

HABS Public Data Release 2.0 Non-Imaging Notes

A. Common Variables

SubjID: Unique random subject identifiers. All measures and all image files are denoted with a SubjID identifier.

StudyArc: Collection Designation. Codes the collection cycle associated with the Data, HAB_1.0 is baseline, HAB_2.0 is one year followup, etc... Designations such as HAB_2.6 refer to years.months which would be 18m from baseline.

X_SessionDate: Specific Date of collection for a given measure or set of measures, with the prefix denoting the modality associated with the data. Note that dates are blinded. Every subject is assigned a random large integer and all dates for a subject are adjusted by this constant. This will mean that all date will appear to be from the future. All dates are provided in standard SQL format of YYYY-MM-DD (Year-Month-Day) Also note that for accessibility reasons all spreadsheets are provided in .csv format. If you open these spreadsheets in excel be aware that excel will automatically reformat dates and may corrupt date information if the date formatting is not returned to YYYY-MM-DD prior to saving the file. This can be done by highlighting the column of dates (prior to saving for the first time) and then going to Format>Cells>Custom and typing 'yyyy-mm-dd' in the Type dialogue box and clicking 'OK'.

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B. Demographic variables

Time: The amount of time, in years, from the initial baseline assessment.

NP_Age: Age at time of Neuropsych assessment (rounded to the nearest quarter year).

BiologicalSex: Self report of biological sex, all values were provided by participants as either M (male) or F (female).

VIQ: This measure comes from the American National Adult Reading Test (AmNART). The AmNART estimates premorbid IQ through correct pronunciation of irregularly spelled words, such as "aisle". The participant is asked to read 50 English words, and the numbers of errors in pronunciation are counted; these errors correspond to a Standard Score of Verbal IQ. Source: Ryan J, Paolo A, 1991; Nelson and Willison, 1991; Storandt, Stone, and LaBarge, 1995.

YrsOfEd: Years of education. 1-12 denote number of years of primary and secondary education. 13 is "some college", 14 is an associates degree, 16 is a bachelors degree, 18 is a masters degree, and 20 is a professional degree (e.g. medical school, law school, or PhD).

Race: Self report of racial identity. AS = Asian, B = Black, NA = Native American, W = Caucasian.

Ethnicity: H = Hispanic, NH = not Hispanic

Hollingshead: A measure of socioeconomic status based on four domains: marital status, retired/employed status, educational attainment, and occupational attainment

APOE_haplotype: Codes which APOE alleles (2, 3, or 4) are present on each chromosome (22, 23, 24, 33, 34, 44).

E4_Status: Codes for the presence or absence of the e4 risk allele.

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C. Clinical Variables

HABS_DX: Consensus diagnosis of cognitive status at each observation. CN = Cognitively Normal. MCI = Mild Cognitive Impairment. Demented = Clinically Demented. Quarterly consensus meetings are conducted with 6 or more clinicians as part of a multidisciplinary team. Participants are brought to consensus if they have a global Clinical Dementia Rating score of 0.5 and/or performance falls 1.5 standard deviations below the sample mean on any individual domain-specific composite score. Diagnoses are determined by clinical consensus after reviewing the CDR, cognitive data, and relevant medications/medical history.

CDR_Global: Global score from the Clinical Dementia Rating scale.

CDR_SB: Sum of boxes from the Clinical Dementia Rating scale.

CDR_Memory: Indicates the portion of the CDR_Global score that comes from the memory box.

The CDR measures dementia severity through a structured interview protocol by a qualified clinician. The interview is conducted with the participant and caregiver/informant. The assessment is calculated on the basis of testing six different cognitive and behavioral domains on a scale of 0-3: memory, orientation, judgment and problem solving, community affairs, home and hobbies performance, and personal care.

From this, a five-point scale is derived, where 0 indicates no cognitive impairment, 0.5 is very mild dementia, 1 is mild, 2 is moderate, and 3 is severe.

Source(s): Morris JC, 1993.

MMSE_Total: Total score from the Mini Mental State Exam

MMSE_Orientation: Orientation (location + time)

MMSE_ImmRecall: Immediate recall of 3 words

MMSE_AttnCalc: Attention calculation (serial subtraction of 7's from 100; if serial 7's is not completed correctly, the word WORLD is spelled backward; highest score recorded)

MMSE_DeIRecall: Delayed recall of 3 words

MMSE_Language: Language (includes naming, repetition, 3-step command, reading, writing)

MMSE_Pentagons: Pentagons

The MMSE test measures cognitive impairment through a 30 item questionnaire. The MMSE is a quick test of orientation, short term memory, attention, language and visuospatial construction. A score is given in each section reaching a maximum point of 30.

Source(s): Folstein MF, et al., 1975.

GDS: The total score (max=30) from the geriatric depression scale.

The GDS is used to help identify depression in older adults. This is a 30 item self-report questionnaire in which the participants are asked to respond by answering yes or no in reference to how they have felt in the last two weeks.

Source(s): Yesavage JA, et al., 1982.

Hachinski: The Hachinski ischemia total score.

The Hachinski Ischemia Score represents a brief clinical tool helpful in the "bedside" differentiation of the most common dementia types, Alzheimer's vs Vascular Dementia. Items distinguishing dementia types were stepwise deterioration, fluctuating course, hypertension, history of stroke, and focal neurological symptoms. It is not useful in determinations between mixed dementia and other dementia types.

Source(s): Hachinski et al., 1975; Moroney, J.T., 1997; Molsa P.K. et al., 1985

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D. Cognitive Variables

Boston Naming Test (BNT)

The Boston Naming Test consists of 30 large ink drawings of items ranging in familiarity from such common ones as “tree” and “pencil” at the beginning of the test to “sphinx” and “trellis” at the end. BNT as a whole is made up of 60 total questions but is broken down into two versions with 30 questions given at a time (even/odd). If a person does not recognize something, semantic and phonemic cues are given.

Source(s): EF Kaplan, Goodglass, and Weintraub, 1983; Goodglass and Kaplan, 2001.

BNT_30: Sum of words recalled (including semantic cues) - without cue + number correct semantic.

Odd and even 30-item versions of the BNT are administered alternately each year, starting with the odd version in year 1 followed by the even version in year 2, etc.

Category Fluency Test (CAT)

Participants are asked to produce as many unique items as possible in 1 minute which belong to a certain category. Over 3 minutes, they are asked to recall first animals, vegetables, and then fruits.

Source(s): Monsch AU, Bondi MW, Butters N, et al., 1992.

CAT3: Total score correct for all three categories

CAT_Animal_Total: Total for Animals.

CAT_Vegetable_Total: Total for Vegetables.

CAT_Fruit_Total: Total for Fruits.

Digit Span Test

The Digits Span test evaluates participant’s working memory and attention span by reading a long sequence of numbers and asking them to repeat the same sequence back to the examiner in forward or backwards order. The testing stops when the participant does not correctly repeat either trial sequence or when the maximal list length is reached (9 digits forward, 8 backwards).

Source(s): Wechsler D, 1981.

Digits_Forward: Digit Span forward.

Digits_Backward: Digit Span backwards.

Digit Symbol Test

The Digit Symbol test measures cognitive dysfunction through matching symbols to numbers. The participant is given a key where numbers 1-9 are assigned a corresponding symbol. The participant has 90 seconds to fill in the correct corresponding symbol under a random series of numbers. Total correct responses is summed.

Source(s): Wechsler D, 1981.

DigitSym: Total correct responses.

Phonemic Fluency (FAS)

The Phonemic Fluency (FAS) test measures cognitive dysfunction through phonemic word fluency and involves access retrieval from memory. The test asks the participant to name as many words beginning with a single letter (F, A, and S) within a minute without using proper nouns or different tenses of the same word. The total number of words form the result.

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The cutoff for individuals with 16 years of education is 3, the cutoff for individuals with 12-15 years of education is 7, the cutoff for individuals with 9-11 years of education is 9, the cutoff for females with 9 years of education is 12, and the cutoff for males with 9 years of education is 17.

Source(s): Benton AL, Varney NR, Hamsher KD, et al., 1983; Patterson J, 2011.

FAS_Total: Sum of scores from F, A, and S.

FAS_F_Total: Total number of words beginning with F.

FAS_A_Total: Total number of words beginning with A.

FAS_S_Total: Total number of words beginning with S.

Free and Cued Selective Reminding Test (FCsrt)

The Free and Cued Selective Reminding Test (FCsrt) helps identify very mild dementia through memory retrieval. The result of this test can be based on three scoring procedures: free recall, total recall, and cue efficiency. The participant is asked to remember 16 images that are associated with categories. In the free recall trial, the participant lists all images that can be remembered. In the subsequent cued trial, the examiner prompts the participant with the category that belongs to the images that were not recounted during the previous free recall trial. The trials trade off (free, cued, free, cued etc.) for a total of 3 free recall trials and 3 cued recall trials. The final score is calculated by adding up the total number of images recalled for every free recall trial and for every cued recall trial, where each cued recall trial is equal to the sum of the free recall total plus the correct cued response.

Source(s): Grober E, Hall C, Sanders AE, & Lipton RB, 2008.

FCsrt_FNC: Total of Free and Cued Recall.

FCsrt_Free: Total of Free Recall.

Alternate versions of the FCsrt are administered in the following order: A-B-C-A-B-C. Further information about the FCSRT version administered in HABS can be found in Papp et al. *Neurology* 2017.

Letter-Number Sequencing Test (LetterNum)

The Letter-Number Sequencing Test (LetterNum), tests working memory and attention span. The examiner reads a list of combinations of letters and numbers, and the participant is asked to recite them back with the numbers first in ascending order and then the letters in alphabetical order. The result is measured for every correct answer, with 1 point given for every answer correct.

Source(s): Wechsler D, 1997.

LetterNum_Total: Total score.

Logical Memory (LogicMem)

A short story is orally presented and the participant is asked to repeat the story. Following a 20-30 minute delay, the participant is asked to recall as many details as possible from the story.

Source(s): Wechsler D, 1987.

LogicMem_IL: Measure of immediate learning.

LogicMem_DR: Measure of delayed recall.

Selective Reminding Test (SRT)

The Selective Reminding Test (SRT) measures verbal learning and memory through a multiple trial list-learning task. The examiner reads a list of 12 unrelated words and the participant is asked to immediately recall as many words as possible. On each subsequent trial, the participant is presented with only the words they failed

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to recall on the previous trial until a total of 6 trials are completed. After a brief delay, they are asked to produce as many words as they can remember. For those words they cannot retrieve, they must select the correct word from a 4-item multiple choice.

Source(s): Masur DM, et al., 1990.

SRT_dr: Delayed Recall.

SRT_cltr: Continuous long term retrieval: number of words recalled over three consecutive trials.

SRT_cr: Continuous retrieval: number of words consistently retrieved between two consecutive trials.

SRT_ltr: Long term retrieval: number of words retrieved from long term storage.

SRT_lts: Long term storage: number of words recalled on 2 consecutive trials without reminder between trials.

SRT_mc: Recognition recall.

SRT_str: Short term retrieval: number of words retrieved from short term storage

SRT_tr: Total recall.

The same version of the SRT is administered each year. Further description of the SRT in HABS can be found in Hedden et al. J Neuroscience 2012 and Papp et al. Neuropsychologia 2015.

Trail Making Test (TMT)

The Trail Making Test (TMT) measures cognitive impairment potential impairment through a visual attention and task switching task. The test consists of two parts containing numbered and lettered circles. In the first (Part A), the participant is asked to draw a line to connect the circled numbers in numerical sequence (1, 2, 3, etc) as quickly as possible. In the second (Part B), the participant is asked to alternate between numbers and letters in sequential order (1, A, 2, B, 3, etc). The goal is to finish in correct order as quickly as possible and the total test time is then used to measure the results.

Source(s): Reitan R., 1979.

TMT_A: Time to complete part A (in seconds).

TMT_B: Time to complete part B (in seconds).

Visual Form Discrimination Test (VFDT)

The Visual Form Discrimination Test (VFDT) measures attentional functions and visual perception. The test is a 16 item multiple choice like design. Each item has a target and four stimuli directly below the target, one of which is an identical match and the other three contain minor variation, peripheral elements or distortion of the major shape. All stimuli are presented simultaneously with no time limit. The scoring of the test is based on a correct match (2 points), incorrect match that includes an error involving peripheral element (1 point), or incorrect match involving a major shape (0 points), the total score is then summed up and evaluated.

Source(s): Benton AL, et al., 1983.

VFDT: Total score

Structured Telephone Interview of Dementia Assessment (STIDA)

STIDA is a 7-item questionnaire of subjective cognitive complaints consisting of seven yes/no questions. It assesses an individual's subjective complaints by asking questions regarding their ability to remember information, understand instructions, follow conversations, and find their way around.

Source: Amariglio RE, Townsend MK, Grodstein F, Sperling RA, Rentz DM. Specific subjective memory complaints in older persons may indicate poor cognitive function. J Am Geriatr Soc. Wiley Online Library; 2011 Sep;59(9):1612–1617. PMID: PMC3315361

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STIDA (written as DemoMemQ): Sum of 7 items regarding subjective memory complaints.

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E. PACC Variables (the Preclinical Alzheimer Cognitive Composite)

The standardization of variables utilized standard normalization of subtracting the sample mean and dividing by the sample variance (SD). Means and SDs were based on the full HABS baseline sample (CDR = 0; n=298).

PACC96: Is an average of standardized tests including the MMSE, Logical Memory (delayed recall), Digit Symbol Coding, and FCsrt96 (sum of free recall and total score added together).

PACC96_MeasUsed: Indicates which measures were present and passed QA for each observation.

PACC5: Is an average of standardized tests including the MMSE, Logical Memory (delayed recall), Digit Symbol Coding, and FCsrt96 (sum of free recall and total score added together), as well as the CAT3.

PACC5_MeasUsed: Indicates which measures were present and passed QA for each observation.

MMSE_Z: Standardized MMSE total score

CAT3_Z: Standardized CAT3 total score.

DigitSym_Z: Standardized DigitSymbol score. This was only used for participants with a VIQ greater than 119, Mean and standard deviation used to normalize differed depending on an individual's years of education.

LogicMem_DR_Z: Standardized Logical Memory delayed recall score.

FCsrt96_Z: Standardized FCsrt96 (sum of free and total recall measures).