**Mayo Normative Studies: Regression-Based Normative Data for Ages 30–91 Years with a Focus on the Boston Naming Test, Trail Making Test and Category Fluency**

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Supplemental Online Resources

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**Supplemental Table 1.** Demographic and cognitive variables by age; mean (SD) or count (percent).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | 30-39(N=214) | 40-49(N=210) | 50-59(N=610) | 60-69(N=916) | 70-79(N=1655) | 80-91(N=823) | Total(N=4428) |
| Age, years | 35.4 (2.6) | 44.9 (2.9) | 54.9 (2.7) | 65.0 (2.8) | 74.5 (2.6) | 83.8 (2.8) | 68.3 (13.1) |
| Sex (Male) | 110, 51.4% | 113, 53.8% | 311, 51.0% | 449, 49.0% | 840, 50.8% | 388, 47.1% | 2211, 49.9% |
| Education, years | 15.8 (2.0) | 15.7 (2.2) | 15.2 (2.2) | 15.1 (2.3) | 14.4 (2.6) | 13.9 (2.9) | 14.7 (2.6) |
| Race, White | 200, 93.5% | 194, 92.4% | 592, 97.0% | 894, 97.6% | 1637, 98.9% | 816, 99.1% | 4333, 97.9% |
| Boston Naming Score  | 55.3 (3.4) | 56.1 (2.7) | 56.7 (2.8) | 56.2 (3.3) | 54.8 (4.2) | 52.8 (5.3) | 55.1 (4.2) |
| Category Fluency Total | 54.6 (11.8) | 52.6 (10.4) | 51.5 (10.2) | 48.8 (9.9) | 44.3 (9.5) | 40.7 (8.2) | 46.4 (10.5) |
| Category Fluency Animals | 24.1 (6.0) | 23.4 (5.4) | 22.3 (5.2) | 21.2 (4.9) | 19.2 (4.7) | 17.3 (4.3) | 20.2 (5.3) |
| Category Fluency Fruit | 16.2 (4.2) | 15.4 (3.7) | 15.2 (3.8) | 14.1 (3.8) | 12.8 (3.5) | 11.8 (3.1) | 13.5 (3.8) |
| Category Fluency Vegetables | 14.2 (3.8) | 13.8 (3.8) | 14.0 (3.9) | 13.5 (3.9) | 12.3 (3.7) | 11.4 (3.2) | 12.8 (3.8) |
| TMT-A | 23.9 (7.0) | 25.0 (7.8) | 28.0 (8.1) | 32.1 (9.4) | 38.2 (12.8) | 48.2 (18.0) | 35.9 (14.3) |
| TMT-B | 52.7 (18.7) | 56.8 (19.8) | 63.0 (21.7) | 73.7 (27.7) | 98.1 (42.6) | 128.6 (59.3) | 89.3 (46.2) |
| WAIS-R Digit Symbol  | 63.0 (11.5) | 61.1 (11.0) | 55.9 (11.0) | 51.3 (10.2) | 44.6 (9.8) | 38.9 (9.2) | 48.3 (12.3) |
| WAIS-R Block Design | 36.3 (9.4) | 33.9 (9.2) | 32.5 (9.1) | 27.9 (8.5) | 24.3 (8.4) | 20.6 (7.5) | 26.6 (9.6) |
| WAIS-R Picture Completion | 15.2 (2.4) | 15.0 (2.3) | 15.1 (2.3) | 14.4 (2.6) | 13.2 (3.1) | 11.6 (3.5) | 13.6 (3.1) |
| WAIS-R Logical Memory I | 27.5 (8.1) | 25.9 (7.2) | 25.5 (6.7) | 25.4 (6.3) | 22.6 (6.6) | 20.7 (6.3) | 23.6 (6.9) |
| WAIS-R Logical Memory II | 23.5 (8.9) | 21.7 (7.8) | 21.2 (7.6) | 20.4 (7.1) | 17.2 (7.2) | 15.1 (6.9) | 18.5 (7.7) |
| WAIS-R Visual Reprod. I | 34.2 (3.4) | 33.3 (3.2) | 33.2 (3.6) | 31.9 (4.0) | 29.8 (5.5) | 26.5 (6.1) | 30.5 (5.4) |
| WAIS-R Visual Reprod. II | 31.0 (5.5) | 30.1 (5.1) | 29.1 (5.9) | 26.2 (6.7) | 21.3 (8.4) | 16.2 (8.3) | 23.4 (8.8) |

*Note*. The above data are presented to better characterize the sample and to allow for future comparison of the regression-based normative data with normative approaches that use mean and SD values only. Deriving z-scores from these means and SD values for clinical use is not advised and has been shown to produce misleading results (Van Breukelen & Vlaeyen, 2005). See Table 1 for n’s for each measure.

**Supplemental Table 2**. Regression models for all test variables (unstandardized coefficients are presented).

 Dependent Variable Estimate StdErr tValue Probt Label

 BNSCOR Intercept 37.3054943943 1.14747 32.51 <0.001 Intercept

 AgeVis 0.4571708728 0.03535 12.93 <0.001 Age at Visit Date

 Age2 -0.0041157230 0.00027922 -14.74 <0.001 agevis^2

 Male 0.7562980149 0.11699 6.46 <0.001 Male gender

 EDUC 0.4125990592 0.02322 17.77 <0.001 Education (yrs)

 CFTOTAL Intercept 38.6374208255 2.64794 14.59 <0.001 Intercept

 AgeVis 0.2590557249 0.08151 3.18 0.001 Age at Visit Date

 Age2 -0.0043668557 0.00064347 -6.79 <0.001 agevis^2

 Male -5.7515348401 0.27135 -21.20 <0.001 Male gender

 EDUC 0.9585277705 0.05373 17.84 <0.001 Education (yrs)

 CFA Intercept 15.8811555314 1.40727 11.29 <0.001 Intercept

 AgeVis 0.0965349639 0.04338 2.23 0.026 Age at Visit Date

 Age2 -0.0018449740 0.00034301 -5.38 <0.001 agevis^2

 Male -0.1008656482 0.14496 -0.70 0.487 Male gender

 EDUC 0.4514008511 0.02874 15.71 <0.001 Education (yrs)

 CFF Intercept 13.3761521652 0.98305 13.61 <0.001 Intercept

 AgeVis 0.0368241865 0.03030 1.22 0.224 Age at Visit Date

 Age2 -0.0010323593 0.00023961 -4.31 <0.001 agevis^2

 Male -2.6715699097 0.10126 -26.38 <0.001 Male gender

 EDUC 0.2662857897 0.02008 13.26 <0.001 Education (yrs)

 CFV Intercept 9.0704466278 0.99661 9.10 <0.001 Intercept

 AgeVis 0.1377910891 0.03072 4.49 <0.001 Age at Visit Date

 Age2 -0.0016066359 0.00024292 -6.61 <0.001 agevis^2

 Male -2.9752858710 0.10266 -28.98 <0.001 Male gender

 EDUC 0.2415938225 0.02035 11.87 <0.001 Education (yrs)

 \*rTMTA Intercept 128.4314376637 3.59037 35.77 <0.001 Intercept

 AgeVis 0.9896198896 0.11066 8.94 <0.001 Age at Visit Date

 Age2 -0.0120778560 0.00087674 -13.78 <0.001 agevis^2

 Male -2.1000255875 0.36911 -5.69 <0.001 Male gender

 EDUC 0.4994213371 0.07312 6.83 <0.001 Education (yrs)

 \*rTMTB Intercept 112.7489167630 11.31864 9.96 <0.001 Intercept

 AgeVis 3.9864535523 0.34880 11.43 <0.001 Age at Visit Date

 Age2 -0.0449300015 0.00276 -16.26 <0.001 agevis^2

 Male -3.4434950564 1.16265 -2.96 0.003 Male gender

 EDUC 3.0040608497 0.23039 13.04 <0.001 Education (yrs)

 WSCDR Intercept 55.3604242657 2.77862 19.92 <0.001 Intercept

 AgeVis 0.0510656278 0.08568 0.60 0.551 Age at Visit Date

 Age2 -0.0044646818 0.00067914 -6.57 <0.001 agevis^2

 Male -6.1278483373 0.28578 -21.44 <0.001 Male gender

 EDUC 0.9472681682 0.05661 16.73 <0.001 Education (yrs)

 WSBDR Intercept 27.9102811576 2.41785 11.54 <0.001 Intercept

 AgeVis -0.0060702698 0.07459 -0.08 0.935 Age at Visit Date

 Age2 -0.0025186475 0.00059102 -4.26 <0.001 agevis^2

 Male 2.1737385723 0.24896 8.73 <0.001 Male gender

 EDUC 0.6882576488 0.04924 13.98 <0.001 Education (yrs)

 WSPCR Intercept 6.2617409303 0.83310 7.52 <0.001 Intercept

 AgeVis 0.2146815646 0.02568 8.36 <0.001 Age at Visit Date

 Age2 -0.0023024408 0.00020340 -11.32 <0.001 agevis^2

 Male 0.7749819130 0.08553 9.06 <0.001 Male gender

 EDUC 0.2330985426 0.01693 13.77 <0.001 Education (yrs)

 MRLMR Intercept 13.8119051581 1.90411 7.25 <0.001 Intercept

 AgeVis 0.2052532730 0.05864 3.50 <0.001 Age at Visit Date

 Age2 -0.0026143853 0.00046315 -5.64 <0.001 agevis^2

 Male -0.9221630888 0.19542 -4.72 <0.001 Male gender

 EDUC 0.6054286949 0.03869 15.65 <0.001 Education (yrs)

 MRLMD Intercept 10.8434040938 2.10415 5.15 <0.001 Intercept

 AgeVis 0.1803392510 0.06480 2.78 0.005 Age at Visit Date

 Age2 -0.0027270570 0.00051185 -5.33 <0.001 agevis^2

 Male -1.3607000470 0.21601 -6.30 <0.001 Male gender

 EDUC 0.6293881988 0.04275 14.72 <0.001 Education (yrs)

 MRVRR Intercept 21.8574545276 1.43275 15.26 <0.001 Intercept

 AgeVis 0.3270836153 0.04418 7.40 <0.001 Age at Visit Date

 Age2 -0.0038484601 0.00035004 -10.99 <0.001 agevis^2

 Male -0.3169833492 0.14718 -2.15 0.031 Male gender

 EDUC 0.3429110782 0.02919 11.75 <0.001 Education (yrs)

 MRVRD Intercept 13.6490587649 2.16432 6.31 <0.001 Intercept

 AgeVis 0.4881669175 0.06674 7.31 <0.001 Age at Visit Date

 Age2 -0.0064934150 0.00052875 -12.28 <0.001 agevis^2

 Male -1.0291576950 0.22233 -4.63 <0.001 Male gender

 EDUC 0.5594291283 0.04409 12.69 <0.001 Education (yrs)

\*Trails A is reversed so high is good like other variables. Trails B is also reversed.

*Note*. BNSCOR = Boston Naming Test total correct. CFTOTAL = category fluency total. CFA = category fluency animals. CFF = category fluency fruits. CFV = category fluency vegetables. rTMTA = Trail Making Test Part A, reversed. rTMTB = Trail Making Test Part B, reversed. WSCDR = WAIS-R Digit Symbol Coding (Digit Symbol Substitution Test). WSBDR = WAIS-R Block Design. WSPCR = WAIS-R picture completion. MRLMR = WMS-R Logical Memory I. MRLMD = WMS-R Logical Memory II. MRVRR = WMS-R Visual Reproduction I. MRVRD = WMS-R Visual Reproduction II. All models used raw scores.

**Supplemental Table 3.** Normative sample (N = 4,428) observed versus expected proportions (base rates) of low test performance (T < 40) for fully-adjusted Mayo Normative Studies (MNS) norms and 95% Confidence Intervals (CIs).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| T-Scoresadjusted for | Measure | Females% T<40(95% CI) | Males% T<40(95% CI) | Total% T<40(95% CI) |
| Age/Sex/Education | Boston Naming Test | 15.2 (13.8, 16.8) | 14.9 (13.4, 16.4) | 15.0 (14.0, 16.1) |
|  | Category Fluency Total | 13.6 (12.2, 15.1) | 15.8 (14.3, 17.3) | 14.7 (13.7, 15.8) |
|  |  Animals | 13.7 (12.3, 15.2) | 15.5 (14.0, 17.1) | 14.6 (13.6, 15.7) |
|  |  Fruits | 13.4 (12.0, 14.9) | \*17.2 (15.6, 18.8) | 15.3 (14.2, 16.4) |
|  |  Vegetables | 13.3 (12.0, 14.9) | \*16.7 (15.1, 18.3) | 15.0 (14.0, 16.1) |
|  | TMT-A  | 14.6 (13.2, 16.2) | 14.2 (12.8, 15.7) | 14.4 (13.4, 15.5) |
|  | TMT-B  | 15.5 (14.0, 17.1) | 14.3 (12.9, 15.9) | 14.9 (13.9, 16.0) |
|  | WAIS-R Digit Symbol Coding | 14.8 (13.4, 16.4) | 13.7 (12.3, 15.2) | 14.2 (13.2, 15.3) |
|  | WAIS-R Block Design | 14.4 (13.0, 16.0) | 14.7 (13.3, 16.3) | 14.6 (13.6, 15.7) |
|  | WAIS-R Picture Completion | 15.1 (13.6, 16.6) | 14.4 (13.0, 15.9) | 14.7 (13.7, 15.8) |
|  | WAIS-R Logical Memory I | 14.0 (12.6, 15.5) | 15.6 (14.1, 17.2) | 14.8 (13.8, 15.9) |
|  | WAIS-R Logical Memory II | 15.4 (13.9, 16.9) | 15.1 (13.7, 16.6) | 15.2 (14.2, 16.3) |
|  | WAIS-R Visual Reprod. I | 14.6 (13.2, 16.2) | 14.4 (13.0, 15.9) | 14.5 (13.5, 15.6) |
|  | WAIS-R Visual Reprod. II | 14.3 (12.9, 15.8) | 13.4 (12.0, 14.9) | 13.8 (12.8, 14.9) |

*\**CIs that do not contain the 14.7% expected base rate value are significantly different than expected.

**Supplemental Table 4.** Validation sample (N=261) observed versus expected proportions (base rates) of females and males showing low test performance (SS < 7 for MOANS; T < 40 for MNS) and 95% Confidence Intervals (CIs).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test | Normative Score Applied | Female (n = 130) | Male (n = 131) | Total (N=261) |
| BNT | Age-adjusted MOANS, % (CI) | \*0.8 (0.1, 4.2) | \*1.6 (0.4, 5.5) | \*1.2 (0.4, 3.3) |
| Age/educ-adj. MOANS, % (CI)  | \*7.7 (4.2, 13.6) | \*6.2 (3.2, 11.8) | \*6.9 (4.4, 10.7) |
| Fully-adjusted MNS, % (CI) | 14.6 (9.6, 21.7) | 17.1 (11.5, 24.5) | 15.8 (11.9, 20.8) |
| Category Fluency Total | Age-adjusted MOANS, % (CI) | \*0.8 (0.1, 4.2) | \*8.5 (4.8, 14.5) | \*4.6 (2.7, 7.9) |
| Age/educ-adj. MOANS, % (CI)  | \*1.5 (0.4, 5.4) | 12.3 (7.7, 19.1) | \*6.9 (4.4, 10.7) |
| Fully-adjusted MNS, % (CI) | 14.6 (9.6, 21.7) | 16.9 (11.4, 24.3) | 15.8 (11.8, 20.7) |
|  Animals | Fully-adjusted MNS, % (CI) | 10.8 (6.5, 17.3) | 16.2 (10.8, 23.4) | 13.5 (9.8, 18.1) |
|  Fruits | Fully-adjusted MNS, % (CI) | 14.7 (9.6, 21.9) | 13.1 (8.3, 19.9) | 13.9 (10.2, 18.6) |
|  Vegetables | Fully-adjusted MNS, % (CI) | 14.6 (9.6, 21.7) | 16.2 (10.8, 23.4) | 15.4 (11.5, 20.3) |
| TMTA | Age-adjusted MOANS, % (CI) | \*3.1 (1.2, 7.6) | \*6.2 (3.2, 11.7) | \*4.6 (2.7, 7.9) |
| Age/educ-adj. MOANS, % (CI)  | \*5.4 (2.6, 10.7) | \*8.5 (4.8, 14.5) | \*6.9 (4.4, 10.7) |
| Fully-adjusted MNS, % (CI) | 9.2 (5.4, 15.4) | 13.1 (8.3, 19.9) | 11.2 (7.9, 15.6) |
| TMTB | Age-adjusted MOANS, % (CI) | \*3.1 (1.2, 7.6) | \*6.2 (3.2, 11.7) | \*4.6 (2.7, 7.9) |
| Age/educ-adj. MOANS, % (CI)  | \*6.9 (3.7, 12.6) | 10.8 (6.5, 17.3) | \*8.8 (6.0, 12.9) |
| Fully-adjusted MNS, % (CI) | \*8.5 (4.8, 14.5) | 16.9 (11.4, 24.3) | 12.7 (9.2, 17.3) |
| WAIS-R Digit Symbol Coding | Age-adjusted MOANS, % (CI) | \*3.1 (1.2, 7.6) | \*3.1 (1.2, 7.7) | \*3.1 (1.6, 6.0) |
|  | Age/educ-adj. MOANS, % (CI)  | \*4.6 (2.1, 9.7) | \*7.0 (3.7, 12.7) | \*5.8 (3.5, 9.3) |
|  | Fully-adjusted MNS, % (CI) | 13.1 (8.3, 19.9) | 11.6 (7.2, 18.3) | 12.4 (8.9, 16.9) |
| WAIS-R Block Design | Age-adjusted MOANS, % (CI) | 8.7 (4.9, 14.8) | \*5.5 (2.7, 10.9) | \*7.1 (4.5, 10.9) |
|  | Age/educ-adj. MOANS, % (CI)  | 10.2 (6.1, 16.7) | \*7.1 (3.8, 12.9) | \*8.7 (5.8, 12.8) |
|  | Fully-adjusted MNS, % (CI) | 14.2 (9.2, 21.3) | 18.9 (13.0, 26.6) | 16.5 (12.5, 21.6) |
| WAIS-R Picture Completion | Age-adjusted MOANS, % (CI) | \*3.1 (1.2, 7.6) | \*0.0 (0.0, 2.9) | \*1.5 (0.6, 3.9) |
|  | Age/educ-adj. MOANS, % (CI)  | \*6.9 (3.7, 12.6) | \*1.6 (0.4, 5.5) | \*4.2 (2.4, 7.4) |
|  | Fully-adjusted MNS, % (CI) | 17.7 (12.1, 25.2) | 12.4 (7.8, 19.2) | 15.1 (11.2, 19.9) |
| WAIS-R Logical Memory I | Age-adjusted MOANS, % (CI) | 14.6 (9.6, 21.7) | 13.0 (8.3, 19.8) | 13.8 (10.1, 18.5) |
|  | Fully-adjusted MNS, % (CI) | 20.0 (14.0, 27.7) | 19.8 (13.9, 27.5) | \*19.9 (15.5, 25.2) |
| WAIS-R Logical Memory II | Age-adjusted MOANS, % (CI) | 14.6 (9.6, 21.7) | 13.7 (8.9, 20.7) | 14.2 (10.5, 18.9) |
|  | Fully-adjusted MNS, % (CI) | 19.2 (13.4, 26.8) | 16.8 (11.4, 24.1) | 18.0 (13.8, 23.1) |
| WAIS-R Visual Reproduction I | Age-adjusted MOANS, % (CI) | \*8.5 (4.8, 14.5) | \*6.9 (3.7, 12.6) | \*7.7 (5.0, 11.6) |
|  | Fully-adjusted MNS, % (CI) | 14.6 (9.6, 21.7) | 17.7 (12.1, 25.2) | 16.2 (12.2, 21.1) |
| WAIS-R Visual Reproduction II | Age-adjusted MOANS, % (CI) | \*6.2 (3.2, 11.7) | 10.8 (6.5, 17.3) | \*8.5 (5.7, 12.5) |
|  | Fully-adjusted MNS, % (CI) | 13.8 (8.9, 20.8) | 17.7 (12.1, 25.2) | 15.8 (11.8, 20.7) |

\*CIs that do not contain the 14.7% expected base rate value are significantly different than expected.

*Note*. CU = Cognitively Unimpaired. MOANS = Mayo’s Older Americans Normative Studies. When both age and age-adjusted MOANS norms are available, both are provided above. WMS-R measures only adjusted for age (Ivnik 1992 citation). MNS = Mayo Normative Studies. Fully-adjusted MNS adjusts for age, age squared, sex and education.

**Supplemental Table 5. Table for converting raw scores to unadjusted scaled scores for WAIS-R/WMS-R measures. a**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SS | Digit Symbol | Block Design | Picture Compl. | Logical Mem. I | Logical Mem. II | Visual Rep. I | Visual Rep. II | SS |
| 0 | 0-15 | - | 0-1 | 0-4 | 0 | 0-8 | - | 0 |
| 1 | 16-18 | 0-2 | 2 | 5-6 | 1 | 9-11 | - | 1 |
| 2 | 19-21 | 3-4 | 3 | 7 | 2 | 12-13 | 0 | 2 |
| 3 | 22-24 | 5-6 | 4 | 8-9 | 3 | 14-15 | 1-2 | 3 |
| 4 | 25-28 | 7-9 | 5-6 | 10-11 | 4-5 | 16-18 | 3-5 | 4 |
| 5 | 29-30 | 10-12 | 7-8 | 12-13 | 6-7 | 19-21 | 6-8 | 5 |
| 6 | 31-34 | 13-16 | 9-10 | 14-15 | 8-9 | 22-23 | 9-11 | 6 |
| 7 | 35-37 | 17-18 | 11 | 16-17 | 10-11 | 24-26 | 12-15 | 7 |
| 8 | 38-41 | 19-21 | 12 | 18-19 | 12-14 | 27-28 | 16-19 | 8 |
| 9 | 42-45 | 22-24 | 13 | 20-22 | 15-16 | 29-30 | 20-23 | 9 |
| 10 | 46-49 | 25-27 | 14 | 23-24 | 17-19 | 31-32 | 24-26 | 10 |
| 11 | 50-54 | 28-31 | 15 | 25-27 | 20-22 | 33 | 27-28 | 11 |
| 12 | 55-58 | 32-35 | 16 | 28-29 | 23-25 | 34 | 29-31 | 12 |
| 13 | 59-63 | 36-38 | - | 30-31 | 26-27 | 35-36 | 32-33 | 13 |
| 14 | 64-67 | 39-42 | 17 | 32-34 | 28-30 | 37 | 34-35 | 14 |
| 15 | 68-72 | 43-45 | 18 | 35-36 | 31-32 | 38 | 36 | 15 |
| 16 | 73-77 | 46-47 | - | 37-38 | 33-35 | - | 37 | 16 |
| 17 | 78-82 | 48-49 | 19 | 39-40 | 36-37 | 39 | 38 | 17 |
| 18 | 83-86 | 50 | - | 41 | 38-39 | 40 | 39 | 18 |
| 19 | 87-91 | 51 | - | 42 | 40 | 41 | 40 | 19 |
| 20 | 92-93 | - | 20 | 43-50 | 41-50 | - | 41 | 20 |

**a** Scaled scores are provided only as a step in determining the demographically-corrected T-scores using the equations below. These scaled scores are not adjusted for any demographic variables and should not be used for clinical practice. Use of the fully-adjusted T-scores is recommended.

*Note*. Picture Compl = Picture Completion. Logical Mem = Logical Memory. SS = scaled score. Visual Reprod = Visual Reproduction.

**Equations for fully-adjusted T-Scores:**

TScoreDSR=rounde(50+((((DSRSS-(10.40019400647760+(Age\* 0.05326215846983)+(Age\*\*2 \* -0.00139236442346)+(Male \* -1.48870140551039)+(EDUC \* 0.22978169555851)))/1) -0.000000000002652906)/0.229279033159529))

TScoreBDR=rounde(50+((((BDRSS-(10.05803396395280+(Age\* 0.00631204272546)+(Age\*\*2 \* -0.00084028169776)+(Male \* 0.67460513183654)+(EDUC \* 0.21481807788611)))/1) -0.000000000022883462)/0.254311619125999))

TScorePCR=rounde(50+((((PCRSS-( 3.56779947929749+(Age\* 0.18316022828254)+(Age\*\*2 \* -0.00203095404575)+(Male \* 0.71997529673553)+(EDUC \* 0.22828692419137)))/(1.3308131474+(Age\*\*0.5\* 0.1011475625))) +0.000012616497022202)/0.125554515875624))

TScoreLMR=rounde(50+((((LMRSS-( 5.69910309835915+(Age\* 0.09168092871817)+(Age\*\*2 \* -0.00115591946085)+(Male \* -0.40452754306887)+(EDUC \* 0.26167987907876)))/(4.4626388677+(Age \*-0.0620867299)+(Age\*\*2 \*0.0003578036)+(Age\*\*3 \* 0.0000008166))) -0.000299900898096185)/0.125519935224679))

TScoreLMD=rounde(50+((((LMDSS-( 6.93401906921695+(Age\* 0.07368576162810)+(Age\*\*2 \* -0.00109858531775)+(Male \* -0.52532317568681)+(EDUC \* 0.24620012321535)))/1) +0.000000000014175991)/0.281780403271844))

TScoreVRR=rounde(50+((((VRRSS-( 6.62065942155669+(Age\* 0.13189811078233)+(Age\*\*2 \* -0.00172920085521)+(Male \* -0.18510630958415)+(EDUC \* 0.19350709076403)))/(5.8229122302+(Age \*-0.2236238906)+(Age\*\*2 \*0.0039158873)+(Age\*\*3 \*-0.0000208915))) +0.002358752972600140)/0.124900636472616))

TScoreVRD=rounde(50+((((VRDSS-( 8.05624642897946+(Age\* 0.11898927382704)+(Age\*\*2 \* -0.00182706330889)+(Male \* -0.33372820503249)+(EDUC \* 0.18799139667641)))/(1.4917622037+(Age \* 0.0066401100))) -0.000001444027406339)/0.127195027319249))

*Note*. BDR = WAIS-R Block Design. DSR = WAIS-R Digit Symbol. EDUC = education (see manuscript Appendix for how education is coded). LMR = WMS-R Logical Memory I. LMD = WMS-R Logical Memory II. Male = indicates male is coded as 1, female is coded as 0. PCR = WAIS-R Picture Completion. Rounde = signifies the specific round function used in Statistical Analysis Software (SAS) Version 9.4. SS = unadjusted scaled score. VRR = WMS-R Visual Reproduction I. VRD = WMS-R Visual Reproduction II.