**Supplementary materials**

**Table S1.** Results of Multilevel Models for the Relationships between Numbers of Child (≥ Age 25) with College Degree and Episodic Memory Scores (N=10992)\*

|  |  |  |
| --- | --- | --- |
|  | **Coef. (95%CI)** | ***p*** |
| **Intercept** | 11.83 (11.61, 12.05) | <0.001 |
| **Age** | 0.04 (0.02, 0.05) | <0.001 |
| **Age2** | -0.005 (-0.005, -0.004) | <0.001 |
| **Children with college degree** |  |  |
| No children | Ref. |  |
| Some children | 0.36 (0.27, 0.46) | <0.001 |
| All children | 0.54 (0.41, 0.67) | <0.001 |
| ***Random effects*** | ***S.D. (95%CI)*** |  |
| *Within individuals: residual* | *0.007 (0.006, 0.009)* | *-* |
| *Between individuals: intercept* | *5.52 (5.03, 6.06)* | *-* |
| *Between individuals: age* | *5.30 (5.23, 5.37)* | *-* |

\*Model additionally adjusted for gender, race, number of children, parental occupation, household income per person, marital status, smoking, days of alcohol consumption, vigorous physical activity, high blood pressure, diabetes, lung diseases, heart problems, stroke, cancer, arthritis, and psychological problems.

Ref.: reference; S.D.: standard deviation; 95%CI: 95% confidence interval.

**Table S2.** Results of Multilevel Models for the Relationships between First Child’s Years of Schooling and Episodic Memory Scores (N=10876)\*

|  |  |  |
| --- | --- | --- |
|  | **Coef. (95%CI)** | ***P*** |
| **Intercept** | 10.77 (10.40, 11.14) | <0.001 |
| **Age** | 0.04 (0.02, 0.05) | <0.001 |
| **Age2** | -0.005 (-0.005, -0.004) | <0.001 |
| **First child’s years of schooling** | 0.09 (0.07, 0.11) | <0.001 |
| ***Random effects*** | ***S.D. (95%CI)*** |  |
| *Within individuals: residual* | *0.007 (0.006, 0.009)* | *-* |
| *Between individuals: intercept* | *5.49 (5.00, 6.03)* | *-* |
| *Between individuals: age* | *5.28 (5.21, 5.36)* | *-* |

\*Model additionally adjusted for gender, race, number of children, parental occupation, household income per person, marital status, smoking, days of alcohol consumption, vigorous physical activity, high blood pressure, diabetes, lung diseases, heart problems, stroke, cancer, arthritis, and psychological problems.

Ref.: reference; S.D.: standard deviation; 95%CI: 95% confidence interval.

**Table S3** Results of Multilevel Models for the Relationships between Adult Children’s Schooling and Episodic Memory Scores, Considering the Interaction Between Race and Adult Children’s Schooling (N=11086)

|  |  |  |
| --- | --- | --- |
|  | **Interaction Model** | |
|  | **Coef. (95%CI)** | ***p*** |
| **Adult children schooling** | 0.07 (0.03, 0.12) | 0.001 |
| **Intercept** | 11.02 (10.33, 11.71) | <0.001 |
| **Age** | 0.04 (0.02, 0.05) | <0.001 |
| **Age2** | -0.005 (-0.005, -0.004) | <0.001 |
| **Gender** |  |  |
| Men | Ref. |  |
| Women | 1.28 (1.18, 1.37) | <0.001 |
| **Race** |  |  |
| White/Caucasian | Ref. |  |
| Black/African American/other | -0.74 (-1.38, -0.11) | 0.022 |
| **Number of children** | 0.02 (0.0005, 0.03) | 0.044 |
| **Parental education** |  |  |
| First stage of tertiary  education/above | Ref. |  |
| Upper secondary | -1.52 (-2.27, -0.76) | <0.001 |
| Lower secondary | -3.31 (-4.26, -2.36) | <0.001 |
| Primary education/below | -4.09 (-5.14, -3.05) | <0.001 |
| **Parental occupation** |  |  |
| Managerial/professional | Ref. |  |
| Technical/sales/support | -0.05 (-0.19, 0.09) | 0.480 |
| Service | -0.22 (-0.39, -0.05) | 0.010 |
| Farming/forestry/fishing | -0.46 (-0.77, -0.15) | 0.004 |
| Craft/repair | -0.17 (-0.38, 0.05) | 0.124 |
| Operators/labours | -0.35 (-0.54, -0.17) | <0.001 |
| Unemployed | -0.24 (-0.46, -0.01) | 0.039 |
| Retired | -0.42 (-0.53, -0.30) | <0.001 |
| Disabled | -0.55 (-0.75, -0.35) | <0.001 |
| Not in labour force | -0.32 (-0.46, -0.18) | <0.001 |
| **Household income per person** |  |  |
| Highest | Ref. |  |
| Medium | -0.15 (-0.21, -0.09) | <0.001 |
| Lowest | -0.40 (-0.47, -0.32) | <0.001 |
| **Marital status** |  |  |
| Married/partnered | Ref. |  |
| Separated/divorced/single | 0.00 (-0.11, 0.10) | 0.930 |
| Widowed | 0.06 (-0.02, 0.15) | 0.136 |
| **Smoking** |  |  |
| Non-smokers | Ref. |  |
| Ex-smokers | -0.03 (-0.12, 0.06) | 0.501 |
| Current smokers | 0.01 (-0.11, 0.13) | 0.870 |
| **Alcohol consumption** |  |  |
| None | Ref. |  |
| 1 | 0.10 (0.02, 0.18) | 0.013 |
| 2 | 0.21 (0.11, 0.32) | <0.001 |
| 3 | 0.22 (0.10, 0.34) | <0.001 |
| 4 | 0.11 (-0.05, 0.27) | 0.194 |
| 5 | 0.23 (0.07, 0.39) | 0.005 |
| 6 | 0.26 (0.04, 0.48) | 0.022 |
| 7 days/week | 0.17 (0.06, 0.29) | 0.003 |
| **Vigorous physical activity** |  |  |
| Yes | Ref. |  |
| No | -0.17 (-0.22, -0.12) | <0.001 |
| **High blood pressure** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.01 (-0.07, 0.06) | 0.851 |
| Yes, no medications | -0.10 (-0.21, 0.01) | 0.085 |
| **Diabetes** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.14 (-0.23, -0.05) | 0.003 |
| Yes, no medications | 0.0005 (-0.13, 0.14) | 0.995 |
| **Lung diseases** |  |  |
| No | Ref. |  |
| Yes, take medications | 0.04 (-0.08, 0.16) | 0.505 |
| Yes, no medications | -0.04 (-0.18, 0.09) | 0.552 |
| **Heart problems** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.07 (-0.15, 0.01) | 0.095 |
| Yes, no medications | – | – |
| **Stroke** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.82 (-0.98, -0.65) | <0.001 |
| Yes, no medications | -0.66 (-0.86, -0.46) | <0.001 |
| **Cancer** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.02 (-0.18, 0.14) | 0.831 |
| Yes, no medications | 0.06 (-0.06, 0.18) | 0.323 |
| **Arthritis** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.04 (-0.13, 0.05) | 0.369 |
| Yes, no medications | 0.03 (-0.05, 0.12) | 0.432 |
| **Psychological problems** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.39 (-0.49, -0.29) | <0.001 |
| Yes, no medications | -0.17 (-0.37, 0.02) | 0.085 |
| **Race x adult children’s schooling** |  |  |
| Black and others | -0.02 (-0.07, 0.03) | 0.350 |
| **Parental education**  **× adult children’s schooling** |  |  |
| First stage of tertiary education/above | Ref. |  |
| Upper secondary | 0.04 (-0.01, 0.10) | 0.087 |
| Lower secondary | 0.10 (0.03, 0.17) | 0.005 |
| Primary education/below | 0.09 (0.01, 0.17) | 0.036 |
| ***Random effects*** | ***S.D. (95%CI)*** |  |
| *Within individuals: residual* | *0.007(0.006, 0.009)* | – |
| *Between individuals: intercept* | *5.48 (5.00, 6.02)* | – |
| *Between individuals: age* | *5.29 (5.22, 5.37)* | – |

Ref.: reference; S.D.: standard deviation; 95%CI: 95% confidence interval.

**Table S4.** Results of Multilevel Models for the Relationships between Adult Children’s Schooling and Episodic Memory Scores, including Participants Aged 90+ (N=12138)

|  |  |  |
| --- | --- | --- |
|  | **Interaction Model** | |
|  | **Coef. (95%CI)** | ***p*** |
| **Adult children schooling** | 0.07 (0.03, 0.11) | <0.001 |
| **Intercept** | 11.17 (10.50, 11.84) | <0.001 |
| **Age** | 0.02 (0.01, 0.04) | 0.001 |
| **Age2** | -0.0041 (-0.0044, -0.0038) | <0.001 |
| **Gender** |  |  |
| Men | Ref. |  |
| Women | 1.25 (1.16, 1.34) | <0.001 |
| **Race** |  |  |
| White/Caucasian | Ref. |  |
| Black/African American/other | -1.04 (-1.16, -0.93) | <0.001 |
| **Number of children** | 0.01 (-0.004, 0.03) | 0.149 |
| **Parental education** |  |  |
| First stage of tertiary  education/above | Ref. |  |
| Upper secondary | -1.44 (-2.17, -0.70) | <0.001 |
| Lower secondary | -3.12 (-4.02, -2.22) | <0.001 |
| Primary education/below | -3.46 (-4.43, -2.47) | <0.001 |
| **Parental occupation** |  |  |
| Managerial/professional | Ref. |  |
| Technical/sales/support | -0.05 (-0.18, 0.09) | 0.506 |
| Service | -0.23 (-0.39, -0.06) | 0.007 |
| Farming/forestry/fishing | -0.44 (-0.74, -0.13) | 0.005 |
| Craft/repair | -0.15 (-0.36, 0.06) | 0.157 |
| Operators/labours | -0.36 (-0.54, -0.18) | <0.001 |
| Unemployed | -0.24 (-0.46, -0.01) | 0.038 |
| Retired | -0.42 (-0.53, -0.31) | <0.001 |
| Disabled | -0.53 (-0.73, -0.34) | <0.001 |
| Not in labour force | -0.30 (-0.44, -0.17) | <0.001 |
| **Household income per person** |  |  |
| Highest | Ref. |  |
| Medium | -0.15 (-0.21, -0.09) | <0.001 |
| Lowest | -0.40 (-0.48, -0.33) | <0.001 |
| **Marital status** |  |  |
| Married/partnered | Ref. |  |
| Separated/divorced/single | 0.01 (-0.10, 0.11) | 0.911 |
| Widowed | 0.08 (0.01, 0.16) | 0.035 |
| **Smoking** |  |  |
| Non-smokers | Ref. |  |
| Ex-smokers | -0.05 (-0.13, 0.04) | 0.295 |
| Current smokers | -0.01 (-0.13, 0.10) | 0.803 |
| **Alcohol consumption** |  |  |
| None | Ref. |  |
| 1 | 0.12 (0.04, 0.19) | 0.004 |
| 2 | 0.21 (0.11, 0.32) | <0.001 |
| 3 | 0.24 (0.13, 0.35) | <0.001 |
| 4 | 0.12 (-0.04, 0.28) | 0.140 |
| 5 | 0.26 (0.10, 0.42) | 0.001 |
| 6 | 0.26 (0.04, 0.47) | 0.018 |
| 7 days/week | 0.18 (0.07, 0.29) | 0.001 |
| **Vigorous physical activity** |  |  |
| Yes | Ref. |  |
| No | -0.18 (-0.23, -0.13) | <0.001 |
| **High blood pressure** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.01 (-0.08, 0.05) | 0.652 |
| Yes, no medications | -0.10 (-0.20, 0.01) | 0.075 |
| **Diabetes** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.17 (-0.26, -0.08) | <0.001 |
| Yes, no medications | -0.04 (-0.17, 0.09) | 0.539 |
| **Lung diseases** |  |  |
| No | Ref. |  |
| Yes, take medications | 0.02 (-0.10, 0.13) | 0.753 |
| Yes, no medications | -0.04 (-0.17, 0.09) | 0.538 |
| **Heart problems** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.08 (-0.15, 0.00) | 0.048 |
| Yes, no medications | – | – |
| **Stroke** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.85 (-1.01, -0.69) | <0.001 |
| Yes, no medications | -0.67 (-0.86, -0.48) | <0.001 |
| **Cancer** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.04 (-0.19, 0.12) | 0.653 |
| Yes, no medications | 0.07 (-0.04, 0.18) | 0.226 |
| **Arthritis** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.04 (-0.13, 0.05) | 0.393 |
| Yes, no medications | 0.05 (-0.03, 0.13) | 0.221 |
| **Psychological problems** |  |  |
| No | Ref. |  |
| Yes, take medications | -0.39 (-0.49, -0.30) | <0.001 |
| Yes, no medications | -0.29 (-0.48, -0.10) | 0.003 |
| **Parental education**  **× adult children’s schooling** |  |  |
| First stage of tertiary education/above | Ref. |  |
| Upper secondary | 0.04 (-0.01, 0.09) | 0.105 |
| Lower secondary | 0.09 (0.03, 0.16) | 0.005 |
| Primary education/below | 0.04 (-0.03, 0.12) | 0.264 |
| ***Random effects*** | ***S.D. (95%CI)*** |  |
| *Within individuals: residual* | *0.006 (0.005, 0.007)* | – |
| *Between individuals: intercept* | *5.42 (4.95, 5.94)* | – |
| *Between individuals: age* | *5.30 (5.23, 5.37)* | – |

Ref.: reference; S.D.: standard deviation; 95%CI: 95% confidence interval.