -0.32   |
| CC                      | RI      | 0.45 †     | 0.51      | 0.33      | -0.02   | 0.40 *  | 0.24    |
|                         | ND      | 0.42 †     | 0.51      | 0.35      | 0.08    | 0.43 *  | 0.25    |
|                         | IF      | -0.48 †    | -0.55     | -0.31     | -0.06   | -0.48 * | -0.33   |
| SLF                     | RI      | 0.35       | 0.35      | 0.28      | 0.08    | 0.33    | 0.25    |
|                         | ND      | 0.19       | 0.16      | 0.36      | 0.15    | 0.23    | 0.19    |
|                         | IF      | -0.25      | -0.34     | -0.26     | -0.12   | -0.39   | -0.34   |
| SCS                     | RI      | 0.42 †     | 0.44      | 0.30      | 0.09    | 0.34    | 0.20    |
|                         | ND      | 0.04       | 0.21      | 0.20      | 0.02    | -0.02   | -0.07   |
|                         | IF      | -0.32      | -0.47     | -0.28     | -0.02   | -0.30   | -0.17   |
| SIFC                    | RI      | 0.39 †     | 0.53      | 0.34      | -0.10   | 0.34    | 0.28    |
|                         | ND      | 0.21       | 0.26      | 0.30 †    | -0.01   | 0.04    | -0.06   |
|                         | IF      | -0.36      | -0.44     | -0.32     | -0.08   | -0.19   | -0.21   |
| IFSFC                   | RI      | 0.40 †     | 0.40      | 0.30      | 0.06    | 0.46 *  | 0.26    |
|                         | ND      | 0.31       | 0.34      | 0.31      | 0.09    | 0.23    | 0.16    |
|                         | IF      | -0.32      | -0.41     | -0.27     | -0.05   | -0.33   | -0.23   |

Bold values indicate $r>0.50$ (p<0.001).
* $r>0.30$ after adjustment for age.
† $p<0.05$ for sex difference (Fisher r-to-z transformation).
ATR, anterior thalamic radiation; BTR, Buschke total recall; CC, corpus callosum; CST, corticospinal tract; HC, hippocampus; HI, hindered isotropic; IF, isotropic free water; IFO, inferior fronto-occipital; IFSF, inferior frontal superior frontal; ILF, inferior longitudinal fasciculus; LMI, logical memory immediate recall; ND, neurite density; RI, reduced isotropic; SCS, superior corticostriatial; SIF, striatal inferior frontal; SLF, superior longitudinal fasciculus; VRI, visual reproduction immediate recall.