**Supplemental Online Content**

**This supplement includes 4 eTables and 7 eFigures.**

**eTable 1.** Content of Cognitively Stimulating Activities Related Questions Assessed at Different Age levels

**eTable 2.** Correlation Coefficient Table of Items on Cognitively Stimulating Activities at Age 6, 12, 18 (Early Life Period)

**eTable 3.** Exploratory Factor Analysis (EFA)Factor Loadings of Early-life Activity Items Simultaneously Fitted across Age 6, 12, 18 (Factor Number = 3, Items with Factor Loading >=0.4 were Highlighted for Each Factor)

**eTable 4.** Odds Ratios a (OR) and 95% Confidence Intervals (CI) for Late-life Depression and Anxiety per 1 Point Increase in Early-Life Cognitively Stimulating Activity Sub-Scale Scores from Exploratory Factor Analysis (EFA)

**eFigure 1.** Pearson Correlation Among Age 6, 12, 18, 40 and Early Life Activity Scores

**eFigure 2.** Distributions of Age 6, 12, 18, 40 and Early Life Activity Scores

**eFigure 3.** Epidemiology Confounding Structure as Presented in a Directed Acyclic Graph (DAG)

**eFigure 4.** Early Life Cognitively Stimulating Activity Score – Response Curves using Log Odds of Outcome Risk and Probability of Outcome Risk as Y-axis

**eFigure 5.** Pearson Correlation Matrix Plot of Items on Cognitively Stimulating Activities at Age 6, 12, 18 (Early Life Period)

**eFigure 6**. Exploratory Factor Analysis (EFA) Scree Plots of Age-specific Cognitively Stimulating Activities Separately Fitted at Age 6, 12, 18

**eFigure 7.** Exploratory Factor Analysis (EFA) Scree Plot of Age-specific Cognitively Stimulating Activities Simultaneously Fitted across Age 6, 12, 18

**eTable 1. Content of Cognitively Stimulating Activities Related Questions Assessed at Different Age levels**

|  |  |
| --- | --- |
| **Age** | **Activities**  |
| When you were 6… | a How often did you play games like tic-tac-toe, checkers, or other board games, cards, or word games?a How often did someone in your home read to you?a How often did someone in your home tell you stories? |
| When you were 12… | b About how much time did you spend reading each day?a How often did you visit a library?a How often did you read a newspaper?a How often did you read magazines?a How often did you read books?a How often did you write letters?a How often did you play games like checkers or other board games, cards, puzzles, word games, mind teasers, or any other similar games?b How much time did you spend on homework each day? |
| When you were 18… | c How many times had you visited a museum?c How many times had you attended a concert, play, or musical?b About how much time did you spend reading each day?a How often did you visit a library?a How often did you read newspapers?a How often did you read magazines?a How often did you read books?a How often did you write letters?a How often did you play games like checkers or other board games, etc.? |
| When you were 40… | b About how much time did you spend reading each day?a How often did you read newspapers?a How often did you read magazines?a How often did you read books?a How often did you write letters?a How often did you play games like checkers or other board games, cards, puzzles, etc.?c (From age 30 to 40) How many times did you visit a museum?c (From age 30 to 40) How many times did you attend a concert, play, or musical?a (From age 30 to 40) How often did you visit a library? |

a Responses were coded as: Once a year or less (1), Several times a year (2), Several times a month (3), Several times a week (4), Every day/almost every day (5); b Responses were coded as: None (1), Less than one hour (2), One to less than two hours (3), Two to less than three hours (4), Three or more hours (5); c Responses were coded as: Never (1), 1-2 times (2), 3-9 times (3), 10-19 times (4), More than 20 times (5).

**eTable 2. Correlation Coefficient Table of Items on Cognitively Stimulating Activities at Age 6, 12, 18 (Early Life Period)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **read to 6** | **storytelling 6** | **games 6** | **read 12** | **library 12** | **newspaper 12** | **magazine 12** | **book 12** | **letter 12** | **games 12** | **homework 12** | **museum 18** | **music 18** | **read 18** | **library 18** | **newspaper 18** | **magazine 18** | **book 18** | **letter 18** | **games 18** |
| **read to 6** | **1.00** | 0.66 | 0.42 | 0.28 | 0.37 | 0.23 | 0.32 | 0.43 | 0.36 | 0.37 | 0.17 | 0.32 | 0.31 | 0.26 | 0.29 | 0.23 | 0.37 | 0.28 | 0.32 | 0.25 |
| **storytelling 6** | 0.66 | **1.00** | 0.43 | 0.21 | 0.30 | 0.22 | 0.30 | 0.31 | 0.35 | 0.39 | 0.13 | 0.26 | 0.25 | 0.24 | 0.27 | 0.22 | 0.28 | 0.29 | 0.31 | 0.29 |
| **games 6** | 0.42 | 0.43 | **1.00** | 0.23 | 0.33 | 0.19 | 0.29 | 0.35 | 0.31 | 0.70 | 0.13 | 0.24 | 0.22 | 0.20 | 0.23 | 0.19 | 0.29 | 0.25 | 0.26 | 0.40 |
| **read 12** | 0.28 | 0.21 | 0.23 | **1.00** | 0.44 | 0.30 | 0.33 | 0.64 | 0.32 | 0.26 | 0.33 | 0.29 | 0.27 | 0.61 | 0.29 | 0.26 | 0.52 | 0.30 | 0.28 | 0.13 |
| **library 12** | 0.37 | 0.30 | 0.33 | 0.44 | **1.00** | 0.28 | 0.36 | 0.56 | 0.40 | 0.36 | 0.20 | 0.31 | 0.29 | 0.31 | 0.43 | 0.25 | 0.43 | 0.32 | 0.31 | 0.22 |
| **newspaper 12** | 0.23 | 0.22 | 0.19 | 0.30 | 0.28 | **1.00** | 0.65 | 0.36 | 0.22 | 0.22 | 0.12 | 0.29 | 0.25 | 0.27 | 0.30 | 0.70 | 0.33 | 0.51 | 0.20 | 0.21 |
| **magazine 12** | 0.32 | 0.30 | 0.29 | 0.33 | 0.36 | 0.65 | **1.00** | 0.40 | 0.35 | 0.30 | 0.16 | 0.36 | 0.31 | 0.28 | 0.33 | 0.54 | 0.36 | 0.67 | 0.27 | 0.24 |
| **book 12** | 0.43 | 0.31 | 0.35 | 0.64 | 0.56 | 0.36 | 0.40 | **1.00** | 0.42 | 0.37 | 0.21 | 0.39 | 0.33 | 0.48 | 0.39 | 0.31 | 0.74 | 0.37 | 0.35 | 0.22 |
| **letter 12** | 0.36 | 0.35 | 0.31 | 0.32 | 0.40 | 0.22 | 0.35 | 0.42 | **1.00** | 0.32 | 0.18 | 0.29 | 0.28 | 0.27 | 0.35 | 0.23 | 0.38 | 0.34 | 0.66 | 0.26 |
| **games 12** | 0.37 | 0.39 | 0.70 | 0.26 | 0.36 | 0.22 | 0.30 | 0.37 | 0.32 | **1.00** | 0.16 | 0.26 | 0.23 | 0.25 | 0.27 | 0.23 | 0.34 | 0.30 | 0.29 | 0.52 |
| **homework 12** | 0.17 | 0.13 | 0.13 | 0.33 | 0.20 | 0.12 | 0.16 | 0.21 | 0.18 | 0.16 | **1.00** | 0.12 | 0.10 | 0.35 | 0.18 | 0.09 | 0.19 | 0.13 | 0.17 | 0.08 |
| **museum 18** | 0.32 | 0.26 | 0.24 | 0.29 | 0.31 | 0.29 | 0.36 | 0.39 | 0.29 | 0.26 | 0.12 | **1.00** | 0.67 | 0.32 | 0.36 | 0.33 | 0.40 | 0.34 | 0.27 | 0.20 |
| **music 18** | 0.31 | 0.25 | 0.22 | 0.27 | 0.29 | 0.25 | 0.31 | 0.33 | 0.28 | 0.23 | 0.10 | 0.67 | **1.00** | 0.29 | 0.32 | 0.27 | 0.33 | 0.25 | 0.27 | 0.18 |
| **read 18** | 0.26 | 0.24 | 0.20 | 0.61 | 0.31 | 0.27 | 0.28 | 0.48 | 0.27 | 0.25 | 0.35 | 0.32 | 0.29 | **1.00** | 0.49 | 0.28 | 0.62 | 0.29 | 0.33 | 0.19 |
| **library 18** | 0.29 | 0.27 | 0.23 | 0.29 | 0.43 | 0.30 | 0.33 | 0.39 | 0.35 | 0.27 | 0.18 | 0.36 | 0.32 | 0.49 | **1.00** | 0.31 | 0.57 | 0.33 | 0.40 | 0.23 |
| **newspaper 18** | 0.23 | 0.22 | 0.19 | 0.26 | 0.25 | 0.70 | 0.54 | 0.31 | 0.23 | 0.23 | 0.09 | 0.33 | 0.27 | 0.28 | 0.31 | **1.00** | 0.36 | 0.68 | 0.25 | 0.25 |
| **magazine 18** | 0.37 | 0.28 | 0.29 | 0.52 | 0.43 | 0.33 | 0.36 | 0.74 | 0.38 | 0.34 | 0.19 | 0.40 | 0.33 | 0.62 | 0.57 | 0.36 | **1.00** | 0.42 | 0.44 | 0.29 |
| **book 18** | 0.28 | 0.29 | 0.25 | 0.30 | 0.32 | 0.51 | 0.67 | 0.37 | 0.34 | 0.30 | 0.13 | 0.34 | 0.25 | 0.29 | 0.33 | 0.68 | 0.42 | **1.00** | 0.31 | 0.31 |
| **letter 18** | 0.32 | 0.31 | 0.26 | 0.28 | 0.31 | 0.20 | 0.27 | 0.35 | 0.66 | 0.29 | 0.17 | 0.27 | 0.27 | 0.33 | 0.40 | 0.25 | 0.44 | 0.31 | **1.00** | 0.30 |
| **games 18** | 0.25 | 0.29 | 0.40 | 0.13 | 0.22 | 0.21 | 0.24 | 0.22 | 0.26 | 0.52 | 0.08 | 0.20 | 0.18 | 0.19 | 0.23 | 0.25 | 0.29 | 0.31 | 0.30 | **1.00** |

**eTable 3. Exploratory Factor Analysis (EFA) Factor Loadings of Early-life Activity Items Simultaneously Fitted across Age 6, 12, 18 (Factor Number = 3, Items with Factor Loading >=0.4 were Highlighted for Each Factor)**

|  |  |
| --- | --- |
|  | **3 FACTORS** |
| **Item** | **Factor 1** | **Factor 2** | **Factor 3** |
| **read to 6** | 0.25 | 0.04 | 0.42 |
| **storytelling 6** | 0.1 | 0.07 | 0.49 |
| **games 6** | -0.03 | -0.03 | 0.83 |
| **read 12** | 0.75 | -0.02 | -0.07 |
| **library 12** | 0.48 | 0.03 | 0.2 |
| **newspaper 12** | 0.01 | 0.79 | -0.05 |
| **magazine 12** | 0.05 | 0.69 | 0.1 |
| **book 12** | 0.79 | -0.01 | 0.07 |
| **letter 12** | 0.35 | 0.06 | 0.26 |
| **games 12** | 0.01 | 0.01 | 0.8 |
| **homework 12** | 0.32 | -0.04 | 0.03 |
| **museum 18** | 0.34 | 0.21 | 0.1 |
| **music 18** | 0.32 | 0.14 | 0.11 |
| **read 18** | 0.75 | -0.02 | -0.09 |
| **library 18** | 0.52 | 0.11 | 0.05 |
| **newspaper 18** | -0.05 | 0.88 | -0.05 |
| **magazine 18** | 0.83 | 0.02 | -0.02 |
| **book 18** | 0.04 | 0.74 | 0.06 |
| **letter 18** | 0.38 | 0.04 | 0.2 |
| **games 18** | -0.03 | 0.14 | 0.51 |

**eTable 4. Odds Ratiosa (OR) and 95% Confidence Intervals (CI) for Late-life Depression and Anxiety per 1 Point Increase in Early-Life Cognitively Stimulating Activity Sub-scale Scores from Exploratory Factor Analysis (EFA)**

|  |  |  |
| --- | --- | --- |
|  | **Depression** | **Anxiety**  |
| **Activities type**  | **OR (95% CI)** | **OR (95% CI)** |
| Factor 1  | 0.75 (0.57-0.99) | 0.87 (0.62-1.22) |
| Factor 2 | 0.71 (0.57-0.89) | 1.12 (0.86-1.46) |
| Factor 3 | 0.67 (0.50-0.89)  | 0.91 (0.64-1.28)  |

*a Adjusted for age, sex, race, parental education, childhood family structure, childhood socioeconomic status.*

**eFigure 1. Pearson Correlation Among Age 6, 12, 18, 40 and Early Life Activity Scores.**

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avg6 is the average age 6 score, avg12 is the average age 12 score, avg18 is the average age 18 score, avg40 is the average age 40 score and avgearly is the average early life score.

**eFigure 2. Distributions of Age 6, 12, 18, 40 and Early Life Activity Scores**

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**eFigure 3. Epidemiology Confounding Structure as Presented in a Directed Acyclic Graph (DAG)**

 

**eFigure 4. Early Life Cognitively Stimulating Activity Score – Response Curves using Log Odds of Outcome Risk and Probability of Outcome Risk as Y-axis**

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**eFigure 5. Pearson Correlation Matrix Plot of Items on Cognitively Stimulating Activities at Age 6, 12, 18 (Early Life Period)**



**eFigure 6. Exploratory Factor Analysis (EFA) Scree Plots of Age-specific Cognitively Stimulating Activities Separately Fitted at Age 6, 12, 18**

 **Age 6. Age 12.**



 **Age 18.**



**eFigure 7. Exploratory Factor Analysis (EFA) Scree Plot of Age-specific Cognitively Stimulating Activities Simultaneously Fitted across Age 6, 12, 18**

