**SUPPLEMENTARY TABLES**

**Table S1.** Association between leukocyte telomere length (per 1,000 base pairs) and cognitive domain z-scores among individuals of the aging Long Life Family Study cohort without evident dementia.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Cognitive Domain**  **z-scores** | **All (n = 1,613)** | | **Relatives (n = 1,221)** | | **Spouse Controls (n = 392)** | |
| **EST**† | **SE** | **EST**† | **SE** | **EST**† | **SE** |
|
| **Global Cognitive Function** | -0.010 | 0.0329 | -0.004 | 0.0379 | -0.058 | 0.0700 |
| **Working Memory** | 0.030 | 0.0509 | 0.070 | 0.0593 | -0.155 | 0.0948 |
| Digit Forward | -0.005 | 0.0551 | 0.038 | 0.0643 | -0.199 | 0.1194 |
| Digit Backward | 0.064 | 0.0628 | 0.101 | 0.0720 | -0.114 | 0.1055 |
| **Episodic Memory** | -0.032 | 0.0655 | 0.002 | 0.0751 | -0.164 | 0.1380 |
| Immediate Memory | -0.058 | 0.0668 | -0.031 | 0.0778 | -0.173 | 0.1350 |
| Delayed Memory | -0.005 | 0.0691 | 0.034 | 0.0777 | -0.148 | 0.1500 |
| **Semantic Processing** | -0.034 | 0.0460 | -0.075 | 0.0524 | 0.096 | 0.1036 |
| Animal Fluency | -0.043 | 0.0551 | -0.091 | 0.0614 | 0.104 | 0.1257 |
| Vegetable Fluency | -0.018 | 0.0588 | -0.045 | 0.0677 | 0.087 | 0.1279 |
| **Information Processing Speed** | 0.004 | 0.0527 | -0.014 | 0.0592 | 0.067 | 0.1109 |

Leukocyte telomere length is expressed as kilo base-pairs, while cognitive scores are unadjusted z-scores. The significance of the association between the two are evaluated using the Wald Chi-Square Test. Abbreviations: EST, beta estimate; SE, standard error.

†Analysis adjusted for sex (males vs. females), generation (proband vs. offspring), country (US vs. Denmark), age (in years), and lymphocyte percentage.

P-values are denoted as follows: \*p<0.005.

**Table S2.** Association between leukocyte telomere length (per 1,000 base pairs) and cognitive domain z-scores among individuals of the aging Long Life Family Study cohort without evident dementia.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Cognitive Domain**  **z-scores** | **All (n = 1,680)** | | **Relatives (n = 1,268)** | | **Spouse Controls (n = 412)** | |
| **EST**† | **SE** | **EST**† | **SE** | **EST**† | **SE** |
|
| **Global Cognitive Function** | 0.000 | 0.0295 | 0.017 | 0.0351 | -0.067 | 0.0622 |
| **Working Memory** | 0.043 | 0.0485 | 0.082 | 0.0571 | -0.111 | 0.0924 |
| Digit Forward | 0.013 | 0.0535 | 0.053 | 0.0624 | -0.147 | 0.1145 |
| Digit Backward | 0.073 | 0.0590 | 0.111 | 0.0692 | -0.081 | 0.1011 |
| **Episodic Memory** | -0.014 | 0.0617 | 0.033 | 0.0708 | -0.176 | 0.1345 |
| Immediate Memory | -0.034 | 0.0630 | 0.006 | 0.0734 | -0.172 | 0.1347 |
| Delayed Memory | 0.006 | 0.0655 | 0.060 | 0.0739 | -0.176 | 0.1437 |
| **Semantic Processing** | -0.027 | 0.0443 | -0.052 | 0.0512 | 0.026 | 0.1005 |
| Animal Fluency | -0.036 | 0.0529 | -0.074 | 0.0592 | 0.058 | 0.1267 |
| Vegetable Fluency | -0.015 | 0.0581 | -0.018 | 0.0671 | -0.006 | 0.1271 |
| **Information Processing Speed** | 0.010 | 0.0511 | -0.002 | 0.0583 | 0.054 | 0.094 |

Leukocyte telomere length is expressed as kilo base-pairs, while cognitive scores are unadjusted z-scores. The significance of the association between the two are evaluated using the Wald Chi-Square Test. Individuals with severely impaired attention/working memory are included. Abbreviations: EST, beta estimate; SE, standard error.

†Analysis adjusted for sex (males vs. females), generation (proband vs. offspring), country (US vs. Denmark), education (less than college, some college or post college), age (in years), and lymphocyte percentage.

P-values are denoted as follows: \*p<0.005.

**Table S3.** Association between leukocyte telomere length (per 1,000 base pairs) and cognitive domain z-scores among individuals of the aging Long Life Family Study cohort without evident dementia (n = 1,613).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Characteristics** | **Cognitive Domain**  **EST (SE)** | | | | | | | | | | |
| **Global Cognitive Function** | **Working Memory** | Digit Forward | Digit Backward | **Episodic Memory** | Immediate Memory | Delayed Memory | **Semantic Processing** | Animal Fluency | Vegetable Fluency | **Information Processing Speed** |
| **LTL** | -0.011  (0.0301) | 0.028  (0.0497) | -0.009  (0.0549) | 0.064  (0.0605) | -0.031  (0.0626) | -0.057  (0.0641) | -0.004  (0.0661) | -0.033  (0.0445) | -0.041  (0.0529) | -0.019  (0.0583) | 0.005  (0.0519) |
| **Sex** |  |  |  |  |  |  |  |  |  |  |  |
| Male | -0.186\*  (0.0262) | -0.021  (0.0394) | 0.051  (0.0452) | -0.095  (0.0453) | -0.148\*  (0.0510) | -0.167\*  (0.0539) | -0.130  (0.0518) | -0.351\*  (0.0384) | -0.025  (0.0453) | -0.672\*  (0.0475) | -0.262\*  (0.0394) |
| Female | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Age (years)** | -0.016\*  (0.0022) | -0.004  (0.0035) | -0.005  (0.0043) | -0.003  (0.0040) | -0.008  (0.0038) | -0.008  (0.0040) | -0.009  (0.0040) | -0.024\*  (0.0033) | -0.026\*  (0.0036) | -0.022\*  (0.0040) | -0.041\*  (0.0033) |
| **Generation** |  |  |  |  |  |  |  |  |  |  |  |
| Proband | -0.226\*  (0.0520) | -0.269\*  (0.0876) | -0.278  (0.1045) | -0.261  (0.1018) | -0.249  (0.0887) | -0.226  (0.0966) | -0.271\*  (0.0917) | -0.175  (0.0743) | -0.151  (0.0870) | -0.185  (0.0875) | -0.178  (0.0787) |
| Offspring | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Education** |  |  |  |  |  |  |  |  |  |  |  |
| Less than college | -0.441\*  (0.0380) | -0.400\*  (0.0667) | -0.337\*  (0.0777) | -0.473\*  (0.0752) | -0.527\*  (0.0722) | -0.553\*  (0.0739) | -0.502\*  (0.0771) | -0.426\*  (0.0626) | -0.503\*  (0.0726) | -0.349\*  (0.0756) | -0.401\*  (0.0663) |
| Some college | -0.232\*  (0.0315) | -0.281\*  (0.0533) | -0.263\*  (0.0581) | -0.303\*  (0.0631) | -0.268\*  (0.0545) | -0.286\*  (0.0567) | -0.250\*  (0.0579) | -0.192\*  (0.0500) | -0.181\*  (0.0597) | -0.205\*  (0.0597) | -0.147  (0.0563) |
| Post college | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Country** |  |  |  |  |  |  |  |  |  |  |  |
| US | 0.292\*  (0.0331) | 0.870\*  (0.0470) | 1.034\*  (0.086) | 0.708\*  (0.0515) | -0.176  (0.0620) | -0.154  (0.0645) | -0.197\*  (0.0645) | -0.010  (0.0477) | -0.408\*  (0.0601) | 0.380\*  (0.0540) | 0.674\*  (0.0536) |
| Denmark | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Lymphocyte Percentage** | 0.000  (0.0013) | -0.002  (0.0019) | -0.004  (0.0021) | 0.000  (0.0025) | 0.001  (0.0023) | 0.000  (0.0022) | 0.001  (0.0024) | 0.001  (0.0019) | -0.001  (0.0023) | 0.002  (0.0022) | 0.005  (0.0024) |

Leukocyte telomere length is expressed as kilo base-pairs, while cognitive scores are unadjusted z-scores. The significance of the association between the two are evaluated using the Wald Chi-Square Test. Abbreviations: LTL, leukocyte telomere length; EST, beta estimate; SE, standard error.

P-values are denoted as follows: \*p<0.005

**Table S4.** Association between leukocyte telomere length (per 1,000 base pairs) and cognitive domain z-scores among individuals of the aging Long Life Family Study cohort without evident dementia, stratified by sex (n = 1,613).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cognitive Domain**  **z-scores** | **Males (n = 738)** | | **Females (n = 875)** | |
| **EST**† | **SE** | **EST**† | **SE** |
|
| **Global Cognitive Function** | -0.010 | 0.0471 | -0.005 | 0.0445 |
| **Working Memory** | 0.103 | 0.0710 | -0.036 | 0.0739 |
| Digit Forward | 0.064 | 0.0830 | -0.072 | 0.0803 |
| Digit Backward | 0.148 | 0.0829 | -0.010 | 0.0873 |
| **Episodic Memory** | -0.077 | 0.0916 | 0.024 | 0.0838 |
| Immediate Memory | -0.125 | 0.0934 | 0.018 | 0.0857 |
| Delayed Memory | -0.032 | 0.0967 | 0.030 | 0.0886 |
| **Semantic Processing** | -0.022 | 0.0700 | -0.031 | 0.0612 |
| Animal Fluency | -0.064 | 0.0819 | -0.005 | 0.0749 |
| Vegetable Fluency | 0.025 | 0.0927 | -0.051 | 0.0752 |
| **Information Processing Speed** | -0.050 | 0.0700 | 0.043 | 0.0753 |

Leukocyte telomere length is expressed as kilo base-pairs, while cognitive scores are unadjusted z-scores. The significance of the association between the two are evaluated using the Wald Chi-Square Test. Abbreviations: EST, beta estimate; SE, standard error.

†Analysis adjusted for generation (proband vs. offspring), country (US vs. Denmark), education (less than college, some college or post college), age (in years), and lymphocyte percentage.

P-values are denoted as follows: \*p<0.005.

**Table S5.** Association between leukocyte telomere length (per 1,000 base pairs) and cognitive domain z-scores among individuals of the aging Long Life Family Study cohort with dementia or incipient dementia (n = 597).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Characteristics** | **Cognitive Domain**  **EST (SE)** | | | | | | | | | | |
| **Global Cognitive Function** | **Working Memory** | Digit Forward | Digit Backward | **Episodic Memory** | Immediate Memory | Delayed Memory | **Semantic Processing** | Animal Fluency | Vegetable Fluency | **Information Processing Speed** |
| **LTL** | 0.006  (0.0654) | 0.149  (0.0890) | 0.017  (0.0970) | 0.258  (0.1095) | -0.073  (0.0958) | -0.133  (0.1072) | -0.013  (0.1050) | -0.045  (0.0982) | 0.020  (0.1022) | -0.111  (0.1163) | 0.028  (0.1023) |
| **Sex** |  |  |  |  |  |  |  |  |  |  |  |
| Male | 0.094  (0.0476) | 0.222\*  (0.0639) | 0.229\*  (0.0785) | 0.213  (0.0764) | 0.130  (0.0751) | 0.058  (0.0817) | 0.202  (0.0826) | -0.020  (0.0724) | 0.301\*  (0.0837) | -0.341\*  (0.0808) | 0.000  (0.0744) |
| Female | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Age (years)** | -0.017\*  (0.0039) | -0.002  (0.0053) | -0.003  (0.0062) | -0.002  (0.0067) | -0.012  (0.0070) | -0.009  (0.0076) | -0.015  (0.0076) | -0.022\*  (0.0057) | -0.024\*  (0.0063) | -0.020\*  (0.0068) | -0.043\*  (0.0059) |
| **Generation** |  |  |  |  |  |  |  |  |  |  |  |
| Proband | -0.250  (0.0940) | -0.344  (0.1274) | -0.326  (0.1436) | -0.350  (0.1602) | -0.103  (0.1819) | -0.280  (0.1992) | 0.075  (0.1875) | -0.266  (0.1370) | -0.181  (0.1515) | -0.346  (0.1611) | -0.331  (0.1451) |
| Offspring | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Education** |  |  |  |  |  |  |  |  |  |  |  |
| Less than college | -0.228  (0.0930) | -0.401\*  (0.1262) | -0.418\*  (0.1311) | -0.389  (0.1653) | -0.199  (0.1522) | -0.281  (0.1603) | -0.117  (0.1623) | -0.020  (0.1353) | -0.089  (0.1470) | 0.047  (0.1636) | -0.337  (0.1591) |
| Some college | -0.160  (0.0962) | -0.248  (0.1269) | -0.286  (0.1320) | -0.222  (0.1689) | -0.123  (0.1555) | -0.163  (0.1623) | -0.081  (0.1683) | -0.078  (0.1359) | -0.079  (0.1461) | -0.077  (0.1670) | -0.193  (0.1623) |
| Post college | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Country** |  |  |  |  |  |  |  |  |  |  |  |
| US | 0.316\*  (0.0673) | 0.793\*  (0.0848) | 1.004\*  (0.0915) | 0.585\*  (0.1017) | 0.106  (0.1049) | -0.059  (0.1231) | -0.155  (0.1062) | 0.000  (0.1050) | -0.349  (0.1246) | 0.347\*  (0.1097) | 0.783\*  (0.0966) |
| Denmark | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. | Ref. |
| **Lymphocyte Percentage** | 0.004  (0.0021) | 0.001  (0.0028) | 0.002  (0.0033) | 0.000  (0.0033) | -0.003  (0.0038) | -0.002  (0.0038) | -0.003  (0.0042) | 0.011\*  (0.0029) | 0.011\*  (0.0031) | 0.010\*  (0.0036) | 0.010\*  (0.0030) |

Leukocyte telomere length is expressed as kilo base-pairs, while cognitive scores are unadjusted z-scores. The significance of the association between the two are evaluated using the Wald Chi-Square Test. Abbreviations: LTL, leukocyte telomere length; EST, beta estimate; SE, standard error.

P-values are denoted as follows: \*p<0.005