Supplemental Table 1. Mean and standard deviations for observed cognitive variables by treatment group.

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|  | **Balance and Tone** | **Once-weekly Resistance Training** | **Twice-weekly Resistance Training** |
|  | Baseline | Post-intervention | Two-year follow-up | Baseline | Post-intervention | Two-year follow-up | Baseline | Post-intervention | Two-year follow-up |
|  | N = 49 | N = 42 | N = 31 | N = 54 | N = 47 | N = 37 | N = 52 | N = 46 | N = 41 |
| **Memory variables** |
| Immediate recall | 9.4±2.9 | 9.8±3.1 | 9.4±3.6 | 8.9±3.2 | 9.3±3.1 | 9.6±3.5 | 8.5±3.1 | 9.0±2.9 | 9.5±2.4 |
| Delayed recall | 9.5±2.7 | 10.1±3.1 | 9.1±3.6 | 8.9±3.2 | 8.8±2.9 | 9.6±3.8 | 8.1±3.0 | 9.2±3.0 | 9.5±2.8 |
| Recognition | 13.4±1.5 | 14.1±1.1 | 13.7±1.2 | 13.5±1.9 | 13.7±1.3 | 13.6±2.6 | 13.3±1.9 | 13.3±2.7 | 13.7±1.7 |
| **Executive function variables** |
| DSST | 33±8 | 35±5 | 35±5 | 33±7 | 35±7 | 36±8 | 32±7 | 33±7 | 34±7 |
| Stroop I-N | 44±15 | 44±19 | 45±16 | 47±26 | 40±14 | 40±16 | 45±16 | 41±15 | 46±27 |
| TMT B-A | 47±41 | 36±22 | 38±25 | 41±29 | 34±27 | 32±38 | 50±37 | 38±33 | 44±37 |
| B-digits | 4.6±2.9 | 4.3±2.1 | 4.5±2.1 | 4.5±2.4 | 4.6±2.4 | 5.1±2.0 | 4.4±2.0 | 4.6±1.9 | 5.1±2.1 |
| *Completers Only* |
|  | N = 31 | N = 31 | N = 31 | N = 38 | N = 38 | N = 38 | N = 41 | N = 41 | N = 41 |
| **Memory variables** |
| Immediate recall | 9.0±3.0 | 9.6±3.0 | 9.4±3.6 | 9.1±3.3 | 9.1±3.1 | 9.6±3.5 | 8.1±3.1 | 8.9±3.0 | 9.5±2.4 |
| Delayed recall | 9.5±2.5 | 10.0±3.0 | 9.1±3.6 | 9.2±3.1 | 8.8±3.0 | 9.6±3.8 | 7.9±3.0 | 9.0±3.0 | 9.5±2.8 |
| Recognition | 13.5±1.2 | 14.2±1.1 | 13.7±1.2 | 13.4±2.1 | 13.5±1.5 | 13.6±2.6 | 13.2±2.1 | 13.2±2.8 | 13.7±1.7 |
| **Executive function variables** |
| DSST | 34±8 | 35±5 | 35±5 | 34±8 | 35±7 | 36±8 | 33±6 | 33±7 | 34±7 |
| Stroop I-N | 45±15 | 44±19 | 45±16 | 47±26 | 40±14 | 40±16 | 46±15 | 41±15 | 46±27 |
| TMT B-A | 50±40 | 36±21 | 38±25 | 41±27 | 35±29 | 32±38 | 48±30 | 37±33 | 44±37 |
| B-digits | 4.0±2.6 | 4.1±1.9 | 4.5±2.1 | 4.6±2.6 | 4.6±2.4 | 5.1±2.0 | 4.4±2.1 | 4.7±1.9 | 5.1±2.1 |

*Notes.* DSST = digit symbol substitution test. Stroop I-N = Stroop performance on the incongruent condition minus performance on the neutral condition (time in seconds). TMT B-A = Trail Making Test Part B minus Part A (time in seconds). B-digits = backward digit span.Supplemental Table 2. Mean and standard deviations for cortical and hippocampal volume by treatment group.

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|  | **Balance and Tone** | **Once-weekly Resistance Training** | **Twice-weekly Resistance Training** |
|  | Baseline | Post-intervention | Two-year follow-up | Baseline | Post-intervention | Two-year follow-up | Baseline | Post-intervention | Two-year follow-up |
|  | N = 25 | N = 18 | N = 8 | N = 32 | N = 29 | N = 10 | N = 26 | N = 21 | N = 9 |
| Cortical GM | 409.2±38.8 | 401.3±39.7 | 408.0±43.4 | 414.2±32.0 | 408.0±33.3 | 415.8±27.6 | 430.6±36.4 | 430.7±33.9 | 442.5±28.8 |
| Cortical WM1 | 391.9±42.6 | 387.5±47.2 | 376.2±30.8 | 390.7±47.2 | 390.7±46.1 | 388.3±46.1 | 414.2±48.5 | 419.7±41.9 | 433.2±49.4 |
| R Hippocampus | 3.72±0.38 | 3.72±0.36 | 3.72±0.36 | 3.79±0.37 | 3.79±0.38 | 3.89±0.33 | 3.85±0.46 | 3.91±0.42 | 4.08±0.43 |
| L Hippocampus | 3.63±0.32 | 3.62±0.34 | 3.58±0.32 | 3.66±0.41 | 3.69±0.41 | 3.82±0.41 | 3.66±0.48 | 3.76±0.44 | 3.85±0.45 |
| *Completers Only* |
|  | N = 8 | N = 8 | N = 8 | N = 10 | N = 10 | N = 10 | N = 9 | N = 9 | N = 9 |
| Cortical GM | 406.7±47.1 | 402.5±47.2 | 408.0±43.4 | 420.8±26.7 | 417.1±26.8 | 415.8±27.6 | 445.2±31.0 | 442.4±31.9 | 442.5±28.8 |
| Cortical WM1 | 384.5±36.7 | 385.4±35.3 | 376.2±30.8 | 394.8±49.0 | 394.3±46.8 | 388.3±46.1 | 436.8±48.3 | 435.0±49.4 | 433.2±49.4 |
| R Hippocampus | 3.67±0.29 | 3.72±0.31 | 3.72±0.36 | 3.84±0.32 | 3.90±0.33 | 3.89±0.33 | 4.07±0.43 | 4.08±0.35 | 4.08±0.43 |
| L Hippocampus | 3.60±0.24 | 3.58±0.24 | 3.58±0.32 | 3.80±0.44 | 3.82±0.38 | 3.82±0.41 | 3.87±0.47 | 3.86±0.44 | 3.85±0.45 |

*Notes:* 1White matter hypo-intensities have been subtracted out of the cortical white matter volumes.

GM = gray matter. WM = white matter.

Supplemental Table 3. Mean and standard deviations for observed peak muscle power by treatment group.

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|  | **Balance and Tone** | **Once-weekly Resistance Training** | **Twice-weekly Resistance Training** |
|  | Baseline | Post-intervention | Two-year follow-up | Baseline | Post-intervention | Two-year follow-up | Baseline | Post-intervention | Two-year follow-up |
|  | N = 33 | N = 24 | N = 19 | N = 33 | N = 27 | N = 21 | N = 33 | N = 25 | N = 21 |
| **Muscle function** |
| Peak power (watts) | 660±226 | 552±190 | 658±217 | 679±181 | 622±201 | 632±165 | 625±191 | 708±158 | 694±177 |
| *Completers Only* |
|  | N = 16 | N = 16 | N = 16  | N = 17 | N = 17  | N = 17  | N = 17 | N = 17 | N = 17 |
| **Muscle function** |
| Peak power (watts) | 705±277 | 591±199 | 666±232 | 713±193 | 638±197 | 610±164 | 679±170 | 730±168 | 687±174 |

Supplemental Table 4. Short- and long-term resistance training effects on change in cognition and brain volume using 2-year follow-up completers only.

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|  | **Outcome: Latent EF (n = 109)** |
|  | Latent change at post-intervention | Latent change at two-year follow-up |
| Predictor | Standardized difference (SE) | *p* value | Standardized difference (SE) | *p* value |
| Baseline EF | -.07 (.09) | .421 | .07 (.12) | .559 |
| 1XRT | .34 (.13) | .011 | .52 (.16) | .001a |
| 2XRT | .28 (.13) | .035 | .37 (.11) | .001a |
|  | **Outcome: Latent Memory (n = 107)** |
|  | Latent change at post-intervention | Latent change at two-year follow-up |
| Baseline memory | -.37 (.11) | .001 | -.29 (.11) | .012 |
| 1XRT | -.03 (.16) | .872 | .24 (.18) | .175 |
| 2XRT | .27 (.18) | .138 | .51 (.15) | .001a |
|  | **Outcome: Cortical GM (n = 27)** |
|  | Latent change at post-intervention | Change at two-year follow-up |
| Baseline GM | .19 (.29) | .513 | -.36 (.29) | .212 |
| Baseline ICV | -.38 (.30) | .212 | .02 (.31) | .947 |
| 1XRT | .12 (.27) | .669 | -.27 (.23) | .242 |
| 2XRT | .18 (.31) | .570 | -.04 (.25) | .870 |
|  | **Outcome: Cortical WM (n = 27)** |
|  | Latent change at post-intervention | Change at two-year follow-up |
| Baseline WM | -.28 (.28) | .275 | -.32 (.20) | .107 |
| Baseline ICV | -.001 (.21) | .211 | -.14 (.18) | .417 |
| 1XRT | -.14 (.28) | .276 | .21 (.19) | .263 |
| 2XRT | -.18 (.34) | .337 | .56 (.20) | .004a |
|  | **Outcome: Left Hippocampus (n = 27)** |
|  | Latent change at post-intervention | Change at two-year follow-up |
| Baseline Left HC | -.48 (.14) | .001 | -.19 (.14) | .184 |
| Baseline ICV | -.12 (.17) | .470 | -.03 (.16) | .849 |
| 1XRT | .38 (.15) | .010 | .22 (.24) | .380 |
| 2XRT | .28 (.18) | .121 | .10 (.21) | .641 |
|  | **Outcome: Right Hippocampus (n = 27)** |
|  | Latent change at post-intervention | Change at two-year follow-up |
| Baseline Right HC | -.47 (.20) | .019 | -.18 (.22) | .426 |
| Baseline ICV | -.07 (.22) | .758 | .19 (.20) | .344 |
| 1XRT | .11 (.21) | .589 | -.06 (.26) | .831 |
| 2XRT | .03 (.20) | .874 | -.16 (.27) | .550 |
|  | **Outcome: Peak Muscle Power (n = 52)** |
|  | Latent change at post-intervention | Latent change at two-year follow-up |
| Baseline power | -.45 (.08) | <.001 | -.46 (.11) | <.001 |
| 1XRT | .15 (.14) | .271 | -.18 (.14) | .219 |
| 2XRT | .49 (.09) | <.001a | .16 (.11) | .169 |

*Notes.* Positive standardized difference scores favour the resistance treatment. *P* value represents the proportion of the posterior distribution below zero (for positive difference scores) or above zero (for negative difference scores).

1XRT = effect of once-weekly resistance training compared to balance-and-tone training.

2XRT = effect of twice-weekly resistance training compared to balance-and-tone training.

BL = baseline. EF = executive function. GM = gray matter. HC = hippocampus.

ICV = intracranial volume. WM = white matter.

a Significant after using Benjamini-Hochberg false discovery rate correction for 14 tests per treatment contrast (i.e., 1xRT versus BAT and 2xRT versus BAT).