Add Health
The National Longitudinal Study of Adolescent to Adult Health

Report prepared by

Allison E. Aiello

Rebecca C. Stebbins

Cherese N.B. Parker

Farizah I. Rob

David A. Bennett

Jennifer J. Manly

Brenda L. Plassman

Robert A. Hummer

Animal Naming Test User Guide

Add CAPS
Add Health Cognitive Assesment, Physical, and Sensory Function

UNC CAROLINA POPULATION CENTER

CAROLINA POPULATION CENTER | CAROLINA SQUARE - SUITE 210 | 123 WEST FRANKLIN STREET | CHAPEL HILL, NC 27516

https://doi.org/10.17615/2ve4-c908

Acknowledgement:

Data collection and dissemination for Wave VI of Add Health was funded by cooperative agreements U01 AG071448 (PI: Robert A. Hummer) and U01 AG071450 (MPIs: Robert A. Hummer and Allison E. Aiello) from the National Institute on Aging to the University of North Carolina at Chapel Hill, with cooperative funding from five other institutes and offices at the National Institutes of Health: the Eunice Kennedy Shriver National Institute of Child Health and Human Development, the National Institute on Minority Health and Health Disparities, the National Institute on Drug Abuse, the Office of Disease Prevention, and the Office of Behavioral and Social Science Research. Waves I-V of Add Health were funded by grant P01 HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 23 other federal agencies and foundations. Add Health is currently directed by Robert A. Hummer at the University of North Carolina at Chapel Hill. Add Health was designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill.

Important Note: The above acknowledgement should be included in all presentations and publications using data from Wave VI of Add Health.

Citation for User Guide:

Aiello A.E., Rob F.I., Stebbins, R.C., Parker, C.N.B., Bennett D.A., Manly J.J., Plassman B.L., and Hummer R.A. Date. *Animal Naming Test User Guide.* Chapel Hill, NC: Carolina Population Center, University of North Carolina at Chapel Hill. doi:10.17615/2ve4-c908

Table of Contents

1. Introduction

The National Longitudinal Study of Adolescent to Adult Health (Add Health) is a nationally representative sample of U.S. adolescents who were in grades 7-12 during the 1994-1995 school year. Using a complex, school-based cluster-sampling frame, researchers selected high school and feeder school pairs from 80 communities across the United States and drew a sex- and grade-stratified random sample of 20,745 adolescents for inclusion in the study. This sample has been followed from adolescence into early midlife across six waves of data collection to date, with the most recent wave of data collection (Wave VI) taking place between 2022 and 2025 when participants were ages 39 to 51, with an average age of 44.

Over the years, Add Health has collected a wealth of information from participants and their parents about demographic characteristics, familial structures, social relationships, health behaviors, cognition, physical and mental health status, medication usage, and health care access. Add Health also has collected anthropometric, cardiovascular, metabolic, renal, hepatic, inflammatory/immune, infectious, neurodegenerative, and multi-omic biomarkers from participants. In addition, Add Health has merged multilevel contextual data about the economic, school, neighborhood, policy, and environmental contexts in which the participants are embedded to the core survey and biological data at each wave. The Add Health dataset thereby provides researchers with rich opportunities to explore the causes and consequences of health status across multiple contextual domains as individuals age across the life course.

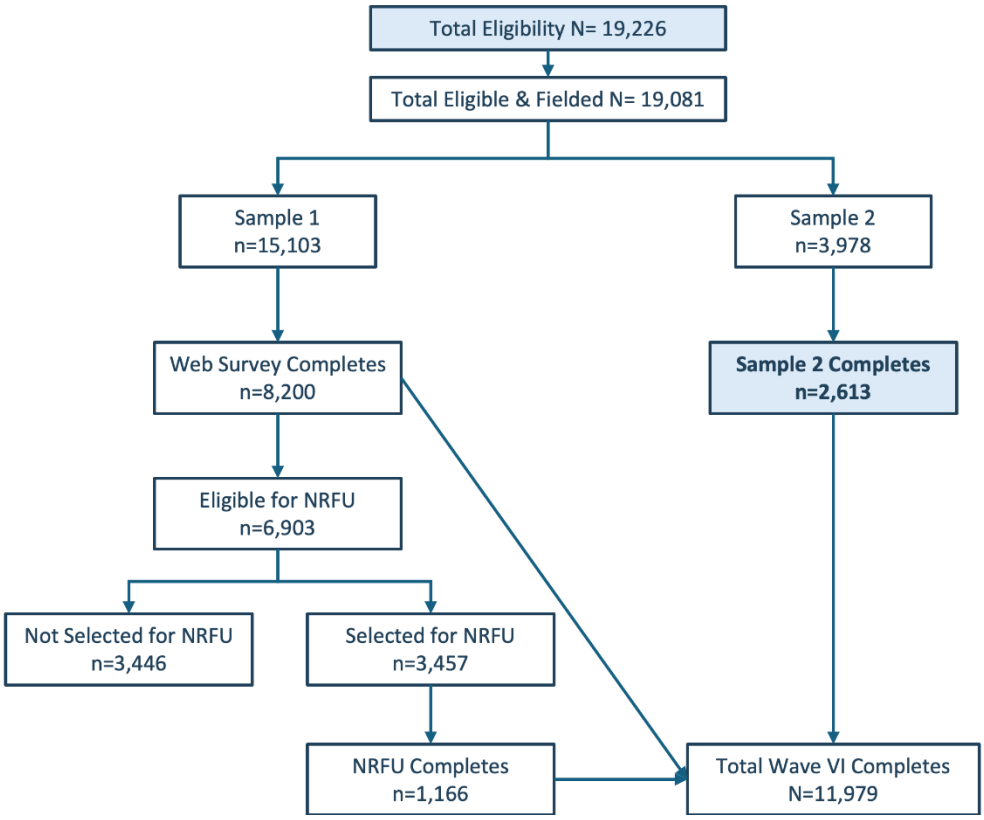
Given the breadth of measures and longitudinal design, Add Health offers a unique opportunity to explore the early origins of cognitive functioning and to track changes in dementia risk within a nationally representative cohort that has been followed since early adolescence. A key objective of Wave VI of Add Health was to significantly expand the measurement of cognitive domains. This wave introduced the Add Health Cognitive Assessment, Physical, and Sensory Function (Add CAPS) battery, designed to support long-term tracking of cognitive, physical, and sensory function. These data lay the groundwork for detecting early signs of cognitive impairment and risk for Alzheimer's disease and related dementias (AD/ADRD) in midlife. The full list of Add CAPS assessments can be found in **Table 1.**

Add CAPS User Guide	Add CAPS Data Set	Add CAPS Assessment	Cognitive Domain Measured
TestMyBrain	accb1_6.sas7bdat	Verbal Paired Associates	Episodic Memory
		Digit Symbol Matching	Processing Speed
		Gradual Onset Continuous Performance Test	Executive Functioning
		Backward Digit Span	Working Memory
NIH Toolbox Cognition	accb3_6.sas7bdat	Dimensional Change Card Sort Test	Executive Functioning
		Pattern Comparison Processing Speed Test	Processing Speed
		Picture Vocabulary Test	Language/Semantic Fluency
Interviewer-Administered Word Recall and Backward Digit Span	accb2_6.sas7bdat	Immediate Word Recall	Episodic Memory
		Delayed Word Recall	Episodic Memory
		Backward Digit Span	Working Memory
Animal Naming Test	acaf_6.sas7bdat	Animal Naming Test	Language/Semantic Fluency
Sensory Function	acsb_6.sas7bdat	hearX hearTest	
Physical Function	acpb_6.sas7bdat	Handgrip Strength	

Table 1. Wave VI Add CAPS assessments and corresponding datasets and User Guides.

Add Health Wave VI was divided into two nationally representative subsamples: Sample 1 and Sample 2 (as detailed in the Sampling and Mixed-Mode Survey Design User Guide; see Hummer et al. 2025). The breakdown of Wave VI sample assignments can be seen in **Figure 1.** Sample 1 members received a primarily web-based, two-phase mixed-mode design, which included web-based cognitive assessments (see the TestMyBrain User Guide (Aiello et al. 2025)). Sample 2 members (N=2,613) received an in-person interview which included the Sample 1 survey content plus in-person cognitive, physical, and sensory functioning assessments (the remaining Add CAPS assessments). At the end of Sample 2 data collection, a small number of Sample 2 members who could not schedule an in-person interview were permitted to complete the web survey and thus did not receive the in-person Add CAPS assessments (N=70).

Figure 1: Overview of Wave VI Sample Design and Completes



The Animal Naming Test was conducted only among Sample 2 participants (N=2,613). Data included in the Animal Naming Test dataset can be linked to the full survey data with the Sample 2 Mixed-Mode Survey data file (w6s2.sas7bdat), described in the Wave VI Sampling and Mixed-Mode Survey User Guide (Hummer et al. 2025, https://addhealth.cpc.unc.edu/wp-content/uploads/docs/user_guides/WaveVISamplingMixedModeSurveyUserGuide.pdf) and the Wave VI Sample 2: Mixed-Mode Survey Codebook (https://addhealth.cpc.unc.edu/wp-content/uploads/docs/restricted_use/WaveVISample2MixedModeSurveyCodebook.pdf). For cross-sectional estimations of the Add CAPS assessments in Sample 2, optimized Sample 2 weights have been created (variable GSW6_2) and should be used in all corresponding analyses.

For further details on the weighting methodology and usage recommendations, please see the Guide to Using Cross-Sectional and Longitudinal Weights in Add Health Wave VI (see Liao et al. 2025).

The inclusion of an Animal Naming Test in Add Health Wave VI reflects our commitment to collecting prospective, in-home neurological measures in early midlife among a nationally representative sample. By using standard interviewer-administered neurological assessment practices, this approach facilitates comparison with similar in-person measures collected in other nationally representative studies.

2. General Overview of Animal Naming Test Administration

The Animal Naming Test is a widely used measure of verbal fluency, assessing an individual's ability to generate words within a semantic category under time constraints. Participants are asked to name as many animals as possible within a fixed time period. The primary research outcome for this test is the total number of unique, valid animal names produced within 60 seconds.

2.1 Recording Equipment

The majority of interviews were conducted using Dell Latitude 3340 13.3" laptops with integrated microphones. However, some interviews early on in data collection were also conducted using HP ProBook 650 G3 15.6" laptops. Additionally, interviewers received instructions on laptop placement during test administration to ensure high-quality audio recordings.

3. Animal Naming Test

3.1 Rationale

The Animal Naming Test is a verbal fluency measure that is used to assess the cognitive domain of semantic fluency. Including this test in a cognitive battery for 40-year-olds is justified by its sensitivity to early changes in cognitive domains that are vulnerable to aging and neurological decline, particularly in frontal and temporal brain regions (Sharma & Malek-Ahmadi, 2022; Rofes et al., 2023). At midlife, performance on semantic fluency tasks can provide valuable insights into language processing, cognitive flexibility, and retrieval efficiency, serving as an early indicator of cognitive health and potential risk for later cognitive impairment (Cintoli et al., 2025).

3.2 Measurement and Protocol

In this task, participants were asked to generate as many unique animal names as possible within a 60-second period.

The interviewer introduced the task with standard instructions: “For this next task, I am going to ask you to name as many animals as you can think of in 60 seconds. I’m going to start the timer and let you know when to begin.” (INTERVIEWER: IF THE PARTICIPANT ASKS FOR CLARIFICATION OF INSTRUCTIONS, REPEAT “When we start, please tell me the names of as many animals as you can think of.”) “Tell me the names of as many animals as you can think of, as quickly as possible. Ready and start.” The interviewer then immediately pressed a “begin timer” button embedded into the digital survey.

As the participant named animals, the interviewer wrote down the animal names on a prepared Animal Naming Test form. If the participant paused for a few seconds, the interviewer encouraged them once by prompting, “Any more animals?” The participant was allowed to continue until the full 60 seconds elapsed, at which point the interviewer said, “Stop” As the timer went off, signaling the end of the exercise. The interviewer then thanked the participant and continued to the next task.

The outcome measure is the total number of distinct animal names given in 60 seconds. Repeated animals or invalid responses (e.g. non-animal words, mythical creatures) were not counted. The interviewer’s written record was later scored by counting all valid unique animal names. For example, if a participant said “dog, cat, elephant, dog, horse,” the score would be 4 (the repeat “dog” is not counted twice). If a participant named a species and then a subtype (e.g., “bird, robin”), typically both could count as long as they are considered separate concepts in semantic fluency scoring.

3.3 CARI Review/Gold-Standard Scoring

To ensure proper administration and scoring of Animal Naming Tests, the Add Health Team manually listened to, transcribed, and scored all test cases that consented to a Computer-Assisted Recording Interview (CARI) recording.

The scoring criteria is as follows: Sum the total number of unique animal names.

Include:

- All animals, including birds, fish, reptiles, insects, humans, and extinct animals (e.g., dodo, dinosaur)
- General category terms (e.g., dog) and specific instances (e.g., terriers and bulldogs) when both are given
- Count the same animal at different developmental stages (e.g., sheep and lamb, cat and kitten, etc.)

Do not include: Mythical creatures (e.g., unicorn) and proper names (e.g., Barney, King Kong)

For cases for which the participant consented to have parts of the interview recorded (CARI consent) and good audio quality, the team applied the gold-standard scoring procedure. The gold-standard scoring procedure consisted of having a research assistant listen to and transcribe the audio file from the Animal Naming Test exercise. For cases that were hard-to-hear, the Add Health team referenced the Animal Naming Test transcript from the

interviewer to determine the score and flagged the case to be reviewed by another team member. In the cases where the audio was incomprehensible or missing, the interviewer transcript was used and scored according to the scoring criteria.

Manual transcription and scoring of the interview audio files, performed by Research Assistants and other Add Health staff, were used to generate a Gold Standard (GS) score for each participant, which was compared to the automated score derived from the responses written by the interviewer. This process ensured valid score generation, detects discrepancies, and informs continuous improvements to automated scoring systems.

Scoring followed standardized criteria and accounted for valid animal names, repeated responses, and protocol deviations. Issues such as poor audio quality, interviewer errors, or environmental interruptions were systematically tracked and categorized by severity to maintain protocol fidelity.

3.4 Variable Construction

3.4.1 Animal Score [C6AF1]

Animal Naming Test score was manually computed by the Add Health team using a gold-standard scoring procedure.

3.4.2 Gold-standard score flag [C6AFF0A]

Indicates that the gold-standard scoring process described above was NOT followed for this case, because there was no audio recording to review or the file was unintelligible

3.4.3 Protocol deviation flag [C6AFF0B]

Indicates a protocol deviation occurred during the administration of the Animal Naming Test. For example, if there was an interruption during the test or if the interviewer asked the participant to slow down.

3.4.4 Qualitative Flag 1[C6AFF1]

Tests were flagged with Qualitative Flag 1 if a distraction or interruption occurred during the test.

3.4.5 Qualitative Flag 2 [C6AFF2]

Tests were flagged with Qualitative Flag 2 when an interviewer capture issue was reported.

3.4.6 Qualitative Flag 3 [C6AFF3]

Tests were flagged with Qualitative Flag 3 when a technical issue occurred.

3.4.7 Qualitative Flag 4 [C6AFF4]

Tests were flagged with Qualitative Flag 4 when the participant reported physical impairment or pain.

3.4.8 Qualitative Flag 5 [C6AFF5]

Tests were flagged with Qualitative Flag 5 when an administration or instruction issue occurred.

3.4.9 Qualitative Flag 6 [C6AFF6]

Tests were flagged with Qualitative Flag 6 when the participant reported fatigue or displayed low effort.

3.4.10 Duration [C6AFTS]

Duration of the Animal Naming Test, in seconds.

3.4.11 Time Flag 1 [C6AFTF]

Tests were flagged with C6AFTF when there was an unexpectedly long or short test duration.

3.4.12 Time Flag 2 [H6AFT*x*]

Flag assigned if duration is unexpectedly long or short for one of the following reasons:

- Technical difficulties [H6AFT1]
- Participant took a break [H6AFT2]
- Interruption [H6AFT3]
- Did not complete test [H6AFT4]
- Did not understand instructions [H6AFT5]
- Physical or cognitive disability [H6AFT6]
- Other [H6AFT7]
- Refused to participate [H6AFT8]

3.5 Quality Control

Data monitoring and quality control were conducted through creation and review of weekly summaries of discrepancies and deviations. Results were compared with published norms in the same age range as the Add Health Wave VI cohort, in order to assess the validity of the test results (Tombaugh et al., 1999).

4. The Animal Naming Test Data File (acaf_6.sas7bdat)

4.1 Structure

The structure of the disseminated Animal Naming Test data file is flat. This means that it is a participant-level data file, wherein each participant has one and only one record. The participant identifier (AID) will appear in the data file only once.

4.2 Contents

Variable Name	**Variable Description**
AID	RESPONDENT IDENTIFIER NUMBER

C6AF1	S15D AF ANIMAL FLUENCY SCORE-W6
C6AFF1	S15D AF DISTRACTION OR INTERRUPTION-W6
C6AFF2	S15D AF FI CAPTURE ISSUES-W6
C6AFF3	S15D AF TECHNICAL ISSUE-W6
C6AFF4	S15D AF PHYSICAL IMPAIRMENT OR PAIN-W6
C6AFF5	S15D AF ADMINISTRATION OR INSTRUCTION-W6
C6AFF6	S15D AF FATIGUE OR LOW EFFORT-W6
C6AFF0A	S15D AF NOT CONSTRUCTED FROM AUDIO RECORDING-W6
C6AFF0B	S15D AF PROTOCOL DEVIATION FLAG FROM AUDIO RECORDING-W6
C6AFTF	S15D AF DURATION FLAG-W6
C6AFTS	S15D AF DURATION SECONDS-W6
H6AFT1	S15DQ1A AF TECHNICAL DIFFICULTIES-W6
H6AFT2	S15DQ1B AF TOOK A BREAK-W6
H6AFT3	S15DQ1C AF INTERRUPTION DURING ANY TESTS-W6
H6AFT4	S15DQ1D AF DID NOT COMPLETE ALL TESTS-W6
H6AFT5	S15DQ1E AF DID NOT UNDERSTAND INSTRUCT-W6
H6AFT6	S15DQ1F AF PHYSICAL/COGNITIVE DISABILITY-W6
H6AFT7	S15DQ1G AF SOME OTHER REASON(S)-W6
H6AFT8	S15DQ1H AF REFUSED TO PARTICIPATE-W6

5. References

Cintoli, S., Favilli, L., Morganti, R., Siciliano, G., Ceravolo, R., & Tognoni, G. (2024). Verbal fluency patterns associated with the amnestic conversion from mild cognitive impairment to dementia. *Scientific Reports*, *14*(1), 2029.

Hummer RA, Dean SC, Liao D, Cooney D, Jackson C, Griffiths A, Aiello AE. 2025. Add Health Wave VI Documentation: Wave VI Sampling and Mixed-Mode Survey Design. Chapel Hill, NC: Carolina Population Center, University of North Carolina at Chapel Hill. doi:10.17615/ydjb-4305

Liao, D., Cooney, D. Aiello, A.A., Hummer, R.A. 2025. Add Health Wave VI Documentation: Guide to Using Cross-Sectional and Longitudinal Weights in Wave VI. Chapel Hill, NC: Carolina Population Center, University of North Carolina at Chapel Hill. doi:10.17615/8s2m-yk29

Rofes, Adrià, et al. What drives task performance in animal fluency in individuals without dementia? The SMART-MR study. *J Speech Lang Hear Res*. 2023;66(9):3473-3485. doi:10.1044/2023_JSLHR-22-00445

Sharma, Vivek Attri, and Michael H. Malek-Ahmadi. Meta-Analysis of Animal Fluency Performance in Amnestic Mild Cognitive Impairment and Cognitively Unimpaired Older Adults. Alzheimer Dis Assoc Disord. 2023;37(3):259-264. doi:10.1097/WAD.0000000000000568

Tombaugh, Tom N., Jean Kozak, and Laura Rees. Normative data stratified by age and education for two measures of verbal fluency: FAS and animal naming. *Arch Clin Neuropsychol*. 1999;14(2):167-177.