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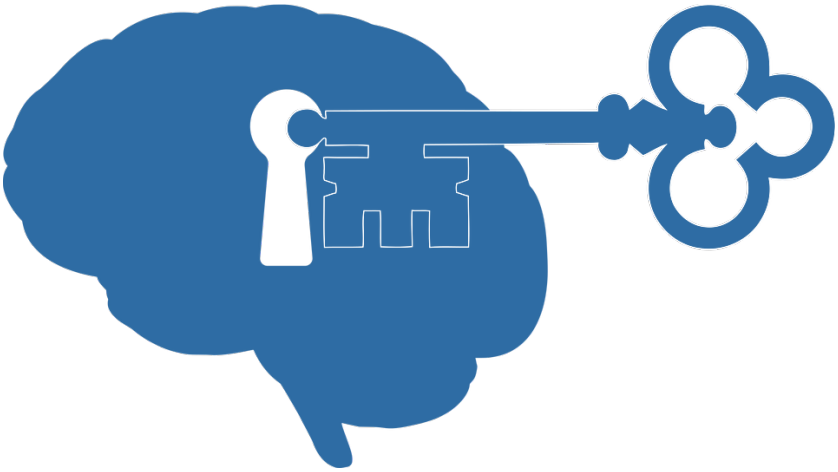
# THE DALLAS LIFESPAN BRAIN STUDY

## Keys to the Kingdom



# The Dallas Lifespan Brain Study
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## What are the "Keys to the Kingdom"

The "Keys to the Kingdom" is a master document and data dictionary that includes all the components of the Dallas Lifespan Brain Study. Within this document are listed the types of data that were collected, the source documents for each, how to access the study's source documents and spreadsheets, and the coded item names and their abbreviations for each variable found in the spreadsheets.

## What is the Dallas Lifespan Brain Study?

The Dallas Lifespan Brain Study (DBLS) is a longitudinal study to examine changes in human cognition as well as changes in brain structure and function across the lifespan. This study represents the first systematic investigation of changes in neural activation across the lifespan, including middle-age. The present work is particularly noteworthy in that we have integrated structural measures of the brain with functional activation patterns to predict both cognitive function and neural activation for encoding tasks. Few, if any, studies have combined both types of neural measures; the standard paradigm in the aging literature has been to use behavioral differences to predict brain function, rather than the reverse, as we have done.

The study was designed to test the same set of subjects approximately every 4 years with the following measures: 2 days of cognitive behavioral testing, take-home questionnaires, and an MRI scan session. 464 people participated in Epoch 1, which was collected between 2008-2014. Approximately 4 years later, between 2012-2017, 338 participants (73%) came back for Epoch 2 repeated testing. Finally, approximately 4 years later, between 2018-2022, 224 participants (48%) came back for Epoch 3 data collection. The Epoch 3 intervals are somewhat less standardized due to interference from Covid 19 restrictions.

## Types of Data Collected

i. Cognitive Data Constructs
   - Speed of processing
   - Working memory
   - Long term (episodic memory)
   - Reasoning
   - Vocabulary
   - Verbal Fluency

ii. Structural MRI Data

iii. Amyloid PET imaging (AV-45) and TAU PET imaging (AV 14-51)

iv. Functional MRI

v. Health and Psychosocial Data
   - Physical Health
   - Mental Health and AD screening Data
   - Psychosocial

# Accessing DLBS Data

## DLBS Datasheets How-To

The Dallas Lifespan Brain Study is hosted publicly on OpenNeuro at https://openneuro.org/datasets/ds004856. Guides for new users to OpenNeuro, including instrcutions on how to download all or partial databases from OpenNeuro, can be found here: https://docs.openneuro.org/user_guide.html

The OpenNeuro repository is organized in the Brain Imaging Data Structure (BIDS, ver. 1.8, 2022) standard using *BIDSCOIN* with participant-specific directories <sub-XXX>, which include up to three subdirectories based on data collection Epoch (e.g., <ses-wave1>) and further subdirectories separated by imaging modality.

Imaging modalities included: anatomical scans ('anat' folder), diffusion weighted images ('dwi'), functional MRI scans ('func'), perfusion imaging ('perf'), and pet imaging ('pet'). Stimulus onset asynchrony values are provided in the *_events.tsv and *_events.json files located in the root directory and in each subject's 'func' folder.

Demographic information and subject-specific testing intervals are provided in the participants.tsv and participants.json files in the root directory. Pre-processed cognitive data, survey data, and genotyping data, as well as summary structural (FreeSurfer metrics), PET amyloid ($^{18}$F-AV-45) SUVRs, and PET tau ($^{18}$F-AV-1451) SUVRs for each participant, are in the 'phenotype' directory, each in the form of Microsoft Excel spreadsheets with tabs for each epoch of data collection.

Each of these domains of pre-processed data are summarized in the subsequent chapters, and data dictionaries for the available data are provided where appropriate.

*Note:* we refer to each instance of longitudinal observation as "Epoch" in our published materials for this database, including this document, while labels and abbreviations in our database and data dictionary utilize "Wave" or "W" to refer to each instance of longitudinal observation. "Epoch" and "Wave"/"W" are equivalent terms wherever they appear in this documenting.

# Cognitive Data Constructs

The Dallas Lifespan Brain Study

## Using the cognitive data

The cognitive data includes all task information, data coding, and data spreadsheets for each of the cognitive constructs in the Dallas Lifespan Brain Study.

The cognitive data in the KTTK is organized by 6 constructs which includes Speed of Processing, Working Memory, Episodic Memory, Reasoning, Vocabulary, and Verbal Fluency.

Each of the 7 constructs has various tasks associated with it and there are a total of 30 tasks that can be found listed below. To access any of the tasks within each construct, select the task of interest. The key to the names and data structure used for data coding of each construct spreadsheet is also included in this document and can be accessed by selecting "Data Coding sheet" included under each construct listed below. Finally, the spreadsheet for each construct can be found listed below and accessed by selecting "Spreadsheet of data" listed under each construct.

*Note:* Construct/task numbering omits construct "3". This is an artifact if initial data collection in which an additional construct was intended to be collected but ultimately dropped from the study during Epoch 1 of data collection.

## Task and Assessment Numbering

**1 Speed of Processing Construct**

- Task 1: Digit Comparison
- Task 2: WAIS-III Digit Symbol
- Task 3: NIH Toolbox Pattern Comparison Processing Speed Test
- Data Coding sheet for speed of processing
- Spreadsheet of Speed of Processing Data

**2 Working Memory**

- Task 4: CANTAB Spatial Working Memory
- Task 5: WAIS-III Letter Number Sequencing Task
- Task 6: Operation Span Task
- Task 7: NIH Toolbox List Sorting
- Task 8: CANTAB Delayed Matching to Sample Task
- Task 9: CANTAB Spatial Recognition Memory Task
- Data Coding sheet for working memory
- Spreadsheet of Working Memory data

**4 Episodic Memory**

- Task 15: Hopkins Verbal Learning, Parts 1-4 (Immediate & Delayed Recall)
- Task 16: CANTAB Verbal Recognition Memory Parts 1-4
- Task 17: Woodcock-Johnson Memory for Names Immediate & Delayed
- Task 18: Wechsler Memory Scale Logical Memory
- Task 19: NIH Toolbox Picture Sequence Memory, Parts 1-2
- Data Coding sheet for Episodic Memory
- Spreadsheet of Episodic Memory data

**5 Reasoning**

- Task 20: Raven's Matrices
- Task 21: ETS Letter Sets
- Task 22: CANTAB Stockings of Cambridge
- Task 23: Everyday Problem Solving
- Data Coding sheet for Reasoning
- Spreadsheet of Reasoning data

**6 Vocabulary**

- Task 24: Educational Testing Service Advanced Vocabulary
- Task 25: Shipley Vocabulary
- Task 26: CANTAB Graded Naming Task
- Task 27: NIH Toolbox Oral Reading Recognition Test
- Task 28: NIH Toolbox Picture Vocabulary
- Data Coding sheet for Vocabulary
- Spreadsheet of Vocabulary data

**7 Verbal Fluency**

- Task 29: Controlled Oral Word Association (FAS)
- Task 30: Controlled Oral Association: Categories
- Data Coding sheet for Verbal Fluency
- Spreadsheet of Verbal Fluency data

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*Note:* Construct numbering skips "3", as a seventh construct (Executive Function) was included in the original design of the DLBS, but was dropped from the study due to persistent data collection and task availability issues. The partial data for this construct are not included in this dataset, but can be made available upon request.

# Construct 1: Speed of Processing

***Definition***

This construct measures how rapidly individuals can perceptually compare and process information (Park, 2000 in D.C. Park & N. Schwartz (Eds.)). It is highly sensitive to cognitive function and is considered a basic core component of cognition. Timothy Salthouse authored a classic paper that fully describes both theoretical importance and empirical measures of speed of processing (Salthouse,1996).

**References**

Salthouse, T.A. (1996). The processing-speed theory of adult age differences in cognition. Psychological Review, 103, 403-428.

Park, D.C. (2000). The basic mechanisms accounting for age-related decline in cognitive function. In D.C. Park & N. Schwartz (Eds.), Cognitive Aging: A primer, pp. 3 -21. Psychology Press.

***Sample Sizes by Epoch and Task (subjects with partial data in parentheses)***

| Assessment | Epoch 1 | Epoch 2 | Epoch 3 |
|---|---|---|---|
| **Digit Comparison** | 463(1) | 324 | 212 |
| **WAIS-III Digit Symbol** | 456 | 323 | 212 |
| **NIH Toolbox Pattern Comparison Processing Speed** | 0 | 322(322)[a] | 206(17)[a] |

Notes on data completeness:

[a]NIH Toolbox Pattern Comparison Processing Speed: for Epoch 2, the computed score is unavailable and the fully-corrected score is available for only 193 participants; for Epoch 3, the age-corrected, percentile, and fully-corrected scores were only available for 189 participants. The uncorrected standardized or raw scores are recommended for this task.

## *Task 1.1 Digit Comparison Task*

**Description (task duration: 2.5 minutes):** Participants have to decide whether two number strings that are either 3, 6, or 9 digits in length, have identical digits or different digits. The task is divided into 3 separate sets; a set is comprised only of 3-digits, 6-digits, or 9-digits comparisons (i.e., a set doesn't contain a mix of different string lengths). Subjects are given 45 seconds for each set to try to complete as many comparisons as they can. The number correctly completed for 3-, 6-, and 9-item strings, as well as total correct, is available. Higher scores are better.

**Primary Reference (Letter Comparison Task)**:

Salthouse T. A., Babcock R. L. (1991). Decomposing adult age differences in working memory. *Developmental Psychology*, 27, 763-776.

**Development of Cross-culturally Appropriate Measures (Digit Comparison Task)**

Hedden, T., Park, D. C., Nisbett, R., Ji, LJ, Jing, Q., & Jiao, S. (2002). Cultural variation in verbal versus spatial neuropsychological function across the life span. *Neuropsychology*, 16, 65-73.

## ***Task 1.2 WAIS-III Digit Symbol***

**Description (task duration: 1.5 minutes):**

- Participants are shown nine geometric symbols that are each assigned to a digit from 1 to 9. They are then presented with randomized digits and asked to draw the corresponding symbol below each digit as quickly as possible for 90 seconds.

**Primary Reference**:

Wechsler, D., (1997). *WAIS-III: Administration and scoring manual: Wechsler Adult Intelligence Scale*. San Antonio, TX: Psychological Corporation.

## ***Task 1.3 NIH Toolbox Pattern Comparison Processing Speed Test***

**Description (task duration: 1.5 minutes):** Participants are shown two pictures side-by-side and are asked to discern whether the pictures are the same or different. If the pictures are the same, the participant presses the "Yes" button. If the pictures are not the same, the participant presses the "No" button. The participant is instructed to only use their index finger on their dominant hand to press either button. Participants' raw score is the number of 130 items correct in an 85-second period. The items are designed to be simple to most purely measure processing speed. Higher scores reflect faster speeds of processing.

**Caution:** Participants in DLBS Epoch 2 performed the NIH Toolbox Pattern Comparison Speed Test on a desktop computer, whereas, participants in DLBS Epoch 3 performed the task on an ipad. NIH toolbox provides a computed score to equate the different platforms (desktop and ipad) used. For additional details, we refer you to the the NIH Toolbox website: https://www.healthmeasures.net/explore-measurement-systems/nih-toolbox/obtain-and-administer-measures.

**Primary Reference:**

Gershon RC, Wagster MV, Hendrie HC, Fox NA, Cook KF, Nowinsky CJ. NIH Toolbox for Assessment of Neurological and Behavioral Function. Neurology. 2013; 80: S1-S92.

**Software Reference:**

NIH Toolbox for the iPad test ver. 2.1
https://nihtoolbox.force.com/s/article/nih-toolbox-scoring-and-interpretation-guide

**Speed of Processing Ability Construct: Key to Names and Data Structure in Data Set**

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Age Interval | AgeInterval | Age at Epoch recoded into 3-year intervals | 20-100 |
| Sex | Sex | Participant's biological sex. | m = Male<br>f = Female |
| Race | Race | Race that the participant self-identifies with. | 1 = Asian American/ Pacific Islander<br>2 = Black/African American<br>3 = Multiracial<br>4 = Native American<br>5 = White/Caucasian<br>6 = Other<br>7 = Unknown |
| Ethnicity | Ethnicity | Ethnicity that the participant self-identifies with. | 1=Hispanic/Latin(o/a)<br>0 = Non-Hispanic |
| Handedness Score | HandednessScore | Average score of participant hand preference while completing various tasks. Higher scores indicate preference for the right hand. | Score range: 0-4<br><br>0 = Always left<br>1 = Usually left<br>2 = No preference<br>3 = Usually right<br>4 = Always right |
| Mini-Mental State Exam Total | MMSE | Total # of items answered correctly. | Score range: 0-30 |
| Cognitive Battery Epoch 1-2 Interval | CogW1toW2 | Interval between cognitive testing day 1 for Epochs 1-2. | # of Years |
| Cognitive Battery Epoch 2-3 Interval | CogW2toW3 | Interval between cognitive testing day 1 for Epochs 2-3. | # of Years |
| Cognitive Battery Epoch 1-3 Interval | CogW1toW3 | Interval between cognitive testing day 1 for Epochs 1-3. | # of Years |
| Take Home Epoch 1-2 Interval | TakeHomeW1toW2 | Interval between Take Home for Epochs 1-2. | # of Years |
| Take Home Epoch 2-3 Interval | TakeHomeW2toW3 | Interval between Take Home for Epochs 2-3. | # of Years |
| Take Home Epoch 1-3 Interval | TakeHomeW1toW3 | Interval between Take Home for Epochs 1-3. | # of Years |
| MRI Epoch 1-2 Interval | MRIW1toW2 | Interval between MRI scan for Epochs 1-2. | # of Years |
| MRI Epoch 2-3 Interval | MRIW2toW3 | Interval between MRI scan for Epochs 2-3. | # of Years |
| MRI Epoch 1-3 Interval | MRIW1toW3 | Interval between MRI scan for Epochs 1-3. | # of Years |
| Amyloid PET Epoch 1-2 Interval | PETAmyW1toW2 | Interval between amyloid PET scan for Epochs 1-2. | # of Years |
| Amyloid PET Epoch 2-3 Interval | PETAmyW2toW3 | Interval between amyloid PET scan for Epochs 2-3. | # of Years |
| Amyloid PET Epoch 1-3 Interval | PETAmyW1toW3 | Interval between amyloid PET scan for Epochs 1-3. | # of Years |
| Highest Level of Education Completed | EduComp5 | This is an ordinal measure of participants' self-reported highest level of education completed. | 1 = Less than high school graduate<br>2 = High school graduate/GED |

| | | | |
|---|---|---|---|
| | | | 3 = Some college/trade/ technical/business school<br>4 = Bachelor's degree<br>5 = Some graduate work<br>6 = Master's degree<br>7 = MD/JD/PhD/other advanced degree |
| Education Estimated Years Capped | EduYrsEstCap5 | This is a conversion of the participant's self-reported highest level of education into a capped estimated number of years it would take to reach this highest level of education.<br><br>The "capped" comes into play when someone spend a longer time than usual for a certain degree but did not complete it. In short, someone with a lot of years of education but did not complete a degree will not score higher than someone who did complete the degree. | *11 maximum* = Less than High school<br>*12* = High School<br>*15 maximum* = Some College<br>*16* = Bachelor's degree<br>*20 maximum* = Some Graduate Work<br>*18* = Master's degree<br>*21* = MD/JD/PhD/ Advanced degree |
| Construct Name | ConstructName | Speed of Processing | |
| Construct Number | ConstructNumber | Construct 1 | |
| Epoch | Wave | Denotes the data collection Epoch.<br>See individual differences data set for more detail, including testing date intervals. | 1 = Epoch 1<br>2 = Epoch 2<br>3 = Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch<br>2 = No, did not return for Epoch | |
| Number of Tasks in Construct | NumTasks | How many tasks make up the speed of processing construct | 3 Tasks for Speed of Processing |
| **Task 1—Digit Comparison** | **Task1** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| Digit Comparison 3 | DigComp3_1 | Total correct for 3-digit strings | Score Range:<br>0-64 |
| Digit Comparison 6 | DigComp6_1 | Dependent Variable: total correct for 6-digit strings | Score Range:<br>0-64 |
| Digit Comparison 9 | DigComp9_1 | Dependent Variable: total correct for 9-digit strings | Score Range:<br>0-64 |
| Digit Comparison Total | DigCompTotal1 | Dependent Variable: Total correct summed across T3, T6, and T9 trials | Score Range:<br>0-192 |
| **Task 2—Digit Symbol** | **Task2** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| Digit Symbol Total | DigSymTotal2 | Number of items matched correctly in 90 sec | Score Range:<br>0-93 |
| **Task 3—NIH Toolbox Pattern** | **Task3** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |

| **Comparison Speed Test** | | | |
|---|---|---|---|
| NIH Toolbox Pattern Comparison Speed Test | NIHSpeedRaw3 | The participant's raw score is the number of items answered correctly in 85 seconds of response time, with a range of 0-130. This score is then converted to the NIH Toolbox normative standard scores. | Score Range: 0-130 |
| NIH Toolbox Pattern Comparison Speed Test | NIHSpeedComp3 | The computed score is a conversion between the desktop and iPad data present in Epoch 3. | Score Range: 0-130 |
| NIH Toolbox Pattern Comparison Speed Test | NIHSpeedUn3 | It compares the performance of the test-taker to those in the entire NIH Toolbox nationally representative normative sample, regardless of age or any other variable. | Normative Mean = 100, SD = 15 |
| NIH Toolbox Pattern Comparison Speed Test | NIHSpeedAge3 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample at the same age, where a score of 100 indicates performance that was at the national average for the test-taking participant's age. Age-corrected standard scores were derived for adults (ages 18-85). | Mean = 100, Standard Deviation = 15 |
| NIH Toolbox Pattern Comparison Speed Test | NIHSpeedPercent3 | A Percentile represents the percentage of people nationally above whom the participant's score ranks (the comparison group will be based on whichever normative score is used) | Percentile rank: 0-100 |
| NIH Toolbox Pattern Comparison Speed Test | NIHSpeedFully3 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample, while adjusting for key demographic variables (education, gender, and race/ethnicity) collected during the NIH Toolbox national norming study. | Mean = 50, Standard Deviation = 10 |

# Construct 2: Working Memory

***Definition***

The construct of working memory measures the ability of individuals to simultaneously manipulate and store information. This ability plays a key role in processes involving language comprehension, reasoning, and planning, highlighting its importance in analyzing cognition. Baddeley and Hitch present the initial transition from classically accepted short-term memory to the current definition of working memory.

**References**

Baddeley, A.D., & Hitch, G. (1974). Working Memory. *Psychology of Learning and Motivation*, *8*, 47-89. https://doi.org/10.1016/S0079-7421(08)60452-1

Salthouse, T. A., & Babcock, R. L. (1991). Decomposing adult age differences in working memory. *Developmental Psychology*, *25*(5), 763-776. https://doi.org/10.1037/0033-295X.103.3.403

Park, D.C. (2000). The basic mechanisms accounting for age-related decline in cognitive function. In D.C. Park & N. Schwartz (Eds.), *Cognitive Aging: A primer*, pp. 47-89. Psychology Press.

***Sample Sizes by Epoch and Task (subjects with partial data in parentheses)***

| Assessment | Epoch 1 | Epoch 2 | Epoch 3 |
|---|---|---|---|
| **CANTAB Spatial Working Memory** | 463 | 333(1) | 212 |
| **WAIS-III Letter Number Sequencing Task** | 463 | 321 | 212 |
| **Operation Span Task** | 461 | 94 | 206 |
| **NIH Toolbox List Sorting** | 0 | 316(230)[a] | 206(17)[a] |
| **CANTAB Delayed Matching to Sample Task** | 463 | 0 | 0 |
| **CANTAB Spatial Recognition Memory Task** | 463 | 0 | 0 |

Notes on data completeness:

[a]NIH Toolbox List Sorting: For Epoch 2, raw scores are only available for 90 participants and fully-corrected scores are only available for 198 participants. For Epoch 3, age-corrected, percentile, and fully-corrected scores are only available for 189 participants. The uncorrected standardized scores are recommended for this task.

## ***Task 2.4 CANTAB Spatial Working Memory***

**Description (task duration: 10 minutes):** This task assesses the participant's ability to retain spatial information while simultaneously manipulating remembered items in working memory. The objective of the task is to remember the sequence of locations where blue tokens were found (spatial memory), and simultaneously continue searching for tokens (processing component) without revisiting locations that have already yielded a token (memory component). Participants collect blue tokens that are hidden in an array of boxes (set size from 3-8 boxes). When an array of boxes is presented, participants must touch each box in turn with a touch-screen stylus until one reveals a blue token inside (a "search"). Once a blue token has been found, the participant will place it in the depository column on the right side of the screen ("home"), which indicates how many tokens remain in the sequence. The participant must search for the remaining tokens until one has been found in each box on the current screen. The boxes will remain on the screen after being touched, regardless of whether the participant locates blue tokens inside of them. The participant's task is to remember where they find the tokens because, once a token has been found in a box, that box will never contain another token for that set. After a participant has found all blue tokens for an array of boxes, the task moves onto the next trial of boxes in a different array. This task contains 15 total trials. Trials 1-3 contain 3 boxes each, trials 4-7 contain 4 boxes each, trials 8-11 contain 6 boxes each, and trials 12-15 contain 8 boxes each. Performance in the more difficult trials of this task is enhanced by the use of a heuristic search strategy, which indicates that participants did not choose boxes at random.

**Performance Errors**: Two kinds of errors can be made: *Between (memory) errors* are when a participant returns to a box in which a token has already been found during the same search trial. Lower between error scores are better.
*Within errors* are when participants search any particular box more than once in the same search sequence. Lower within error scores are better.

**Primary References**:

Robbins T.W., et al. (1994). Cambridge Neuropsychological Test Automated Battery (CANTAB): A factor-analytic study of a large sample of normal elderly volunteers. *Dementia, 5*(5):266-281. https://doi.org/10.1159/000106735.

CANTAB Eclipse (2007). https://www.cambridgecognition.com/cantab/cognitive-tests/executive-function/spatial-executive-function-swm

## ***Task 2.5 WAIS-III Letter-Number Sequencing***

**Description (task duration: 5 minutes): 7 blocks of 3 trials per block are presented unless task is terminated for poor performance.** Participants listen to a series of numbers and letters (e.g., 1-J-A-6) and are asked to rearrange the items in their head and recite the sequence with the numbers first, in ascending order, followed by the letters, in alphabetical order (e.g., 1-6-A-J). Researchers present the letter-number strings at a rate of one letter or number per second. Responses are recorded for accuracy and each receives a score of correct (1) or incorrect (0). There are a total of 21 trials that range from 2-8-item strings and are presented from easiest to hardest. The task is terminated when a participant responds incorrectly to all three trials within a 3-item block. Otherwise, the researcher will continue and administer the next item of increased difficulty (higher total number of letters and numbers) until all seven blocks are completed. The

variables of interest are the number of trials answered correctly in each block and the total number of trials correct across all blocks. A higher score indicates better working memory performance.

**Primary Reference**:

Wechsler, D. (1997). *WAIS-III: Administration and scoring manual: Wechsler Adult Intelligence Scale*. San Antonio, TX: Psychological Corporation.

## ***Task 2.6 Operation Span Task***

**Description (task duration: 20 minutes):** Participants are presented with a simple arithmetic equation and they respond "yes" if the equation is accurate (e.g., (6/3) +5=7) and "no" if it is inaccurate (e.g., (3+6)/3=2). As soon as the subject responds, the equation disappears, and a concrete noun is presented. Participants read the word aloud. Participants are told to take as much time as is needed to answer the arithmetic portion but must immediately read the ensuing word after answering. Immediately after they pronounce the word, the next arithmetic-word string appears on the screen. After a block of equations and words is complete (number of items in block varies from 2-5), participants are shown a screen with three question marks and prompted to write down all the words they remembered from that block in the order that they were presented. There are 12 blocks presented that each contain 2-5 items within a block, with a total of 42 arithmetic-word strings. Blocks are randomly ordered but do not vary between participants. Variables of interest are total number of words correctly recalled for each of the four block sizes (2, 3, 4, 5) and total recalled, with a higher number of recalled words indicative of better performance. Responses to the arithmetic portion of each set are not recorded and are not used for data analysis.

**Primary Reference**:

Turner, M. L., & Engle, R. W. (1989). Is working memory capacity task dependent? *Journal of Memory and Language*, *28*(2):127-154. https://doi.org/10.1016/0749-596X(89)90040-5

## ***Task 2.7 NIH Toolbox List Sorting***

**Description (task duration: 10 minutes):** Participants are presented with pictures of commonly known foods and animals that are displayed along with written text and an accompanying audio recording of the name of the item (e.g., "elephant"). Each picture is displayed on the screen, one at a time, in a "flashing" manner at a rate of 2 seconds per item. The objective is to re-order the block of pictures according to particular rules. In the one-list condition, participants sort each block of items by size and in the two-list condition, items are sorted by both size as well as by category. The variable of interest is a sum of the total correct responses across both lists, with higher scores suggesting greater global working memory capacity.

**One-List Condition:** Participants are presented with a sequence of 2-7 pictures (*either* food or animals) and must order the series from smallest to largest. Participants answer verbally and must name all the items in the correct order without intrusions. The task begins with a 2-item block. If answered correctly, the number of items in each block will increase up to seven total items. If answered incorrectly, participants will get a second block of similar difficulty. If they then answer correctly for the second block, they advance to the next block of higher difficulty,

otherwise, the testing is terminated. This condition contains two practice blocks in which immediate feedback is provided and a maximum of 14 testing blocks.

**Two-List Condition:** Participants are presented with a series of *both* food and animals and must order the series by both size and category. Participants will sort the food items from smallest to largest, followed by the animal items from smallest to largest. This condition contains two practice blocks, in which feedback is provided, and a maximum of 12 testing blocks. The test procedure is identical to the one-list condition, only with the added complexity of sorting by both size and category.

**Primary References**:

Gershon, R.C., et al. (2013). NIH toolbox for assessment of neurological and behavioral function. *Neurology, 80*(11 Suppl 3): S2-6. https://doi.org/10.1212/WNL.0b013e3182872e5f

Tulsky, D.S., et al. (2013). NIH Toolbox Cognitive Function Battery (NIHTB-CFB): Measuring working memory. *Monographs of the Society for Research in Child Development*, *78*(4):70–87. https://doi.org/10.1111/mono.12035

## ***Task 2.8 CANTAB Delayed Matching to Sample Task***

**Description (task duration: 12 minutes):** This task measures maintenance of visual memory in a four-choice delayed recognition memory paradigm. Participants are presented with a complex, abstract target pattern that consists of four quadrants differing in color and form and they must match the target to one of four choice patterns. One of the choice patterns is identical to the target, one is a novel distractor pattern, one has the shape of the sample and the colors of the distractor, and the fourth has the colors of the sample and the shape of the distractor. All four choice patterns have at least one quadrant in common with the sample. There a four different choice conditions: (1) choices added to the screen with the target, (2) choices shown 0 seconds after the target disappears, (3) choices are shown 4 seconds after the target pattern disappears, and (4) choices are shown 12 seconds after the target pattern disappears. Participants are asked to select the choice pattern that matches the presented sample pattern by touching their response with a touch-screen stylus. Feedback is provided on-screen for incorrect responses and participants continue their search until they find the matching pattern. The variables of interest include the total number of items matched correctly across each delay period (simultaneous, 0 second delay, 4 second delay, and 12 second delay) and the total number of correctly matched items across all delayed periods. Higher scores suggest a more efficient visual memory ability.

**Primary References**:

Robbins T.W., et al. (1994). Cambridge Neuropsychological Test Automated Battery (CANTAB): A factor-analytic study of a large sample of normal elderly volunteers. *Dementia, 5*(5):266-281. https://doi.org/10.1159/000106735.

CANTAB Eclipse (2007). https://www.cambridgecognition.com/cantab/cognitive-tests/executive-function/spatial-executive-function-swm

## ***Task 2.9 CANTAB Spatial Recognition Memory Task***

**Description (task duration: 5 minutes):** This task measures visual-spatial recognition memory in a two-choice forced discrimination paradigm. The task has two phases: spatial encoding followed by recognition. In the encoding phase, participants are shown a white square that moves sequentially to five different locations on the screen, each for three seconds. After a five second delay, subjects are presented with two white squares for the recognition phase. One of them occupies a location where a square was presented during encoding and the other square is in a novel location (distractor stimulus). Participants are asked to select the square that is in location previously seen in the encoding phase. There are four blocks of five trials, for a total of 20 responses. The variable of interest is total number of locations correctly identified with higher scores indicating better working memory performance.

**Primary References**:

Robbins T.W., et al. (1994). Cambridge Neuropsychological Test Automated Battery (CANTAB): A factor-analytic study of a large sample of normal elderly volunteers. *Dementia, 5*(5):266-281. https://doi.org/10.1159/000106735.

CANTAB Eclipse (2007). https://www.cambridgecognition.com/cantab/cognitive-tests/executive-function/spatial-executive-function-swm

**Working Memory Data Set: Key to Names and Data Structure in Data Set**

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Age Interval | AgeInterval | Age at Epoch recoded into 3-year intervals | 20-100 |
| Sex | Sex | Participant's biological sex. | m = Male<br>f = Female |
| Race | Race | Race that the participant self-identifies with. | 1 = Asian American/ Pacific Islander<br>2 = Black/African American<br>3 = Multiracial<br>4 = Native American<br>5 = White/Caucasian<br>6 = Other<br>7 = Unknown |
| Ethnicity | Ethnicity | Ethnicity that the participant self-identifies with. | 1=Hispanic/Latin(o/a)<br>0 = Non-Hispanic |
| Handedness Score | HandednessScore | Average score of participant hand preference while completing various tasks. Higher scores indicate preference for the right hand. | Score range: 0-4<br><br>0 = Always left<br>1 = Usually left<br>2 = No preference<br>3 = Usually right<br>4 = Always right |
| Mini-Mental State Exam Total | MMSE | Total # of items answered correctly. | Score range: 0-30 |
| Cognitive Battery Epoch 1-2 Interval | CogW1toW2 | Interval between cognitive testing day 1 for Epochs 1-2. | # of Years |
| Cognitive Battery Epoch 2-3 Interval | CogW2toW3 | Interval between cognitive testing day 1 for Epochs 2-3. | # of Years |
| Cognitive Battery Epoch 1-3 Interval | CogW1toW3 | Interval between cognitive testing day 1 for Epochs 1-3. | # of Years |
| Take Home Epoch 1-2 Interval | TakeHomeW1toW2 | Interval between Take Home for Epochs 1-2. | # of Years |
| Take Home Epoch 2-3 Interval | TakeHomeW2toW3 | Interval between Take Home for Epochs 2-3. | # of Years |
| Take Home Epoch 1-3 Interval | TakeHomeW1toW3 | Interval between Take Home for Epochs 1-3. | # of Years |
| MRI Epoch 1-2 Interval | MRIW1toW2 | Interval between MRI scan for Epochs 1-2. | # of Years |
| MRI Epoch 2-3 Interval | MRIW2toW3 | Interval between MRI scan for Epochs 2-3. | # of Years |
| MRI Epoch 1-3 Interval | MRIW1toW3 | Interval between MRI scan for Epochs 1-3. | # of Years |
| Amyloid PET Epoch 1-2 Interval | PETAmyW1toW2 | Interval between amyloid PET scan for Epochs 1-2. | # of Years |
| Amyloid PET Epoch 2-3 Interval | PETAmyW2toW3 | Interval between amyloid PET scan for Epochs 2-3. | # of Years |
| Amyloid PET Epoch 1-3 Interval | PETAmyW1toW3 | Interval between amyloid PET scan for Epochs 1-3. | # of Years |
| Highest Level of Education Completed | EduComp5 | This is an ordinal measure of participants' self-reported highest level of education completed. | 1 = Less than high school graduate<br>2 = High school graduate/GED |

| | | | |
|---|---|---|---|
| | | | 3 = Some college/trade/ technical/business school<br>4 = Bachelor's degree<br>5 = Some graduate work<br>6 = Master's degree<br>7 = MD/JD/PhD/other advanced degree |
| Education Estimated Years Capped | EduYrsEstCap5 | This is a conversion of the participant's self-reported highest level of education into a capped estimated number of years it would take to reach this highest level of education.<br><br>The "capped" comes into play when someone spend a longer time than usual for a certain degree but did not complete it. In short, someone with a lot of years of education but did not complete a degree will not score higher than someone who did complete the degree. | *11 maximum* = Less than High school<br>*12* = High School<br>*15 maximum* = Some College<br>*16* = Bachelor's degree<br>*20 maximum* = Some Graduate Work<br>*18* = Master's degree<br>*21* = MD/JD/PhD/ Advanced degree |
| Construct Name | ConstructName | Working Memory | |
| Construct Number | ConstructNumber | Construct 2 | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1=Epoch 1<br>2=Epoch 2<br>3=Epoch 3 |
| Has Data | HasData | Yes =1<br>No=2 | |
| Number of Tasks in Construct | NumTasks | How many tasks make up the working memory construct | 6 tasks for Working Memory |
| **Task 4-CANTAB Spatial Working Memory** | **Task4** | 1 = Has data<br>2 = Task data partial<br>3 =No task data | |
| Spatial WM 4-Box Errors* | SptlWM4BoxErrs4 | Total errors for 4-box trials | No max score |
| Spatial WM 6-Box Errors* | SptlWM6BoxErrs4 | Total errors for 6-box trials | No max score |
| Spatial WM 8-Box Errors* | SptlWM8BoxErrs4 | Total errors for 8-box trials | No max score |
| Spatial WM Total Errors | SptlWMTotErrs4 | Total number of errors across all trials. | No max score |
| **Task 5 – WAIS Letter-Number Sequencing** | **Task5** | 1 = Has data<br>2 = Task data partial<br>3 =No task data | |
| Letter-Number Sequencing 2-Item Trials Total Correct | LetNumSeq2Item5 | Total number of 2-item trials recalled correctly | Score Range: 0-3 |
| Letter-Number Sequencing 3-Item | LetNumSeq3Item5 | Total number of 3-item trials recalled correctly | Score Range: 0-3 |

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|---|---|---|---|
| Trials Total Correct | | | |
| Letter-Number Sequencing 4-Item Trials Total Correct | LetNumSeq4Item5 | Total number of 4-item trials recalled correctly | Score Range: 0-3 |
| Letter-Number Sequencing 5-Item Trials Total Correct | LetNumSeq5Item5 | Total number of 5-item trials recalled correctly | Score Range: 0-3 |
| Letter-Number Sequencing 6-Item Trials Total Correct | LetNumSeq6Item5 | Total number of 6-item trials recalled correctly | Score Range: 0-3 |
| Letter-Number Sequencing 7-Item Trials Total Correct | LetNumSeq7Item5 | Total number of 7-item trials recalled correctly | Score Range: 0-3 |
| Letter-Number Sequencing 8-Item Trials Total Correct | LetNumSeq8Item5 | Total number of 8-item trials recalled correctly | Score Range: 0-3 |
| Letter-Number Sequencing Total | LetNumSeqTot5 | Total number of trials recalled correctly | Score Range: 0-21 |
| **Task 6 – Operation Span** | **Task6** | 1 = Has data<br>2 = Task data partial<br>3 =No task data | |
| OSpan 2-Item Block Total (Blocks 4,7,11) | OSp2BLTot6 | Total # of blocks recalled correctly for 2-item blocks | Score Range: 0-3 |
| OSpan 3-Item Block Total (Blocks 1,3,9) | OSp3BLTot6 | Total # of blocks recalled correctly for 3-item blocks | Score Range: 0-3 |
| OSpan 4-Item Block Total (Blocks 6,8,12) | OSp4BLTot6 | Total # of blocks recalled correctly for 4-item blocks | Score Range: 0-3 |
| OSpan 5-Item Block Total (Blocks 2,5,10) | OSp5BLTot6 | Total # of blocks recalled correctly for 5-item blocks | Score Range: 0-3 |
| OSpan Total | OSpanTot6 | Sum of total # of words recalled correctly for *perfectly recalled* blocks<br>To get a score of 42, subjects must correctly recall: Three two-item blocks (3 blocks x 2 words each = 6), three three-item blocks (3 blocks x 3 words each = 9), three four-item blocks (3 blocks x 4 words each = 12), three five-item blocks (3 blocks x 5 words each = 15); total number of words correct is thus 42. | Score Range: 0-42 |
| **Task 7 – NIH Toolbox List Sorting** | **Task7** | 1 = Has data<br>2 = Task data partial<br>3 =No task data | |

| | | | |
|---|---|---|---|
| NIH Toolbox List Sorting Raw Score | LstSrtRaw7 | Scored sum of total # of items correctly recalled and sequenced on both lists | Score Range: 0-26 |
| NIH Toolbox List Sorting Uncorrected Standard Score | LstSrtUn7 | This score compares the performance of the test-taker to those in the entire NIH Toolbox nationally representative normative sample, regardless of age or any other variable. | normative mean = 100, SD = 15 |
| NIH Toolbox List Sorting Age-Corrected Standard Score | LstSrtAge7 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample at the same age, where a score of 100 indicates performance that was at the national average for the test-taking participant's age. Age-corrected standard scores were derived for adults (ages 18-85). | mean=100, standard deviation=15 |
| NIH Toolbox List Sorting National Percentile | LstSrtPercent7 | A Percentile represents the percentage of people nationally above whom the participant's score ranks (the comparison group will be based on whichever normative score is used). | Percentile Rank: 0-100 |
| NIH Toolbox List Sorting Fully-Corrected T-score | LstSrtFully7 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample, while adjusting for key demographic variables (education, gender, and race/ethnicity) collected during the NIH Toolbox national norming study. | mean=50, standard deviation=10 |
| **Task 8 – CANTAB Delayed Matching to Sample** | **Task8** | 1 = Has data<br>2 = Task data partial<br>3 =No task data | |
| Delayed Matching to Sample Simultaneous Total* | DMSSimTot8 | Total # of items matched correctly with simultaneous presentation | Score Range: 0-10 |
| Delayed Matching to Sample Immediate (0 second delay) Total* | DMSImmTot8 | Total # of items matched correctly with immediate (0 second delay) presentation | Score Range: 0-10 |
| Delayed Matching to Sample 4 Second Delay Total* | DMS4SecTot8 | Total # of items matched correctly with 4 second delay presentation | Score Range: 0-10 |
| Delayed Matching to Sample 12 | DMS12SecTot8 | Total # of items matched correctly with 12 second delay presentation | Score Range: 0-10 |

| | | | |
|---|---|---|---|
| Second Delay Total* | | | |
| Delayed Matching to Sample Total | DMSTot8 | Total # of items matched correctly | Score Range: 0-40 |
| **Task 9 – CANTAB Spatial Recognition Memory** | **Task9** | 1 = Has data<br>2 = Task data partial<br>3 =No task data | |
| Spatial Recognition Memory Total | SRMTot9 | Total # of locations correctly identified | |

# Construct 4: Episodic Memory

***Definition***

This construct measures how well individuals can store, maintain, and retrieve detailed information in long-term memory. It is highly sensitive to normal aging processes and shows robust deficits in mild cognitive impairment and Alzheimer's disease (Koen & Yonelinas, 2014). Two classic papers by Endel Tulving (1972, 2002) provide both a theoretical conceptualization of episodic memory and relevant empirical measures.

**References**

Koen, J. D., & Yonelinas, A. P. (2014). The effects of healthy aging, amnestic mild cognitive impairment, and Alzheimer's disease on recollection and familiarity: A meta-analytic review. *Neuropsychology Review*, 24(3), 332-354. https://doi.org/10.1007/s11065-014-9266-5

Tulving, E. (1972). Episodic and semantic memory. *Organization of memory, 1*, 381-403.

Tulving, E. (2002). Episodic memory: From mind to brain. *Annual Review of Psychology, 53*, 1–25. https://doi.org/10.1146/annurev.psych.53.100901.135114

**Note**: For all included memory tasks, the same item lists were used at each Epoch of data collection as there was an approximately 4-year interval between testing sessions.

***Sample Sizes by Epoch and Task (subjects with partial data in parentheses)***

| Assessment | Epoch 1 | Epoch 2 | Epoch 3 |
|---|---|---|---|
| **Hopkins Verbal Learning** | 463(37)[a] | 323(2) | 213 |
| **CANTAB Verbal Recognition Memory** | 463(2) | 335(335)[b] | 212(212)[b] |
| **Woodcock-Johnson Memory for Names** | 251(1)[c] | 322(5) | 212(2) |
| **Wechsler Memory Scale Logical Memory** | 0 | 331 | 213(3)[a] |
| **NIH Toolbox Picture Sequence Memory** | 0 | 322(144)[d] | 206(17)[d] |

Notes on data completeness:
[a]Hopkins Verbal Learning: For Epoch 1, the delayed recall and recognition tests were only administered to 426 participants.
[b]CANTAB Verbal Recognition Memory: Epoch 2-3 data for the delayed recall portion of the CANTAB VRM task are unavailable as administration of that test was discontinued due to extremely skewed score distributions. Use of the immediate recall score is recommended.
[c]Woodcock-Johnson Memory for Names: Admnistration of the Woodcock-Johnson began partway through Epoch 1, thus data were not collected for approximately the first half of participants.
[d]NIH Toolbox Picture Sequence Memory: For Epoch 2, the fully-corrected score is only available for 191 participants. For Epoch 3, the age-corrected, percentile, and fully-corrected scores are only available for 189 participants. The uncorrected standardized scores or raw scores are recommended for this task.

## *Task 4.15 Hopkins Verbal Learning, Parts 1-4*

**Description (task duration: 6 minutes):**

- **Encoding:** Participants memorize a semantically categorized list of 12 concrete nouns that are read aloud by the experimenter at a rate of one word every 1.5 seconds. The three semantic categories are sports, professions, and vegetables, with 4 words in each category.
- **Immediate Recall:** Immediately following the presentation, participants are asked to recall aloud as many words from the list as they can in any order. The experimenter records the words recalled on a scoring sheet. The dependent measure is the number of items correctly recalled out of 12.

- **Delayed Recall:** After approximately 20 minutes, participants are again asked to recall aloud as many words as possible from the previous list in any order. The experimenter records the words recalled on a scoring sheet. The dependent measure is the number of items correctly recalled out of 12.
- **Delayed Recognition:** Following delayed recall, participants are given a recognition test in which the experimenter reads another list of 24 words, including 12 target words (from recall list) and 12 new words (lures). Of the 12 lures, 6 are semantically related to the target items (2 for each semantic category) and 6 are not semantically related to the target items. Participants make "yes"/"no" judgments to indicate if the word was on the original study list. The dependent measure is the total number of correct judgments (including hits + correction rejections) out of 24. In addition, false alarm rates are available for related and unrelated items, as are hits to old items.

**Primary Reference:**

Brandt, J. (1991). The Hopkins Verbal Learning Test: Development of a new memory test with six equivalent forms. *The Clinical Neuropsychologist*, *5*(2), 125-142. https://doi.org/10.1080/13854049108403297

## *Task 4.16 CANTAB Verbal Recognition Memory, Parts 1-4*

**Description (task duration: 7 minutes):**

- **Encoding**: Twelve nouns are presented on the computer screen one at a time. Participants are asked to read each word aloud and remember as many as they can.
- **Immediate Recall:** Immediately following the presentation of the word list, participants are asked to recall aloud as many of the words as possible in any order. Data for the number of items recalled, out of 12, are available.
- **Immediate Recognition:** Immediately following recall, participants complete a recognition test in which the computer displays the 12 target items and 12 distractor items, one at a time. Participants answer whether they remember seeing the item earlier in the task on the computer ("yes" or "no"). Performance was near ceiling for this test, and data are not currently processed/checked.
- **Delayed Recognition:** The recognition phase is repeated after a delay of approximately 40 minutes. Data for the number of items recognized (and correct rejections), out of 24, are available. Performance was near ceiling for this task and we advise against using it but include it to provide a complete accounting of the methodology.

**Primary Reference:**

Robbins, T.W.,et al., (1994). Cambridge Neuropsychological Test Automated Battery (CANTAB): A factor analytic_____ study of a large sample of normal elderly volunteers. *Dementia, 5*, 266-281. https://doi.org/10.1159/000106735

**Software Reference:**

CANTAB Eclipse. *Cambridge Cognition* (2007). https://www.cambridgecognition.com/cantab/cognitive-tests/memory/verbal-recognition-memory-vrm/

**Note**: It is recommended that the delayed recognition score (CantabVrmDelayRcg16) should NOT be used as it has strong ceiling effects, resulting in severe skewness and kurtosis. Standard data transformations were unable to correct this issue.

## ***Task 4.17 Woodcock-Johnson Memory for Names, Parts 1-3***

**Description (task duration: 15 minutes):**

- **Task Overview:** In this paired-associate recognition task, participants are given 12 trials that each include both an encoding and recognition component. This task is administered using color illustrations in a printed flip-book. On each trial, the participant first learns the name of a single cartoon space creature. Then, they must identify that creature in an array of nine aliens. Finally, they are asked to identify previously learned creatures in that array. The difficulty increases across trials as participants are required to remember the names of an increasingly larger set of creatures (up to 12 unique creatures). A separate delayed recognition test is administered 20 minutes later.
- **Encoding:** For the encoding component of each trial, participants are shown a color illustration of the space creature by itself on a page. Participants are told the name of the creature and are asked to point to it on the page (e.g., "This is Meegoy. Point to Meegoy."; see figure below).
- **Immediate Recognition:** Next, for the recognition component of that trial, participants are shown a page of nine space creatures and are asked to point to the newly-introduced creature among the distractors ("Now point to Meegoy"; see figure below). Then, they are asked to point to previously learned creatures ("Now point to Kiptron"). For each trial, the previously learned creatures are tested in a novel order, and whenever the participant responds incorrectly, they are corrected (e.g., "No, this is Meegoy. Point to Meegoy."). For each trial, they are tested on all previously learned creatures up to a total of 9 creatures; for trials 10-12, the earliest creatures are dropped to keep that total at 9. Specifically, the total number of creatures to be recognized on each trial progresses across the 12 trials as follows: 1, 2, 3, 4, 5, 6, 7, 8, 9, 9, 9, 9 (total = 72 items). The dependent measure is the number of creatures recognized out of 72.
- **Delayed Recognition:** After a 20-minute delay, participants are given a surprise recognition test in which they are asked to point to each space creature when prompted by the experimenter. This delayed test has 3 parts, with 12 trials per part. In each trial, the participant is shown an array of nine space creatures, as before, and is asked to point to a previously learned creature ("Now point to Meegoy"). Next, they are shown a new array and asked to point to a different creature ("Now point to Kiptron"). In this test, incorrect responses are no longer corrected by the experimenter, and creatures are not presented in the order originally learned. This process repeats for part 1 until they have been asked to recognize all 12 unique space creatures in one of the 12 different arrays. For parts 2 and 3, they repeat this processing going through the 12 arrays in the same order, but with the items tested being put in a new order—for example, in trial 1 they may now be asked to identify "Delton" instead of "Meegoy". Thus, all 12 space creatures are tested 3 times each, and the dependent measure is the number of creatures recognized out of 36.

**Primary Reference**:

Woodcock, R. W., & Johnson, M. B. (1989). *Woodcock-Johnson Tests of Achievement*. Allen, TX: DLM Teaching Resources.

## *Task 4.18 Wechsler Memory Scale (WMS-III) Logical Memory, Parts 1-3*

**Description (task duration: 7 minutes):**

- **Encoding:** The experimenter reads two highly detailed stories to the participant. One story describes a fictional character reporting a robbery and another describes a character listening to a weather bulletin.
- **Immediate Recall:** Immediately after each story, the participant is asked to recall as much of the story as they can, verbatim. The participant's response is recorded via tape recorder. Reviewing the tape, the experimenter scores the participant's response by awarding one point per highly specific detail recalled by the participant (called Story Units, e.g., the main character's name is Anna, the story took place in Boston, the weather forecast predicted rain and hail, etc.). Story Unit scores for Story A and Story B (each out of 25) are calculated by summing all correct details (total out of 50).
- **Delayed Recall:** After a delay of approximately 30 minutes, the participant is asked to repeat as much each of the two stories as they can remember with answers recorded. Story Unit scores for Story A and B (each out of 25) are again calculated, with a combined score out of 50.

**Task Example:**

Story A: This story involves a fictional character, Anna Thompson, reporting at a police station that she was robbed, including additional details about her profession and family. (length: 351 characters)

Story B: This story involves a fictional character, Joe Garcia, hearing a detailed weather bulletin about inclement weather and then Joe deciding to stay home for the day. (length: 470 characters)

**Primary Reference**:

Wechsler, D. (1997). *Wechsler memory scale (WMS-III)*. San Antonio, TX: Psychological Corporation.

**Note:** The Logical Memory task can also be scored based on the participants' recall of seven or eight thematic details from the stories (e.g., broadly, indication of character's gender, indication of major events in the story – storm, robbery, etc.). The thematic score is not checked or verified and is not used.

## *Task 4.19 NIH Toolbox Picture Sequence Memory, Parts 1-2*

**Description (task duration: 7 minutes):**

- **Encoding:** This test involves recalling increasingly lengthy series of illustrated objects and activities that are presented in a particular order on the computer screen. These picture sequences revolve around two scenarios: playing in a park and going camping. During encoding, each picture is presented individually in the center of the screen for approximately 5 s with pre-recorded instructions describing the image (e.g., "roasting a marshmallow") and the item then being placed below in a sequence mirroring presentation order (from left-to-right) (see below example).

- **Retrieval:** After all items are placed, these pictures are then returned to the center of the screen in a jumbled pattern, and the participant's task is to move them below again in the correct sequence. There are 15 items in the first trial, and 18 items in the second trial.
- **Scoring:** Participants are given credit for each adjacent pair of pictures that are put in the correct sequence, regardless of location. For example, if pictures in locations 7 and 8 are placed in that order and adjacent to each other anywhere–such as slots 1 and 2–one point is awarded. The maximum score for each trial is one less than the trial length, which equates to 14 points for trial 1 and 17 points for trial 2 (Total Score Range: 0-31). Multiple dependent variables are provided via NIH Toolbox: (1) a *raw score* is their combined score across the two trials (Score Range: 0-31), (2) a *computed score* uses item response theory to put everyone on a scale of 200-750, (3) an *unadjusted scale score* compares this computed score with the full NIH Toolbox nationally representative normative sample (normative $M = 100$, $SD = 15$) (4) an *age-adjusted scale score* compares the computed score of the test-taker to those in the NIH normative sample at the same age ($M = 100$, $SD = 15$), (5) an *age-adjusted national percentile* represents the percentage of people nationally above whom the participant's score ranks (using NIH normative sample), and (6) a *fully-adjusted scale score* further adjusts for key demographic variables from the NIH normative sample, including age, gender, race/ethnicity (white/Asian, black, Hispanic, multiracial), and educational attainment ($M = 50$, $SD = 10$; NIH Toolbox: Scoring and Interpretation Guide, 2016).

**Primary Reference:**

Dikmen, S. S., Bauer, P. J., Weintraub, S., Mungas, D., Slotkin, J., Beaumont, J. L., ... & Heaton, R. K. (2014). Measuring episodic memory across the lifespan: NIH Toolbox Picture Sequence Memory Test. *Journal of the International Neuropsychological Society, 20*(6), 611-619. https://doi.org/10.1017/S1355617714000460

**Software Reference:**

NIH Toolbox for the iPad test ver. 2.1
https://nihtoolbox.force.com/s/article/nih-toolbox-scoring-and-interpretation-guide

**Note:** Participants in DLBS Epoch 2 performed the NIH Toolbox Picture Sequence Memory on a desktop computer, whereas, participants in DLBS Epoch 3 performed the task on an ipad. For additional details, we refer you to the the NIH Toolbox website: https://www.healthmeasures.net/explore-measurement-systems/nih-toolbox/obtain-and-administer-measures

**Episodic Memory Data Set: Key to Names and Data Structure in Data Set**

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Age Interval | AgeInterval | Age at Epoch recoded into 3-year intervals | 20-100 |
| Sex | Sex | Participant's biological sex. | m = Male<br>f = Female |
| Race | Race | Race that the participant self-identifies with. | 1 = Asian American/ Pacific Islander<br>2 = Black/African American<br>3 = Multiracial<br>4 = Native American<br>5 = White/Caucasian<br>6 = Other<br>7 = Unknown |
| Ethnicity | Ethnicity | Ethnicity that the participant self-identifies with. | 1=Hispanic/Latin(o/a)<br>0 = Non-Hispanic |
| Handedness Score | HandednessScore | Average score of participant hand preference while completing various tasks. Higher scores indicate preference for the right hand. | Score range: 0-4<br><br>0 = Always left<br>1 = Usually left<br>2 = No preference<br>3 = Usually right<br>4 = Always right |
| Mini-Mental State Exam Total | MMSE | Total # of items answered correctly. | Score range: 0-30 |
| Cognitive Battery Epoch 1-2 Interval | CogW1toW2 | Interval between cognitive testing day 1 for Epochs 1-2. | # of Years |
| Cognitive Battery Epoch 2-3 Interval | CogW2toW3 | Interval between cognitive testing day 1 for Epochs 2-3. | # of Years |
| Cognitive Battery Epoch 1-3 Interval | CogW1toW3 | Interval between cognitive testing day 1 for Epochs 1-3. | # of Years |
| Take Home Epoch 1-2 Interval | TakeHomeW1toW2 | Interval between Take Home for Epochs 1-2. | # of Years |
| Take Home Epoch 2-3 Interval | TakeHomeW2toW3 | Interval between Take Home for Epochs 2-3. | # of Years |
| Take Home Epoch 1-3 Interval | TakeHomeW1toW3 | Interval between Take Home for Epochs 1-3. | # of Years |
| MRI Epoch 1-2 Interval | MRIW1toW2 | Interval between MRI scan for Epochs 1-2. | # of Years |
| MRI Epoch 2-3 Interval | MRIW2toW3 | Interval between MRI scan for Epochs 2-3. | # of Years |
| MRI Epoch 1-3 Interval | MRIW1toW3 | Interval between MRI scan for Epochs 1-3. | # of Years |
| Amyloid PET Epoch 1-2 Interval | PETAmyW1toW2 | Interval between amyloid PET scan for Epochs 1-2. | # of Years |
| Amyloid PET Epoch 2-3 Interval | PETAmyW2toW3 | Interval between amyloid PET scan for Epochs 2-3. | # of Years |
| Amyloid PET Epoch 1-3 Interval | PETAmyW1toW3 | Interval between amyloid PET scan for Epochs 1-3. | # of Years |
| Highest Level of Education Completed | EduComp5 | This is an ordinal measure of participants' self-reported highest level of education completed. | 1 = Less than high school graduate<br>2 = High school graduate/GED |

| | | | |
|---|---|---|---|
| | | | 3 = Some college/trade/ technical/business school<br>4 = Bachelor's degree<br>5 = Some graduate work<br>6 = Master's degree<br>7 = MD/JD/PhD/other advanced degree |
| Education Estimated Years Capped | EduYrsEstCap5 | This is a conversion of the participant's self-reported highest level of education into a capped estimated number of years it would take to reach this highest level of education.<br><br>The "capped" comes into play when someone spend a longer time than usual for a certain degree but did not complete it. In short, someone with a lot of years of education but did not complete a degree will not score higher than someone who did complete the degree. | *11 maximum* = Less than High school<br>*12* = High School<br>*15 maximum* = Some College<br>*16* = Bachelor's degree<br>*20 maximum* = Some Graduate Work<br>*18* = Master's degree<br>*21* = MD/JD/PhD/ Advanced degree |
| Construct Name | ConstructName | Episodic Memory | |
| Construct Number | ConstructNumber | Construct 4 | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1 = Epoch 1<br>2 = Epoch 2<br>3 = Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch;<br>2 = No, did not return for Epoch | |
| Number of Tasks in Construct | NumTasks | How many tasks make up the episodic memory construct | 5 tasks for Episodic Memory |
| **Task 15—Hopkins Verbal Learning** | **Task15** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| Hopkins immediate recall | HopImmRcll15 | Total correctly recalled | Score Range: 0-12 |
| Hopkins delayed recall | HopDelayRcll15 | Total correctly recalled | Score Range: 0-12 |
| Hopkins delayed recognition | HopRcgCrrct15 | Total correct (hits + correct rejections) | Score Range: 0-24 |
| Hopkins delayed recognition | HopRcgHit15 | Total hits (calling old item old) | Score Range: 0-12 |
| Hopkins delayed recognition | HopRcgFaRelat15 | Total false alarms to distractors semantically related to target (calling new item old) | Score Range: 0-6 |

| | | | |
|---|---|---|---|
| Hopkins delayed recognition | HopRcgFaUnrelat15 | Total false alarms to distractors semantically unrelated to target (calling new item old) | Score Range: 0-6 |
| Hopkins delayed recognition | HopRcgFaTotal15 | Total false alarms to distractors (calling new item old) | Score Range: 0-12 |
| Hopkins delayed recognition | HopRcgHitminusfa15 | Total hits – false alarms | Score Range: -12-12 |
| **Task 16—CANTAB Verbal Recognition Memory** | **Task16** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| CANTAB Verbal Recognition immediate recall | CantabVrmImmRcll16 | Total correctly recalled | Score Range: 0-12 |
| CANTAB Verbal Recognition delayed | CantabVrmDelayRcg16 | Total correctly recognized (hits + correct rejections) | Score Range: 0-24 |
| **Task 17—Woodcock-Johnson Memory for Names** | **Task17** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| Woodcock-Johnson immediate recognition | WjImm17 | Total correctly recognized | Score Range: 0-72 |
| Woodcock-Johnson delayed recognition | WjDelay17 | Total correctly recognized | Score Range: 0-36 |
| **Task 18—Wechsler Memory Scale Logical Memory** | **Task18** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| Logical memory immediate recall | LmStoryAImm18 | Total immediate Story A recall score | Score Range: 0-25 |
| Logical memory immediate recall | LmStoryBImm18 | Total immediate Story B recall score | Score Range: 0-25 |
| Logical memory immediate recall | LmStoryImm18 | Total immediate Story A+B recall score | Score Range: 0-50 |
| Logical memory delayed recall | LmStoryADelay18 | Total delayed Story A recall score | Score Range: 0-25 |
| Logical memory delayed recall | LmStoryBDelay18 | Total delayed Story B recall score | Score Range: 0-25 |
| Logical memory delayed recall | LmStoryDelay18 | Total delayed Story A+B recall score | Score Range: 0-50 |
| **Task19--NIH Toolbox Picture Sequence Memory** | **Task19** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| NIH Toolbox Picture Sequence Memory | NIHPicSeqRaw19 | Total number of pictures placed in the correct sequence across both trials | Score Range: 0-31 |
| NIH Toolbox Picture Sequence Memory | NIHPicSeqComp19 | This computed score uses item response theory to put everyone on a scale of 200-750 | Score Range: 200-750 |
| NIH Toolbox Picture Sequence Memory | NIHPicSeqUn19 | It compares the performance of the test-taker to those in the entire NIH Toolbox nationally representative | Normative Mean = 100, SD = 15 |

| | | | |
|---|---|---|---|
| | | normative sample, regardless of age or any other variable. | |
| NIH Toolbox Picture Sequence Memory | NIHPicSeqAge19 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample at the same age, where a score of 100 indicates performance that was at the national average for the test-taking participant's age. Age-corrected standard scores were derived for adults (ages 18-85). | Mean = 100, Standard Deviation = 15 |
| NIH Toolbox Picture Sequence Memory | NIHPicSeqPercent19 | A Percentile represents the percentage of people nationally above whom the participant's score ranks (the comparison group will be based on whichever normative score is used) | Percentile Rank: 0-100 |
| NIH Toolbox Picture Sequence Memory | NIHPicSeqFully19 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample, while adjusting for key demographic variables (education, gender, and race/ethnicity) collected during the NIH Toolbox national norming study. | Mean = 50, Standard Deviation = 10 |

# Construct 5: Reasoning

***Definition***

The construct of reasoning measures an individual's ability to recognize novel patterns and the conceptual relationship among objects and effectively apply these patterns to solve similar problems.

**References**

Schaie, K. W., & Willis, S. L. (1986). Can decline in adult intellectual functioning be reversed? *Developmental Psychology, 22*(2), 223–232. https://doi.org/10.1037/0012-1649.22.2.223

Boron, Julie Blaskewicz, Turiano, Nicholas A., Willis, Sherry L., Schaie, K. Warner (2007). Effects of Cognitive Training on Change in Accuracy in Inductive Reasoning Ability *Journal of Gerontology: Psychological Sciences,* 62B (3), 179-186.

***Sample Sizes by Epoch and Task (subjects with partial data in parentheses)***

| Assessment | Epoch 1 | Epoch 2 | Epoch 3 |
|---|---|---|---|
| **Raven's Matrices** | 426(361) | 327(45) | 212(28) |
| **ETS Letter Sets** | 461(1) | 320(4) | 212(3) |
| **CANTAB Stockings of Cambridge** | 463 | 334 | 212(2) |
| **Everyday Problem Solving** | 0 | 322 | 0 |

Notes on data completeness:

[a]Raven's Matrices: For Epoch 1, completion times were available for only 65 participants. For Epoch 2, completion times were available for only 282 participants. For Epoch 3, completion times were available for only 184 participants.

## *Task 5.20 Raven's Matrices*

**Description (task duration: 15 minutes):**

- Participants are presented with a set of geometric patterns that have a sequential structure with one piece missing. At the same time, they are also presented with an array of 6 or 8 geometric shape options. Participants must determine which pattern out of these 6 or 8 options is required to complete the visual pattern set.
- The problems are divided into 4 blocks. In the first two blocks, subjects chose the correct pattern out of 6 options; in the last two blocks, subjects choose the correct pattern out of 8 options. Within a block, problems are arranged by increasing difficulty, with problems 1 and 2 being the easiest, problems 3 and 4 being moderately difficult, and problems 5 and 6 the most difficult.
- Participants are given 15 minutes to complete 24 problems. We note that this is a modification of the original Raven's Matrices, which has a larger pattern set.

**Primary Reference:**

Raven, J., Raven, J. C., & Court, J. H. (1998a). Manual for Raven's Progressive Matrices and Vocabulary Scales. Section 1: General Overview. San Antonio, TX: Harcourt Assessment.

## *Task 5.21 ETS Letter Sets*

**Description (task duration: 14 minutes):**

- Subjects are presented with 5 sets of letters; each set is made up of 4 letters. Four of the sets of letters are alike in some way, while the fifth set of letters does not follow the same rule. Subjects are asked to determine which set of letters does not follow the same rule as the other 4 sets of letters. Subjects are instructed to mark a line through the set of letters that does not follow the same rule as the other 4 sets of letters.
- Participants have a total of 14 minutes to complete 30 problems. The task is presented in 2 parts each part lasting 7 minutes with 15 problems to complete.
- Higher scores indicate better reasoning ability.

**Primary Reference:**

Ekstrom, R. B., French, J. W., Harman, H., & Derman, D. (1976). Kit of factor-referenced cognitive tests (rev. ed.). Princeton, NJ: Educational Testing Service.

## *Task 5.22 CANTAB Stockings of Cambridge*

**Description (task duration: approximately 15 minutes):**

- Stockings of Cambridge is a computerized version of Tower of London (Shallice 1982) in which participants are shown a split screen with two displays each containing three colored balls.
- ***Task Phase:*** The balls are arranged in such a way that they look like they are stacked in stockings hanging from a beam. Participants must move the balls in the bottom arrangement one at a time in order to match the top arrangement in as few moves as possible.
- ***Motor Phase:*** The balls are arranged in the same way as in the task phase, but now the top arrangement and the bottom arrangement begin identical. The computer will automatically move a ball in the top arrangement. The participant should copy the same movement on the bottom arrangement, moving the same-colored ball to the same position the computer moved the ball in the top arrangement.
- ***Practice Phase:*** Subjects are given 8 1 or 2-move practice problems, which are not included in the overall score.
- Stockings of Cambridge is completed in 4 blocks. It starts with the task phase, which is followed by the motor phase. This sequence is then repeated with a slight increase in difficulty. In the first task phase subjects see 2, 3 and 4-move problems twice each. In the second task phase subjects see 4-move problems twice, and 5-move problems four times. There is a total of 12 scored items.

**Primary Reference:**

Robbins, T.W., James, M., Owen, A.M., Sahakian, B.J., McInnes, L., Rabbitt, P. (1994). Cambridge Neuropsychological Test Automated Battery (CANTAB): A factor analytic

study of a large sample of normal elderly volunteers. *Dementia, 5*, 266-281. https://doi.org/10.1159/000106735

**Software Reference:**

CANTAB Eclipse (2007) http://www.cambridgecognition.com/academic/cantabsuite/tests

***Task 5.23 Everyday Problem Solving***

**Description (task duration: approximately 30 minutes):**

- Participants are asked to read things taken from things people think are important, such as labels, credit applications and bus schedules, and answer questions based on them.
- This test has 42 questions and is not timed.

**Primary Reference:**

Willis, S. L., & Marsiske, M. (1993). Manual for the everyday problems test. University Park: Pennsylvania State University.

**Reasoning Construct: Key to Names and Data Structure in Data Set**

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Age Interval | AgeInterval | Age at Epoch recoded into 3-year intervals | 20-100 |
| Sex | Sex | Participant's biological sex. | m = Male<br>f = Female |
| Race | Race | Race that the participant self-identifies with. | 1 = Asian American/ Pacific Islander<br>2 = Black/African American<br>3 = Multiracial<br>4 = Native American<br>5 = White/Caucasian<br>6 = Other<br>7 = Unknown |
| Ethnicity | Ethnicity | Ethnicity that the participant self-identifies with. | 1=Hispanic/Latin(o/a)<br>0 = Non-Hispanic |
| Handedness Score | HandednessScore | Average score of participant hand preference while completing various tasks. Higher scores indicate preference for the right hand. | Score range: 0-4<br><br>0 = Always left<br>1 = Usually left<br>2 = No preference<br>3 = Usually right<br>4 = Always right |
| Mini-Mental State Exam Total | MMSE | Total # of items answered correctly. | Score range: 0-30 |
| Cognitive Battery Epoch 1-2 Interval | CogW1toW2 | Interval between cognitive testing day 1 for Epochs 1-2. | # of Years |
| Cognitive Battery Epoch 2-3 Interval | CogW2toW3 | Interval between cognitive testing day 1 for Epochs 2-3. | # of Years |
| Cognitive Battery Epoch 1-3 Interval | CogW1toW3 | Interval between cognitive testing day 1 for Epochs 1-3. | # of Years |
| Take Home Epoch 1-2 Interval | TakeHomeW1toW2 | Interval between Take Home for Epochs 1-2. | # of Years |
| Take Home Epoch 2-3 Interval | TakeHomeW2toW3 | Interval between Take Home for Epochs 2-3. | # of Years |
| Take Home Epoch 1-3 Interval | TakeHomeW1toW3 | Interval between Take Home for Epochs 1-3. | # of Years |
| MRI Epoch 1-2 Interval | MRIW1toW2 | Interval between MRI scan for Epochs 1-2. | # of Years |
| MRI Epoch 2-3 Interval | MRIW2toW3 | Interval between MRI scan for Epochs 2-3. | # of Years |
| MRI Epoch 1-3 Interval | MRIW1toW3 | Interval between MRI scan for Epochs 1-3. | # of Years |

| | | | |
|---|---|---|---|
| Amyloid PET Epoch 1-2 Interval | PETAmyW1toW2 | Interval between amyloid PET scan for Epochs 1-2. | # of Years |
| Amyloid PET Epoch 2-3 Interval | PETAmyW2toW3 | Interval between amyloid PET scan for Epochs 2-3. | # of Years |
| Amyloid PET Epoch 1-3 Interval | PETAmyW1toW3 | Interval between amyloid PET scan for Epochs 1-3. | # of Years |
| Highest Level of Education Completed | EduComp5 | This is an ordinal measure of participants' self-reported highest level of education completed. | 1 = Less than high school graduate<br>2 = High school graduate/GED<br>3 = Some college/trade/ technical/business school<br>4 = Bachelor's degree<br>5 = Some graduate work<br>6 = Master's degree<br>7 = MD/JD/PhD/other advanced degree |
| Education Estimated Years Capped | EduYrsEstCap5 | This is a conversion of the participant's self-reported highest level of education into a capped estimated number of years it would take to reach this highest level of education.<br><br>The "capped" comes into play when someone spend a longer time than usual for a certain degree but did not complete it. In short, someone with a lot of years of education but did not complete a degree will not score higher than someone who did complete the degree. | *11 maximum* = Less than High school<br>*12* = High School<br>*15 maximum* = Some College<br>*16* = Bachelor's degree<br>*20 maximum* = Some Graduate Work<br>*18* = Master's degree<br>*21* = MD/JD/PhD/ Advanced degree |
| Construct Name | ConstructName | Reasoning | |
| Construct Number | ConstructNumber | Construct 5 | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1 = Epoch 1<br>2 = Epoch 2<br>3 = Epoch 3 |

| | | | |
|---|---|---|---|
| Has Data | HasData | 1 = Yes, returned for Epoch; 2 = No, did not return for Epoch | |
| Number of Tasks in Construct | NumTasks | How many tasks make up the reasoning construct | 4 Tasks for Reasoning |
| **Task 20—Ravens Matrices** | **Task20** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| Ravens Accuracy Easy | RavenAccE20 | Total number of correct items for first 18 Easy problems divided by 18 | Score Range:<br>0-1 |
| Ravens Accuracy Medium | RavenAccM20 | Total number of correct items for first 18 Medium problems divided by 18 | Score Range:<br>0-1 |
| Ravens Accuracy Hard | RavenAccH20 | Total number of correct items for first 18 Hard problems divided by 18 | Score Range:<br>0-1 |
| Ravens Accuracy All | RavenAccAll20 | Total number of correct items for all 24 problems divided by 24 | Score Range:<br>0-1 |
| Ravens Number Correct | RavenNumCor20 | Number of correct responses for all 24 problems | Score Range:<br>0-24 |
| Ravens Time | RavenTime20 | Time subjects needed to complete the task | 0-15 minutes |
| Ravens Number Answered | RavenNumAnswer20 | Number of problems answered in 15 minutes | Score Range:<br>0-24 |
| **Task 21—ETS Letter Sets** | **Task21** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| ETS Letter Sets Part 1 | EtsLsP1_21 | Total number of correct items for the first 15 Sets | Score Range:<br>0-15 |
| ETS Letter Sets Part 2 | EtsLsP2_21 | Total number of correct items for the last 15 Sets | Score Range:<br>0-15 |
| ETS Letter Sets Total | EtsLsTOTAL21 | Total number of correct items for the whole task. | Score Range:<br>0-30 |
| **Task 22—Cantab Stockings of Cambridge** | **Task22** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| Cantab Stocking of Cambridge – Number of Problems solved in Minimum Moves | CantabSOCMinMov22 | The number of times upon which the subject has successfully completed a test problem in the minimum possible number of moves. | Score Range:<br>0-12 |

| | | | |
|---|---|---|---|
| Cantab Stocking of Cambridge – Mean 2-move problems | CantabSOCMeanMove2_22 | The average number of moves the subject made for 2-move problems | |
| Cantab Stocking of Cambridge - Mean 3-move problems | CantabSOCMeanMove3_22 | The average number of moves the subject made for 3-move problems | |
| Cantab Stocking of Cambridge – Mean 4-move problems | CantabSOCMeanMove4_22 | The average number of moves the subject made for 4-move problems | |
| Cantab Stocking of Cambridge – Mean 5-move problems | CantabSOCMeanMove5_22 | The average number of moves the subject made for 5-move problems | |
| Cantab Stocking of Cambridge | CantabSOCIntialTime2_22 | Average initial thinking time is the difference in time taken to select the first ball for the same 2-move problems in the task phase vs. the motor phase. | |
| Cantab Stocking of Cambridge | CantabSOCIntialTime3_22 | Average initial thinking time is the difference in time taken to select the first ball for the same 3-move problems in the task phase vs. the motor phase. | |
| Cantab Stocking of Cambridge | CantabSOCIntialTime4_22 | Average initial thinking time is the difference in time taken to select the first ball for the same 4-move problems in the task phase vs. the motor phase. | |
| Cantab Stocking of Cambridge | CantabSOCIntialTime5_22 | Average initial thinking time is the difference in time taken to select the first ball for the same 5-move problems in the task phase vs. the motor phase. | |
| Cantab Stocking of Cambridge | CantabSOCSubsequentTime2_22 | The average difference in time between selecting the first ball and completing the 2-move problem for the task vs. motor phase, and then dividing this | |

| | | | |
|---|---|---|---|
| | | result by the number of moves made. | |
| Cantab Stocking of Cambridge | CantabSOCSubsequentTime3_22 | The average difference in time between selecting the first ball and completing the 3-move problem for the task vs. motor phase, and then dividing this result by the number of moves made. | |
| Cantab Stocking of Cambridge | CantabSOCSubsequentTime4_22 | The average difference in time between selecting the first ball and completing the 4-move problem for the task vs. motor phase, and then dividing this result by the number of moves made. | |
| Cantab Stocking of Cambridge | CantabSOCSubsequentTime5_22 | The average difference in time between selecting the first ball and completing the 5-move problem for the task vs. motor phase, and then dividing this result by the number of moves made. | |
| **Task 23—Everyday Problem Solving** | **Task23** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| Everyday Problem Solving | Eps23 | Total number correct | Score Range:<br>0-42 |

# Construct 6: Vocabulary

***Definition***

This construct measures the breadth of vocabulary known by an individual and is a core measure of crystallized intelligence (Diehl, Willis, and Schaie, 1995). Unlike most cognitive measures, verbal ability has been shown to be greater in older adults relative to the young (Park et al., 2002). A classic paper Horn and Cattell (1967) provides a theoretical conceptualization of verbal ability—in relation to crystallized intelligence—and relevant measures.

**References**

Diehl, M., Willis, S.L., Schaie, K.W. (1995). Everyday problem solving in older adults: Observational assessment and cognitive correlates. *Psychology and Aging, 10*, 478-491. https://doi.org/10.1037/0882-7974.10.3.478

Horn, J., & Cattell, R.B. (1967). Age differences in fluid and crystallized intelligence. *Acta Psychologica, 26*, 107-129. https://doi.org/10.1016/0001-6918(67)90011-X

Park, D.C., Lautenschlager, G., Hedden, T., Davidson, N.S., Smith, A.D., Smith, P.K. (2002). Models of visuospatial and verbal memory across the adult life span. *Psychology and Aging, 17*, 299–320. https://doi.org/10.1037/0882-7974.17.2.299

***Sample Sizes by Epoch and Task (subjects with partial data in parentheses)***

| Assessment | Epoch 1 | Epoch 2 | Epoch 3 |
|---|---|---|---|
| **Educational Testing Service Advanced Vocabulary** | 463 | 324 | 212 |
| **Shipley Vocabulary** | 463 | 0 | 212 |
| **CANTAB Graded Naming Task** | 464 | 70 | 212 |
| **NIH Toolbox Oral Reading Recognition Test** | 0 | 304(304)[a] | 207(17)[a] |
| **NIH Toolbox Picture Vocabulary** | 0 | 302(302)[b] | 208(18)[b] |

Notes on data completeness:
[a]NIH Toolbox Oral Reading Recognition Test: For Epoch 2, thetas and theta SEs are unavailable and fully-corrected scores are only available for 193 participants. For Epoch 3, age-corrected, percentile, and fully-corrected scores are only available for 190 participants. Use of the uncorrected standardized score is recommended.
[b]NIH Toolbox Picture Vocabulary: For Epoch 2, thetas and theta SEs are unavailable and fully-corrected scores are only available for 192 participants. For Epoch 3, age-corrected, percentile, and fully-corrected scores are only available for 191 participants. Use of the uncorrected standardized score is recommended.

***Task 6.24 Educational Testing Service Advanced Vocabulary***

- **Description (task duration: self-paced, approximately 10-20 minutes):** This a paper and pencil task. Participants compare a target word with five other words and select the one word that means the same or most nearly the same as the target word. The task is divided into 2 sections. Participants are given 4 minutes per section to select 18 synonyms (or 36 trials total).
- **Scoring:** Participants' scores are penalized for wrong answers; total score equals total number of items correct - .25*(number of items incorrect). Higher scores indicate better vocabulary.

**Primary Reference**:

Ekstrom, R. B., French, J. W., Harman, H., & Derman, D. (1976). *Kit of factor-referenced cognitive tests* (rev. ed.). Princeton, NJ: Educational Testing Service.

## *Task 6.25 Shipley Vocabulary*

- **Description (task duration: self-paced, approximately 10-20 minutes):** This a paper and pencil task. Participants compare a target word with four other words and select the

one that means the same or most nearly the same as the target word. This task is not timed and there are 40 trials.

- **Scoring:** Final score is the total number of items correct. Higher scores indicate better vocabulary.

**Primary Reference**:

Zachary, A. & Shipley, W. C. (1986). *Shipley Institute of Living Scale. RevisedManual.* Los Angeles, CA: Western Psychological Services.

## ***Task 6.26 CANTAB Graded Naming Task***

- **Description (task duration: approximately 10-15 minutes):** Thirty-line drawings are present on a computer screen, one at a time, with increasing difficulty. Participants must orally identify the exact name of each drawing (e.g., kangaroo, bellows). This task is not timed.
- **Scoring:** Final score is the total number of items correct. Higher scores indicate better vocabulary.

**Primary Reference**:

Robbins, T.W., et al., (1994). Cambridge Neuropsychological Test Automated Battery (CANTAB): A factor analytic study of a large sample of normal elderly volunteers. *Dementia, 5*, 266-281. https://doi.org/10.1159/000106735

**Software Reference:**

CantabEclipse. *Cambridge Cognition* (2007).
https://www.cambridgecognition.com/cantab/cognitive-tests/graded-naming-test-gnt/

## ***Task 6.27 NIH ToolBox Oral Reading Recognition Test***

- **Description (task duration: 3 minutes):** Participants see a series of letters and words presented one at a time on the computer screen and are to give the correct pronunciation for that series of letters or word. Items are presented in order of difficulty; the iPad adjusts the difficulty level of items depending on the participant's performance. The number of items presented will depend on age and performance; for most participants, the measure will last approximately 3 minutes and will contain about 25 items. The iPad will administer each item one by one, in an untimed fashion, until the test is completed. The examiner is responsible for recording whether each response is correct.
- **Scoring:** Participants are given credit for each series of letters or word pronounced correctly. Multiple dependent variables are provided via NIH Toolbox: (1) the *NIH Oral Reading Recognition Task Theta score* represents the overall ability or performance of the participant, (2) the *NIH Oral Reading Recognition Task Standard Error* represents the standard error, (3) the *NIH Oral Reading Recognition Task Uncorrected Standard Score* uses a standard score metric (normative mean=100, SD=15) and compares the participant's score to the entire NIH Toolbox nationally representative normative sample, (4) the *NIH Oral Reading Recognition Task Age-Corrected Standard Score* compares the participant's score to scores of participants of the same age in the NIH Toolbox nationally representative normative sample, (5) the *NIH Oral Reading Recognition Task*

*National Percentile (age adjusted)* represents the percentage of participants the test-taker scored higher than when being compared to participants of the same age, (6) the *NIH Oral Reading Recognition Task Fully-Corrected T-score* represents the performance of the participant in comparison to the NIH Toolbox nationally representative normative sample, while adjusting for key demographic values.

**Primary Reference:**

Gershon, Richard C et al. "NIH toolbox for assessment of neurological and behavioral function." *Neurology* vol. 80,11 Suppl 3 (2013): S2-6. doi:10.1212/WNL.0b013e3182872e5f

**Software Reference:**

NIH Toolbox for the iPad test ver. 2.1
https://nihtoolbox.force.com/s/article/nih-toolbox-scoring-and-interpretation-guide

**Note:** Please note the differences in administration for this task across the three Epochs of data collection. Participants in DLBS Epoch 2 performed NIH Toolbox Oral Reading Recognition Task on a desktop computer, whereas participants in DLBS Epoch 3 performed the task on an iPad. This change was mandated by developers and standardized scores will differ between the two forms of administration. For additional details, we refer you to the NIH Toolbox website: https://www.healthmeasures.net/explore-measurement-systems/nih-toolbox/obtain-and-administer-measures

## ***Task 6.28 NIH ToolBox Picture Vocabulary***

- **Description (task duration: 5 minutes):** Participants are presented with four pictures on the iPad screen and an audio recording saying a word. The participant is instructed to touch the picture that most closely shows the meaning of the word. After the participant makes a choice, another set of pictures automatically appears with the next item and associated audio file. The number of items presented depends on age and performance; for most participants, the measure will last approximately five minutes and will contain about 25 items. The iPad administers each item one by one, in an untimed fashion, until the test is completed.
- **Scoring:** Participants are given credit for each correct pairing of audio recording and picture. Multiple dependent variables are provided via NIH Toolbox: (1) the *NIH Picture Vocabulary Task Theta score* represents the overall ability or performance of the participant, (2) the *NIH Picture Vocabulary Task Standard Error* represents the standard error, (3) the *NIH Picture Vocabulary Task Uncorrected Standard Score* uses a standard score metric (normative mean=100, SD=15) and compares the participant's score to the entire NIH Toolbox nationally representative normative sample, (4) the *NIH Picture Vocabulary Task Age-Corrected Standard Score* compares the participant's score to participants of the same age in the NIH Toolbox nationally representative normative sample, (5) the *NIH Picture Vocabulary Task National Percentile (age adjusted)* represents the percentage of participants the test-taker scored higher than when being compared to participants of the same age, (6) the *NIH Picture Vocabulary Task Fully-Corrected T-score* represents the performance of the participant in comparison to the NIH

Toolbox nationally representative normative sample, while adjusting for key demographic values.

**Primary Reference:**

Gershon, Richard C et al. "NIH toolbox for assessment of neurological and behavioral function." *Neurology* vol. 80,11 Suppl 3 (2013): S2-6. https://doi.org/10.1212/WNL.0b013e3182872e5f

**Software Reference:**

NIH Toolbox for the iPad test ver. 2.1
https://nihtoolbox.force.com/s/article/nih-toolbox-scoring-and-interpretation-guide
**Note:** Please note the differences in administration for this task across the three Epochs of data collection. Participants in DLBS Epoch 2 performed NIH Toolbox Picture Vocabulary Task on a desktop computer, whereas participants in DLBS Epoch 3 performed the task on an iPad. This change was mandated by developers and standardized scores will differ between the two forms of administration. For additional details, we refer you to the NIH Toolbox website: https://www.healthmeasures.net/explore-measurement-systems/nih-toolbox/obtain-and-administer-measures

**Vocabulary Construct Data Set: Key to Names and Data Structure in Data Set**

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Age Interval | AgeInterval | Age at Epoch recoded into 3-year intervals | 20-100 |
| Sex | Sex | Participant's biological sex. | m = Male<br>f = Female |
| Race | Race | Race that the participant self-identifies with. | 1 = Asian American/ Pacific Islander<br>2 = Black/African American<br>3 = Multiracial<br>4 = Native American<br>5 = White/Caucasian<br>6 = Other<br>7 = Unknown |
| Ethnicity | Ethnicity | Ethnicity that the participant self-identifies with. | 1=Hispanic/Latin(o/a)<br>0 = Non-Hispanic |
| Handedness Score | HandednessScore | Average score of participant hand preference while completing various tasks. Higher scores indicate preference for the right hand. | Score range: 0-4<br><br>0 = Always left<br>1 = Usually left<br>2 = No preference<br>3 = Usually right<br>4 = Always right |
| Mini-Mental State Exam Total | MMSE | Total # of items answered correctly. | Score range: 0-30 |
| Cognitive Battery Epoch 1-2 Interval | CogW1toW2 | Interval between cognitive testing day 1 for Epochs 1-2. | # of Years |
| Cognitive Battery Epoch 2-3 Interval | CogW2toW3 | Interval between cognitive testing day 1 for Epochs 2-3. | # of Years |
| Cognitive Battery Epoch 1-3 Interval | CogW1toW3 | Interval between cognitive testing day 1 for Epochs 1-3. | # of Years |
| Take Home Epoch 1-2 Interval | TakeHomeW1toW2 | Interval between Take Home for Epochs 1-2. | # of Years |
| Take Home Epoch 2-3 Interval | TakeHomeW2toW3 | Interval between Take Home for Epochs 2-3. | # of Years |
| Take Home Epoch 1-3 Interval | TakeHomeW1toW3 | Interval between Take Home for Epochs 1-3. | # of Years |
| MRI Epoch 1-2 Interval | MRIW1toW2 | Interval between MRI scan for Epochs 1-2. | # of Years |
| MRI Epoch 2-3 Interval | MRIW2toW3 | Interval between MRI scan for Epochs 2-3. | # of Years |
| MRI Epoch 1-3 Interval | MRIW1toW3 | Interval between MRI scan for Epochs 1-3. | # of Years |
| Amyloid PET Epoch 1-2 Interval | PETAmyW1toW2 | Interval between amyloid PET scan for Epochs 1-2. | # of Years |

| | | | |
|---|---|---|---|
| Amyloid PET Epoch 2-3 Interval | PETAmyW2toW3 | Interval between amyloid PET scan for Epochs 2-3. | # of Years |
| Amyloid PET Epoch 1-3 Interval | PETAmyW1toW3 | Interval between amyloid PET scan for Epochs 1-3. | # of Years |
| Highest Level of Education Completed | EduComp5 | This is an ordinal measure of participants' self-reported highest level of education completed. | 1 = Less than high school graduate<br>2 = High school graduate/GED<br>3 = Some college/trade/ technical/business school<br>4 = Bachelor's degree<br>5 = Some graduate work<br>6 = Master's degree<br>7 = MD/JD/PhD/other advanced degree |
| Education Estimated Years Capped | EduYrsEstCap5 | This is a conversion of the participant's self-reported highest level of education into a capped estimated number of years it would take to reach this highest level of education.<br><br>The "capped" comes into play when someone spend a longer time than usual for a certain degree but did not complete it. In short, someone with a lot of years of education but did not complete a degree will not score higher than someone who did complete the degree. | *11 maximum* = Less than High school<br>*12* = High School<br>*15 maximum* = Some College<br>*16* = Bachelor's degree<br>*20 maximum* = Some Graduate Work<br>*18* = Master's degree<br>*21* = MD/JD/PhD/ Advanced degree |
| Construct Name | ConstructName | Vocabulary | |
| Construct Number | ConstructNumber | Construct 6 | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1 = Epoch 1<br>2 = Epoch 2<br>3 = Epoch 3 |
| Has Data | HasData | Yes = 1<br>No = 2 | |
| Number of Tasks in Construct | NumTasks | How many tasks make up the Vocabulary construct | 5 tasks for Vocabulary |
| **Task 24—ETS Vocabulary** | **Task24** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| ETS Advanced Vocabulary Total | ETSVocab24 | Dependent Variable: Total # of items correct - .25*(# of items incorrect) | Score range:<br>0-36 |
| **Task 25—Shipley Vocabulary** | **Task25** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |

| | | | |
|---|---|---|---|
| Shipley Vocabulary Total | ShipVocab25 | Dependent Variable: Total # of items correct | Score range: 0-40 |
| **Task 26—CANTAB Graded Naming Task** | **Task26** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| CANTAB Graded Naming Task Total | CantabGnt26 | Dependent Variable: Total # of items named correctly | Score range: 0-30 |
| **Task 27—Oral Reading Recognition Task** | **Task27** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| NIH Oral Reading Recognition Task Theta | NIHOralReadTheta27 | Item Response Theory (IRT) is used to score ORRT. A score known as a theta score is calculated for each participant; it represents the relative overall ability or performance of the participant. | Mean = 0, Standard Deviation = 1 |
| NIH Oral Reading Recognition Task Standard Error | NIHOralReadSE27 | Standard Error | |
| NIH Oral Reading Recognition Task Uncorrected Standard Score | NIHOralReadUn27 | It compares the performance of the test-taker to those in the entire NIH Toolbox nationally representative normative sample, regardless of age or any other variable. | Normative Mean = 100, Standard Deviation = 15 |
| NIH Oral Reading Recognition Task Age-Corrected Standard Score | NIHOralReadAge27 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample at the same age, where a score of 100 indicates performance that was at the national average for the test-taking participant's age. Age-corrected standard scores were derived for adults (ages 18-85). | Mean = 100, Standard Deviation = 15 |
| NIH Oral Reading Recognition Task National Percentile (age adjusted) | NIHOralReadPercent27 | A Percentile represents the percentage of people nationally above whom the participant's score ranks (the comparison group will be based on whichever normative score is used) | Percentile rank: 0-100 |
| NIH Oral Reading Recognition Task Fully-Corrected T-score | NIHOralReadFully27 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample, while adjusting for key demographic variables | Mean = 50, Standard Deviation = 10 |

| | | | |
|---|---|---|---|
| | | (education, gender, and race/ethnicity) collected during the NIH Toolbox national norming study. | |
| **Task 28—Picture Vocabulary** | **Task28** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| NIH Picture Vocabulary Task Theta | NIHPicVocabTheta28 | Item Response Theory (IRT) is used to score the TPVT. A score known as a theta score is calculated for each participant; it represents the relative overall ability or performance of the participant. | Mean = 0, Standard Deviation = 1 |
| NIH Picture Vocabulary Task Standard Error | NIHPicVocabSE28 | Standard Error | |
| NIH Picture Vocabulary Task Uncorrected Standard Score | NIHPicVocabUn28 | It compares the performance of the test-taker to those in the entire NIH Toolbox nationally representative normative sample, regardless of age or any other variable. | Normative Mean = 100, Standard Deviation = 15 |
| NIH Picture Vocabulary Task Age-Corrected Standard Score | NIHPicVocabAge28 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample at the same age, where a score of 100 indicates performance that was at the national average for the test-taking participant's age. Age-corrected standard scores were derived for adults (ages 18-85). | Mean = 100, Standard Deviation = 15 |
| NIH Picture Vocabulary Task National Percentile (age adjusted) | NIHPicVocabPercent28 | A Percentile represents the percentage of people nationally above whom the participant's score ranks (the comparison group will be based on whichever normative score is used) | Percentile rank: 0-100 |
| NIH Picture Vocabulary Task Fully-Corrected T-score | NIHPicVocabFully28 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample, while adjusting for key demographic variables (education, gender, and race/ethnicity) collected during the NIH Toolbox national norming study. | Mean = 50, Standard Deviation = 10 |

# Construct 7: Verbal Fluency

***Definition***

The construct of verbal fluency measures verbal knowledge, but also addresses speed of retrieval from semantic memory and thus, has a speed/working memory component. For this reason, verbal fluency is treated as a separate construct from vocabulary. The task requires participants to generate as many words as possible in 60 seconds relating to a letter or a category.

**Caution: Please note that there are differences in the administration of the phonemic letter task across Epochs. Also note that the semantic category task was not presented in Epoch 1.**

**References**

Spreen, O., & Benton, A. L. (1977). *Neurosensory Center Comprehensive Examination for Aphasia: Manual of instructions (NCCEA)* (rev. ed.). Victoria, BC: University of Victoria.

Salthouse, T. A. (2019). Trajectories of normal cognitive aging. *Psychology and Aging, 34*(1), 17–24.

Hedden, T., Lautenschlager, G., & Park, D. C. (2005). Contributions of Processing Ability and Knowledge to Verbal Memory Tasks across the Adult Life-Span. *The Quarterly Journal of Experimental Psychology Section A*, *58*(1), 169-190.

***Sample Sizes by Epoch and Task (subjects with partial data in parentheses)***

| Assessment | Epoch 1 | Epoch 2 | Epoch 3 |
|---|---|---|---|
| **Controlled Oral Word Association** | 462 | 331 | 213 |
| **Controlled Oral Association: Categories** | 0 | 331 | 213 |

## *Task 7.29 Controlled Oral Word Association (FAS)*

**Description (task duration: 3 minutes):** This task assesses the spontaneous production of words under a phonemic search condition. Participants are presented with three blocks of letters (F, A, and S) and are asked to **write down (Epoch 1) or say out loud (Epoch 2 and Epoch 3)** as many words beginning with that specific letter as possible in 60 seconds. Responses are recorded for accuracy and each unique word response receives a score of correct (1) or incorrect (0). Proper nouns and repeated words with a different suffix (e.g., friend, friends, friendly) are counted as incorrect. The variables of interest for this task are the number of correct words produced for the F, A, and S blocks as well as a total score.

***Caution:*** In Epoch 1, participants were instructed to write down their responses for 60 seconds. In Epoch 2 and Epoch 3, participants were instructed to orally respond, and responses would be recorded for later scoring and validation.

**Primary Reference:**

Bechtoldt, H.P., Benton, A.L. & Fogel, M.L. (1962). An application of factor analysis in neuropsychology. *The Psychological Record*, *12*, 147–156.

## *Task 7.30 Controlled Oral Association: Categories*

**Description (task duration: 2 minutes)**: This task is similar to the letter task but assesses the spontaneous production of words under a semantic search condition. Participants are present with two blocks of categories (animals and vegetables) and asked to verbally respond with all the items they can think of that fit into that specific category in 60 seconds. Responses are recorded for accuracy and each unique word response receives a score of correct (1) or incorrect (0). The variables of interest for this task are the total number of correct words produced for the animal and vegetable blocks as well as a total score. It is important to note that this task was *not administered in Epoch 1*.

**Primary Reference:**

Bechtoldt, H.P., Benton, A.L. & Fogel, M.L. (1962). An application of factor analysis in neuropsychology. *The Psychological Record*, *12*, 147–156.

**Verbal Fluency Data Set: Key to Names and Data Structure in Data Set**

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Age Interval | AgeInterval | Age at Epoch recoded into 3-year intervals | 20-100 |
| Sex | Sex | Participant's biological sex. | m = Male<br>f = Female |
| Race | Race | Race that the participant self-identifies with. | 1 = Asian American/ Pacific Islander<br>2 = Black/African American<br>3 = Multiracial<br>4 = Native American<br>5 = White/Caucasian<br>6 = Other<br>7 = Unknown |
| Ethnicity | Ethnicity | Ethnicity that the participant self-identifies with. | 1=Hispanic/Latin(o/a)<br>0 = Non-Hispanic |
| Handedness Score | HandednessScore | Average score of participant hand preference while completing various tasks. Higher scores indicate preference for the right hand. | Score range: 0-4<br><br>0 = Always left<br>1 = Usually left<br>2 = No preference<br>3 = Usually right<br>4 = Always right |
| Mini-Mental State Exam Total | MMSE | Total # of items answered correctly. | Score range: 0-30 |
| Cognitive Battery Epoch 1-2 Interval | CogW1toW2 | Interval between cognitive testing day 1 for Epochs 1-2. | # of Years |
| Cognitive Battery Epoch 2-3 Interval | CogW2toW3 | Interval between cognitive testing day 1 for Epochs 2-3. | # of Years |
| Cognitive Battery Epoch 1-3 Interval | CogW1toW3 | Interval between cognitive testing day 1 for Epochs 1-3. | # of Years |
| Take Home Epoch 1-2 Interval | TakeHomeW1toW2 | Interval between Take Home for Epochs 1-2. | # of Years |
| Take Home Epoch 2-3 Interval | TakeHomeW2toW3 | Interval between Take Home for Epochs 2-3. | # of Years |
| Take Home Epoch 1-3 Interval | TakeHomeW1toW3 | Interval between Take Home for Epochs 1-3. | # of Years |
| MRI Epoch 1-2 Interval | MRIW1toW2 | Interval between MRI scan for Epochs 1-2. | # of Years |
| MRI Epoch 2-3 Interval | MRIW2toW3 | Interval between MRI scan for Epochs 2-3. | # of Years |
| MRI Epoch 1-3 Interval | MRIW1toW3 | Interval between MRI scan for Epochs 1-3. | # of Years |
| Amyloid PET Epoch 1-2 Interval | PETAmyW1toW2 | Interval between amyloid PET scan for Epochs 1-2. | # of Years |

| | | | |
|---|---|---|---|
| Amyloid PET Epoch 2-3 Interval | PETAmyW2toW3 | Interval between amyloid PET scan for Epochs 2-3. | # of Years |
| Amyloid PET Epoch 1-3 Interval | PETAmyW1toW3 | Interval between amyloid PET scan for Epochs 1-3. | # of Years |
| Highest Level of Education Completed | EduComp5 | This is an ordinal measure of participants' self-reported highest level of education completed. | 1 = Less than high school graduate<br>2 = High school graduate/GED<br>3 = Some college/trade/ technical/business school<br>4 = Bachelor's degree<br>5 = Some graduate work<br>6 = Master's degree<br>7 = MD/JD/PhD/other advanced degree |
| Education Estimated Years Capped | EduYrsEstCap5 | This is a conversion of the participant's self-reported highest level of education into a capped estimated number of years it would take to reach this highest level of education.<br><br>The "capped" comes into play when someone spend a longer time than usual for a certain degree but did not complete it. In short, someone with a lot of years of education but did not complete a degree will not score higher than someone who did complete the degree. | *11 maximum* = Less than High school<br>*12* = High School<br>*15 maximum* = Some College<br>*16* = Bachelor's degree<br>*20 maximum* = Some Graduate Work<br>*18* = Master's degree<br>*21* = MD/JD/PhD/ Advanced degree |
| Construct Name | ConstructName | Verbal Fluency | |
| Construct Number | ConstructNumber | Construct 7 | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1 = Epoch 1<br>2 = Epoch 2<br>3 = Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch; 2 = No, did not return for Epoch | |
| Number of Tasks in Construct | NumTasks | How many tasks make up the Verbal Fluency construct | 2 Tasks for Verbal Fluency |
| **Task 29—Controlled Oral** | **Task 29** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |

| | | | |
|---|---|---|---|
| **Association Letters** | | | |
| Written Controlled Oral Association Letters *[Epoch 1 Only]* | WContOralAssocF29 | Total # correct for words beginning with letter F | DLBS Score Range: 0-24 |
| Written Controlled Oral Association Letters *[Epoch 1 Only]* | WContOralAssocA29 | Total # correct for words beginning with letter A | DLBS Score Range: 0-21 |
| Written Controlled Oral Association Letters *[Epoch 1 Only]* | WContOralAssocS29 | Total # correct for words beginning with letter S | DLBS Score Range: 0-24 |
| Written Controlled Oral Association Letter *[Epoch 1 Only]* | WContOralAssocLetterTot29 | Total # of words correct summed across F, A, and S blocks | DLBS Score Range: 0-66 |
| Controlled Oral Association Letters | ContOralAssocF29 | Total # correct for words beginning with letter F | Score Range: 0-28 |
| Controlled Oral Association Letters | ContOralAssocA29 | Total # correct for words beginning with letter A | Score Range: 0-29 |
| Controlled Oral Association Letters | ContOralAssocS29 | Total # correct for words beginning with letter S | Score Range: 0-32 |
| Controlled Oral Association Letters | ContOralAssocTot29 | Total # of words correct summed across F, A, and S blocks | Score Range: 0-81 |
| **Task 30— Controlled Oral Association Categories** | **Task30** | 1 = Has data<br>2 = Task data partial<br>3 = No task data | |
| Controlled Oral Association Categories | ContOralAssocCatAni30 | Total # correct for animals produced | Score Range: 0-36 |
| Controlled Oral Association Categories | ContOralAssocCatVeg30 | Total # correct for vegetables produced | Score Range: 0-30 |
| Controlled Oral Association | ContOralAssocCatTot30 | Total # of words correct summed across animal and vegetable blocks | Score Range: 0-66 |

# Structural Brain Data

The Dallas Lifespan Brain Study

# Using the Structural data

The structural data includes all task information, data coding, and data spreadsheets for the MRI structural measures in the Dallas Lifespan Brain Study.

The structural data in the KTTK is parcellated into 4 morphometric parameters which includes cortical thickness, gray matter volume, surface area, and subcortical volume. Additionally, we include summary global measures.

Each of the cortical parameters include regional parcellations conducted independently in the two hemispheres. To access any of the tasks within each construct, select the task of interest. The key to the names and data structure used for data coding of each construct spreadsheet is also included in this document and can be accessed by selecting "Data Coding sheet" included under each construct listed below. Finally, the spreadsheet for each construct can be found listed below and accessed by selecting "Spreadsheet of data" listed under each construct.

**Structural Data**

Structural MRI Data Processing Description
Data Coding Sheets

# Structural MRI Data

***Table of Contents***

Sample Sizes By Epoch and Task

Section 1: Brief Descriptions of Structural Data Processing

Section 2: Access to Structural Summary Data

## *Sample Sizes by Epoch and Assessment*

| Assessment | Epoch 1 | Epoch 2 | Epoch 3 |
|---|---|---|---|
| **Structural Data** | 464 | 295 | 190 |

## *Structural Data Processing Description*

For all three Epochs of DLBS data collection, MRI scans were processed cross-sectionally through Freesurfer ver. 5.3 (Martinos Center for Biomedical Imaging, MA, USA) with regional parcellations based on the Desikan-Killiany atlas (Desikan et al., 2006). Extensively trained operators inspected the reconstructed white and grey matter surfaces and performed manual edits when necessary. Quality control was extensive. A second highly trained and independent group reviewed each parcellation for accuracy. For each region automatically parcellated by FreeSurfer, cortical thickness was computed as the distance between the pial surface and grey-white matter boundary, grey matter volume was computed as the volume between those two boundaries, and cortical surface area was computed as the surface area of the grey-white matter boundary.

**References**

Desikan, R. S., Ségonne, F., Fischl, B., Quinn, B. T., Dickerson, B. C., Blacker, D., ... & Albert, M. S. (2006). An automated labeling system for subdividing the human cerebral cortex on MRI scans into based regions of interest. *NeuroImage 31*(3), 968–980. https://doi.org/10.1016/j.neuroimage.2006.01.021

## Cortical Thickness Data Set: Key to Names and Data Structure in Data Set

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| AIRC Number | AIRC_ID | AIRC subject identifier | |
| Construct Name | ConstructName | Cortical Thickness | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1=Epoch 1<br>2=Epoch 2<br>3=Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch; 2 = No, did not return for Epoch | |
| Number of Scores in Construct | NumScores | How many scores are available | 68 |
| Cortical Thickness | Thickness | 1 = Has data<br>2 = Task data partial<br>3 =No task data | |
| Left banks of superior temporal | LhBanksstsThick | Thickness for ROI | Score Range: 1-5 |
| Left caudal anterior cingulate | LhCaudalanteriorcingulateThick | Thickness for ROI | Score Range: 1-5 |
| Left caudal middle frontal | LhCaudalmiddlefrontalThick | Thickness for ROI | Score Range: 1-5 |
| Left cuneus | LhCuneusThick | Thickness for ROI | Score Range: 1-5 |
| Left entorhinal | LhEntorhinalThick | Thickness for ROI | Score Range: 1-5 |
| Left fusiform | LhFusiformThick | Thickness for ROI | Score Range: 1-5 |
| Left inferior parietal | LhInferiorparietalThick | Thickness for ROI | Score Range: 1-5 |
| Left inferior temporal | LhInferiortemporalThick | Thickness for ROI | Score Range: 1-5 |
| Left cingulate isthmus | LhIsthmuscingulateThick | Thickness for ROI | Score Range: 1-5 |
| Left lateral occipital | LhLateraloccipitalThick | Thickness for ROI | Score Range: 1-5 |
| Left lateral orbitofrontal | LhLateralorbitofrontalThick | Thickness for ROI | Score Range: 1-5 |
| Left lingual | LhLingualThick | Thickness for ROI | Score Range: 1-5 |
| Left medial orbitofrontal | LhMedialorbitofrontalThick | Thickness for ROI | Score Range: 1-5 |
| Left middle temporal | LhMiddletemporalThick | Thickness for ROI | Score Range: 1-5 |
| Left parahippocampal | LhParahippocampalThick | Thickness for ROI | Score Range: 1-5 |
| Left paracentral | LhParacentralThick | Thickness for ROI | Score Range: 1-5 |
| Left parsopercularis | LhParsopercularisThick | Thickness for ROI | Score Range: 1-5 |
| Left parsorbitalis | LhParsorbitalisThick | Thickness for ROI | Score Range: 1-5 |
| Left pars triangularis | LhParstriangularisThick | Thickness for ROI | Score Range: 1-5 |
| Left pericalcarine | LhPericalcarineThick | Thickness for ROI | Score Range: 1-5 |
| Left postcentral | LhPostcentralThick | Thickness for ROI | Score Range: 1-5 |
| Left posterior cingulate | LhPosteriorcingulateThick | Thickness for ROI | Score Range: 1-5 |
| Left precentral | LhPrecentralThick | Thickness for ROI | Score Range: 1-5 |
| Left precuneus | LhPrecuneusThick | Thickness for ROI | Score Range: 1-5 |
| Left rostral anterior cingulate | LhRostralanteriorcingulateThick | Thickness for ROI | Score Range: 1-5 |
| Left rostral middle frontal | LhRostralmiddlefrontalThick | Thickness for ROI | Score Range: 1-5 |
| Left superior frontal | LhSuperiorfrontalThick | Thickness for ROI | Score Range: 1-5 |
| Left superior parietal | LhSuperiorparietalThick | Thickness for ROI | Score Range: 1-5 |
| Left superior temporal | LhSuperiortemporalThick | Thickness for ROI | Score Range: 1-5 |
| Left supramarginal | LhSupramarginalThick | Thickness for ROI | Score Range: 1-5 |

| | | | |
|---|---|---|---|
| Left frontal pole | LhFrontalpoleThick | Thickness for ROI | Score Range: 1-5 |
| Left temporal pole | LhTemporalpoleThick | Thickness for ROI | Score Range: 1-5 |
| Left transverse temporal | LhTransversetemporalThick | Thickness for ROI | Score Range: 1-5 |
| Left insula | LhInsulaThick | Thickness for ROI | Score Range: 1-5 |
| Right banks of superior temporal | RhBanksstsThick | Thickness for ROI | Score Range: 1-5 |
| Right caudal anterior cingulate | RhCaudalanteriorcingulateThick | Thickness for ROI | Score Range: 1-5 |
| Right caudal middle frontal | RhCaudalmiddlefrontalThick | Thickness for ROI | Score Range: 1-5 |
| Right cuneus | RhCuneusThick | Thickness for ROI | Score Range: 1-5 |
| Right entorhinal | RhEntorhinalThick | Thickness for ROI | Score Range: 1-5 |
| Right fusiform | RhFusiformThick | Thickness for ROI | Score Range: 1-5 |
| Right inferior parietal | RhInferiorparietalThick | Thickness for ROI | Score Range: 1-5 |
| Right inferior temporal | RhInferiortemporalThick | Thickness for ROI | Score Range: 1-5 |
| Right cingulate isthmus | RhIsthmuscingulateThick | Thickness for ROI | Score Range: 1-5 |
| Right lateral occipital | RhLateraloccipitalThick | Thickness for ROI | Score Range: 1-5 |
| Right lateral orbitofrontal | RhLateralorbitofrontalThick | Thickness for ROI | Score Range: 1-5 |
| Right lingual | RhLingualThick | Thickness for ROI | Score Range: 1-5 |
| Right medial orbitofrontal | RhMedialorbitofrontalThick | Thickness for ROI | Score Range: 1-5 |
| Right middle temporal | RhMiddletemporalThick | Thickness for ROI | Score Range: 1-5 |
| Right parahippocampal | RhParahippocampalThick | Thickness for ROI | Score Range: 1-5 |
| Right paracentral | RhParacentralThick | Thickness for ROI | Score Range: 1-5 |
| Right parsopercularis | RhParsopercularisThick | Thickness for ROI | Score Range: 1-5 |
| Right parsorbitalis | RhParsorbitalisThick | Thickness for ROI | Score Range: 1-5 |
| Right pars triangularis | RhParstriangularisThick | Thickness for ROI | Score Range: 1-5 |
| Right pericalcarine | RhPericalcarineThick | Thickness for ROI | Score Range: 1-5 |
| Right postcentral | RhPostcentralThick | Thickness for ROI | Score Range: 1-5 |
| Right posterior cingulate | RhPosteriorcingulateThick | Thickness for ROI | Score Range: 1-5 |
| Right precentral | RhPrecentralThick | Thickness for ROI | Score Range: 1-5 |
| Right precuneus | RhPrecuneusThick | Thickness for ROI | Score Range: 1-5 |
| Right rostral anterior cingulate | RhRostralanteriorcingulateThick | Thickness for ROI | Score Range: 1-5 |
| Right rostral middle frontal | RhRostralmiddlefrontalThick | Thickness for ROI | Score Range: 1-5 |
| Right superior frontal | RhSuperiorfrontalThick | Thickness for ROI | Score Range: 1-5 |
| Right superior parietal | RhSuperiorparietalThick | Thickness for ROI | Score Range: 1-5 |
| Right superior temporal | RhSuperiortemporalThick | Thickness for ROI | Score Range: 1-5 |
| Right supramarginal | RhSupramarginalThick | Thickness for ROI | Score Range: 1-5 |
| Right frontal pole | RhFrontalpoleThick | Thickness for ROI | Score Range: 1-5 |
| Right temporal pole | RhTemporalpoleThick | Thickness for ROI | Score Range: 1-5 |
| Right transverse temporal | RhTransversetemporalThick | Thickness for ROI | Score Range: 1-5 |
| Right insula | RhInsulaThick | Thickness for ROI | Score Range: 1-5 |

## Grey Matter Volume Data Set: Key to Names and Data Structure in Data Set

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| AIRC Number | AIRC_ID | AIRC subject identifier | |
| Construct Name | ConstructName | GM Volume | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1=Epoch 1<br>2=Epoch 2<br>3=Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch; 2 = No, did not return for Epoch | |
| Number of Scores in Construct | NumScores | How many scores are available | 68 |
| Grey Matter Volume | Volume | 1 = Has data<br>2 = Task data partial<br>3 =No task data | |
| Left banks of superior temporal | LhBanksstsVol | Volume for ROI | Score Range: 1-35000 |
| Left caudal anterior cingulate | LhCaudalanteriorcingulateVol | Volume for ROI | Score Range: 1-35000 |
| Left caudal middle frontal | LhCaudalmiddlefrontalVol | Volume for ROI | Score Range: 1-35000 |
| Left cuneus | LhCuneusVol | Volume for ROI | Score Range: 1-35000 |
| Left entorhinal | LhEntorhinalVol | Volume for ROI | Score Range: 1-35000 |
| Left fusiform | LhFusiformVol | Volume for ROI | Score Range: 1-35000 |
| Left inferior parietal | LhInferiorparietalVol | Volume for ROI | Score Range: 1-35000 |
| Left inferior temporal | LhInferiortemporalVol | Volume for ROI | Score Range: 1-35000 |
| Left cingulate isthmus | LhIsthmuscingulateVol | Volume for ROI | Score Range: 1-35000 |
| Left lateral occipital | LhLateraloccipitalVol | Volume for ROI | Score Range: 1-35000 |
| Left lateral orbitofrontal | LhLateralorbitofrontalVol | Volume for ROI | Score Range: 1-35000 |
| Left lingual | LhLingualVol | Volume for ROI | Score Range: 1-35000 |
| Left medial orbitofrontal | LhMedialorbitofrontalVol | Volume for ROI | Score Range: 1-35000 |
| Left middle temporal | LhMiddletemporalVol | Volume for ROI | Score Range: 1-35000 |
| Left parahippocampal | LhParahippocampalVol | Volume for ROI | Score Range: 1-35000 |
| Left paracentral | LhParacentralVol | Volume for ROI | Score Range: 1-35000 |
| Left parsopercularis | LhParsopercularisVol | Volume for ROI | Score Range: 1-35000 |
| Left parsorbitalis | LhParsorbitalisVol | Volume for ROI | Score Range: 1-35000 |
| Left pars triangularis | LhParstriangularisVol | Volume for ROI | Score Range: 1-35000 |
| Left pericalcarine | LhPericalcarineVol | Volume for ROI | Score Range: 1-35000 |
| Left postcentral | LhPostcentralVol | Volume for ROI | Score Range: 1-35000 |
| Left posterior cingulate | LhPosteriorcingulateVol | Volume for ROI | Score Range: 1-35000 |
| Left precentral | LhPrecentralVol | Volume for ROI | Score Range: 1-35000 |
| Left precuneus | LhPrecuneusVol | Volume for ROI | Score Range: 1-35000 |
| Left rostral anterior cingulate | LhRostralanteriorcingulateVol | Volume for ROI | Score Range: 1-35000 |
| Left rostral middle frontal | LhRostralmiddlefrontalVol | Volume for ROI | Score Range: 1-35000 |
| Left superior frontal | LhSuperiorfrontalVol | Volume for ROI | Score Range: 1-35000 |
| Left superior parietal | LhSuperiorparietalVol | Volume for ROI | Score Range: 1-35000 |

| | | | |
|---|---|---|---|
| Left superior temporal | LhSuperiortemporalVol | Volume for ROI | Score Range: 1-35000 |
| Left supramarginal | LhSupramarginalVol | Volume for ROI | Score Range: 1-35000 |
| Left frontal pole | LhFrontalpoleVol | Volume for ROI | Score Range: 1-35000 |
| Left temporal pole | LhTemporalpoleVol | Volume for ROI | Score Range: 1-35000 |
| Left transverse temporal | LhTransversetemporalVol | Volume for ROI | Score Range: 1-35000 |
| Left insula | LhInsulaVol | Volume for ROI | Score Range: 1-35000 |
| Right banks of superior temporal | RhBanksstsVol | Volume for ROI | Score Range: 1-35000 |
| Right caudal anterior cingulate | RhCaudalanteriorcingulateVol | Volume for ROI | Score Range: 1-35000 |
| Right caudal middle frontal | RhCaudalmiddlefrontalVol | Volume for ROI | Score Range: 1-35000 |
| Right cuneus | RhCuneusVol | Volume for ROI | Score Range: 1-35000 |
| Right entorhinal | RhEntorhinalVol | Volume for ROI | Score Range: 1-35000 |
| Right fusiform | RhFusiformVol | Volume for ROI | Score Range: 1-35000 |
| Right inferior parietal | RhInferiorparietalVol | Volume for ROI | Score Range: 1-35000 |
| Right inferior temporal | RhInferiortemporalVol | Volume for ROI | Score Range: 1-35000 |
| Right cingulate isthmus | RhIsthmuscingulateVol | Volume for ROI | Score Range: 1-35000 |
| Right lateral occipital | RhLateraloccipitalVol | Volume for ROI | Score Range: 1-35000 |
| Right lateral orbitofrontal | RhLateralorbitofrontalVol | Volume for ROI | Score Range: 1-35000 |
| Right lingual | RhLingualVol | Volume for ROI | Score Range: 1-35000 |
| Right medial orbitofrontal | RhMedialorbitofrontalVol | Volume for ROI | Score Range: 1-35000 |
| Right middle temporal | RhMiddletemporalVol | Volume for ROI | Score Range: 1-35000 |
| Right parahippocampal | RhParahippocampalVol | Volume for ROI | Score Range: 1-35000 |
| Right paracentral | RhParacentralVol | Volume for ROI | Score Range: 1-35000 |
| Right parsopercularis | RhParsopercularisVol | Volume for ROI | Score Range: 1-35000 |
| Right parsorbitalis | RhParsorbitalisVol | Volume for ROI | Score Range: 1-35000 |
| Right pars triangularis | RhParstriangularisVol | Volume for ROI | Score Range: 1-35000 |
| Right pericalcarine | RhPericalcarineVol | Volume for ROI | Score Range: 1-35000 |
| Right postcentral | RhPostcentralVol | Volume for ROI | Score Range: 1-35000 |
| Right posterior cingulate | RhPosteriorcingulateVol | Volume for ROI | Score Range: 1-35000 |
| Right precentral | RhPrecentralVol | Volume for ROI | Score Range: 1-35000 |
| Right precuneus | RhPrecuneusVol | Volume for ROI | Score Range: 1-35000 |
| Right rostral anterior cingulate | RhRostralanteriorcingulateVol | Volume for ROI | Score Range: 1-35000 |
| Right rostral middle frontal | RhRostralmiddlefrontalVol | Volume for ROI | Score Range: 1-35000 |
| Right superior frontal | RhSuperiorfrontalVol | Volume for ROI | Score Range: 1-35000 |
| Right superior parietal | RhSuperiorparietalVol | Volume for ROI | Score Range: 1-35000 |
| Right superior temporal | RhSuperiortemporalVol | Volume for ROI | Score Range: 1-35000 |
| Right supramarginal | RhSupramarginalVol | Volume for ROI | Score Range: 1-35000 |
| Right frontal pole | RhFrontalpoleVol | Volume for ROI | Score Range: 1-35000 |
| Right temporal pole | RhTemporalpoleVol | Volume for ROI | Score Range: 1-35000 |
| Right transverse temporal | RhTransversetemporalVol | Volume for ROI | Score Range: 1-35000 |
| Right insula | RhInsulaVol | Volume for ROI | Score Range: 1-35000 |

## Surface Area Data Set: Key to Names and Data Structure in Data Set

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| AIRC Number | AIRC_ID | AIRC subject identifier | |
| Construct Name | ConstructName | Surface Area | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1=Epoch 1<br>2=Epoch 2<br>3=Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch; 2 = No, did not return for Epoch | |
| Number of Scores in Construct | NumScores | How many scores are available | 68 |
| Surface Area | Area | 1 = Has data<br>2 = Task data partial<br>3 =No task data | |
| Left banks of superior temporal | LhBanksstsArea | Surface Area for ROI | Score Range: 1-9999 |
| Left caudal anterior cingulate | LhCaudalanteriorcingulateArea | Surface Area for ROI | Score Range: 1-9999 |
| Left caudal middle frontal | LhCaudalmiddlefrontalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left cuneus | LhCuneusArea | Surface Area for ROI | Score Range: 1-9999 |
| Left entorhinal | LhEntorhinalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left fusiform | LhFusiformArea | Surface Area for ROI | Score Range: 1-9999 |
| Left inferior parietal | LhInferiorparietalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left inferior temporal | LhInferiortemporalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left cingulate isthmus | LhIsthmuscingulateArea | Surface Area for ROI | Score Range: 1-9999 |
| Left lateral occipital | LhLateraloccipitalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left lateral orbitofrontal | LhLateralorbitofrontalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left lingual | LhLingualArea | Surface Area for ROI | Score Range: 1-9999 |
| Left medial orbitofrontal | LhMedialorbitofrontalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left middle temporal | LhMiddletemporalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left parahippocampal | LhParahippocampalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left paracentral | LhParacentralArea | Surface Area for ROI | Score Range: 1-9999 |
| Left parsopercularis | LhParsopercularisArea | Surface Area for ROI | Score Range: 1-9999 |
| Left parsorbitalis | LhParsorbitalisArea | Surface Area for ROI | Score Range: 1-9999 |
| Left pars triangularis | LhParstriangularisArea | Surface Area for ROI | Score Range: 1-9999 |
| Left pericalcarine | LhPericalcarineArea | Surface Area for ROI | Score Range: 1-9999 |
| Left postcentral | LhPostcentralArea | Surface Area for ROI | Score Range: 1-9999 |
| Left posterior cingulate | LhPosteriorcingulateArea | Surface Area for ROI | Score Range: 1-9999 |
| Left precentral | LhPrecentralArea | Surface Area for ROI | Score Range: 1-9999 |
| Left precuneus | LhPrecuneusArea | Surface Area for ROI | Score Range: 1-9999 |
| Left rostral anterior cingulate | LhRostralanteriorcingulateArea | Surface Area for ROI | Score Range: 1-9999 |
| Left rostral middle frontal | LhRostralmiddlefrontalArea | Surface Area for ROI | Score Range: 1-9999 |

| | | | |
|---|---|---|---|
| Left superior frontal | LhSuperiorfrontalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left superior parietal | LhSuperiorparietalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left superior temporal | LhSuperiortemporalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left supramarginal | LhSupramarginalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left frontal pole | LhFrontalpoleArea | Surface Area for ROI | Score Range: 1-9999 |
| Left temporal pole | LhTemporalpoleArea | Surface Area for ROI | Score Range: 1-9999 |
| Left transverse temporal | LhTransversetemporalArea | Surface Area for ROI | Score Range: 1-9999 |
| Left insula | LhInsulaArea | Surface Area for ROI | Score Range: 1-9999 |
| Right banks of superior temporal | RhBanksstsArea | Surface Area for ROI | Score Range: 1-9999 |
| Right caudal anterior cingulate | RhCaudalanteriorcingulateArea | Surface Area for ROI | Score Range: 1-9999 |
| Right caudal middle frontal | RhCaudalmiddlefrontalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right cuneus | RhCuneusArea | Surface Area for ROI | Score Range: 1-9999 |
| Right entorhinal | RhEntorhinalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right fusiform | RhFusiformArea | Surface Area for ROI | Score Range: 1-9999 |
| Right inferior parietal | RhInferiorparietalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right inferior temporal | RhInferiortemporalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right cingulate isthmus | RhIsthmuscingulateArea | Surface Area for ROI | Score Range: 1-9999 |
| Right lateral occipital | RhLateraloccipitalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right lateral orbitofrontal | RhLateralorbitofrontalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right lingual | RhLingualArea | Surface Area for ROI | Score Range: 1-9999 |
| Right medial orbitofrontal | RhMedialorbitofrontalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right middle temporal | RhMiddletemporalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right parahippocampal | RhParahippocampalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right paracentral | RhParacentralArea | Surface Area for ROI | Score Range: 1-9999 |
| Right parsopercularis | RhParsopercularisArea | Surface Area for ROI | Score Range: 1-9999 |
| Right parsorbitalis | RhParsorbitalisArea | Surface Area for ROI | Score Range: 1-9999 |
| Right pars triangularis | RhParstriangularisArea | Surface Area for ROI | Score Range: 1-9999 |
| Right pericalcarine | RhPericalcarineArea | Surface Area for ROI | Score Range: 1-9999 |
| Right postcentral | RhPostcentralArea | Surface Area for ROI | Score Range: 1-9999 |
| Right posterior cingulate | RhPosteriorcingulateArea | Surface Area for ROI | Score Range: 1-9999 |
| Right precentral | RhPrecentralArea | Surface Area for ROI | Score Range: 1-9999 |
| Right precuneus | RhPrecuneusArea | Surface Area for ROI | Score Range: 1-9999 |
| Right rostral anterior cingulate | RhRostralanteriorcingulateArea | Surface Area for ROI | Score Range: 1-9999 |
| Right rostral middle frontal | RhRostralmiddlefrontalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right superior frontal | RhSuperiorfrontalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right superior parietal | RhSuperiorparietalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right superior temporal | RhSuperiortemporalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right supramarginal | RhSupramarginalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right frontal pole | RhFrontalpoleArea | Surface Area for ROI | Score Range: 1-9999 |
| Right temporal pole | RhTemporalpoleArea | Surface Area for ROI | Score Range: 1-9999 |
| Right transverse temporal | RhTransversetemporalArea | Surface Area for ROI | Score Range: 1-9999 |
| Right insula | RhInsulaArea | Surface Area for ROI | Score Range: 1-9999 |

## Subcortical Volume Data Set: Key to Names and Data Structure in Data Set

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| AIRC Number | AIRC_ID | AIRC subject identifier | |
| Construct Name | ConstructName | Subcortical Volume | From aseg.stats file |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1=Epoch 1<br>2=Epoch 2<br>3=Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch; 2 = No, did not return for Epoch | |
| Number of Scores in Construct | NumScores | How many scores are available | 38 |
| Subcortical Volumes | SubVolumes | 1 = Has data<br>2 = Task data partial<br>3 =No task data | |
| Left-Lateral-Ventricle | LhLatVentVol | Volume for ROI | Score Range: 1-99999 |
| Left-Inf-Lat-Vent | LhInfLatVentVol | Volume for ROI | Score Range: 1-99999 |
| Left-Cerebellum-White-Matter | LhCerebellumWMVol | Volume for ROI | Score Range: 1-99999 |
| Left-Cerebellum-Cortex | LhCerebellumCortexVol | Volume for ROI | Score Range: 1-99999 |
| Left-Thalamus-Proper | LhThalamusProperVol | Volume for ROI | Score Range: 1-99999 |
| Left-Caudate | LhCaudateVol | Volume for ROI | Score Range: 1-99999 |
| Left-Putamen | LhPutamenVol | Volume for ROI | Score Range: 1-99999 |
| Left-Pallidum | LhPallidumVol | Volume for ROI | Score Range: 1-99999 |
| 3rd-Ventricle | ThirdVentVol | Volume for ROI | Score Range: 1-99999 |
| 4th-Ventricle | FourthVentVol | Volume for ROI | Score Range: 1-99999 |
| Brain-Stem | BrainStemVol | Volume for ROI | Score Range: 1-99999 |
| Left-Hippocampus | LhHippocampusVol | Volume for ROI | Score Range: 1-99999 |
| Left-Amygdala | LhAmygdalaVol | Volume for ROI | Score Range: 1-99999 |
| Left-Accumbens-area | LhAccumbensVol | Volume for ROI | Score Range: 1-99999 |
| Left-VentralDC | LhVentralDCVol | Volume for ROI | Score Range: 1-99999 |
| Left-vessel | LhVesselVol | Volume for ROI | Score Range: 1-99999 |
| Left-choroid-plexus | LhChoroidPVol | Volume for ROI | Score Range: 1-99999 |
| Right-Lateral-Ventricle | RhLatVentVol | Volume for ROI | Score Range: 1-99999 |
| Right-Inf-Lat-Vent | RhInfLatVentVol | Volume for ROI | Score Range: 1-99999 |
| Right-Cerebellum-White-Matter | RhCerebellumWMVol | Volume for ROI | Score Range: 1-99999 |
| Right-Cerebellum-Cortex | RhCerebellumCortexVol | Volume for ROI | Score Range: 1-99999 |
| Right-Thalamus-Proper | RhThalamusProperVol | Volume for ROI | Score Range: 1-99999 |
| Right-Caudate | RhCaudateVol | Volume for ROI | Score Range: 1-99999 |
| Right-Putamen | RhPutamenVol | Volume for ROI | Score Range: 1-99999 |
| Right-Pallidum | RhPallidumVol | Volume for ROI | Score Range: 1-99999 |
| Right-Hippocampus | RhHippocampusVol | Volume for ROI | Score Range: 1-99999 |
| Right-Amygdala | RhAmygdalaVol | Volume for ROI | Score Range: 1-99999 |
| Right-Accumbens-area | RhAccumbensVol | Volume for ROI | Score Range: 1-99999 |
| Right-VentralDC | RhVentralDCVol | Volume for ROI | Score Range: 1-99999 |

| | | | |
|---|---|---|---|
| Right-vessel | RhVesselVol | Volume for ROI | Score Range: 1-99999 |
| Right-choroid-plexus | RhChoroidPVol | Volume for ROI | Score Range: 1-99999 |
| 5th-Ventricle | FifthVentVol | Volume for ROI | Score Range: 1-99999 |
| Optic-Chiasm | OpticChiasmVol | Volume for ROI | Score Range: 1-99999 |
| CC_Posterior | CCPosteriorVol | Volume for ROI | Score Range: 1-99999 |
| CC_Mid_Posterior | CCMidPosteriorVol | Volume for ROI | Score Range: 1-99999 |
| CC_Central | CCCentralVol | Volume for ROI | Score Range: 1-99999 |
| CC_Mid_Anterior | CCMidAnteriorVol | Volume for ROI | Score Range: 1-99999 |
| CC_Anterior | CCAnteriorVol | Volume for ROI | Score Range: 1-99999 |

## Global Variables Data Set: Key to Names and Data Structure in Data Set

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| AIRC Number | AIRC_ID | AIRC subject identifier | |
| Construct Name | ConstructName | Global Variables | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1=Epoch 1<br>2=Epoch 2<br>3=Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch; 2 = No, did not return for Epoch | |
| Number of Scores in Construct | NumScores | How many scores are available | 28 |
| Global Variables | Global | 1 = Has data<br>2 = Task data partial<br>3 =No task data | |
| Left hemisphere | LhMeanThick | Mean thickness across all left ROIs | Score Range: 1-5 |
| Right hemisphere | RhMeanThick | Mean thickness across all left ROIs | Score Range: 1-5 |
| Left hemisphere | LhWhiteSurfArea | Total Surface Area across all left ROIs | Score Range: 1-115000 |
| Right hemisphere | RhWhiteSurfArea | Total Surface Area across all right ROIs | Score Range: 1-115000 |
| Estimated Total Intracranial Volume | TotalIntracranialVol | Intracranial Volume | Score Range: 1-2500000 |
| CSF | CSFVol | CSF Volume | Score Range: 1-9999 |
| WM-hypointensities | WMHypointensitiesVol | White Matter Hypointensity Volume | Score Range: 1-99999 |
| non-WM-hypointensities | NonWMHypointensitiesVol | Non-WM Hypointensity Volume | Score Range: 1-99999 |
| BrainSegVol | BrainSegVol | BrainSeg Volume | Score Range: 1-140000 |
| BrainSegVolNotVent | BrainSegVolNotVent | BrainSeg Volume | Score Range: 1-140000 |
| BrainSegVolNotVentSurf | BrainSegVolNotVentSurf | BrainSeg Volume | Score Range: 1-140000 |
| lhCortexVol | LhCortexVol | Left Hemisphere Volume | Score Range: 1-280000 |
| rhCortexVol | RhCortexVol | Right Hemisphere Volume | Score Range: 1-280000 |
| CortexVol | CortexVol | Total Cortex Volume | Score Range: 1-560000 |
| lhCorticalWhiteMatterVol | LhCortWMVol | Left Hemisphere White Matter Volume | Score Range: 1-350000 |
| rhCorticalWhiteMatterVol | RhCortWMVol | Right Hemisphere White Matter Volume | Score Range: 1-350000 |

| | | | |
|---|---|---|---|
| CorticalWhiteMatterVol | CortWMVol | Total White Matter Volume | Score Range: 1-650000 |
| SubCortGrayVol | SubCortGMVol | Subcortical Gray Matter Volume | Score Range: 1-75000 |
| TotalGrayVol | TotalGMVol | Total Gray Matter Volume | Score Range: 1-750000 |
| SupraTentorialVol | SupraTentorialVol | SupraTentorial Volume | Score Range: 1-1200000 |
| SupraTentorialVolNotVent | SupraTentorialVolNotVent | SupraTentorial Volume | Score Range: 1-1200000 |
| SupraTentorialVolNotVentVox | SupraTentorialVolNotVentVox | SupraTentorial Volume | Score Range: 1-1200000 |
| MaskVol | MaskVol | Mask Volume | Score Range: 1-2100000 |
| BrainSegVol-to-eTIV | BrainSegVolToeTIV | BrainSeg Volume | Score Range: 0.1-2 |
| MaskVol-to-eTIV | MaskVolToeTIV | Mask Volume | Score Range: 0.1-2 |
| lhSurfaceHoles | LhSurfaceHolesVol | Left Hemisphere Surface Hole Volume | Score Range: 1-300 |
| rhSurfaceHoles | RhSurfaceHolesVol | Right Hemisphere Surface Hole Volume | Score Range: 1-300 |
| SurfaceHoles | SurfaceHolesVol | Total Surface Hole Volume | Score Range: 1-300 |

# Amyloid, Tau, and Genotyping

The Dallas Lifespan Brain Study

# Using the Amyloid and Tau data

The amyloid and tau data include all task information, data coding, and data spreadsheets for each of the amyloid and tau constructs in the Dallas Lifespan Brain Study.

The amyloid and tau data in the KTTK is organized by 3 constructs which includes Amyloid, Tau, and Genotyping (APOE, BDNF, COMT, DRD2).

To access any of the construct, select the construct of interest. The key to the names and data structure used for data coding of each construct spreadsheet is also included in this document and can be accessed by selecting "Data Coding sheet" included under each construct listed below. Finally, the spreadsheet for each construct can be found listed below and accessed by selecting "Spreadsheet of data" listed under each construct.

**Amyloid**
- PET Processing Data Description
- Data Coding Sheet

**Tau**
- PET Processing Data Description
- Data Coding Sheet

**Genotyping**
- Data Description
- Data Coding Sheet

# PET-Amyloid

***Table of Contents***

Sample Sizes by Epoch and Task

Section 1: Brief Descriptions of PET Data Processing

Section 2: Access to PET Summary Data

## *Sample Sizes by Epoch and Assessment*

| Assessment | Epoch 1 | Epoch 2 | Epoch 3 |
|---|---|---|---|
| **PET-Amyloid** | 295 | 180[b] | 76[a] |

[a]Note: Sample size includes 4 participants who only have Epoch 1 and 3 PET-amyloid data, and 73 who have complete Epoch 1-3 PET-amyloid data.
[b]Note: Eight participants did not have a Epoch 2 MRI, so their PET data were registered to their Epoch 1 MRI. They all had an MRI-PET interval over 3 years (see MRItoAmyloid variable).

## *PET Data Processing Description*

The Dallas Lifespan Brain Study (DLBS) began in 2008 and utilized new in vivo imaging techniques indicative of AD pathology to determine the development process of aging and cognition. One such method scanned for beta-amyloid using the radioligand $^{18}$F-AV-45, also known as florbetapir. The corresponding data set includes SUVRs for eight key regions that were averaged to form a global SUVR value and PET counts for a wide range of Freesurfer regions. The eight regions included: anterior cingulate, posterior cingulate, lateral prefrontal, orbitofrontal, precuneus, lateral parietal, lateral occipital, and lateral temporal cortices.

PET processing: First, PET runs were registered to the first run in the PET sequence to provide motion correction. Second, for each subject with at least two Epochs of data, a mean anatomical template was created using Freesurfer 5.3's *mri_robust_template* procedure. For subjects with only one Epoch of data, their original T1 was used. Third, the PET data and Freesurfer parcellations described above were registered to this mean template (or T1) and the relevant PET counts were extracted. Finally, SUVRs were formed using a whole-cerebellum reference.

Freesurfer processing: For all three Epochs of DLBS data collection, MRI scans were processed cross-sectionally through Freesurfer ver. 5.3 (Martinos Center for Biomedical Imaging, MA, USA) with regional parcellations based on the Desikan-Killiany atlas (Desikan et al., 2006). Extensively trained operators inspected the reconstructed white and grey matter surfaces and performed manual edits when necessary. Left and right hemisphere parcellations were combined to form bilateral volume of interest masks for the amyloid data.

## Amyloid-PET Data Set: Key to Names and Data Structure in Data Set

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Construct Name | ConstructName | Amyloid | |
| Construct Number | ConstructNumber | Construct 17 | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1=Epoch 1<br>2=Epoch 2<br>3=Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch; 2 = No, did not return for Epoch | |
| Number of Scores in Construct | NumScores | How many scores are available | 59 |
| Amyloid PET | Amyloid | 1 = Has data<br>2 = Task data partial<br>3 =No task data | |
| Interval from MRI to Amyloid scan | MRItoAmyloid | Interval, in years, between MRI and amyloid scan | Score Range: 0-4.5 |
| Caudal anterior cingulate count | CaudalAnteriorCingulateCount | Tracer count for region | Score Range: 1000-50,000 |
| Caudal middle frontal count | CaudalMiddleFrontalCount | Tracer count for region | Score Range: 1000-50,000 |
| Cerebellum cortex count | CerebellumCortexCount | Tracer count for region | Score Range: 1000-50,000 |
| Cerebellum white matter count | CerebellumWhiteMatterCount | Tracer count for region | Score Range: 1000-50,000 |
| Cerebral white matter count | CerebralWhiteMatterCount | Tracer count for region | Score Range: 1000-50,000 |
| Cuneus count | CuneusCount | Tracer count for region | Score Range: 1000-50,000 |
| Entorhinal count | EntorhinalCount | Tracer count for region | Score Range: 1000-50,000 |
| Frontal pole count | FrontalPoleCount | Tracer count for region | Score Range: 1000-50,000 |
| Fusiform count | FusiformCount | Tracer count for region | Score Range: 1000-50,000 |
| Hippocampus count | HippocampusCount | Tracer count for region | Score Range: 1000-50,000 |
| Inferior parietal count | InferiorParietalCount | Tracer count for region | Score Range: 1000-50,000 |
| Inferior temporal count | InferiorTemporalCount | Tracer count for region | Score Range: 1000-50,000 |
| Insula count | InsulaCount | Tracer count for region | Score Range: 1000-50,000 |
| Isthmus cingulate count | IsthmusCingulateCount | Tracer count for region | Score Range: 1000-50,000 |
| Lateral occipital count | LateralOccipitalCount | Tracer count for region | Score Range: 1000-50,000 |

| | | | |
|---|---|---|---|
| Lateral orbitofrontal count | LateralOrbitofrontalCount | Tracer count for region | Score Range: 1000-50,000 |
| Lingual count | LingualCount | Tracer count for region | Score Range: 1000-50,000 |
| Medial orbitofrontal count | MedialOrbitofrontalCount | Tracer count for region | Score Range: 1000-50,000 |
| Middle temporal count | MiddleTemporalCount | Tracer count for region | Score Range: 1000-50,000 |
| Negative Mask | NEGMask | Tracer count for precentral, postcentral, and pericalcarine | Score Range: 1000-50,000 |
| Paracentral count | ParacentralCount | Tracer count for region | Score Range: 1000-50,000 |
| Parahippocampal count | ParahippocampalCount | Tracer count for region | Score Range: 1000-50,000 |
| Pars opercularis count | ParsOpercularisCount | Tracer count for region | Score Range: 1000-50,000 |
| Pars orbitalis count | ParsOrbitalisCount | Tracer count for region | Score Range: 1000-50,000 |
| Pars triangularis count | ParsTriangularisCount | Tracer count for region | Score Range: 1000-50,000 |
| Pericalcarine count | PericalcarineCount | Tracer count for region | Score Range: 1000-50,000 |
| Postcentral count | PostcentralCount | Tracer count for region | Score Range: 1000-50,000 |
| Posterior cingulate count | PosteriorCingulateCount | Tracer count for region | Score Range: 1000-50,000 |
| Precentral count | PrecentralCount | Tracer count for region | Score Range: 1000-50,000 |
| Precuneus count | PrecuneusCount | Tracer count for region | Score Range: 1000-50,000 |
| Cerebellum and cerebral white matter count | CerebellumCerebralWMCount | Tracer count for whole cerebellum and cerebral white matter | Score Range: 1000-50,000 |
| Rostral anterior cingulate count | RostralAnteriorCingulateCount | Tracer count for region | Score Range: 1000-50,000 |
| Rostral middle frontal count | RostralMiddleFrontalCount | Tracer count for region | Score Range: 1000-50,000 |
| Superior frontal count | SuperiorFrontalCount | Tracer count for region | Score Range: 1000-50,000 |
| Superior parietal count | SuperiorParietalCount | Tracer count for region | Score Range: 1000-50,000 |
| Superior temporal count | SuperiorTemporalCount | Tracer count for region | Score Range: 1000-50,000 |
| Supramarginal count | SupramarginalCount | Tracer count for region | Score Range: 1000-50,000 |
| Temporal pole count | TemporalPoleCount | Tracer count for region | Score Range: 1000-50,000 |
| Transverse temporal count | TransverseTemporalCount | Tracer count for region | Score Range: 1000-50,000 |
| Combined anterior cingulate VOI count | VOIAnteriorCingulateCount | Count for VOI | Score Range: 1000-50,000 |

| | | | |
|---|---|---|---|
| Combined cerebellum VOI count | VOICerebellumCount | Count for VOI | Score Range: 1000-50,000 |
| Combined dorsolateral prefrontal VOI count | VOIDorsolateralPrefrontalCount | Count for VOI | Score Range: 1000-50,000 |
| Combined inferior frontal VOI count | VOIInferiorFrontalCount | Count for VOI | Score Range: 1000-50,000 |
| Combined inferior parietal supramarginal VOI count | VOIInferiorParietalSupramarginalCount | Count for VOI | Score Range: 1000-50,000 |
| Combined lateral parietal VOI count | VOILateralParietalCount | Count for VOI | Score Range: 1000-50,000 |
| Combined lateral temporal VOI count | VOILateralTemporalCount | Count for VOI | Score Range: 1000-50,000 |
| Combined middle frontal VOI count | VOIMiddleFrontalCount | Count for VOI | Score Range: 1000-50,000 |
| Combined orbitofrontal VOI count | VOIOrbitofrontalCount | Count for VOI | Score Range: 1000-50,000 |
| Combined posterior cingulate isthmus VOI count | VOIPosteriorCingulateIsthmusCount | Count for VOI | Score Range: 1000-50,000 |
| Anterior cingulate SUVR | VOIAnteriorCingulateSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.6-2.1 |
| Dorsolateral prefrontal SUVR | VOIDorsolateralPrefrontalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.6-2.1 |
| Lateral parietal SUVR | VOILateralParietalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.6-2.1 |
| Lateral temporal SUVR | VOILateralTemporalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.6-2.1 |
| Orbitofrontal SUVR | VOIOrbitofrontalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.6-2.1 |
| Posterior cingulate isthmus SUVR | VOIPosteriorCingulateIsthmusSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.6-2.1 |
| Lateral occipital SUVR | LateralOccipitalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.6-2.1 |
| Precuneus SUVR | PrecuneusSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.6-2.1 |
| Global SUVR | GlobalSUVR | Average SUVR across the eight regions described above | Score Range: 0.6-2.1 |

# PET-Tau

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Sample Sizes By Epoch and Task

Section 1: Brief Descriptions of PET Data Processing

Section 2: Access to PET Summary Data

## *Sample Sizes by Epoch and Assessment*

| Assessment | Epoch 2 | Epoch 3 |
|---|---|---|
| **PET-Tau** | 60 | 124[a] |

[a]Note: Three participants did not have a Epoch 3 MRI, so their PET data were registered to their Epoch 2 MRI. These all had an MRI-PET interval over 5 years (see MRItoTau variable).

## *PET Data Processing Description*

The Dallas Lifespan Brain Study (DLBS) began in 2008 and utilized new in vivo imaging techniques indicative of AD pathology to determine the development process of aging and cognition. One such method scanned for tau using the radioligand $^{18}$F-AV-1451, also known as flortaucipir. The corresponding data set includes standardized uptake ratios (SUVRs) for a temporal meta region presented by Jack et al., 2018, which includes inferior temporal, middle temporal, entorhinal, parahippocampus, fusiform, and amygdala. This region was selected due to its sensitivity in detecting tau accumulation in otherwise healthy aging.

The data set also includes tau SUVRs for the eight regions that we previously used to assess global cortical amyloid (see Construct 17: PET-Amyloid), as well as PET counts for a wide range of Freesurfer regions. We caution against examining tau in these eight cortical amyloid regions except to compare with deposition of amyloid, as tau does not typically accumulate across the cortex in this widespread manner in cognitively normal participants. The eight global SUVR regions were: anterior cingulate, posterior cingulate, lateral prefrontal, orbitofrontal, precuneus, lateral parietal, lateral occipital, and lateral temporal cortices.

PET processing: First, PET runs were registered to the first run in the PET sequence to provide motion correction. Second, their PET data and Freesurfer parcellations described above were registered to their most recent MRI scan and the relevant PET counts were extracted. Finally, SUVRs were formed using a whole-cerebellum reference. We note that COVID-19-related research delays resulted in a larger interval between MRI and PET scan for Epoch 3 (see MRItoTau variable). Additionally, PET data were processed cross-sectionally because different PET scanners were used for Epoch 2 and Epoch 3 data.

Freesurfer processing: For all three Epochs of DLBS data collection, MRI scans were processed cross-sectionally through Freesurfer ver. 5.3 (Martinos Center for Biomedical Imaging, MA, USA) with regional parcellations based on the Desikan-Killiany atlas (Desikan et al., 2006). Extensively trained operators inspected the reconstructed white and grey matter surfaces and performed manual edits when necessary. Left and right hemisphere parcellations were combined to form bilateral volume of interest masks for the tau data.

**Reference**

Jack, C. R., Wiste, H. J., Schwarz, C. G., Lowe, V. J., Senjem, M. L., Vemuri, P., . . .Petersen, R. C. (2018). Longitudinal tau PET in ageing and Alzheimer's disease. *Brain, 141,* 1517-1528. https://doi.org/10.1093/brain/awy059

**Tau-PET Data Set: Key to Names and Data Structure in Data Set**

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Construct Name | ConstructName | Tau | |
| Construct Number | ConstructNumber | Construct 18 | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1=Epoch 1<br>2=Epoch 2<br>3=Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch; 2 = No, did not return for Epoch | |
| Number of Scores in Construct | NumScores | How many scores are available | 69 |
| Tau PET | Tau | 1 = Has data<br>2 = Data partial<br>3 =No task data | |
| Interval from MRI to Tau scan | MRItoTau | Interval, in years, between MRI and tau scan | Score Range: –0.02 to 6.7 |
| Amygdala count | AmygdalaCount | Tracer count for region | Score Range: 1,000-20,000 |
| Caudal anterior cingulate count | CaudalAnteriorCingulateCount | Tracer count for region | Score Range: 1,000-20,000 |
| Caudal middle frontal count | CaudalMiddleFrontalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Cerebellum cortex count | CerebellumCortexCount | Tracer count for region | Score Range: 1,000-20,000 |
| Cerebellum white matter count | CerebellumWhiteMatterCount | Tracer count for region | Score Range: 1,000-20,000 |
| Cerebral white matter count | CerebralWhiteMatterCount | Tracer count for region | Score Range: 1,000-20,000 |
| Cuneus count | CuneusCount | Tracer count for region | Score Range: 1,000-20,000 |

| | | | |
|---|---|---|---|
| Entorhinal count | EntorhinalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Frontal pole count | FrontalPoleCount | Tracer count for region | Score Range: 1,000-20,000 |
| Fusiform count | FusiformCount | Tracer count for region | Score Range: 1,000-20,000 |
| Hippocampus count | HippocampusCount | Tracer count for region | Score Range: 1,000-20,000 |
| Inferior parietal count | InferiorParietalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Inferior temporal count | InferiorTemporalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Insula count | InsulaCount | Tracer count for region | Score Range: 1,000-20,000 |
| Isthmus cingulate count | IsthmusCingulateCount | Tracer count for region | Score Range: 1,000-20,000 |
| Lateral occipital count | LateralOccipitalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Lateral orbitofrontal count | LateralOrbitofrontalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Lingual count | LingualCount | Tracer count for region | Score Range: 1,000-20,000 |
| Medial orbitofrontal count | MedialOrbitofrontalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Middle temporal count | MiddleTemporalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Negative Mask | NEGMask | Tracer count for precentral, postcentral, and pericalcarine | Score Range: 1,000-20,000 |
| Paracentral count | ParacentralCount | Tracer count for region | Score Range: 1,000-20,000 |
| Parahippocampal count | ParahippocampalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Pars opercularis count | ParsOpercularisCount | Tracer count for region | Score Range: 1,000-20,000 |
| Pars orbitalis count | ParsOrbitalisCount | Tracer count for region | Score Range: 1,000-20,000 |
| Pars triangularis count | ParsTriangularisCount | Tracer count for region | Score Range: 1,000-20,000 |
| Pericalcarine count | PericalcarineCount | Tracer count for region | Score Range: 1,000-20,000 |
| Postcentral count | PostcentralCount | Tracer count for region | Score Range: 1,000-20,000 |
| Posterior cingulate count | PosteriorCingulateCount | Tracer count for region | Score Range: 1,000-20,000 |
| Precentral count | PrecentralCount | Tracer count for region | Score Range: 1,000-20,000 |
| Precuneus count | PrecuneusCount | Tracer count for region | Score Range: 1,000-20,000 |
| Cerebellum and cerebral white matter count | CerebellumCerebralWMCount | Tracer count for whole cerebellum and cerebral white matter | Score Range: 1,000-20,000 |

| | | | |
|---|---|---|---|
| Rostral anterior cingulate count | RostralAnteriorCingulateCount | Tracer count for region | Score Range: 1,000-20,000 |
| Rostral middle frontal count | RostralMiddleFrontalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Superior frontal count | SuperiorFrontalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Superior parietal count | SuperiorParietalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Superior temporal count | SuperiorTemporalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Supramarginal count | SupramarginalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Temporal pole count | TemporalPoleCount | Tracer count for region | Score Range: 1,000-20,000 |
| Transverse temporal count | TransverseTemporalCount | Tracer count for region | Score Range: 1,000-20,000 |
| Combined anterior cingulate VOI count | VOIAnteriorCingulateCount | Count for VOI | Score Range: 1,000-20,000 |
| Combined cerebellum VOI count | VOICerebellumCount | Count for VOI | Score Range: 1,000-20,000 |
| Combined dorsolateral prefrontal VOI count | VOIDorsolateralPrefrontalCount | Count for VOI | Score Range: 1,000-20,000 |
| Combined inferior frontal VOI count | VOIInferiorFrontalCount | Count for VOI | Score Range: 1,000-20,000 |
| Combined inferior parietal supramarginal VOI count | VOIInferiorParietalSupramarginalCount | Count for VOI | Score Range: 1,000-20,000 |
| Combined lateral parietal VOI count | VOILateralParietalCount | Count for VOI | Score Range: 1,000-20,000 |
| Combined lateral temporal VOI count | VOILateralTemporalCount | Count for VOI | Score Range: 1,000-20,000 |
| Combined middle frontal VOI count | VOIMiddleFrontalCount | Count for VOI | Score Range: 1,000-20,000 |
| Combined orbitofrontal VOI count | VOIOrbitofrontalCount | Count for VOI | Score Range: 1,000-20,000 |
| Combined posterior cingulate isthmus VOI count | VOIPosteriorCingulateIsthmusCount | Count for VOI | Score Range: 1,000-20,000 |
| Anterior cingulate SUVR | VOIAnteriorCingulateSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Dorsolateral prefrontal SUVR | VOIDorsolateralPrefrontalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Lateral parietal SUVR | VOILateralParietalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Lateral temporal SUVR | VOILateralTemporalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Orbitofrontal SUVR | VOIOrbitofrontalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Posterior cingulate isthmus SUVR | VOIPosteriorCingulateIsthmusSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Lateral occipital SUVR | LateralOccipitalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Precuneus SUVR | PrecuneusSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |

| | | | |
|---|---|---|---|
| Global SUVR | GlobalSUVR | Average SUVR across the eight regions described above | Score Range: 0.7-2.2 |
| Inferior temporal SUVR | InferiorTemporalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Middle temporal SUVR | MiddleTemporalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Superior temporal SUVR | SuperiorTemporalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Entorhinal SUVR | EntorhinalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Parahippocampus SUVR | ParahippocampalSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Fusiform SUVR | FusiformSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Hippocampus SUVR | HippocampusSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Amygdala SUVR | AmygdalaSUVR | Count for VOI / VOICerebellumCount | Score Range: 0.7-2.2 |
| Temporal meta region SUVR | TemporalMetaSUVR | Average SUVR across the six regions described above | Score Range: 0.7-2.2 |

# Genotyping

***Table of Contents***

Sample Sizes By Epoch and Task

Section 1: Brief Descriptions of Blood Sample Collection and Inventory, and DNA Isolation and Genotyping

Section 2: Access to Genotyping Summary Data

## *Sample Sizes by Epoch and Assessment*

| Assessment | Epoch 1 | Epoch 2 | Epoch 3 |
|---|---|---|---|
| **Genotyping** | 419 | 0 | 0 |

## *Blood Sample Collection and Inventory*

Genetics samples were collected via blood for those participants completing PET scanning and via buccal swab (through the mail or in-person) for those participants unable to have a blood draw. All details below were given by Dr. Ramon Diaz-Arrastia during his time at UTSW:

All samples will be drawn in tubes with appropriate barcode labeling for accurate identification and tracking according to the protocols below. In order to ensure secure, accurate tracking of all samples once they arrive at UT-Southwestern, we will use the Freezerworks Version 5 software program from Dataworks Development, Inc. This product integrates both the vial labeling and storage tasks into one program and streamlines data transfer by exchanging data with other programs electronically while ensuring data integrity. The Freezerworks 5.0 program meets regulatory requirements, including 21 CFR Part 11, with a robust audit trail and 45 CFR Part 164 standards for safeguarding of electronic protected health information including administrative and technical safeguards. Freezerworks version 5 contains a basic user identification system to assign three levels of data access: system administrator, data entry, and view only with unique User Name and Password login security maintained by the system administrator to determine the appropriate security level. Further control of unwarranted access to data is provided by encrypting stored information within the database using proprietary methods of the database engine. All necessary training for all study personnel will be provided. Upon receipt, all samples will be scanned by a barcode reader to confirm receipt and to facilitate subsequent storage and tracking. Each site will have appropriate access to the database to maintain consistency and accuracy of the information on samples from their site and to facilitate tracking. A total of 10 mL of whole blood will be collected from each participant using a Vacutainer phlebotomy system: 5 mL in a serum separator tube (tiger top) and 5 mL in an EDTA-containing tube (purple top). Blood will be centrifuged at (2500 rpm x 10 minutes) within 10 minutes of collection, and serum

(from the tiger top) tube distributed into five 0.5 mL aliquots. Plasma (from the purple top tube) will be distributed into another five 0.5 mL aliquot. Remaining blood cells from the purple top tube are distributed into two 1 mL aliquots. All aliquots are frozen within 30 minutes of collection at -80ºC. Vials containing each aliquot are labeled with barcodes generated by the Freezerworks v. 5 software package. Unused DNA and biological fluids (serum and DNA) will be stored at -80ºC the UT Southwestern Alzheimer's Disease Center. These samples will be available for future scientifically meritorious studies.

Note: Samples are now stored at the Center for Vital Longevity.

## ***DNA Isolation and Genotyping***

Data are available for APOE, BDNF, COMT, and DRD2. All details below were given by Dr. Ramon Diaz-Arrastia during his time at UTSW:

Venous blood samples will be collected into EDTA-anti-coagulated tubes and genomic DNA was isolated by standard protocols [1]. We routinely obtain 50 – 70 g of DNA from 2 mL of whole blood. Fragments containing each of the polymorphisms were amplified from genomic DNA by polymerase chain reaction (PCR) using Taq DNA polymerase (Roche Diagnostics; Indianapolis, IN) and a thermal profile, reaction conditions and primer sequences optimized for each polymorphism. All amplifications were carried out in an ABI 7900HT thermal cycler (Applied Biosystems, Inc; Foster City, CA). Genotypes were determined by a number of methods, depending upon the nature of the polymorphism. For single nucleotide polymorphisms (SNPs; ApoE, BDNF, COMT, DRD2) genotypes were determined by real-time PCR using TaqMan probes unique for each SNP (Applied Biosystems, Inc; Foster City, CA)(Table 1).

Genomic DNA was extracted from cheek swabs using Qiagen DNA Blood kits (#51162; Qiagen Inc., Valencia, CA, USA). To identify the six APOE genotypes comprising the APOE *E2, *E3 and *E4 alleles, two single nucleotide polymorphisms (SNPs) were assayed using the TaqMan method [Applied Biosystems Inc. (ABI), Foster City, CA, USA]. SNP-specific primers and probes were designed by ABI (TaqMan genotyping assays) and assays were performed according to the manufacturer's instructions in 5 µl total volumes in 384-well plates. The polymorphisms distinguish the *E2 allele from the *E3 and *E4 alleles at amino acid position 158 (NCBI rs7412) and the *E4 allele from the *E2 and *E3 alleles at amino acid position 112 (NCBI rs429358).

**Table 1**

| SNP | Assay ID |
|---|---|
| ApoE 112 | C___3084793_20 |
| ApoE 158 | C____904973_10 |
| BDNF | C__11592758_10 |
| COMT | C__25746809_50 |
| DDRD2 | C___7486676_10 |

[1]Miller SA, Dykes DD, Polesky HF: A simple salting out procedure for extracting DNA from human nucleated cells. Nucleic Acids Res 16:1215, 1988

## Genotyping Data Set: Key to Names and Data Structure in Data Set

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Construct Name | ConstructName | Genotyping | |
| Construct Number | ConstructNumber | Construct 19 | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1=Epoch 1<br>2=Epoch 2<br>3=Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch; 2 = No, did not return for Epoch | |
| Number of Scores in Construct | NumScores | How many scores are available | 11 |
| Position 112 polymorphism | APOE112 | Polymorphisms distinguishing E2-E4 alleles at amino acid position 112 (NCBI rs429358) | CC to TT |
| Position 158 polymorphism | APOE158 | Polymorphisms distinguishing E2-E4 alleles at amino acid position 158 (NCBI rs7412) | CC to TT |
| APOE Genotype | APOEGenotype | Specific APOE allele combination | e2/e2 to e4/e4 |
| E4 Allele Carrier Status | E4CarrierStatus | Whether they had at least one e4 allele | 1=yes<br>0=no |
| Total APOE4 Alleles | TotalE4Alleles | Total e4 alleles carried | Score Range: 0-2 |
| BDNF Polymorphism | BDNF | BDNF polymorphism | AA, GA, GG |
| BDNF Genotype | BDNFGenotype | BDNF genotype | Val/Val, Met/Met, Val/Met |
| COMT Polymorphism | COMT | COMT polymorphism | AA, GA, GG |
| COMT Genotype | COMTGenotype | COMT genotype | Val/Val, Met/Met, Val/Met |
| DRD2 Polymorphism | DRD2 | DRD2 polymorphism | AA, GA, GG |
| DRD2 Genotype | DRD2Genotype | DRD2 genotype | Al1/Al1, Al2/Al2, Al1/Al2 |

# Functional MRI Data

The Dallas Lifespan Brain Study

# Using the Functional MRI Data

Three in-scanner cognitive tasks were administered to participants during fMRI acquisition at each epoch of data collection. These three tasks – the Subsequent Memory Task, Semantic Judgement Task, and Face/Place Passive Viewing Task – are described below, and are additionally detailed in primary publications cited in each task's respective description. In addition to these three cognitive tasks, all participants also contributed resting state data during each epoch, and also had the opportunity to undergo hypercapnia manipulation at their option to assess cerebrovascular reactivity at each epoch. We note that the subsequent memory tasks was designed to focus on hippocampal and frontal regions; the semantic judgement task focused on frontal parietal regions, and the passive viewing category task was directed primarily towards mental/visual areas.

We provide only raw scans for all of the fMRI tasks described in this section (in the 'func' directory in the OpenNeuro repository, as described in the "How to access these data" section at the beginning of this document).

## *fMRI Subsequnt Memory Task*

**Description:** This task was designed to assess how fMRI BOLD signal during the incidental encoding of images relates to performance in a subsequent recognition test. Using an incidental encoding paradigm, participants were presented with outdoor landscape scenes and had to determine whether there was water present in each scene by pressing a yes or no button. The task consisted of three runs with a random ordering of 96 outdoor scenes (32 scenes per run) presented in an event-related design. Each image was presented for 3s, and intertrial intervals (ITIs) were jittered between 4 and 14 seconds. The total scan time was 20 minutes. Responses were recorded using a fiber-optic button box held in the right hand.

Visual stimuli were presented using E-prime software (Psychology Software Tools, Pittsburgh, PA, USA), projected through the back of the scanner and viewed though a mirror attached to the head coil. Approximately twenty minutes after the encoding trial, an off-line recognition task was administered outside the scanner. A total of 192 pictures were presented, consisting of 96 previously encountered target scenes and 96 closely matched lure scenes. Participants were instructed to make one of three judgements: 1. "high confidence remember" to indicate confident recognition of the exact picture ; 2) "low confidence remember" to indicate recognition with low confidence; 3. "new item" to indicate that the picture was not previously presented. The recognition task allowed participants to respond at their own pace with a maximum response time of 4 seconds for each trial.

**Primary Reference (Subsequent Memory Task)**:

Gutchess, A.H., & Park, D.C. (2009). Effects of aging on associative memory for related and unrelated pictures. *European Journal of Cognitive Psychology, 21,* 235-254.

Kennedy, K.M; Rodrigue, K.M.; Bischof, G.M; Hebrank, A.C.; Reuter-Lorenz, P.A.; Park, D.C. (2015). Age trajectories of functional activation under conditions of low and high processing demands: An adult lifespan fMRI study of the aging brain. *Neuroimage, 104,* 21-34.

## *fMRI Semantic Judgement Task*

**Description:** This block-design fMRI task was designed to investigate patterns of fMRI BOLD signal during semantic judgements with varying levels of difficulty and ambiguity. The experiment consisted of 8 blocks of easy (non-ambiguous) items and 8 blocks of hard (ambiguous) items, with 8 words per block, drawn from a word bank including 64 ambiguous and 64 non-ambiguous words, respectively. Examples of easy (non-ambiguous) words included "walrus", "truck", "asphalt". Examples of hard (ambiguous) words included "speaker", "virus", and "sponge". Upon viewing each word, participants made a living or non-living semantic judgment by pressing a button with their right index for "yes" (living) or middle finger for "no" (not living). The easy and hard blocks were presented in a pseudo-randomized order, and the words were randomly distributed among the easy and hard condition blocks.

Visual stimuli were presented using E-prime software (Psychology Software Tools, Pittsburgh, PA, USA) projected through the back of the scanner and viewed through a mirror attached to the head coil. During each stimulus presentation, the semantic decision response time was recorded. Each word was displayed for 2500 ms followed by a 500 ms fixation period (crosshair). Additionally, three 24-second fixation blocks were included as a baseline for the scan session. The total scan time was 7.7 min, including a 6-second fixation interval before the first stimulus block. Responses were recorded using a fiber-optic button box held in the right hand.

*Note:* Subject-specific stimulus onset files for the words task were found to be inaccurate. Therefore, a study-wide stimulus onset asynchrony file is provided in this project's root directory (task-Words_run-1_events.tsv).

**Primary References (Semantic Judgement Task):**

Kennedy, K.M; Rodrigue, K.M.; Bischof, G.M; Hebrank, A.C.; Reuter-Lorenz, P.A.; Park, D.C. (2015). Age trajectories of functional activation under conditions of low and high processing demands: An adult lifespan fMRI study of the aging brain. *Neuroimage, 104,* 21-34.

Chen, X., Farrell, M. E., Rundle, M. M., Chan, M. Y., Moore, W., Wig, G. S., & Park, D. C. (2021). The relationship of functional hippocampal activity, amyloid deposition, and longitudinal memory decline to memory complaints in cognitively healthy older adults. *Neurobiology of Aging, 105,* 318–326.

## *fMRI Face/Place Passive Viewing Task ('vv')*

**Description:** This task was designed to assess age-related changes in dedifferentiation, including the neural selectivity to various visual stimuli. Participants viewed images from seven categories: human faces, primate faces, domestic cat faces, wild cat faces, houses, chairs, and phase-scrambled control stimuli. Each category consisted of 64 gray-scale photographs (400 pixels wide x 300 pixels tall), except for domestic and wild cat faces, which had 32 photographs each. The images of human faces were sourced from the face library of Minear and Park[69], and included individuals of different ages, races, and genders. Animal photographs (primate, domestic and wild cats) were obtained from the internet and cropped to ensure clear visibility of the animal's face. Similar to human faces, only animal images with front-facing views and neutral expressions were selected. Houses were photographed from various locations across the United States, and photographs of chairs were sourced from furniture websites. To create control

stimuli, phase-scrambled images were generated by scrambling the phase information in all the experimental stimuli. This process preserved the spatial frequency information while rendering the visual content meaningless.

The images were presented in 16-second blocks, with each image displayed for 2 seconds. A total of 8 blocks were presented for each category, distributed across two separate runs with four blocks per run. The order of the blocks was randomized for each participant to minimize potential order effects. The stimuli were presented using E-prime software (Psychology Software Tools) and displayed through a back-projection system.

**Primary Reference (Face/Place Passive Viewing Task):**

Park, D. C., Polk, T. A., Park, R., Minear, M., Savage, A., & Smith, M. R. (2004). Aging reduces neural specialization in ventral visual cortex. *Proceedings of the National Academy of Sciences of the United States of America*, *101*(35), 13091–13095.

## ***fMRI Resting State***

**Description:** In each epoch, participants completed awake resting-state scans, which were meant to allow extraction of "intrinsic" patterns of functional connectivity. During this time participants were instructed to relax while fixating on a black crosshair against a white background. At the end of the run, the experimenter verified that participants complied with the instructions and did not fall asleep during the functional scan via verbal confirmation. One run of 154 BOLD acquisition was collected in Epoch 1. Two runs of resting-state data were collected in Epochs 2 and 3. The duration of the run was increased from 154 BOLD volumes to 180 volumes part-way through Epoch 2.

**Primary Reference (Resting State**

Chan, M. Y., Park, D. C., Savalia, N. K., Petersen, S. E., & Wig, G. S. (2014). Decreased segregation of brain systems across the healthy adult lifespan. *PNAS Proceedings of the National Academy of Sciences of the United States of America, 111(46),* E4997–E5006.

## ***fMRI Hypercapnia***

**Description**. Cerebrovascular reactivity (CVR) was assessed at each epoch via a hypercapnia block-design model. Participants inhaled a 5% $CO_2$ gas mixture (5% $CO_2$, 74% $N_2$, and 21% $O_2$) while BOLD MR images were simultaneously captured. During the CVR scan, participants wore a nose clip and alternated between breathing room air and the prepared gas (60 seconds $CO_2$, followed by 60 seconds of room air, repeated three times) through a mouthpiece. Additionally, the concentration of $CO_2$ in the lungs (end-tidal $CO_2$ or EtCO2), which closely reflects arterial $CO_2$ levels, was recorded throughout the breathing task using a capnograph. The total duration of the CVR scan was 7 minutes.

**Primary Reference (Hypercapnia)**

Lu, H., Xu, F., Rodrigue, K. M., Kennedy, K. M., Chen, Y., Flicker, B., Hebran, A. C., Uh, J., & Park, D. C. (2011). Alterations in cerebral metabolic rate and blood supply across the adult lifespan. *Cerebral Cortex, 21(6),* 1426–1434.

# Health & Psychosocial Data

The Dallas Lifespan Brain Study

# Using the Health and Psychosocial data

The health and psychosocial data include all task information, data coding, and data spreadsheets for each of the health and psychosocial constructs in the Dallas Lifespan Brain Study.

The health and psychosocial data in the KTTK is organized by 3 constructs which includes Physical Health, Mental Health and AD screening, and Psychosocial.

Each of the 3 constructs has various tasks associated with it and there are a total of 20 tasks that can be found listed below. To access any of the tasks within each construct, select the task of interest. The key to the names and data structure used for data coding of each construct spreadsheet is also included in this document and can be accessed by selecting "Data Coding sheet" included under each construct listed below. Finally, the spreadsheet for each construct can be found listed below and accessed by selecting "Spreadsheet of data" listed under each construct.

**8 Physical Health**
- Task 8.32: Fitness Survey
- Task 8.33: Sf-36
- Task 8.34: Blood Pressure
- Task 8.35: NIH Toolbox Motor Assessment
- Data Coding Sheet

**9 Mental Health and AD Screening**
- Task 9.36: Geriatric Depression Scale
- Task 9.37: Center for Epidemiological Studies-Depression (CESD)
- Task 9.38: Alzheimer's Disease Assessment Scale—Cognitive Subscale (ADAS-Cog)
- Mental Health and AD Screening Data Set: Key to Names and Data Structure in Data Set
- Mental Health and AD Screening Data Set: Key to Additional Raw Data Available
- Mental Health and AD Screening Data Set: Instruments
- Data Coding Sheet

**10 Psychosocial**
- Task 10.39: Martin and Park Environmental Demands (MPED) Questionnaire
- Task 10.40: Daily Activities Questionnaire
- Task 10.41: Lifetime Cognitive Activities
- Task 10.42: Need for Cognition Survey (NFC)
- Task 10.43: Metamemory in Adulthood (MIA) Questionnaire
- Task 10.44: Self-Concept Clarity (SCC) Survey
- Task 10.45: Satisfaction with Life Scale
- Task 10.46: Revised Neuroticism-Extraversion-Openness Personality Inventory (NEO-PI-R)

Task 10.47: Big 5 Inventory
Task 10.48: Personality Survey
Task 10.49: NIH Toolbox Emotion Measures
Task 10.50: Scale of Positive and Negative Experience (SPANE)
Task 10.51: Psychological Well-being (SWQ)
Data Coding Sheet

# Construct 8: Physical Health

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***Sample Sizes by Epoch and Assessment (subjects with partial data in parentheses)***

| Assessment | Epoch 1 | Epoch 2 | Epoch 3 |
|---|---|---|---|
| **Fitness Survey** | 460 | 291 | 153 |
| **SF-36** | 460(7) | 289 | 142 |
| **Blood Pressure** | 454(43)[a] | 329(51)[a] | 213(4) |
| **NIH Toolbox Motor** | 0 | 301(301)[b] | 202(17)[b] |

Notes on data completeness:
[a]Blood Pressure: For Epoch 1, 43 participants are missing data for at least one blood pressure assessment, though these missing data are relatively evenly distributed across day and time of assessment. For Epoch 2, only 294 participants have blood pressure data for the end of day 1. Averaging blood pressure across all available assessments is recommended for greater reliability.
[b]NIH Toolbox Motor: For Epoch 2, scores for the non-dominant hand are unavailable, raw scores are only available for 201 participants for pegboard and 197 for grip strength, and fully-corrected scores are only available for 197 for pegboard. Age-corrected, percentile, and fully-corrected scores are unavailable for grip strength. For Epoch 3, pegboard and grip strength scores for the non-dominant hand, age-corrected, percentile, and fully corrected are only available for 186 participants. Use of the uncorrected standardized score of the dominant hand is recommended.

## *Task Descriptions*

### *Assessment 8.32: Fitness Survey*

**Description:** Participants were asked about their daily fitness activities. This questionnaire has 9 questions concerning the following: exercise, recreation, physical activities other than regular job duties, and daily activities including time spent at work. The first four items were used to develop a summary score, and these items assessed how many times per week the participant performed at least 20 minutes of strenuous exercise (heavy breathing/sweating), at least 30 minutes of non-strenuous exercise, performed muscle strengthening exercises, and how often they watched TV (reverse scored).

**Scoring:** A summary score, Fitness Total, is provided as an average of the first 4 survey items with the question regarding watching television reverse scored.

**Primary Reference:** Revised version based on the physical activities section of the Youth Risk Behavior Surveillance System (YRBSS) 1999.
https://www.cdc.gov/healthyyouth/data/yrbs/questionnaires.htm

Kann, L., Kinchen, S. A., Williams, B. I., Ross, J. G., Lowry, R., Grunbaum, J. A., & Kolbe, L. J. (2000). Youth risk behavior surveillance—United States, 1999. *Journal of School Health*, *70*(7), 271-285. https://doi.org/10.1111/j.1746-1561.2000.tb07252.x

*Please note this is a revised version of the YRBSS.*

## *Assessment 8.33: SF-36*

**Description:** Participants completed 36 questions to measure functional health and well-being. There are 8 health domain scales: Physical Functioning, Role Limitations due to Physical Problems, Bodily Pain, General Health, Vitality, Social Functioning, Role Limitations due to Emotional Problems, and Mental Health.

**Scoring:** This assessment produces scores from the 8 domains listed above each ranging from 0-100, with higher scores indicating better health. Norm-based scores for the 8 domains are also provided, using the means and standard deviations from the Medical Outcomes Study (N = 2471). Scores were computed manually using the procedure provided by the Rand Corporation.

**Primary Reference:**

Ware J, Kosinski M, Bjorner J, Turner-Bowker D, Gandek B, Maruish M. Development. User's Manual for the SF-36v2® Health Survey. Lincoln (RI): QualityMetric Incorporated; 2007.

**Scoring Procedure**: https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form/scoring.html

*Please note whenever researchers publish/report the outcomes for SF36, we must mention that "a modified version of the SF-36v2® was used."*

## *Assessment 8.34: Blood Pressure*

**Description:** Participant's blood pressure (systolic and diastolic) was taken twice at each of the two cognitive sessions, once at each MRI session, and twice at each PET session. The tester assessed the participant's blood pressure and ensured that it was within an expected range. If the participant's blood pressure was outside of the expected range, blood pressure protocol was followed to ensure the participant had access to EMS if needed. Blood pressure data from the two cognitive sessions are available in this data set.

**Primary Reference:** No official citation.

## *Assessment 8.35: NIH Toolbox Motor Assessment*

**Description:** Participants completed two tasks to assess their motor skills, the 9-Hole Pegboard Dexterity task and the Grip Strength Task. For the 9-Hole Pegboard Dexterity Task, participants were timed while they used one hand to place pegs in a pegboard one at a time and then removed those same pegs one at a time. First, their dominant hand was tested and then their non-dominant hand was tested. For the Grip Strength Task, participants were asked to squeeze a dynamometer as hard as they could for three seconds. Their grip strength (in lbs.) was recorded for the left and right hand.

**Scoring:** The pegboard and grip strength tasks include a raw score for both hands—seconds to complete task or pounds of pressure, respectively—as well as scores standardized to the NIH Toolbox nationally-representative normative sample. The standardized scores include an

uncorrected score, percentile range, age-corrected score, and a score that is corrected for age, sex, education, and race/ethnicity ("fully-corrected").

**Primary Reference:**

Gershon, R. C., Wagster, M. V., Hendrie, H. C., Fox, N. A., Cook, K. F., Nowinsky, C. J. (2013). NIH Toolbox for assessment of neurological and behavioral function. *Neurology*, *80*(11), S1-S92. https://doi.org/10.1212/WNL.0b013e3182872e5f

**Software Reference:** NIH Toolbox for the iPad test ver. 2.1.
https://nihtoolbox.force.com/s/article/nih-toolbox-scoring-and-interpretation-guide

## Physical Health Data Set: Key to Names and Data Structure in Data Set

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Construct Name | ConstructName | Physical Health | |
| Construct Number | ConstructNumber | Construct 8 | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1 = Epoch 1<br>2 = Epoch 2<br>3 = Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch;<br>2 = No, did not return for Epoch | |
| Number of Assessments in Data Set | NumAssess | How many assessments make up the physical health data set | 4 Assessments for Physical |
| Assessment 32—Fitness Survey | Assess32 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Fitness Total | FitTot32 | Average of questions 1-4 with Q4 reverse scored | Score Range: 1-7 |
| Assessment 33—SF-36 | Assess33 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Physical Functioning Average Score | SFPhysFuncAvg33 | Average of Q3-12 put on a 0-100 scale. A higher score indicates better physical function. | Score Range: 0-100 |
| Role Limitations: Physical Health Problems Average Score | SFLimitPhysAvg33 | Average of Q13-16 put on a 0-100 scale. A higher score indicates fewer physical limitations. | Score Range: 0-100 |
| Bodily Pain Average Score | SFBodPainAvg33 | Average of Q21, 22 put on a 0-100 scale. A higher score indicates less bodily pain. | Score Range: 0-100 |
| General Health Perceptions Average Score | SFHealthPerceptAvg33 | Average of Q1, 33-36 put on a 0-100 scale. A higher score indicates more positive health perceptions. | Score Range: 0-100 |
| Health Change Score | SFHealthChange33 | Question 2 put on a 0-100 scale. A higher score indicates better self-reported health compared to one year ago. | Score Range: 0-100 |
| Vitality, Energy, and Fatigue Average Score | SFVitEnerFatAvg33 | Average of Q23, 27, 29, 31 put on a 0-100 scale. A higher score indicates | Score Range: 0-100 |

| | | | |
|---|---|---|---|
| | | better vitality and energy and reduced fatigue. | |
| Social Functioning Average Score | SFSocFunctAvg33 | Average of Q20, 32 put on a 0-100 scale. A higher score indicates better social functioning. | Score Range: 0-100 |
| Role Limitations: Emotional Average Score | SFLimitEmoAvg33 | Average of Q18-19 put on a 0-100 scale. A higher score indicates fewer limitations due to emotional problems. | Score Range: 0-100 |
| Mental Health Average Score | SFMentHealAvg33 | Average of Q24, 25, 26, 28, 30 put on a 0-100 scale. A higher score indicates better mental health. | Score Range: 0-100 |
| Physical Functioning: Norm-based Score | SFPhysFuncNorm33 | Domain score was z-transformed based on norms from the Medical Outcomes Study. Scores above 0 are interpreted as above the US population average and scores below 0 are interpreted as below the US population average. | Score Range: -3-3 |
| Role Limitations: Physical Health Problems Norm-based Score | SFLimitPhysNorm33 | Domain score was z-transformed based on norms from the Medical Outcomes Study. Scores above 0 are interpreted as above the US population average and scores below 0 are interpreted as below the US population average. | Score Range: -3-3 |
| Bodily Pain: Norm-based Score | SFBodPainNorm33 | Domain score was z-transformed based on norms from the Medical Outcomes Study. Scores above 0 are interpreted as above the US population average and scores below 0 are interpreted as below the US population average. | Score Range: -3-3 |
| General Health Perceptions: Norm-based Score | SFHealthPerceptNorm33 | Domain score was z-transformed based on norms from the Medical Outcomes Study. Scores above 0 are interpreted as above the US population average and scores below 0 are interpreted as below | Score Range: -3-3 |

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|---|---|---|---|
| | | the US population average. | |
| Health Change: Norm-based Score | SFHealthChangeNorm33 | Domain score was z-transformed based on norms from the Medical Outcomes Study. Scores above 0 are interpreted as above the US population average and scores below 0 are interpreted as below the US population average. | Score Range: -3-3 |
| Vitality, Energy, and Fatigue: Norm-based Score | SFVitEnerFatNorm33 | Domain score was z-transformed based on norms from the Medical Outcomes Study. Scores above 0 are interpreted as above the US population average and scores below 0 are interpreted as below the US population average. | Score Range: -3-3 |
| Social Functioning: Norm-based Score | SFSocFunctNorm33 | Domain score was z-transformed based on norms from the Medical Outcomes Study. Scores above 0 are interpreted as above the US population average and scores below 0 are interpreted as below the US population average. | Score Range: -3-3 |
| Role Limitations: Emotional: Norm-based Score | SFLimitEmoNorm33 | Domain score was z-transformed based on norms from the Medical Outcomes Study. Scores above 0 are interpreted as above the US population average and scores below 0 are interpreted as below the US population average. | Score Range: -3-3 |
| Mental Health: Norm-based Score | SFMentHealNorm33 | Domain score was z-transformed based on norms from the Medical Outcomes Study. Scores above 0 are interpreted as above the US population average and scores below 0 are interpreted as below the US population average. | Score Range: -3-3 |
| Assessment 34—Blood Pressure | Assess34 | 1 = Has data | |

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| | | 2 = Assessment data partial<br>3 = No data | |
| Day 1, Time 1, systolic | BPDay1Time1Sys34 | Systolic pressure recorded early on the first day of cognitive testing | Score Range: 73-209 |
| Day 1, Time 1, diastolic | BPDay1Time1Dia34 | Diastolic pressure recorded early on the first day of cognitive testing | Score Range: 49-119 |
| Day 1, Time 2, systolic | BPDay1Time2Sys34 | Systolic pressure recorded late on the first day of cognitive testing | Score Range: 83-207 |
| Day 1, Time 2, diastolic | BPDay1Time2Dia34 | Diastolic pressure recorded late on the first day of cognitive testing | Score Range: 50-134 |
| Day 2, Time 1, systolic | BPDay2Time1Sys34 | Systolic pressure recorded early on the second day of cognitive testing | Score Range: 80-211 |
| Day 2, Time 1, diastolic | BPDay2Time1Dia34 | Diastolic pressure recorded early on the second day of cognitive testing | Score Range: 51-125 |
| Day 2, Time 2, systolic | BPDay2Time2Sys34 | Systolic pressure recorded late on the second day of cognitive testing | Score Range: 83-216 |
| Day 2, Time 2, diastolic | BPDay2Time2Dia34 | Diastolic pressure recorded late on the second day of cognitive testing | Score Range: 42-122 |
| Assessment 35—NIH Toolbox 9-Hole Pegboard Dexterity Test | Assess35 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Dominant hand pegboard raw score | NIHPegDomRaw35 | Time, in seconds, to put in and take out all pegs using one's dominant hand. | Score Range: 12-39 |
| Non-dominant hand pegboard raw score | NIHPegNDomRaw35 | Time, in seconds, to put in and take out all pegs using one's non-dominant hand. | Score Range: 11-40 |
| Dominant hand pegboard uncorrected standardized score | NIHPegDomUn35 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample. | Score Range: 59-149 |
| Dominant hand pegboard age-correct score | NIHPegDomAge35 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample at the same age, where a score of 100 indicates performance that was at the national average for the test-taking | Score Range: 65-152 |

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| | | participant's age. Age-corrected standard scores were derived for adults (ages 18-85). | |
| Dominant hand pegboard percentile rank | NIHPegDomPercent35 | A Percentile represents the percentage of people nationally above whom the participant's score ranks (the comparison group will be based on whichever normative score is used) | Score Range: 0-100 |
| Dominant hand pegboard fully-corrected score | NIHPegDomFully35 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample, while adjusting for key demographic variables (age, education, gender, and race/ethnicity) collected during the NIH Toolbox national norming study. | Score Range: 30-152 |
| Non-dominant hand pegboard uncorrected standardized score | NIHPegNDomUn35 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample. | Score Range: 68-122 |
| Non-dominant hand pegboard age-corrected score | NIHPegNDomAge35 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample at the same age, where a score of 100 indicates performance that was at the national average for the test-taking participant's age. Age-corrected standard scores were derived for adults (ages 18-85). | Score Range: 72-159 |
| Non-dominant hand pegboard percentile rank | NIHPegNDomPercent35 | A Percentile represents the percentage of people nationally above whom the participant's score ranks (the comparison group will be based on whichever normative score is used) | Score Range: 0-100 |
| Non-dominant hand pegboard fully-corrected score | NIHPegNDomFully35 | This score compares the score of the test-taker to those in the NIH Toolbox | Score Range: 32-86 |

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| | | nationally representative normative sample, while adjusting for key demographic variables (age, education, gender, and race/ethnicity) collected during the NIH Toolbox national norming study. | |
| Dominant hand grip strength raw score | NIHGripDomRaw35 | Grip strength, in pounds, when squeezing a dynamometer using one's dominant hand. | Score Range: 9-146 |
| Non-dominant hand grip strength raw score | NIHGripNDomRaw35 | Grip strength, in pounds, when squeezing a dynamometer using one's non-dominant hand. | Score Range: 9-146 |
| Dominant hand grip strength uncorrected standardized score | NIHGripDomUn35 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample. | Score Range: 71-141 |
| Dominant hand grip strength age-corrected score | NIHGripDomAge35 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample at the same age, where a score of 100 indicates performance that was at the national average for the test-taking participant's age. Age-corrected standard scores were derived for adults (ages 18-85). | Score Range: 55-138 |
| Dominant hand grip strength percentile rank | NIHGripDomPercent35 | A Percentile represents the percentage of people nationally above whom the participant's score ranks (the comparison group will be based on whichever normative score is used) | Score Range: 0-100 |
| Dominant hand grip strength fully-corrected score | NIHGripDomFully35 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample, while adjusting for key demographic variables (age, education, gender, and race/ethnicity) collected during the NIH | Score Range: -3-73 |

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|---|---|---|---|
| | | Toolbox national norming study. | |
| Non-dominant hand grip strength uncorrected standardized score | NIHGripNDomUn35 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample. | Score Range: 70-143 |
| Non-dominant hand grip strength age-corrected score | NIHGripNDomAge35 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample at the same age, where a score of 100 indicates performance that was at the national average for the test-taking participant's age. Age-corrected standard scores were derived for adults (ages 18-85). | Score Range: 49-148 |
| Non-dominant hand grip strength percentile rank | NIHGripNDomPercent35 | A Percentile represents the percentage of people nationally above whom the participant's score ranks (the comparison group will be based on whichever normative score is used) | Score Range: 0-100 |
| Non-dominant hand grip strength fully-corrected score | NIHGripNDomFully35 | This score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative sample, while adjusting for key demographic variables (age, education, gender, and race/ethnicity) collected during the NIH Toolbox national norming study. | Score Range: -15-83 |

## Physical Health Data Set: Key to Additional Raw Data Available

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Construct Name | ConstructName | Psychosocial | |
| Construct Number | ConstructNumber | Construct 9 | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1 = Epoch 1<br>2 = Epoch 2<br>3 = Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch;<br>2 = No, did not return for Epoch | |
| Number of Tasks in Construct | NumTasks | How many tasks make up the physical construct | 4 tasks for the physical construct |
| Assessment 32—Fitness Survey | Assess32 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| 20 minute exercise that made you sweat or breathe hard | 20Sweat32 | During the past year, approximately how many times per week did you exercise or participate in physical activity, that was not part of your job, for at least 20 minutes that made you sweat and breathe hard? | 0 = 0 times<br>1 = 1 or 2 times per week<br>2 = 2 or 3 times per week<br>3 = 3 or 4 times per week<br>4 = 4 or 5 times per week<br>5 = 5 or 6 times per week<br>6 = 6 or 7 times per week |
| 30 minute exercise that did not make you sweat or breathe hard | 30NoSweat32 | During the past year, approximately how many times per week did you participate in physical activity, that was not part of your job, for at least 30 minutes that did not make you sweat or breathe hard? | 0 = 0 times<br>1 = 1 or 2 times per week<br>2 = 2 or 3 times per week<br>3 = 3 or 4 times per week<br>4 = 4 or 5 times per week<br>5 = 5 or 6 times per week<br>6 = 6 or 7 times per week |
| Exercises that strengthened and toned your muscle or increased flexibility | StrengthTrain32 | During the past year, approximately how many times per week did you do exercises that were not part of your job, that strengthened and toned your muscles or increased your flexibility? | 0 = 0 times<br>1 = 1 or 2 times per week<br>2 = 2 or 3 times per week<br>3 = 3 or 4 times per week<br>4 = 4 or 5 times per week |

| | | | |
|---|---|---|---|
| | | | 5 = 5 or 6 times per week<br>6 = 6 or 7 times per week |
| How many hours do you watch TV? | HoursTV32 | On an average day, how many hours do you watch TV? | 6 = I do not watch TV on an average day.<br>5 = Less than 1 hour per day<br>4 = 1 hour per day<br>3 = 2 hours per day<br>2 = 3 hours per day<br>1 = 4 hours per day<br>0 = 5 or more hours per day |
| How many hours do you spend in physical activity that makes you sweat and breathe hard? | HoursPhysActSweat32 | In a typical day, including time spent at work, how many hours do you spend in physical activity that makes you sweat and breathe hard? | *currently unscored |
| How many hours do you spend in physical activity that does not make you sweat or breathe hard? | HourPhysActNoSweat32 | In a typical day, including time spent at work, how many hours do you spend in physical activity that does not make you sweat or breathe hard? | *currently unscored |
| How many hours do you spend in sedentary actions that involve no physical effort, such as sitting in front of a computer or spending time on the phone? | HoursSedAct32 | In a typical day, including time spent at work, how many hours do you spend in sedentary actions that involve no physical effort, such as sitting in front of a computer or spending time on the phone? | *currently unscored |
| During the past year, on how many group sports teams did you play? | GroupSports32 | During the past year, on how many group sports teams did you play? (Include any teams run by your school, work, religious or community groups.) | *currently unscored |
| During the past year, in how many sporting contests did you participate in? | SportContests32 | During the past year, in how many sporting contests did you participate, such as running, biking or triathlon races, softball, tennis or volleyball tournaments, etc…? | *currently unscored |
| Assessment 33—SF-36 | Assess33 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |

| | | | |
|---|---|---|---|
| General health | SFGenHealth33 | In general, would you say your health is: | Score Range: Excellent; Very good; Good; Fair; Poor |
| How is your health compared to your health a year ago | SFOneYearHealth33 | Compared to one year ago, how would you rate your health in general now? | Score Range: Much better now than one year ago; Somewhat better now than one year ago; About the same as one year ago; Somewhat worse now than one year ago; Much worse now than one year ago |
| Limited in Vigorous activities | SFVigActivities33 | Because of your health now, are you limited in Vigorous activities such as running / lifting heavy objects / participating in strenuous sports (like swimming laps) | Score Range: Yes, limited a lot; Yes, limited a little; No, not limited at all |
| Limited in moderate activities | SFModActivities33 | Because of your health now, are you limited in moderate activities such as moving a table / pushing a vacuum cleaner / bowling / or playing golf | Score Range: Yes, limited a lot; Yes, limited a little; No, not limited at all |
| Limited in carrying groceries | SFCarryGroceries33 | Because of your health now, are you limited in lifting or carrying groceries? | Score Range: Yes, limited a lot; Yes, limited a little; No, not limited at all |
| Limited in climbing several flights of stairs | SFClimbSevStair33 | Because of your health now, are you limited in climbing several flights of stairs? | Score Range: Yes, limited a lot; Yes, limited a little; No, not limited at all |
| Limited in climbing one flight of stairs | SFClimbOneStair33 | Because of your health now, are you limited in climbing one flight of stairs? | Score Range: Yes, limited a lot; Yes, limited a little; No, not limited at all |
| Limited in bending / kneeling / stooping | SFBendStoop33 | Because of your health now, are you limited in bending / kneeling / stooping? | Score Range: Yes, limited a lot; Yes, limited a little; No, not limited at all |
| Limited in walking more than a mile | SFWalkMilePlus33 | Because of your health now, are you limited in walking more than a mile? | Score Range: Yes, limited a lot; Yes, limited a little; No, not limited at all |
| Limited in walking several hundred yards | SFWalkSevHundYard33 | Because of your health now, are you limited in walking several hundred yards? | Score Range: Yes, limited a lot; Yes, limited a little; No, not limited at all |

| | | | |
|---|---|---|---|
| Limited in walking one hundred yards | SFWalkHundYard33 | Because of your health now, are you limited in walking one hundred yards? | Score Range: Yes, limited a lot; Yes, limited a little; No, not limited at all |
| Limited in bathing or dressing self | SFBathDress33 | Because of your health now, are you limited in bathing or dressing yourself? | Score Range: Yes, limited a lot; Yes, limited a little; No, not limited at all |
| Cut down amount of time spent on work or other activities due to physical health | SFCutDownWork33 | During the past four weeks, how much of the time have you had to cut down on the amount of time you spent on work or other activities as a result of your physical health? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| Accomplished less than you would like because of physical health | SFAccomplishLess33 | During the past four weeks, how much of the time have you accomplished less than you would like as a result of your physical health? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| How much time were you limited in the kind of work or other activities due to physical health | SFLimitWorkOthPhys33 | During the past four weeks, how much of the time were you limited in the kind of work or other activities you did as a result of your physical health? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| Difficulty performing work or other activities due to physical health | SFDiffWorkOthPhys33 | During the past four weeks, how much of the time did you have difficulty performing work or other activities (for example/ it took extra effort) as a result of your physical health? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| Cut down on amount of time spent work due to emotional problems | SFLimitWorkEmo33 | During the past four weeks, how much of the time have you had to cut down on the amount of time you spent on work or other activities as a result of any emotional problems (such as feeling depressed or anxious)? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| Accomplished less than you would like due to emotional problems | SFAccomplishLessEmo33 | During the past four weeks, how much of the time have you accomplished less than you would like as a result of any emotional problems (such as feeling depressed or anxious)? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| Work or do other activities less carefully due to emotional problems | SFLessCareEmo33 | During the past four weeks, how much of the time did you do work or other activities less carefully than usual as a result of any | Score Range: All of the time; Most of the time; Some of the time; A little |

| | | | |
|---|---|---|---|
| | | emotional problems (such as feeling depressed or anxious)? | of the time; None of the time |
| To what extent has physical health or emotional problems interfered with social activities | SFLimitedSocialPhysEmo33 | During the past four weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family/friends/neighbors/or groups? | Score Range: Not at all; Slightly; Moderately; Quite a bit; Extremely |
| Bodily pain in the past four weeks | SFBodPain33 | How much bodily pain have you had during the past four weeks? | Score Range: None; Very mild; Mild; Moderate; Severe; Very severe |
| Pain interference with normal work in the past four weeks | SFPainInterWork33 | During the past four weeks, how much did pain interfere with your normal work (including both work outside the home and housework)? | Score Range: Not at all; A little bit; Moderately; Quite a bit; Extremely |
| Full of life in the past four weeks | SFFullOfLife33 | How much of the time during the past four weeks did you feel full of life? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| Very nervous in the past four weeks | SFVeryNervous33 | How much of the time during the past four weeks have you been very nervous? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| Down in the dumps in the past four weeks | SFDownInTheDumps33 | How much of the time during the past four weeks have you felt so down in the dumps that nothing could cheer you up? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| Calm and peaceful in the past four weeks | SFCalmAndPeace33 | How much of the time during the past four weeks have you felt calm and peaceful? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| A lot of energy in the past four weeks | SFLotOfEnergy33 | How much of the time during the past four weeks did you have a lot of energy? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |

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| Downhearted and depressed in the past four weeks | SFDownDepressed33 | How much of the time during the past four weeks have you felt downhearted and depressed? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| Worn out in the past four weeks | SFWornOut33 | How much of the time during the past four weeks did you feel worn out? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| Happy in the past four weeks | SFHappy33 | How much of the time during the past four weeks have you been happy? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| Tired in the past four weeks | SFTired33 | How much of the time during the past four weeks did you feel tired? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| How much of the time | SFTimeLimitedSocialPhysEmo33 | During the past four weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends/ relatives/ etc.)? | Score Range: All of the time; Most of the time; Some of the time; A little of the time; None of the time |
| Sick easier than others | SFSickEasier33 | I seem to get sick a little easier than other people | Score Range: Definitely true; Mostly true; Don't know; Mostly false; Definitely false |
| As healthy as anybody I know | SFHealthAsAny33 | I am as healthy as anybody I know | Score Range: Definitely true; Mostly true; Don't know; Mostly false; Definitely false |
| Expect health to get worse | SFExpectHeathWorse33 | I expect my health to get worse | Score Range: Definitely true; Mostly true; Don't know; Mostly false; Definitely false |
| Health is excellent | SFExHealth33 | My health is excellent | Score Range: Definitely true; Mostly true; Don't know; Mostly |

| | | | |
|---|---|---|---|
| | | | false; Definitely false |
| **Assessment 34—Blood Pressure** | Assess34 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Mean Systolic | BPMeanSys34 | Mean of questions 1, 3, 5, & 7 | Score Range: 85-200 |
| Mean Diastolic | BPMeanDia34 | Mean of questions 2, 4, 6, & 8 | Score range: 56-121 |

# Physical Health Data Set: Instruments

## *Assessment 8.32 Fitness Survey*

The first four questions of this survey are about exercise, recreation, or physical activities other than your regular job duties. For each question, choose the response that best describes your answer.

1. During the past year, approximately how many times per week did you exercise or participate in physical activity, that was not part of your job, for at least 20 minutes that made you sweat and breathe hard?
2. During the past year, approximately how many times per week did you participate in physical activity that was not part of your job, for at least 30 minutes that did not make you sweat or breathe hard?
3. During the past year, approximately how many times per week did you do exercises, that were not part of your job, that strengthened and toned you muscles or increased your flexibility?
4. On an average day, how many hours do you watch TV?

The next questions are about daily activities, including time spent at work. For each question, choose the response that best describes your answer.

5. In a typical day, including time spent at work, how many hours do you spend in physical activity that makes you sweat and breathe hard?
6. In a typical day, including time spent at work, how many hours do you spend in physical activity that does not make you sweat or breathe hard?
7. In a typical day, including time spent at work, how many hours do you spend in sedentary actions that involve no physical effort, such as sitting in front of a computer or spending time on the phone?
8. During the past year, on how many group sports teams did you play? (Include any teams run by your school, work, religious or community groups.)
9. During the past year, in how many sporting contests did you participate, such as running, biking, or triathlon race, softball, tennis or volleyball tournaments, etc…?

## *Assessment 8.33 SF-36*

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. For each question, select the response that best describes your answer.

1. In general, would you say your health is:
2. Compared to one year ago, how would you rate your health in general now?
3. Because of your health now, are you limited in **Vigorous** activities such as running/ lifting heavy objects/ participating in strenuous sports (like swimming laps)?
4. Because of your health now, are you limited in **Moderate** activities such as moving a table/ pushing a vacuum cleaner/ bowling/ or playing golf?
5. Because of your health now, are you limited in lifting or carrying groceries?
6. Because of your health now, are you limited in climbing **several** flights of stairs?
7. Because of your health now, are you limited in climbing **one** flight of stairs?

8. Because of your health now, are you limited in bending/ kneeling/ stooping?
9. Because of your health now, are you limited in walking **more than a mile?**
10. Because of your health now, are you limited in walking **several hundred years?**
11. Because of your health now, are you limited in walking **one hundred yards?**
12. Because of your health now, are you limited in bathing or dressing yourself?
13. During the **past four weeks,** how much of the time have you had to cut down on the amount of time you spent on work or other activities **as a result of your physical health?**
14. During the **past four weeks,** how much of the time have you **accomplished less** than you would like **as a result of your physical health?**
15. During the **past four weeks,** how much of the time were you limited in the **kind** of work or other activities you did **as a result of your physical health?**
16. During the **past four weeks,** how much of the time did you have difficulty performing work or other activities (for example/ it took extra effort) **as a result of your physical health?**
17. During the **past four week,** how much of the time have you had to cut down on the **amount of time** you spent on work or other activities **as a result of any emotional problems** (such as feeling depressed or anxious)?
18. During the **past four weeks,** how much of the time have you **accomplished less** than you would like **as a result of any emotional problems** (such as feeling depressed or anxious)?
19. During the **past four weeks,** how much of the time did you do work or other activities **less carefully than usual as a result of any emotional problems** (such as feeling depressed or anxious)?
20. During the **past four week,** to what extent has your **physical health or emotional problems** interfered with your normal social activities with family/friends/neighbors/or groups?
21. How much **bodily** pain have you had during the **past four weeks?**
22. During the **past four weeks,** how much did **pain** interfere with your normal work (including both work outside the home and housework)?
23. How much of the time during the **past four weeks** did you feel full of life?
24. How much of the time during the **past four weeks** have you been very nervous?
25. How much of the time during the **past four weeks** have you felt so down in the dumps that nothing could cheer you up?
26. How much of the time during the **past four weeks** have you felt calm and peaceful?
27. How much of the time during the **past four weeks** did you have a lot of energy?
28. How much of the time during the **past four weeks** have you felt downhearted and depressed?
29. How much of the time during the **past four weeks** did you feel worn out?
30. How much of the time during the **past four weeks** have you been happy?
31. How much of the time during the **past four weeks** did you feel tired?
32. During the **past four weeks,** how much of the time have your **physical health of emotional problems** interfered with your social activities (like visiting friends/ relatives/ etc.)?

How much would you agree with the following statements?

33. I seem to get sick a little easier than other people.

34. I am as healthy as anybody I know.
35. I expect my health to get worse.
36. My health is excellent.

## ***Assessment 8.34 Blood Pressure***

ID:

Blood Pressure Measurement Sheet

Cognitive Battery DAY 1

T1 _____ /_____

T2 _____ / _____

## ***Assessment 8.35 NIH Toolbox Motor Assessment***

Please refer to publications for questionnaires.

# Construct 9: Mental Health and AD Screening

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***Sample Sizes by Epoch and Assessment (subjects with partial data in parentheses)***

| Assessment | Epoch 1 | Epoch 2 | Epoch 3 |
|---|---|---|---|
| **GDS** | 460 | 289 | 145 |
| **CESD** | 460 | 290(1) | 147 |
| **ADAS-Cog** | 127(15)[a] | 331(1) | 213 |

[a]ADAS-Cog: For Epoch 1, only 112 participants have data for the recall and "rest of cognition" portions of the ADAS-Cog.

## *Task Descriptions*

### *Assessment 9.36 Geriatric Depression Scale*

**Description:** Participants responded to 21 questions regarding their views about their moods to assess symptoms of depression. Note the original questionnaire has 30 questions and our version only includes the first 21.

**Scoring:** A higher total score represents greater depressive symptoms. This total is determined by reverse scoring and then summing items 1, 5, 7, 9, 15, 19, and 21.

**Primary Reference**: Yesavage, J.A., Brink, T.L., Rose, T.L., Lum, O., Huang, V., Adey, M., Leirer, V.O. (1982). Development and validation of a geriatric depression screening scale: a preliminary report. *J. Psychiatr. Res. 17*(1), 37–49. https://doi.org/10.1016/0022-3956(82)90033-4

*Please note this is not the official 30 or 15 item scale and cannot be used to classify depressed participants.*

## ***Assessment 9.37 Center for Epidemiological Studies-Depression (CESD)***

**Description:** Participants were asked how they felt or behaved during the past week to assess symptoms of depression. This questionnaire has 20 questions.

**Scoring:** The total scores range from 0 to 60, with higher scores indicating more symptoms of depression. This total is determined by reverse scoring and then summing items 4, 8, 12, and 16.

**Primary Reference**: Radloff, L. (1977). A self-report depression scale for research in the general population. *Appl. Psychol. Meas. 1*(3), 385-401. https://doi.org/10.1177/014662167700100306

## ***Assessment 9.38 Alzheimer's Disease Assessment Scale—Cognitive Subscale (ADAS-Cog)***

**Description:** ADAS-Cog is a rating of the severity of cognitive symptoms of Alzheimer's Disease. This assessment includes 11 tasks that assess the cognitive domains of language, memory, and praxis (ability to follow instructions). These tasks include:

- *Word Recall:* The participant read aloud a list of 10 words printed on white cards and was then asked immediately to verbally recall as many of those words as they could. This was done for three trials.
- *Naming Objects and Fingers: This* task required participants to name the fingers of their dominant hand and twelve objects: flower, bed, whistle, pencil, rattle, mask, scissors, comb, wallet, harmonica, stethoscope, and tongs.
- *Commands:* This task asked the participant to perform 5 tasks, each ranging from 1-5 steps.
- *Constructional Praxis:* The test administrator showed the participant four geometric shapes (a circle, two overlapping rectangles, a rhombus, and a cube) and participants were asked to copy those shapes onto a separate sheet of paper.
- *Ideational Praxis:* The participant was told to pretend to send themselves a letter. The instructions they were asked to follow are: fold a letter, put letter in envelope, seal envelope, address envelope, indicate where a stamp goes.
- *Orientation:* The participant was asked to give the following information: their full name, the month, the date, the year, the day, the season, the place, and the time of day.

- *Word Recognition:* The participant read 12 words aloud from the white paper cards, and then viewed a new list with those 12 old words intermixed with 12 new words. For this new list of 24 words, the participant was asked to identify which items they had previously seen. This was conducted for three trials.
- *Language:* The participant's language ability was assessed by the test administrator throughout the completion of the previous tasks.
- *Comprehension of Spoken Language:* The participant's comprehension of spoken language was assessed by the administrator during the previous tasks and assessed how well a participant understood speech.
- *Word Finding Difficulty:* The participant's word finding ability was assessed by the administrator during the previous tasks and showed if/ how much difficulty a participant had finding desired words.
- *Remembering Test Instructions:* The participant's ability to remember test instructions was assessed by the administrator and showed how many times the participant had to be reminded of instructions throughout the administration of the previous tasks.

**Scoring:** The three Word Recall trials, Object Naming, Commands, Construction Praxis, Ideation Praxis, Orientation, and Word Recognition are reverse scored. These measures are summarized by a recall, rest of cognition, impairment, and total score, as described below in the dataset key.

**Primary Reference:** Rosen W. G., Mohs R. C., Davis K. L (1984). A new rating scale for Alzheimer's disease. *Am J Psychiatry,141*(11):1356–1364. https://doi.org/10.1176/ajp.141.11.1356

**Mental Health and AD Screening Data Set: Key to Names and Data Structure in Data Set**

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Construct Name | ConstructName | Mental Health and AD Screening | |
| Construct Number | ConstructNumber | Construct 9 | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1=Epoch 1<br>2=Epoch 2<br>3=Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch; 2 = No, did not return for Epoch | |
| Number of Assessments in Data Set | NumAssess | How many assessments make up the Mental Health data set | 3 Assessments for Mental Health |
| Assessment 36—Geriatric Depression Scale | Assess36 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Geriatric Depression Scale Total | GDSTot36 | Sum of the 21 questions, yes=1, no=0. Items 1, 5, 7, 9, 15, 19, and 21 are reverse scored. A higher score indicates greater depressive symptoms. | Score Range: 0-21 |
| Assessment 37—Center for Epidemiological Studies-Depression | Assess37 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Center for Epidemiological Studies-Depression Total | CESDTot37 | Sum of the 20 questions. Items 4, 8, 12, 16 are reverse scored. A higher score indicates greater depressive symptoms. | Score Range: 0-60 |
| Center for Epidemiological Studies-Depression Answered | CESDAnswered37 | Total number of questions answered | Score Range: 0-20 |
| Assessment 38—Alzheimer's Disease Assessment Scale (ADAS)- | Assess38 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |

| Cognitive Subscale | | | |
|---|---|---|---|
| ADAS Word Recall | ADASRcll38 | Mean number of words not recalled during the three trials | Score Range: 0-10 |
| ADAS Rest of Task | ADASRestOfCog38 | Sum of Naming Object, Commands, Constructional Praxis, Ideational Praxis, Orientation, and Word Recognition (questions 4-9) | Score Range: 0-40 |
| ADAS Impairment | ADASImpair38 | Sum of language impairment, comprehension of spoken language, level of word finding difficulty, and remembering test instruction (questions 10-13) | Score Range: 0-20 |
| ADAS Total | ADASTot38 | Sum of Mean Word Recall, Rest of Cog, and Impairment. Higher scores indicate greater impairment. | Score Range: 0-70 |

## Mental Health and AD Screening Data Set: Key to Additional Raw Data Available

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Construct Name | ConstructName | Mental Health and AD Screening | |
| Construct Number | ConstructNumber | Construct 9 | |
| Epoch | Wave | Denotes which Epoch the data were collected. See individual differences data set for more detail. | 1=Epoch 1<br>2=Epoch 2<br>3=Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch; 2 = No, did not return for Epoch | |
| Number of Tasks in Construct | NumTasks | How many tasks make up the Mental Health construct | 3 tasks for Mental Health |
| Assessment 36—Geriatric Depression Scale | Assess36 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Basically satisfied with life | LifeSatisfact36 | Are you basically satisfied with your life? | Score range: Yes; No |
| Dropped activities or interests | DropActInt36 | Have you dropped many of your activities or interests? | Score range: Yes; No |
| Feeling that life is empty | LifeEmpty36 | Do you feel that your life is empty? | Score range: Yes; No |
| Bored often | Bored36 | Do you often get bored? | Score range: Yes; No |
| Hopeful about the future | HopeFut36 | Are you hopeful about the future? | Score range: Yes; No |
| Bothered by thoughts | BotherThoughts36 | Are you bothered by thoughts you can't get out of your head? | Score range: Yes; No |
| In good spirits | GoodSpirit36 | Are you in good spirits most of the time? | Score range: Yes; No |
| Afraid that something bad is going to happen | SomethingBad36 | Are you afraid that something bad is going to happen to you? | Score range: Yes; No |
| Feel happy | Happy36 | Do you feel happy most of the time? | Score range: Yes; No |
| Feel helpless | Helpless36 | Do you often feel helpless? | Score range: Yes; No |
| Restless and Fidgety | RestlessFidget36 | Do you often get restless and fidgety? | Score range: Yes; No |
| Prefer to stay at home | StayatHome36 | Do you prefer to stay at home, rather than going out and doing new things? | Score range: Yes; No |
| Worry about the future | WorryAbtFut36 | Do you frequently worry about the future? | Score range: Yes; No |

| | | | |
|---|---|---|---|
| Problems with memory | MemProb36 | Do you feel you have more problems with memory than most? | Score range: Yes; No |
| Wonderful to be alive | Alive36 | Do you think it is wonderful to be alive now? | Score range: Yes; No |
| Feel downhearted and blue | DownheartedBlue36 | Do you often feel downhearted and blue? | Score range: Yes; No |
| Feel worthless | Worthless36 | Do you feel pretty worthless the way you are now? | Score range: Yes; No |
| Worry about the past | WorryAbtPast36 | Do you worry a lot about the past? | Score range: Yes; No |
| Find life exciting | LifeExciting36 | Do you find life very exciting? | Score range: Yes; No |
| Hard to get started on new projects | StartNewProj36 | Is it hard for you to get started on new projects? | Score range: Yes; No |
| Feel full of energy | FullEnergy36 | Do you feel full of energy? | Score range: Yes; No |
| Assessment 37—Center for Epidemiological Studies-Depression | Assess37 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| I was bothered by things that usually don't bother me | Bothered37 | During the last week, I was bothered by things that usually don't bother me. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I did not feel like eating, my appetite was poor | PoorAppetite37 | During the last week, I did not feel like eating, my appetite was poor. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I felt that I could not shake off the blues even with the help from my family or friends | CouldNotShakeBlues37 | During the last week, I felt that I could not shake off the blues even with the help from my family or friends. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I felt that I was just as good as other people | JustAsGood37 | During the last week, I felt that I was just as good as other people. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); |

| | | | |
|---|---|---|---|
| | | | Occasionally (3-4 Days); Frequently (5-7 Days) |
| I had trouble keeping my mind on what I was doing | TroubleKeepMind37 | During the last week, I had trouble keeping my mind on what I was doing. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I felt depressed | Depressed37 | During the last week, I felt depressed. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I felt that everything I did was an effort | EverythingEffort37 | During the last week, I felt that everything I did was an effort. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I felt hopeful about the future | HopefulFuture37 | During the last week, I felt hopeful about the future. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I thought my life had been a failure | LifeFailure37 | During the last week, I thought my life had been a failure. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I felt fearful | Fearful37 | During the last week, I felt fearful. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| My sleep was restless | SleepRestless37 | During the last week, my sleep was restless. | Score Range: Rarely (Less than |

| | | | |
|---|---|---|---|
| | | | 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I was happy | Happy37 | During the last week, I was happy. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I talked less than usual | TalkedLess37 | During the last week, I talked less than usual. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I felt lonely | Lonely37 | During the last week, I felt lonely. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| People were unfriendly | PeopleUnfriendly37 | During the last week, people were unfriendly. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I enjoyed life | EnjoyedLife37 | During the last week, I enjoyed life. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I had crying spells | CryingSpells37 | During the last week, I had crying spells. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |

| | | | |
|---|---|---|---|
| I felt sad | Sad37 | During the last week, I felt sad. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I felt that people dislike me | PeopleDislikeMe37 | During the last week, I felt that people dislike me. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| I could not get going | CouldNotGetGoing37 | During the last week, I could not get going. | Score Range: Rarely (Less than 1 Day); Some (1-2 Days); Occasionally (3-4 Days); Frequently (5-7 Days) |
| Assessment 38—Alzheimer's Disease Assessment Scale (ADAS)-Cognitive Subscale | Assess38 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| ADAS Word Recall Trial 1 | ADASRcll1_38 | Number of words recalled during trial 1 | Score Range: 0-10 |
| ADAS Word Recall Trial 2 | ADASRcll2_38 | Number of words recalled during trial 2 | Score Range: 0-10 |
| ADAS Word Recall Trial 3 | ADASRcll3_38 | Number of words recalled during trial 3 | Score Range: 0-10 |
| ADAS Naming Objects and Fingers | ADASNaming38 | Number of fingers and objects named incorrectly | Score Range: 0-5<br>0 = 0-2 incorrect<br>1 = 3-5 incorrect<br>2 = 6-8 incorrect<br>3 = 9-11 incorrect<br>4 = 12-14 incorrect<br>5 = 15-17 incorrect |
| ADAS Commands | ADASComnds38 | Number of commands incorrectly performed | Score Range: 0-5 |
| ADAS Constructional Praxis | ADASConsPrax38 | Number of forms drawn incorrectly | Score Range: 0-5<br>0 = 0 incorrect<br>1 = 1 incorrect<br>2 = 2 incorrect |

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| | | | 3 = 3 incorrect<br>4 = 4 incorrect (but one or more section was drawn)<br>5 = No figures drawn, no recognizable attempt at drawing any side/section of any figure |
| ADAS Ideational Praxis | ADASIdeaPrax38 | Number of components completed incorrectly | Score Range: 0-5 |
| ADAS Orientation | ADASOrient38 | Number of correct responses. One point is given for each incorrect response. | Score Range: 0-8 |
| ADAS Word Recognition | ADASRcg38 | Mean number of correct responses given throughout the three trials | Score Range: 0-12 |
| ADAS Language | ADASLang38 | Language Ability. Lower scores indicate more fluent speech. | Score Range: 0-5<br>0 = subject speaks clearly and/or is understandable<br>1 = very mild: one instance of lack of understandability<br>2 = mild: subject has difficulty less than 25% of the time<br>3 = moderate: subject has difficulty 25-50% of the time<br>4 = moderately severe: subject has difficulty more than 50% of the time<br>5 = severe: one- or two-word utterances; fluent, but empty speech; mute |
| ADAS Comprehension of Spoken Language | ADASSpokenLang38 | How well the participant understands spoken language. Lower scores indicate greater comprehension. | Score Range: 0-5<br>0 = None: subject understands.<br>1 = Very Mild: one or two |

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| | | | instances of misunderstanding.<br>2 = Mild: 3–5 instances of misunderstanding.<br>3 = Moderate: requires several repetitions and rephrasing.<br>4 = Moderately Severe: subject only occasionally responds correctly, i.e., yes-or-no questions.<br>5 = Severe: subject rarely responds to questions appropriately; not due to poverty of speech. |
| ADAS Word Finding Difficulty | ADASWordFindDiff38 | The level of difficulty a participant demonstrates in finding desired words | Score Range: 0-5<br>0=no evidence of word finding difficulty in spontaneous speech<br>1=very mild: 1 or 2 instances, not clinically significant<br>2=mild: noticeable circumlocution or synonym substitution<br>3=moderate: loss of words without compensation on occasion<br>4=moderately severe: frequent loss of words without compensation<br>5=severe: nearly total loss of content of words; speech sounds empty; 1–2-word utterances |

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|---|---|---|---|
| ADAS Remembering Test Instructions | ADASRemInstruct38 | Number of times a participant needs to be reminded of instructions | Score Range: 0-5<br>0 = subject never needs extra reminders of instructions<br>1 = very mild: forgets once<br>2 = mild: must be reminded 2 times<br>3 = moderate: must be reminded 3 or 4 times<br>4 = moderately severe: must be reminded 5 or 6 times<br>5 = severe: must be reminded 7 or more times |

# Mental Health and AD Screening Data Set: Instruments

## *Assessment 9.36 Geriatric Depression Scale*

This survey asks for your views about your moods. For each question, choose the response that best describes your answer.

1. Are you basically satisfied with your life?
2. Have you dropped many of your activities or interests?
3. Do you feel that your life is empty?
4. Do you often get bored?
5. Are you hopeful about the future?
6. Are you bothered by thoughts you can't get out of your head?
7. Are you in good spirits most of the time?
8. Are you afraid that something bad is going to happen to you?
9. Do you feel happy most of the time?
10. Do you often feel hopeless?
11. Do you often get restless and fidgety?
12. Do you prefer to stay at home, rather than going out and doing new things?
13. Do you frequently worry about the future?
14. Do you feel you have more problems with memory than most?
15. Do you think it is wonderful to be alive right now?
16. Do you often feel downhearted and blue?
17. Do you feel pretty worthless the way you are now?
18. Do you worry a lot about the past?
19. Do you find life very exciting?
20. Is it hard for you to get started on new projects?
21. Do you feel full of energy?

## ***Assessment 9.37 Center for Epidemiological Studies-Depression (CESD)***

For this survey, respond about how you felt or behaved **DURING THE PAST WEEK.** For each question, choose the one response that best describes your answer.

1. During the last week, I was bothered by things that usually don't bother me.
2. During the last week, I did not feel like eating my appetite was poor.
3. During the last week, I felt that I could not shake off the blues even with the help from my family or friends.
4. During the last week, I felt that I was just as good as other people.
5. During the last week, I had trouble keeping my mind on what I was doing.
6. During the last week, I felt depressed.
7. During the last week, I felt that everything I did was an effort.
8. During the last week, I felt hopeful about the future.
9. During the last week, I thought my life had been a failure.
10. During the last week, I felt fearful.
11. During the last week, my sleep was restless.
12. During the last week, I was happy.
13. During the last week, I talked less than usual.
14. During the last week, I felt lonely.
15. During the last week, people were unfriendly.
16. During the last week, I enjoyed life.
17. During the last week, I had crying spells.
18. During the last week, I felt sad.
19. During the last week, I felt that people dislike me.
20. During the last week, I could not get going.

## ***Assessment 9.38 Alzheimer's Disease Assessment Scale- Cognitive Subscale (ADAS-Cog)***

For ADAS-Cog instrument and scoring manual, please see the FDA website:
https://www.fda.gov/media/122843/download

# Construct 10: Psychosocial

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Personality Survey
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Psychological Well-being (SWQ)

***Sample Sizes by Epoch and Assessment (subjects with partial data in parentheses)***

| Assessment | Epoch 1 | Epoch 2 | Epoch 3 |
|---|---|---|---|
| **MPED** | 460 | 291 | 152 |
| **DAQ** | 460 | 290(1) | 151 |
| **LCA** | 460 | 291 | 154(1) |
| **NFC** | 460 | 292 | 151 |
| **Metamemory** | 0 | 283(1) | 132(1) |
| **SCC** | 460 | 288 | 144 |
| **SLS** | 460 | 289 | 149 |
| **NEO-PI-R** | 463 | 0 | 0 |
| **Big5** | 0 | 288 | 136 |
| **Personality** | 459 | 0 | 0 |
| **NIH Emotion** | 0 | 297(297)[a] | 201 |
| **SPANE** | 90 | 286 | 143 |
| **SWQ** | 460(73)[b] | 288(37)[b] | 146(24)[b] |

Notes on data completeness:
[a]NIH Emotion: For Epoch 2, the summary scores for negative affect, well-being, and social satisfaction are unavailable.
[b]SWQ: For Epochs 1, 2, and 3, total scores are only available for 387, 251, and 122 participants, respectively.

# *Task Descriptions*

## *Assessment 10.39 Martin and Park Environmental Demands (MPED) Questionnaire*

**Description:** This assessment evaluates a participant's level of daily busyness and routines. The original published questionnaire had 11 questions: 7 items for busyness and 4 items for routines. The DLBS questionnaire included two additional questions relating to forgetfulness. On one question, they rated how busy they are during an average day using a five-point Likert scale ranging from "not busy at all" to "extremely busy"; the remaining items asked how often they did various actions on a five-point scale ranging from "never" to "very often".

**Scoring:** The variables of interest are a 7-item total busyness score, total routines score, total forgetfulness score, and a 9-item total busyness score.

**Primary Reference**:
Martin, M. & Park, D. C. (2003). The Martin and Park Environmental Demands (MPED) Questionnaire: Psychometric properties of a brief instrument to measure self-reported

environmental demands. *Aging Clinical and Experimental Research, 15*(1), 77-82. https://doi.org/10.1007/BF03324483

***Assessment 10.40 Daily Activities Questionnaire***

**Description:** Participants were asked how often they participated in the activities that follow within the last six months: how often they grocery shop, drive a car, do household repairs, etc. Participants selected the response from: a). Never; b). Less than once every 6 months; c). Once every 6 months; d). 2 or 3 times every 6 months; e). Once a month; f). 2 or 3 once a month; g). Once a week; h). 2 or 3 times a week, i). Daily. This questionnaire has 70 questions.

**Scoring:** Summary scores are available for each of the seven factors: Physical, Self-Maintenance, Social, Integrative Information Getting, Passive Information Processing, Novel Information Processing, and Travel.

**Primary Reference**:

Hultsch, D. F., Hertzog, C., Small, B. J., & Dixon, R. A. (1999). Use it or lose it: Engaged lifestyle as a buffer of cognitive decline in aging? *Psychology and Aging, 14*(2), 245-263**.** https://doi.org/10.1037/0882-7974.14.2.245

*Please note that Hultsch et al., 1999 called the factor integrative information getting "Hobbies and home maintenance activities".*

## *Assessment 10.41 Lifetime Cognitive Activities*

**Description:** Participants were asked about the frequency with which they participated in cognitively stimulating activities in the past and present. This questionnaire has 26 questions. Each set of questions refers to a specific time period in their life: age 6 (3 items), age 12 (six items), age 18 (six items), age 40 (five items), and current age (five items). Participants selected their response from: a). Once a year; b). Several times a year; c). Several times a month; d). Several times a week; e). Every day or about every day.

**Scoring:** A total score, lifetime cognitive activities to 18 years old score, lifetime cognitive activities to 40 years old score, and past lifetime cognitive activities for participants over 40 score are available. Higher scores are indicative of more frequent cognitive activity. Additionally, a DLBS-specific score is available to identify participants who are younger than 40 years old.

**Primary Reference**:

Wilson, R., Barnes, L., & Bennett, D. (2003). Assessment of lifetime participation in cognitively stimulating activities. *Journal of Clinical and Experimental Neuropsychology, 25*(5), 634-642. https://doi.org/10.1076/jcen.25.5.634.14572

## *Assessment 10.42 Need for Cognition Survey (NFC)*

**Description:** Cacioppo et al. (1984) operationalize the need for cognition as "the tendency for an individual to engage in and enjoy effortful cognitive endeavors" (p. 306). Participants rated whether or not each statement was characteristic of them on a five-point Likert scale ranging

from “extremely uncharacteristic” to “extremely characteristic”. This questionnaire has 18 questions.

**Scoring:** A need for cognition total score is available.

**Primary Reference**:

Cacioppo, J. T., Petty, R. E., & Kao, C. F. (1984). The efficient assessment of need for cognition. *Journal of Personality Assessment, 48*(3), 306-307. https://doi.org/10.1207/s15327752jpa4803_13

## ***Assessment 10.43 Metamemory in Adulthood (MIA) Questionnaire***

**Description:** This assessment measures knowledge and beliefs about one’s own memory functioning. This questionnaire has 108 questions. The following abilities are assessed: use of memory strategies (strategy), knowledge of memory tasks (task), knowledge of own memory capacities (capacity), attitudes towards own memory: perception of change, memory and state anxiety (anxiety), memory and achievement motivation (achievement), and locus of control in memory abilities (locus). For the first 18 items, participants rated on a five-point Likert scale how often they did a behavior from “never” to “always”; for the remaining items, they rated on a five-point Likert scale how much they agreed with various statements from “strongly disagree” to “strongly agree”.

**Scoring:** Total scores are available for all seven subscales: strategy, task, capacity, change, anxiety, achievement, and locus.

**Primary Reference:**

Dixon, R. A., Hultsch, D. F., & Hertzog, C. (1988). The Metamemory in Adulthood (MIA) questionnaire. *Psychopharmacology bulletin, 24*(4), 671-688.

## ***Assessment 10.44 Self-Concept Clarity (SCC) Survey***

**Description:** Participants rated how well statements regarding the clarity of their concept of self applied to them on a five-point Likert scale ranging from “disagree strongly” to “agree strongly” (e.g., “My beliefs about myself seem to change very frequently”). They were asked to rate themselves as they generally are now, not as they wish to be in the future. Self-concept clarity is defined by Campbell et al. (1996) as the extent to which “the contents of an individual's self-concept (e.g., perceived personal attributes) are clearly and confidently defined, internally consistent, and temporally stable” (p. 141). This task consists of 12 questions. The variable of interest is a total score of self-concept clarity.

**Scoring:** A Self-Concept Clarity total score is available and calculated using questions 1-12.

**Primary Reference**:

Campbell, J. D., Trapnell, P. D., Heine, S. J., Katz, I. M., Lavallee, L. F., & Lehman, D. R. (1996). Self-concept clarity: Measurement, personality correlates, and cultural boundaries. *Journal of Personality and Social Psychology, 70*(1), 141-156. https://doi.org/10.1037/0022-3514.70.1.141

***Assessment 10.45 Satisfaction with Life Scale***

**Description:** Participants were asked for their views about their life in the attempt to assess global life satisfaction. This questionnaire has 5 questions requiring a rating on a seven-point Likert scale ranging from "strongly disagree" to "strongly agree". A self-reflection composite score is available.

**Scoring:** A Satisfaction with Life total score is available and calculated using questions 1-5.

**Primary Reference**:

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction With Life Scale. *Journal of Personality Assessment, 49*(1), 71-75. https://doi.org/10.1207/s15327752jpa4901_13

## *Assessment 10.46 Revised Neuroticism-Extraversion-Openness Personality Inventory (NEO-PI-R)*

**Description:** Please note that this questionnaire was administered on Day 2 of Cognitive Testing, however, it is a comprehensive measure of adult personality, and thus, is included with the psychosocial data. Participants were asked to rate how well a statement corresponds to their personality on a five-point Likert scale from "strongly disagree" to "strongly agree". This questionnaire has 240 questions that assess five major dimensions of personality: Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. In addition, there are six facets or traits that further define each dimension. Only scores are available, refer to publications for questionnaires.

**Scoring:** Summary scores are available for each of the five dimensions: Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. Each of these dimensions also has six corresponding facet scores (e.g., Neuroticism-Anxiety, Neuroticism-Depression).

**Primary References:**

Costa P.T., Jr, & McCrae R.R. (1992). Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual. Odessa, FL: Psychological Assessment Resources.

Costa, P. T., Jr, & McCrae, R. R. (1995). Domains and facets: hierarchical personality assessment using the revised NEO personality inventory. *Journal of personality assessment, 6*4(1), 21–50.

*Please note that the NEO-PI-R was only administered in Epoch 1. Personality was assessed in Epochs 2-3 with the Big Five Inventory.*

## *Assessment 10.47 Big 5 Inventory*

**Description:** Participants were asked to indicate how well a statement pertaining to personality applied to them on a five-point Likert scale from "strongly disagree" to "strongly agree". This questionnaire has 44 items and is designed to measure the Big Five dimensions of personality.

**Scoring:** Summary scores are available for each of the five dimensions: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness.

**Primary Reference:**

John, O. P., Donahue, E. M., & Kentle, R. L. (1991). The Big Five Inventory--Versions 4a and 54. Berkeley, CA: University of California, Berkeley, Institute of Personality and Social Research. https://doi.org/10.1037/t07550-000

*Please note that this inventory was first administered in Epoch 2 and was our primary personality inventory for Epochs 2-3.*

## ***Assessment 10.48 Personality Survey***

**Description:** Participants rated how accurately different statements pertaining to personality applied to themselves on a five-point Likert scale from "very inaccurate" to "very accurate". They were asked to make these ratings based on how they generally are now, not as they wish to be in the future. This questionnaire has 108 questions.

**Scoring:** There are two composites: Conscientiousness and Openness. The Conscientiousness composite is made up of seven facets and the Openness composite is comprised of four facets. Summary scores are available for each of the eleven facets: orderliness, virtue, traditionalism, self-control, responsibility, industriousness, intellect, ingenuity, competence, quickness, and creativity.

**Primary References**:

Roberts, B. W., Chernyshenko, O. S., Stark, S., & Goldberg, L. R. (2005). The structure of conscientiousness: An empirical investigation based on seven major personality questionnaires. *Personnel Psychology, 58*(1), 103–139. https://doi.org/10.1111/j.1744-6570.2005.00301.x

Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., Cloninger, C. R., et al. (2006). The International Personality Item Pool and the future of public- domain personality measures. *Journal of Research in Personality, 40*, 84–96. http://dx.doi.org/10.1016/j.jrp.2005.08.007.

*Please note that the individual facets tend to be better and differential predictors of numerous outcomes than the composite measures. Also note that the Personality Survey was only administered in Epoch 1. Personality was assessed in Epochs 2-3 with the Big Five Inventory.*

## ***Assessment 10.49 NIH Toolbox Emotion Measures***

**Description:** This battery consists of self-report surveys assessing 17 subdomains of emotion:

- *NIH Toolbox Anger-Affect Survey:* This CAT (computer adaptive test) assesses anger as an emotion. Participants respond using a 5-point scale ranging from "never" to "always."

- *NIH Toolbox Anger-Hostility Survey:* This 5-item fixed form survey assesses attitudes of hostility and cynicism. Participants respond using a 7-point scale ranging from "extremely untrue of me" to "extremely true of me."
- *NIH Toolbox Anger-Physical Aggression Survey:* This 5-item fixed form survey assesses aggression as a behavioral component. Participants respond using a 7-point scale ranging from "extremely untrue of me" to "extremely true of me."
- *NIH Toolbox Emotional Support Survey:* This 8-item fixed form survey assesses emotional support. Participants respond using a 5-point scale ranging from "never" to "always."
- *NIH Toolbox Fear-Affect Survey:* This CAT self-report measure assesses fear and anxious misery. Participants respond using a 5-point scale ranging from "never" to "always."
- *NIH Toolbox Fear-Somatic Arousal Survey:* This 6-item fixed form survey assesses somatic symptoms related to arousal. Participants respond using a 5-point scale ranging from "not at all" to "extremely."
- *NIH Toolbox Friendship Survey:* This 8-item fixed form survey assesses perceptions of friendship. Participants respond using a 5-point scale ranging from "never" to "always."
- *NIH Toolbox General Life Satisfaction Survey:* This CAT assesses global feelings and attitudes about one's life. Participants respond using a 5-point or 7-point scale—depending on item—ranging "strongly disagree" to "strongly agree."
- *NIH Toolbox Instrumental Support Survey:* This 8-item fixed form survey assesses instrumental support. Participants respond using a 5-point scale ranging from "never" to "always."
- *NIH Toolbox Loneliness Survey:* This 5-item fixed form survey assesses perceptions of loneliness. Participants respond using a 5-point scale ranging from "never" to "always."
- *NIH Toolbox Meaning and Purpose Survey:* This CAT self-report measure assesses the extent to which participants feel that their life matters or makes sense. Participants respond using a 5-point scale ranging from "strongly disagree" to "strongly agree," or from "not at all" to "very much."
- *NIH Toolbox Perceived Hostility Survey***:** This fixed form survey assesses perceptions of hostility. Participants respond using a 5-point scale ranging from "never" to "always."
- *NIH Toolbox Perceived Rejection Survey:* This 8-item fixed form survey measure assesses perceptions of rejection. Participants respond using a 5-point scale ranging from "never" to "always."
- *NIH Toolbox Perceived Stress Survey:* This fixed form survey assesses how unpredictable, uncontrollable and overloaded respondents find their lives. Participants respond using a 5-point scale ranging from "never" to "very often."
- *NIH Toolbox Positive Affect Survey*: This CAT assesses both activated (i.e., happiness, joy) and unactivated (i.e., serenity, peace) aspects of positive affect. Participants respond using a 5-point scale ranging from "not at all" to "very much."

- *NIH Toolbox Sadness Survey:* This CAT self-report measure assesses negative mood, negative views of the self, and negative social cognition. Participants respond using a 5-point scale ranging from "never" to "always."
- *NIH Toolbox Self-Efficacy Survey:* This CAT self-report measure assesses respondents' sense of global self-efficacy. Participants respond using a 5-point scale ranging from "never" to "very often."

**Scoring:** Raw scores, Thetas, T-scores, and SEs are available for all surveys listed above. Scores 1 SD or more below the mean ($T \leq 40$) suggest low levels, scores 1 SD or more above the mean ($T \geq 60$) suggest high levels, and T-scores $\leq 40$ may warrant heightened surveillance or concern.

**Caution:** Participants in DLBS Epoch 2 performed the NIH Toolbox Emotion Measures on a desktop computer, whereas, participants in DLBS Epoch 3 performed the task on an ipad. For additional details, we refer you to the the NIH Toolbox website: https://www.healthmeasures.net/explore-measurement-systems/nih-toolbox/obtain-and-administer-measures.

**Primary Reference**:

Gershon R. C., Wagster M. V., Hendrie H. C., Fox N. A., Cook K. F., Nowinsky C. J. (2013). NIH Toolbox for assessment of neurological and behavioral function. Neurology, *80*, S1-S92. https://doi.org/10.1212/WNL.0b013e3182872e5f

**Software and Scoring Reference:**

NIH Toolbox for the iPad test ver. 2.1
https://nihtoolbox.force.com/s/article/nih-toolbox-scoring-and-interpretation-guide

## ***Assessment 10.50 Scale of Positive and Negative Experience (SPANE)***

**Description:** Participants were asked about what they have been doing and experiencing during the past four weeks. They were asked to report how frequently they experienced various emotions on a five-point Likert scale from "very rarely or never" to 5 "very often or always". This questionnaire has 12 questions.

**Scoring:** A score for the frequency of positive emotions (6 questions), frequency of negative emotions (6 questions), and a total "balance" score of positive and negative emotions were derived.

**Primary Reference**:

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, DW, Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social Indicator Research, 97*(2), 143-156. https://doi.org/10.1007/s11205-009-9493-y

*Please note that this questionnaire was only administered to a partial sample of participants in Epoch 1 (n = 90)*

## ***Assessment 10.51 Psychological Well-being (SWQ)***

**Description**: Participants were asked for rate how well statements pertaining to psychological well-being applied to them on five-point Likert scale from "strongly disagree" to "strongly agree". This questionnaire has 84 questions. There are six factors: positive relations with others, autonomy, environmental mastery, personal growth, purpose in life, and self-acceptance, as well as a composite score.

**Scoring:** The following items were used to produce each of the 6 factors (reverse score *)

- Positive Relations with Others (1, 7*, 13*, 19, 25, 31*, 37, 43*, 49, 55*, 61*, 67, 73*, 79)
- Autonomy (2*, 8, 14, 20*, 26, 32*, 38, 44*, 50, 56*, 62*, 68, 74*, 80)
- Environmental Mastery (3, 9*, 15*, 21, 27*, 33, 39, 45*, 51, 57, 63*, 69, 75*, 81)
- Personal Growth (4*, 10, 16, 22*, 28, 34*, 40, 46, 52, 58*, 64, 70, 76*, 82*)
- Purpose in Life (5, 11*, 17*, 23, 29*, 35*, 41*, 47, 53, 59, 65*, 71, 77, 83*)
- Self-acceptance (6, 12, 18*, 24*, 30, 36, 42*, 48, 54*, 60*, 66*, 72, 78, 84*)

**Primary Reference**:

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57*(6), 1069-1081. https://doi.org/10.1037/0022-3514.57.6.1069

**Note:** This questionnaire is publicly available, but Dr. Ryff requests that institutions or organizations provide her with the results of their study and any subsequent journal article citations. Dr. Carol Ryff; University of Wisconsin; Institute on Aging; 2245 Medical Sciences Center; 1300 University Avenue; Madison, WI 53706; Phone: (608) 262-1818; Fax: (608) 263-6211; email:cryff@wisc.edu.

**Psychosocial Construct: Key to Names and Data Structure in Data Set**

| Item Name | Abbreviation | Description | Measurement |
|---|---|---|---|
| Subject Number | S# | Subject identifier | |
| Construct Name | ConstructName | Psychosocial | |
| Construct Number | ConstructNumber | Construct 10 | |
| Epoch | Wave | Denotes the data collection Epoch. See individual differences data set for more detail, including testing date intervals. | 1 = Epoch 1<br>2 = Epoch 2<br>3 = Epoch 3 |
| Has Data | HasData | 1 = Yes, returned for Epoch;<br>2 = No, did not return for Epoch | |
| Number of Assessments in Data Set | NumAssess | How many assessments make up the psychosocial data set | 13 Assessments for Psychosocial |
| Assessment 39—Martin and Park Environmental Demands | Assess39 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Martin and Park Environmental Demands Busyness Total 7 Items | MPEDBusyness7_39 | Summary score for 7-item busyness measure. Average of questions 1-5, 8, 9. Higher scores reflect greater busyness.<br>Q. 1: daily busyness<br>Q. 2: too many tasks<br>Q. 3: rushing to places<br>Q. 4: missing rest<br>Q. 5: missing meals<br>Q. 8: rushed mornings<br>Q. 9: delayed bedtime | Score Range: 1-5 |
| Martin and Park Environmental Demands Routines Total | MPEDRoutines39 | Summary score for routines measure. Average of questions 10-13. Higher scores reflect greater routine implementation.<br>Q. 10: follow routine<br>Q. 11: routine sleep<br>Q. 12: routine meals<br>Q. 13: routine activities | Score Range: 1-5 |
| Martin and Park Environmental Demands Forgetfulness Total | MPEDForgetful39 | Summary score for forgetfulness measure. Average of questions 6 & 7. Higher scores indicate more forgetfulness.<br>Q. 6: forget tasks<br>Q. 7: forget medications | Score Range: 1-5 |
| Martin and Park Environmental Demands Busyness Total 9 Items | MPEDBusyness9_39 | Summary score for 9-item busyness measure, which includes the 2 self-developed forgetfulness items. Higher scores | Score Range: 1-5 |

| | | | |
|---|---|---|---|
| | | reflect greater busyness and this is an average of the below questions.<br>Q. 1: daily busyness<br>Q. 2: too many tasks<br>Q. 3: rushing to places<br>Q. 4: missing rest<br>Q. 5: missing meals<br>Q. 6: forget tasks<br>Q. 7: forget medications<br>Q. 8: rushed mornings<br>Q. 9: delayed bedtime | |
| Assessment 40—Daily Activities Questionnaire | Assess40 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Daily Activities Questionnaire Physical | ActivPhysical40 | Average score for how often one engages in physical activity, such as gardening, walking, or playing tennis | Score Range: 1-9 |
| Daily Activities Questionnaire Self-maintenance | ActivSelfMain40 | Average score for how often one engages in self-maintenance activities, such as preparing a meal or grocery shopping. | Score Range: 1-9 |
| Daily Activities Questionnaire Social | ActivSocial40 | Average score for how often one engages in social activities, such as visiting friends. | Score Range: 1-9 |
| Daily Activities Questionnaire Integrative | ActivInteg40 | Average score for how often one engages in hobbies and home maintenance activities, such as playing an instrument or repairing mechanical items | Score Range: 1-9 |
| Daily Activities Questionnaire Passive Information Processing | ActivPassInfoProc40 | Average score for passive information processing, such as listening to the radio or watching a sporting event. Higher scores denote more passive information processing. | Score Range: 1-9 |
| Daily Activities Questionnaire Novel Information Processing | ActivNovelInfoProc40 | Average score for how often one engages in novel processing activities, such as driving a car or doing a crossword puzzle. | Score Range: 1-9 |
| Daily Activities Questionnaire Travel | ActivTravel40 | Average score for how often one performs traveling, such as outside one's home state. | Score Range: 1-9 |

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| Assessment 41—Lifetime Cognitive Activities Questionnaire | Assess41 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Lifetime Cognitive Activities Total | LCATot41 | Average score for total lifetime cognitive activities. Higher scores denote greater cognitive activity engagement during lifetime. | Score Range: 1-5 |
| Lifetime Cognitive Activities to 18 Years Old | LCA18_41 | Average score for lifetime cognitive activities until age 18. Higher scores denote greater engagement in lifetime cognitive activities. | Score Range: 1-5 |
| Lifetime Cognitive Activities to 40 Years Old | LCA40_41 | Average score for lifetime cognitive activities until age 40. Higher scores denote greater engagement in lifetime cognitive activities. | Score Range: 1-5 |
| Younger than 40 Years Old | LCAYT40_41 | Are you age 41 or older? | Score Range: 0-1<br>0 = Yes<br>1 = No |
| Past Lifetime Cognitive Activities for Participants Under 40 | LCAPastYT40_41 | Average score for past lifetime cognitive activities for individuals younger than 40 years-old. Higher scores denote greater cognitive activity engagement. | Score Range: 1-5 |
| Assessment 42—Need for Cognition Survey | Assess42 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Need for Cognition Total | NFCTot42 | Average score questions 1-18, which assess one's need to engage in cognitively effortful endeavors. Higher scores denote greater need for cognition. | Score Range: 1-5 |
| Assessment 43—Metamemory in Adulthood Questionnaire | Assess43 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Metamemory in Adulthood Questionnaire Strategy | MemStrategy43 | Knowledge and use of information about one's remembering abilities so that performance in given instances is potentially improved. High scores | Score Range: 0-90 |

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| | | indicate greater use of strategy. | |
| Metamemory in Adulthood Questionnaire Task | MemTask43 | Knowledge of basic memory processes, especially that are interesting as evidenced by how most people perform. High scores indicate high knowledge. | Score Range: 0-75 |
| Metamemory in Adulthood Questionnaire Capacity | MemCapacity43 | Perception of memory capacities as evidenced by rating of performance on given tasks. High scores indicate greater capacity. | Score Range: 0-85 |
| Metamemory in Adulthood Questionnaire Change | MemChange43 | Perception of memory abilities as generally stable or subject to long-term decline. High scores indicate greater stability. | Score Range: 0-85 |
| Metamemory in Adulthood Questionnaire Anxiety | MemAnxiety43 | Feelings of stress related to memory performance. High scores indicate greater anxiety. | Score Range: 0-70 |
| Metamemory in Adulthood Questionnaire Achievement | MemAchieve43 | Perceived importance of having a good memory and performing well on memory tasks. High scores indicate high achievement. | Score Range: 0-80 |
| Metamemory in Adulthood Questionnaire Locus | MemLocus43 | Perceived personal control over remembering abilities. High scores indicate an internal locus of control. | Score Range: 0-50 |
| Assessment 44—Self-Concept Clarity Survey | Assess44 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Self-Concept Clarity Total | SCCTot44 | Average score of how clear, consistent, and stable one's self-concept is. High score indicates greater self-concept clarity. | Score Range: 1-5 |
| Assessment 45—Satisfaction with Life Scale | Assess45 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Satisfaction with Life Total | SatisfacLifeTot45 | Average score of one's life satisfaction. High score indicates greater life satisfaction. | Score Range: 1-7 |
| Assessment 46—Revised Neuroticism- | Assess46 | 1 = Has data<br>2 = Assessment data partial | |

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| Extraversion-Openness Personality Inventory | | 3 = No data | |
| NEO PI-R Neuroticism: Anxiety | NEONeurAnx46 | Average score of anxiety. Higher scores here, and for the below NEO variables, indicate stronger trait expression. | Score Range: 0-4 |
| NEO PI-R Neuroticism: Anger Hostility | NEONeurAngerHos46 | Average score of anger and hostility. | Score Range: 0-4 |
| NEO PI-R Neuroticism: Depression | NEONeurDep46 | Average score of depression. | Score Range: 0-4 |
| NEO PI-R Neuroticism: Self-Consciousness | NEONeurSelfCon46 | Average score of self-consciousness. | Score Range: 0-4 |
| NEO PI-R Neuroticism: Impulsiveness | NEONeurImp46 | Average score of impulsiveness. | Score Range: 0-4 |
| NEO PI-R Neuroticism: Vulnerability | NEONeurVuln46 | Average score of vulnerability. | Score Range: 0-4 |
| NEO PI-R Extraversion: Warmth | NEOExtWarm46 | Average score of warmth. | Score Range: 0-4 |
| NEO PI-R Extraversion: Gregariousness | NEOExtGreg46 | Average score of gregariousness. | Score Range: 0-4 |
| NEO PI-R Extraversion: Assertiveness | NEOExtAssert46 | Average score of assertiveness. | Score Range: 0-4 |
| NEO PI-R Extraversion: Activity | NEOExtActiv46 | Average score of activity. | Score Range: 0-4 |
| NEO PI-R Extraversion: Excitement-seeking | NEOExtExcit46 | Average score of excitement-seeking. | Score Range: 0-4 |
| NEO PI-R Extraversion: Positive emotions | NEOExtPosEmo46 | Average score of positive emotions. | Score Range: 0-4 |
| NEO PI-R Openness: Fantasy | NEOOpenFant46 | Average score of openness to fantasy. | Score Range: 0-4 |
| NEO PI-R Openness: Aesthetics | NEOOpenAest46 | Average score of openness to aesthetics. | Score Range: 0-4 |
| NEO PI-R Openness: Feelings | NEOOpenFeel46 | Average score of openness about feelings. | Score Range: 0-4 |
| NEO PI-R Openness: Actions | NEOOpenAct46 | Average score of openness to actions. | Score Range: 0-4 |
| NEO PI-R Openness: Ideas | NEOOpenIdea46 | Average score of openness to ideas. | Score Range: 0-4 |
| NEO PI-R Openness: Values | NEOOpenValue46 | Average score of openness to values. | Score Range: 0-4 |

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| NEO PI-R Agreeableness: Trust | NEOAgreeTrust46 | Average score of trust. | Score Range: 0-4 |
| NEO PI-R Agreeableness: Straightforwardness | NEOAgreeStrait46 | Average score of straightforwardness. | Score Range: 0-4 |
| NEO PI-R Agreeableness: Altruism | NEOAgreeAltur46 | Average score of altruism. | Score Range: 0-4 |
| NEO PI-R Agreeableness: Compliance | NEOAgreeCompli46 | Average score of compliance. | Score Range: 0-4 |
| NEO PI-R Agreeableness: Modesty | NEOAgreeMod46 | Average score of modesty. | Score Range: 0-4 |
| NEO PI-R Agreeableness: Tender-mindedness | NEOAgreeTend46 | Average score of tender-mindedness. | Score Range: 0-4 |
| NEO PI-R Conscientiousness: Competence | NEOConComp46 | Average score of competence. | Score Range: 0-4 |
| NEO PI-R Conscientiousness: Order | NEOConOrder46 | Average score of order. | Score Range: 0-4 |
| NEO PI-R Conscientiousness: Dutifulness | NEOConDuti46 | Average score of dutifulness. | Score Range: 0-4 |
| NEO PI-R Conscientiousness: Achievement striving | NEOConAchieve46 | Average score of achievement striving. | Score Range: 0-4 |
| NEO PI-R Conscientiousness: Self-discipline | NEOConSelfDis46 | Average score of self-discipline. | Score Range: 0-4 |
| NEO PI-R Conscientiousness: Deliberation | NEOConDelib46 | Average score of deliberation. | Score Range: 0-4 |
| NEO PI-R Conscientiousness Total | NEOConTot46 | Summary score of conscientiousness, which is a measure of effective planning, organization, and impulse control. | Score Range: 0-4 |
| NEO PI-R Agreeableness Total | NEOAgreeTot46 | Summary score of agreeableness or how trusting, altruistic, and cooperative one is with others. | Score Range: 0-4 |
| NEO PI-R Neuroticism Total | NEONeurTot46 | Summary score of neuroticism, which is a measure of emotional instability and degree of negative emotions. | Score Range: 0-4 |
| NEO PI-R Extraversion Total | NEOExtTot46 | Summary score of extraversion, which is a measure of how sociable, | Score Range: 0-4 |

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| | | assertive, outgoing, and excitement-seeking one is. | |
| NEO PI-R Openness Total | NEOOpenTot46 | Summary score of openness to new experiences and learning new information. | Score Range: 0-4 |
| Assessment 47—Big-Five Inventory | Assess47 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Big-Five Inventory Extraversion | Big5Ext47 | Average score of extraversion, which is a measure of how sociable, assertive, outgoing, and excitement-seeking one is. | Score Range: 1-5 |
| Big-Five Inventory Agreeableness | Big5Agree47 | Average score of agreeableness, or how trusting, altruistic, and cooperative one is with others. | Score Range: 1-5 |
| Big-Five Inventory Conscientiousness | Big5Con47 | Average score of conscientiousness, which is a measure of how effective one is in planning, organization, and impulse control. | Score Range: 1-5 |
| Big-Five Inventory Neuroticism | Big5Neur47 | Average score of neuroticism, which is a measure of how emotional instable one is and their degree of negative emotions. | Score Range: 1-5 |
| Big-Five Inventory Openness | Big5Open47 | Average score of openness to new experiences and learning new information. Higher scores denote greater openness to new experience and learning new information. | Score Range: 1-5 |
| Assessment 48—Personality Survey | Assess48 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Personality Survey Orderliness | PersonOrder48 | Average score of orderliness. Higher scores indicate greater orderliness. | Score Range: 1-5 |
| Personality Survey Virtue | PersonVirtue48 | Average score of virtue. Higher scores indicate greater virtue. | Score Range: 1-5 |
| Personality Survey Traditionalism | PersonTrad48 | Average score of traditionalism. Higher scores indicate greater traditionalism. | Score Range: 1-5 |

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| Personality Survey Self-Control | PersonSelfCont48 | Average score of self-control. Higher scores indicate greater self-control. | Score Range: 1-5 |
| Personality Survey Responsibility | PersonRespon48 | Average score of responsibility. Higher scores indicate greater responsibility. | Score Range: 1-5 |
| Personality Survey Industriousness | PersonIndust48 | Average score of industriousness. Higher scores indicate greater industriousness. | Score Range: 1-5 |
| Personality Survey Intellect | PersonIntel48 | Average score of intellect. Higher scores indicate greater intellect. | Score Range: 1-5 |
| Personality Survey Ingenuity | PersonIngen48 | Average score of ingenuity. Higher scores indicate greater ingenuity. | Score Range: 1-5 |
| Personality Survey Competence | PersonComp48 | Average score of competence. Higher scores indicate greater competence. | Score Range: 1-5 |
| Personality Survey Quickness | PersonQuick48 | Average score of quickness. Higher scores indicate greater quickness. | Score Range: 1-5 |
| Personality Survey Creativity | PersonCreat48 | Average score of creativity. Higher scores indicate greater creativity. | Score Range: 1-5 |
| **Assessment** 49—NIH Toolbox Emotion Assessment | Assess49 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| NIH Toolbox Anger Affect Raw | NIHAngerAffCatRaw49 | Raw scale score | Score Range: 0-30 |
| NIH Toolbox Anger Affect Theta | NIHAngerAffCatTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Anger Affect T-Score | NIHAngerAffCatT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Anger Affect SE | NIHAngerAffCatSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox Anger-Hostility Raw | NIHAngerHostFfRaw49 | Raw scale score | Score Range: 0-30 |
| NIH Toolbox Anger-Hostility Theta | NIHAngerHostFfTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Anger-Hostility T-Score | NIHAngerHostFfT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Anger-Hostility SE | NIHAngerHostFfSE49 | Standard error of score | Score Range: 1-8 |

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| NIH Toolbox Anger-Physical Aggression Raw | NIHAngerPAFfRaw49 | Raw scale score | Score Range: 0-35 |
| NIH Toolbox Anger-Physical Aggression Theta | NIHAngerPAFfTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Anger-Physical Aggression T-Score | NIHAngerPAFfT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Anger-Physical Aggression SE | NIHAngerPAFfSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox Emotional Support Raw | NIHEmoSupportFfRaw49 | Raw scale score | Score Range: 0-40 |
| NIH Toolbox Emotional Support Theta | NIHEmoSupportFfTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Emotional Support T-Score | NIHEmoSupportFfT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Emotional Support SE | NIHEmoSupportFfSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox Fear-Affect CAT Raw | NIHFearAffCatRaw49 | Raw scale score | Score Range: 0-30 |
| NIH Toolbox Fear-Affect CAT Theta | NIHFearAffCatTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Fear-Affect CAT T-Score | NIHFearAffCatT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Fear-Affect CAT SE | NIHFearAffCatSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox Fear-Somatic Arousal Raw | NIHFearArousalFfRaw49 | Raw scale score | Score Range: 0-30 |
| NIH Toolbox Fear-Somatic Arousal Theta | NIHFearArousalFfTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Fear-Somatic Arousal T-Score | NIHFearArousalFfT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Fear-Somatic Arousal SE | NIHFearArousalFfSE49 | Standard error of score | Score Range: 1-8 |

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| NIH Toolbox Friendship FF Raw | NIHFriendFfRaw49 | Raw scale score | Score Range: 0-40 |
| NIH Toolbox Friendship FF Theta | NIHFriendFfTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Friendship FF T-Score | NIHFriendFfT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Friendship FF SE | NIHFriendFfSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox General Life Satisfaction CAT Raw | NIHGenLifeSatCatRaw49 | Raw scale score | Score Range: 0-60 |
| NIH Toolbox General Life Satisfaction CAT Theta | NIHGenLifeSatCatTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox General Life Satisfaction CAT T-Score | NIHGenLifeSatCatT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox General Life Satisfaction CAT SE | NIHGenLifeSatCatSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox Instrumental Support FF Raw | NIHInstSupportFfRaw49 | Raw scale score | Score Range: 0-40 |
| NIH Toolbox Instrumental Support FF Theta | NIHInstSupportFfTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Instrumental Support FF T-Score | NIHInstSupportFfT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Instrumental Support FF SE | NIHInstSupportFfSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox Loneliness FF Raw | NIHLonelinessFfRaw49 | Raw scale score | Score Range: 0-30 |
| NIH Toolbox Loneliness FF Theta | NIHLonelinessFfTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Loneliness FF T-Score | NIHLonelinessFfT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |

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| NIH Toolbox Loneliness FF SE | NIHLonelinessFfSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox Meaning and Purpose CAT Raw | NIHMeaningPurpCatRaw49 | Raw scale score | Score Range: 0-60 |
| NIH Toolbox Meaning and Purpose CAT Theta | NIHMeaningPurpCatTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Meaning and Purpose CAT T-Score | NIHMeaningPurpCatT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Meaning and Purpose CAT SE | NIHMeaningPurpCatSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox Perceived Hostility FF Raw | NIHPerHostFfRaw49 | Raw scale score | Score Range: 0-35 |
| NIH Toolbox Perceived Hostility FF Theta | NIHPerHostFfTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Perceived Hostility FF T-Score | NIHPerHostFfT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Perceived Hostility FF SE | NIHPerHostFfSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox Perceived Rejection FF Raw | NIHPerRejectFfRaw49 | Raw scale score | Score Range: 0-30 |
| NIH Toolbox Perceived Rejection FF Theta | NIHPerRejectFfTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Perceived Rejection FF T-Score | NIHPerRejectFfT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Perceived Rejection FF SE | NIHPerRejectFfSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox Perceived Stress FF Raw | NIHPerStressFfRaw49 | Raw scale score | Score Range: 0-45 |
| NIH Toolbox Perceived Stress FF Theta | NIHPerStressFfTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Perceived Stress FF T-Score | NIHPerStressFfT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally | Mean = 50, Standard Deviation = 10 |

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| | | representative normative sample | |
| NIH Toolbox Perceived Stress FF SE | NIHPerStressFfSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox Positive Affect CAT Raw | NIHPosAffectCatRaw49 | Raw scale score | Score Range: 0-60 |
| NIH Toolbox Positive Affect CAT Theta | NIHPosAffectCatTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Positive Affect CAT T-Score | NIHPosAffectCatT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Positive Affect CAT SE | NIHPosAffectCatSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox Sadness CAT Raw | NIHSadnessCatRaw49 | Raw scale score | Score Range: 0-30 |
| NIH Toolbox Sadness CAT Theta | NIHSadnessCatTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Sadness CAT T-Score | NIHSadnessCatT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Sadness CAT SE | NIHSadnessCatSE49 | Standard error of score | Score Range: 1-8 |
| NIH Toolbox Self-Efficacy CAT Raw | NIHSelfEfficCatRaw49 | Raw scale score | Score Range: 0-40 |
| NIH Toolbox Self-Efficacy CAT Theta | NIHSelfEfficCatTheta49 | Theta score | Score Range: -4-4 |
| NIH Toolbox Self-Efficacy CAT T-Score | NIHSelfEfficCatT49 | t-score comparing the test-taker to those in the NIH Toolbox nationally representative normative sample | Mean = 50, Standard Deviation = 10 |
| NIH Toolbox Self-Efficacy CAT SE | NIHSelfEfficCatSE49 | Standard error of score | Score Range: 1-8 |
| NIH Negative Affect Summary Score | NIHNegAffSum49 | Negative Affect summary score | Score Range: 10-75 |
| NIH Psychological Well-Being Summary Score | NIHWellBeingSum49 | Psychological Well-Being summary score | Score Range: 10-75 |
| NIH Social Satisfaction Summary Score | NIHSocialSatSum49 | Social Satisfaction summary score | Score Range: 10-75 |

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| Assessment 50—Scale of Positive and Negative Emotions | Assess50 | 1 = Has data<br>2 = Assessment data partial<br>3 = No task data | |
| Scale of Positive and Negative Emotions: Positive Score | SPANEPos50 | A summed score indicating the amount of positive emotions experienced in the past four weeks. | Score Range: 6-30 |
| Scale of Positive and Negative Emotions: Negative Score | SPANENeg50 | A summed score indicating the amount of negative emotions experienced in the past four weeks. | Score Range: 6-30 |
| Scale of Positive and Negative Emotions: Balance Score | SPANEBal50 | An overall score of emotions experienced in the past four weeks. SPANE Positive total minus SPANE Negative total | Score Range: -24 to 24 |
| Assessment 51—Psychological Well-being | Assess51 | 1 = Has data<br>2 = Assessment data partial<br>3 = No data | |
| Psychological Well-being: Positive Relations with Others | SWQRelWOther51 | Average score of positive relationships with others, which is the ability to achieve warm, trusting interpersonal relationships. Higher scores indicate greater positive relationship with others. | Score Range: 0-5 |
| Psychological Well-being: Autonomy | SWQAuto51 | Average score of autonomy, or self-determination, independence, and evaluating oneself by personal standards instead of outward approval. Higher scores indicate greater autonomy. | Score range: 0-5 |
| Psychological Well-being: Environmental Mastery | SWQEnvirMast51 | Average score of environmental mastery, which is an individual's ability to choose, create, and take advantage of environmental opportunities. Higher scores indicate greater environmental mastery. | Score range: 0-5 |
| Psychological Well-being: Personal Growth | SWQPersonGrow51 | Average score of personal growth, or one's continued commitment to develop as a person. Higher scores | Score range: 0-5 |

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| | | indicate greater personal growth. | |
| Psychological Well-being: Purpose in Life | SWQPurposeLife51 | Average score of purpose in life, or a feeling of meaning, sense of directedness, and intentionality. Higher scores indicate greater purpose in life. | Score range: 0-5 |
| Psychological Well-being: Self-acceptance | SWQSelfAccept51 | Average score of self-acceptance or holding positive attitudes towards oneself. Higher scores indicate greater self-acceptance. | Score range: 0-5 |
| Psychological Well-being Total | SWQTot51 | Total average score of psychological well-being. Higher scores are indicative of greater psychological well-being. | Score range: 1-5 |

## Psychosocial Data Set: Instruments

***Assessment 10.39 Martin and Park Environmental Demands (MPED) Questionnaire***

1. How busy are you during an average day?
2. How often do you have too many things to do each day to actually get them all done?
3. How often do you find yourself rushing from place to place trying to get appointments or to get things done?
4. How often are you so busy that you miss scheduled breaks or rest periods?
5. How often are you so busy that you miss your regular meal times?
6. How often are you so busy that you forget what you are supposed to do?
7. How often are you so busy that you cannot take you medications when you are supposed to take them?
8. How often do you rush out of the house in the morning to get to where you need to be?
9. How often do you have so many things to do that you go to bed later than you regular bedtime?
10. How often do your days follow a basic routine?
11. How often do you get out of bed in the morning and go to bed at night at about the same time?
12. How often do you eat all of your meals at about the same time each day and night?
13. How often do you engage in activities at home at specific time (i.e. read the paper after work, watch a particular television show, spend time with children, work on hobbies, etc.)?

***Assessment 10.40 Daily Activities Questionnaire***

1. I prepare a meal
2. I do housework (dishes, laundry, vacuuming, etc.)
3. I go grocery shopping

4. I go shopping at a mall or downtown
5. I drive a car
6. I take a bus
7. I take care of someone in my family (invalid or disabled)
8. I take care of one or more pets
9. I do household repairs (painting, leaky faucets, etc.)
10. I repair a car, lawn mower, or other mechanical device
11. I purchase a new item requiring some set-up or assembly
12. I do woodworking, carpentry, or furniture refinishing
13. I play a musical instrument
14. I engage in creative writing, writing poems, writing newspaper articles, etc.
15. I engage in photography
16. I collect stamps, coins, dolls or other memorabilia
17. I engage in sewing, knitting, or needlework
18. I engage in painting, sculpting, ceramics, drawing, etc.
19. I participate in a theatrical activity
20. I sing in a choir
21. I garden indoors or outdoors
22. I engage in exercise activities such as jogging, swimming, bicycling, or walking
23. I engage in outdoor activities such as sailing, fishing, or backpacking
24. I engage in recreational sports such as tennis, bowling, or golf
25. I work crossword puzzles, acrostics, or anagrams
26. I play card games such as Pinochle or Bridge
27. I do jigsaw puzzles
28. I play board games such as chess and checkers
29. I play knowledge games such as Trivial Pursuit
30. I play word games such as Scrabble
31. I read newspapers
32. I read books or magazines for leisure
33. I read books or magazines as part of my job, career, or formal education
34. I go to the library
35. I watch news programs on television
36. I watch documentary or educational programs on television
37. I watch game shows such as Wheel of Fortune on television
38. I watch comedy or adventure programs on television
39. I watch continuing dramas on television
40. I listen to radio programs
41. I write a letter (to a friend, relative, business, etc.)
42. I program software for a personal computer
43. I use pre-programmed software on a personal computer
44. I use an electronic calculator
45. I balance a check book
46. I prepare my own income taxes
47. I prepare someone else's income taxes
48. I do arithmetic or mathematical calculations
49. I attend films (travel films, commercial movies, etc.)

50. I attend a concert or a play
51. I attend a public lecture or talk
52. I attend sports events such as hockey, soccer, football, baseball, lawn bowling, or cricket
53. I eat out at a restaurant
54. I visit a physician, dentist, or other professional
55. I visit relatives, friends or neighbors
56. I give a dinner or a party for friends
57. I attend religious services
58. I engage in prayer, meditation, or philosophical contemplation
59. I attend meetings of service organizations such as Lions, Rotary, or Seniors Serving Seniors
60. I attend meeting of clubs (hobby club, book club, discussion club, etc.)
61. I give a public talk or lecture (to a club, service organization, etc.)
62. I do volunteer work for an organization such as a hospital, church, school, or political party
63. I engage in business activities such as investments or real estate transactions not related to my job or career
64. I engage in an on-the-job training program
65. I enroll in a course at a college or university
66. I enroll in a correspondence course
67. I study or practice a language other than my native tongue
68. I travel away from my home, but within my home state
69. I travel outside my home state, but within the United States:
70. I travel in a foreign country

***Assessment 10.41 Lifetime Cognitive Activities***

1. At age 6 how often did someone in your home read to you?
2. At age 6 how often did you play games (i.e. Cards, puzzles, checkers)?
3. At age 6 how often did someone in your home tell you stories?
4. At age 12 how often did you visit the library
5. At age 12 how often did you read newspapers?
6. At age 12 how often did you read magazines?
7. Age at 12 how often did you read books?
8. At age 12 how often did you write letters/ emails?
9. At age 12 how often did you play games (i.e. cards, puzzles, checkers)?
10. At age 18 how often did you visit the library?
11. At age 18 how often did you read newspapers?
12. At age 18 how often did you read magazines?
13. At age 18 how often did you read books?
14. At age 18 how often did you write letters/emails?
15. At age 18 how often did you play games (i.e. cards, puzzles, checkers)?
16. Are you age 41 or older?
17. At age 40 how often did you read newspapers?
18. At age 40 how often did you read magazines?
19. At age 40 how often did you read books?
20. At age 40 how often did you write letters/emails?

21. At age 40 how often did you play games (i.e. cards, puzzles, checkers)?
22. Currently, how often do you read newspapers?
23. Currently, how often do you read magazines?
24. Currently, how often do you read books?
25. Currently, how often do you write letters/emails?
26. Currently, how often do you play games (i.e. cards, puzzles, checkers)?

***Assessment 10.42 Need for Cognition Survey (NFC)***

1. I prefer complex to simple problems.
2. I like to have the responsibility of handling a situation that requires a lot of thinking.
3. Thinking is not my idea of fun.
4. I would rather do something that requires little thought than something that is sure to challenge m abilities.
5. I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.
6. I find satisfaction in deliberation for long hours.
7. I only think as hard as I have to.
8. I prefer to think about small daily projects rather than long-term ones.
9. I like tasks that require little thought once I've learned them.
10. The idea of relying on thought to make my own way to the top appeals to me.
11. I really enjoy a task that involves coming up with new solutions to problems.
12. Learning new ways to think doesn't excite me much.
13. I prefer my life to be filled with problems that I must solve.
14. The notion of thinking abstractly is appealing to me.
15. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.
16. I feel relief rather than satisfaction after completing a task that requires a lot of mental effort.
17. It's enough for me that something gets the job done; I don't care how or why it works.
18. I usually end up deliberating about issues even when they do not affect me personally.

***Assessment 10.43 Metamemory in Adulthood (MIA) Questionnaire***

Different people use their memory in different ways in their everyday lives. For example, some people make shopping lists, whereas others do not. Some people are good at remembering names, whereas others are not. In this questionnaire, we would like you to tell us how you use your memory and how you feel about it. There are no right or wrong answers to these questions because people are different. Please take your time and answer each of these questions to the best of your ability.

1. For most people, facts that are interesting are easier to remember than facts that are not.
2. I am good at remembering names.
3. Do you keep a list of otherwise not important dates, such as birthdays or anniversaries?
4. It is important to me to have a good memory.
5. I get upset when I cannot remember something.
6. When you are looking for something you have recently misplaced, do you try to retrace your steps to locate it?
7. I think a good memory is something of which to be proud.

8. I find it harder to remember things when I am upset.
9. I am good at remembering birthdates.
10. I can remember things as well as always.
11. When you have not finished reading a book or magazine, do you somehow note the place where you have stopped?
12. I get anxious when I am asked to remember something.
13. It bothers me when others notice my memory failures.
14. I'm less efficient at remembering things now than I used to be.
15. I have difficulty remembering things when I'm anxious.
16. The older I get the harder it is to remember clearly.
17. Do you think about the day's activities at the beginning of the day so you can remember what you are supposed to do?
18. I am just as good at remembering as I ever was.
19. I have no trouble keeping track of my appointments.
20. For most people, it is easier to remember information they need to use immediately than information they will not use for a long time.
21. Most people find it easier to remember directions to places they want or need to go than to places they know they will never be going.
22. I am usually uneasy when I attempt a problem that requires me to use my memory.
23. I feel jittery if I have to introduce someone I just met.
24. Having a better memory would be nice but it is not very important.
25. Do you post reminders of things you need to do in a prominent place, such as on bulletin boards or note boards?
26. It does not bother me when my memory fails.
27. I am poor at remembering trivia.
28. I am much worse now at remembering the content of news articles and broadcasts than I was 10 years ago.
29. Do you routinely keep things in a familiar spot so you won't forget them when you need to locate them?
30. Compared to 10 years ago, I am much worse at remembering titles of books, films, or plays.
31. For most people it is easier to remember words they want to use than words they know they will never use.
32. I remember my dreams much less now than 10 years ago.
33. I can't expect to be good at remembering zip codes at my age.
34. Most people find it easier to remember the names of people they especially dislike than people they hardly notice.
35. I have little control over my memory ability.
36. When you want to take something with you, do you leave it in an obvious, prominent place, such as putting your suitcase in front of the door?
37. I think it is important to work at sustaining my memory abilities.
38. I misplace things more frequently now than when I was younger.
39. As people get older they tend to forget where they put things more frequently.
40. I work hard at trying to improve my memory.
41. Compared to 10 years ago, I now forget many more appointments.
42. If I am put on the spot to remember names, I know I will have difficulty doing it.

43. For most people, it is easier to remember the names of people they especially like than people that don't mean very much to them.
44. Most people find it easier to remember words they understand than words that don't mean very much to them.
45. My memory for important events has improved over the last 10 years.
46. I admire people who have good memories.
47. My friends often notice my memory ability.
48. When you try to remember people you have met, do you associate names and faces?
49. I am good at remembering the order that events occurred.
50. For most people, words they have seen or heard before are easier to remember than words that are totally new to them.
51. Familiar things are easier to remember than unfamiliar things.
52. I am good at remembering conversations I have had.
53. I would feel on edge right now if I had to take a memory test or something similar.
54. My memory for phone numbers will decline as I get older.
55. I often notice my friends' memory ability.
56. My memory for dates has greatly declined in the last 10 years.
57. When you have trouble remembering something, do you try to remember something similar in order to help you remember?
58. My memory for names has declined greatly in the last 10 years.
59. I often forget who was with me at events I have attended.
60. Do you consciously attempt to reconstruct the day's events in order to remember something?
61. As long as I exercise my memory, it will not decline.
62. I am good at remembering the places I have been.
63. I know if I keep using my memory I will never lose it.
64. Do you try to relate something you want to remember to something else, hoping that this will increase the likelihood of your remembering later?
65. It's important that I am very accurate when remembering names of people.
66. When I am tense and uneasy at a social gathering, I cannot remember names very well.
67. Do you try to concentrate hard on something you want to remember?
68. It's important that I am very accurate when remembering significant dates.
69. It's up to me to keep my remembering abilities from deteriorating.
70. When someone I don't know very well asks me to remember something, I get nervous.
71. I have no trouble remembering where I have put things.
72. It is easier for most people to remember things that are unrelated to each other than things that are related.
73. Even if I work on it, my memory ability will go downhill.
74. Most people find it easier to remember concrete things than abstract things.
75. Do you make mental images or pictures to help you remember?
76. I know of someone in my family whose memory improved significantly in old age.
77. I am good at remembering things like recipes.
78. I get anxious when I have to do something I haven't done for a long time.
79. It bothers me when I forget an appointment.
80. Most people find it easier to remember things that happen to them than things that happen to others.

81. Do you mentally repeat something you are trying to remember?
82. My memory has improved greatly in the past 10 years.
83. I like to remember things on my own, without relying on other people to remind me.
84. I get tense and anxious when I feel my memory is not as good as other people's.
85. Do you ask other people the remind you of something?
86. I'm highly motivated to remember new things I learn.
87. I do not get flustered when I am put on the spot to remember new things.
88. I am good at remembering titles of books, films, or plays.
89. My memory has declined greatly in the last 10 years.
90. For most people it is easier to remember things in which they are most interested than things in which they are less interested.
91. I have no trouble remembering lyrics of songs.
92. My memory will get better as I get older.
93. It is easier for most people to remember bizarre things than usual things.
94. Do you write yourself reminder notes?
95. I am good at remembering names of musical selections.
96. Most people find it easier to remember visual things than verbal things.
97. After I have read a book, I have no difficulty remembering factual information from it.
98. Do you write appointments on a calendar to help you remember them?
99. I would feel very anxious if I visited a new place and had to remember how to find my way back.
100. I am good at remembering the content of news articles and broadcasts.
101. No matter how hard a person works on his memory, it cannot be improved very much.
102. If I were to work on my memory I could improve it.
103. It gives me great satisfaction to remember things I thought I had forgotten.
104. Remembering the plots of stories and novels is easy for me.
105. I am usually able to remember exactly where I read or heard a specific thing.
106. I think a good memory comes mostly from working at it.
107. Most people find it easier to remember unorganized things than organized things.
108. Do you write shopping lists?

***Assessment 10.44 Self-Concept Clarity (SCC) Survey***

This survey asks for your views about yourself. For each question, choose the response that best describes your answer.

1. My beliefs about myself often conflict with one another.
2. On one day I might have one opinion of myself and on another day I might have a different opinion.
3. I spend a lot of time wondering what kind of person I really am.
4. Sometimes, I feel that I am not really the person that I appear to be.
5. When I think about the kind of person I have been in the past, I'm not sure what I was really like.
6. I seldom experience conflict between the different aspects of my personality.
7. Sometimes I think I know other people better than I know myself.
8. My beliefs about myself seem to change very frequently.
9. If I were asked to describe my personality, my description might end up being different from one day to another.

10. Even if I wanted to, I don't think I could tell someone what I'm really like.
11. In general, I have a clear sense of who I am and what I am.
12. It is often hard for me to make up my mind about things because I don't really know what I want.

***Assessment 10.45 Satisfaction with Life Scale***

This survey asks for your views about your life. For each question, choose the response that best describes your answer.

1. In most ways my life is close to my ideal.
2. The conditions of my life are excellent.
3. I am satisfied with my life.
4. So far I have gotten the important things I want in life.
5. If I could live my life over, I would change almost nothing.

***Assessment 10.46 Revised Neuroticism-Extraversion-Openness Personality Inventory (NEO-PI-R)***

Please refer to publications for questionnaires.

***Assessment 10.47 Big 5 Inventory***

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please indicate the extent to which you agree or disagree with each statement.

1. Is talkative
2. Tends to find fault with others
3. Does a thorough job
4. Is depressed, blue
5. Is original, comes up with new ideas
6. Is reserved
7. Is helpful and unselfish with others
8. Can be somewhat careless
9. Is relaxed, handles stress well
10. Is curious about many different things
11. Is full of energy
12. Starts quarrels with others
13. Is a reliable worker
14. Can be tense
15. Is ingenious, a deep thinker
16. Generates a lot of enthusiasm
17. Has a forgiving nature
18. Tends to be disorganized
19. Worries a lot
20. Has an active imagination
21. Tends to be quiet
22. Is generally trusting
23. Tends to be lazy
24. Is emotionally stable, not easily upset

25. Is inventive
26. Has an assertive personality
27. Can be cold and aloof
28. Perseveres until the task is finished
29. Can be moody
30. Values artistic, aesthetic experiences
31. Is sometimes shy, inhibited
32. Is considerate and kind to almost everyone
33. Does things efficiently
34. Remains calm in tense situations
35. Prefers work that is routine
36. Is outgoing, sociable
37. Is sometimes rude to others
38. Makes plans and follows through with them
39. Gets nervous easily
40. Likes to reflect, play with ideas
41. Has few artistic interests
42. Likes to cooperate with others
43. Is easily distracted
44. Is sophisticated in art, music, or literature

***Assessment 10.48 Personality Survey***

On the following pages, there are phrases describing people's behaviors. Please describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of your gender and age. Please read each statement carefully, and select the response that best describes your answer.

1. Being neat is not exactly my strength.
2. Organization is a key component of most things I do.
3. I need a neat environment in order to work well.
4. I become annoyed when things around me are disorganized.
5. For me, being organized is unimportant.
6. Half of the time I do not put things in their proper place.
7. Most of the time my room is in complete disarray.
8. Every item in my room and on my desk has its own designated place.
9. I frequently forget to put things back in their proper place.
10. I hate when people are sloppy.
11. If I could get away with it, I would not pay taxes.
12. I would lie without hesitation if it serves my purpose.
13. I could be insincere and dishonest if situation required me to do so.
14. If I find money laying around, I'll keep it to myself.:
15. If I cashier forgot to charge me for an item I would tell him/her.
16. I would rather get a bad grade than copy someone else's homework and turn it in as my own.
17. It bothers me when people cheat on their taxes.
18. If I accidentally scratched a parked car, I would try to find the owner to pay for the repairs.

19. I firmly believe that under no circumstances it is okay to lie.
20. The people who know me best would say that I am honest.
21. I have the highest respect for authorities and assist them whenever I can.
22. People respect authority more than they should.
23. Even if I knew how to get around the rules without breaking them, I would not do it.
24. I believe that people should be allowed to take drugs, as long as it doesn't affect others.
25. I support long-established rules and traditions.
26. People who resist authority should be severely punished.
27. When I was in school, I used to break rules quite regularly.
28. In my opinion, all laws should be strictly enforced.
29. In my opinion, censorship slows down progress.
30. When working with others I am the one who makes sure that rules are observed.
31. I often rush into action without thinking about potential consequences.
32. I rarely jump into something without first thinking about it.
33. I am known to make quick, hot-headed decisions.
34. I do not take unnecessary risks.
35. I am easily talked into doing silly things.
36. My friends say I am unpredictable.
37. I get into trouble because I act on impulses rather than on thoughts.
38. I am careful with what I say to others.
39. I dislike being around impulsive people.
40. Even under time pressure, I would rather take my time to think about my answer than to say the first thing that comes to mind.
41. I carry out my obligations to the best of my ability.
42. I often feel responsible for making sure that all group project assignments are completed.
43. I go out of my way to keep my promises.
44. Sometimes it is too much of a bother to do exactly what is promised.
45. I would gladly spend some of my leisure time trying to improve my community.
46. If I am running late to an appointment, I may decide not to go at all.
47. I am usually not the most responsible group member, but I will not shirk on my duties either.
48. If I am running late, I try to call ahead to notify those who are waiting for me.
49. When I make mistakes I often blame others.
50. I have a reputation for being late for almost every meeting or event.
51. I have high standards and work toward them.
52. I go above and beyond of what is required.
53. I do not work as hard as the majority of people around me.
54. I invest little effort into my work.
55. I demand the highest quality in everything I do.
56. I try to be the best at anything I do.
57. I make every effort to do more than what is expected of me.
58. I do what is required, but rarely anything more.
59. Setting goals and achieving them is not very important to me.
60. Getting average grades is enough for me.
61. I have a rich vocabulary.
62. I use difficult words.

63. I make insightful remarks.
64. I show a mastery of language.
65. I enjoy thinking about things.
66. I try to understand myself.
67. I am not interested in abstract ideas.
68. I will not probe deeply into a subject.
69. I have a poor vocabulary.
70. I dislike learning.
71. I skip difficult words while reading.
72. I am full of ideas.
73. I have excellent ideas.
74. I carry the conversation to a higher level.
75. I come up with bold plans.
76. I quickly think up new ideas.
77. I am good at many things.
78. I do not have a good imagination.
79. I have difficulty imagining things.
80. I can't come up with new ideas.
81. I learn quickly.
82. I use my brain.
83. I excel in what I do.
84. I look at the facts.
85. I meet challenges.
86. I seek explanations of things.
87. I need things explained only once.
88. I know how to apply my knowledge.
89. I can handle complex problems.
90. I am quick to understand things.
91. I catch on to things quickly.
92. I love to read challenging material.
93. I am able to find out things by myself.
94. I can handle a lot of information.
95. I quickly get the idea of things.
96. I avoid difficult reading material.
97. I try to avoid complex people.
98. I don't understand things.
99. I like to solve complex problems.
100. I ask questions that nobody else does.
101. I know the answers to many questions.
102. I challenge others' point of view.
103. I can easily link facts together.
104. I have difficulty understanding abstract ideas.
105. I avoid philosophical discussions.
106. I am not interested in theoretical discussions.
107. I consider myself an average person.
108. I am not interested in speculating about things.

***Assessment 10.49 NIH Toolbox Emotion Measures***

Please refer to publications for questionnaires.

***Assessment 10.50 Scale of Positive and Negative Experience (SPANE)***

Please think about what you have been doing and experiencing during the past four weeks. Then report how much you experienced each of the following feelings:

1. During the past 4 weeks, I experienced feeling: Positive
2. During the past 4 weeks, I experienced feeling: Negative
3. During the past 4 weeks, I experienced feeling: Good
4. During the past 4 weeks, I experienced feeling: Bad
5. During the past 4 weeks, I experienced feeling: Pleasant
6. During the past 4 weeks, I experienced feeling: Unpleasant
7. During the past 4 weeks, I experienced feeling: Happy
8. During the past 4 weeks, I experienced feeling: Sad
9. During the past 4 weeks, I experienced feeing: Afraid
10. During the past 4 weeks, I experienced feeling: Joyful
11. During the past 4 weeks, I experienced feeling: Angry
12. During the past 4 weeks, I experienced feeling: Contented

***Assessment 10.51 Psychological Well-being (SWQ)***

This survey asks for your views about yourself. For each question, choose the response that best describes your answer.

1. Most people see me as loving and affectionate.
2. Sometimes I change the way I act or think to be more like those around me.
3. In general, I feel I am in charge of the situation in which I live.
4. I am not interested in activities that will expand my horizons.
5. I feel good when I think of what I've done in the past and what I hope to do in the future.
6. When I look at the story of my life, I am pleased with how things have turned out.
7. Maintaining close relationships has been difficult and frustrating for me.
8. I am not afraid to voice my opinions, even when they are in opposition to the opinions of most people.
9. The demands of everyday life often get me down.
10. In general, I feel that I continue to learn more about myself as time goes by.
11. I live life one day at a time and don't really think about the future.
12. In general, I feel confident and positive about myself.
13. I often feel lonely because I have few close friends with whom to share my concerns.
14. My decisions are not usually influenced by what everyone else is doing.
15. I do not fit very well with the people and the community around me.
16. I am the kind of person who likes to give new things a try.
17. I tend to focus on the present, because the future nearly always brings me problems.
18. I feel like many of the people I know have gotten more out of life than I have.
19. I enjoy personal and mutual conversations with family members or friends.
20. I tend to worry about what other people think of me.
21. I am quite good at managing the many responsibilities of my daily life.
22. I don't want to try new ways of doing things - my life is fine the way it is.

23. I have a sense of direction and purpose in life.
24. Given the opportunity, there are many things about myself that I would change.
25. It is important to me to be a good listener when close friends talk to me about their problems.
26. Being happy with myself is more important to me than having others approve of me.
27. I often feel overwhelmed by my responsibilities.
28. I think it is important to have new experiences that challenge how you think about yourself and the world.
29. My daily activities often seem trivial and unimportant to me.
30. I like most aspects of my personality.
31. I don't have many people who want to listen when I need to talk.
32. I tend to be influenced by people with strong opinions.
33. If I were unhappy with my living situation, I would take effective steps to change it.
34. When I think about it, I haven't really improved much as a person over the years.
35. I don't have a good sense of what it is I'm trying to accomplish in life.
36. I made some mistakes in the past, but I feel that all in all everything has worked out for the best.
37. I feel like I get a lot out of my friendships.
38. People rarely talk me into doing things I don't want to do.
39. I generally do a good job of taking care of my personal finances and affairs.
40. In my view, people of every age are able to continue growing and developing.
41. I used to set goals for myself, but that now seems like a waste of time.
42. In many ways, I feel disappointed about my achievements in life.
43. It seems to me that most other people have more friends than I do.
44. It is more important to me to fit in with others than to stand alone on my principles.
45. I find it stressful that I can't keep up with all of the things I have to do each day.
46. With time, I have gained a lot of insight about life that has made me a stronger, more capable person.
47. I enjoy making plans for the future and working to make them a reality.
48. For the most part, I am proud of who I am and the life I lead.
49. People would describe me as a giving person, willing to share my time with others.
50. I have confidence in my opinions, even if they are contrary to the general consensus.
51. I am good at juggling my time so that I can fit everything in that needs to be done.
52. I have a sense that I have developed a lot as a person over time.
53. I am an active person in carrying out the plans I set for myself.
54. I envy many people for the lives they lead.
55. I have not experienced many warm and trusting relationships with others.
56. It's difficult for me to voice my own opinions on controversial matters.
57. My life is busy, but I derive a sense of satisfaction from keeping up with everything.
58. I do not enjoy being in new situations that require me to change my old familiar ways of doing things.
59. Some people wander aimlessly through life, but I am not one of them.
60. My attitude about myself is probably not as positive as most people feel about themselves.
61. I often feel as if I'm on the outside looking in when it comes to friendships.
62. I often change my mind about decisions if my friends or family disagree.
63. I get frustrated when trying to plan my daily activities because I never accomplish the things I set out to do.

64. For me, life has been a continuous process of learning, changing and growth.
65. I sometimes feel as if I've done all there is to do in life.
66. Many days I wake up feeling discouraged about how I have lived my life.
67. I know that I can trust my friends, and they know they can trust me.
68. I am not the kind of person who gives in to social pressures to think or act in certain ways.
69. My efforts to find the kinds of activities and relationships that I need have been quite successful.
70. I enjoy seeing how my views have changed and matured over the year.
71. My aims in life have been more a source of satisfaction than frustration to me.
72. The past had its ups and down, but in general, I wouldn't want to change it.
73. I find it difficult to really open up when I talk to others.
74. I am concerned about how other people evaluate the choices I have made in my life.
75. I have difficulty arranging my life in a way that is satisfying to me.
76. I gave up trying to make big improvements or changes in my life a long time ago.
77. I find it satisfying to think about what I have accomplished in life.
78. When I compare myself to friends and acquaintances, it makes me feel good about who I am.
79. My friends and I sympathize with each other's problems.
80. I judge myself by what I think is important, not by the values of what others think is important.
81. I have been able to build a home and a lifestyle for myself that is much to my liking.
82. There is truth to the saying that you can't teach an old dog new tricks.
83. In the final analysis, I'm not so sure that my life adds up to much.
84. Everyone has their weaknesses, but I seem to have more than my fair share.