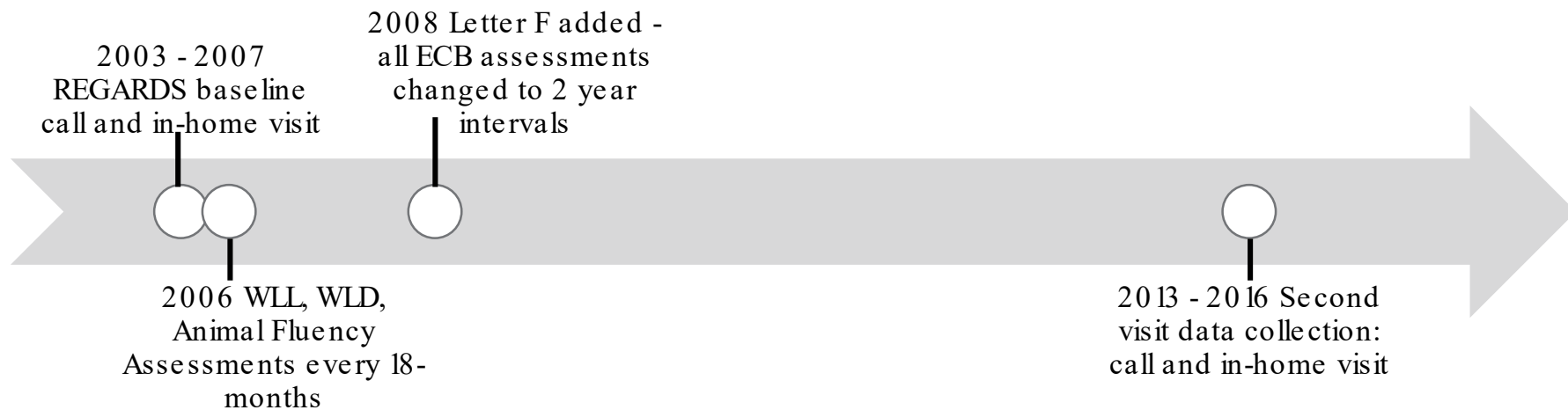


# Cognitive Impairment in REGARDS

1. Cognitive Assessments
2. Normative sample
3. Definition of impairment
4. Data available
5. Results

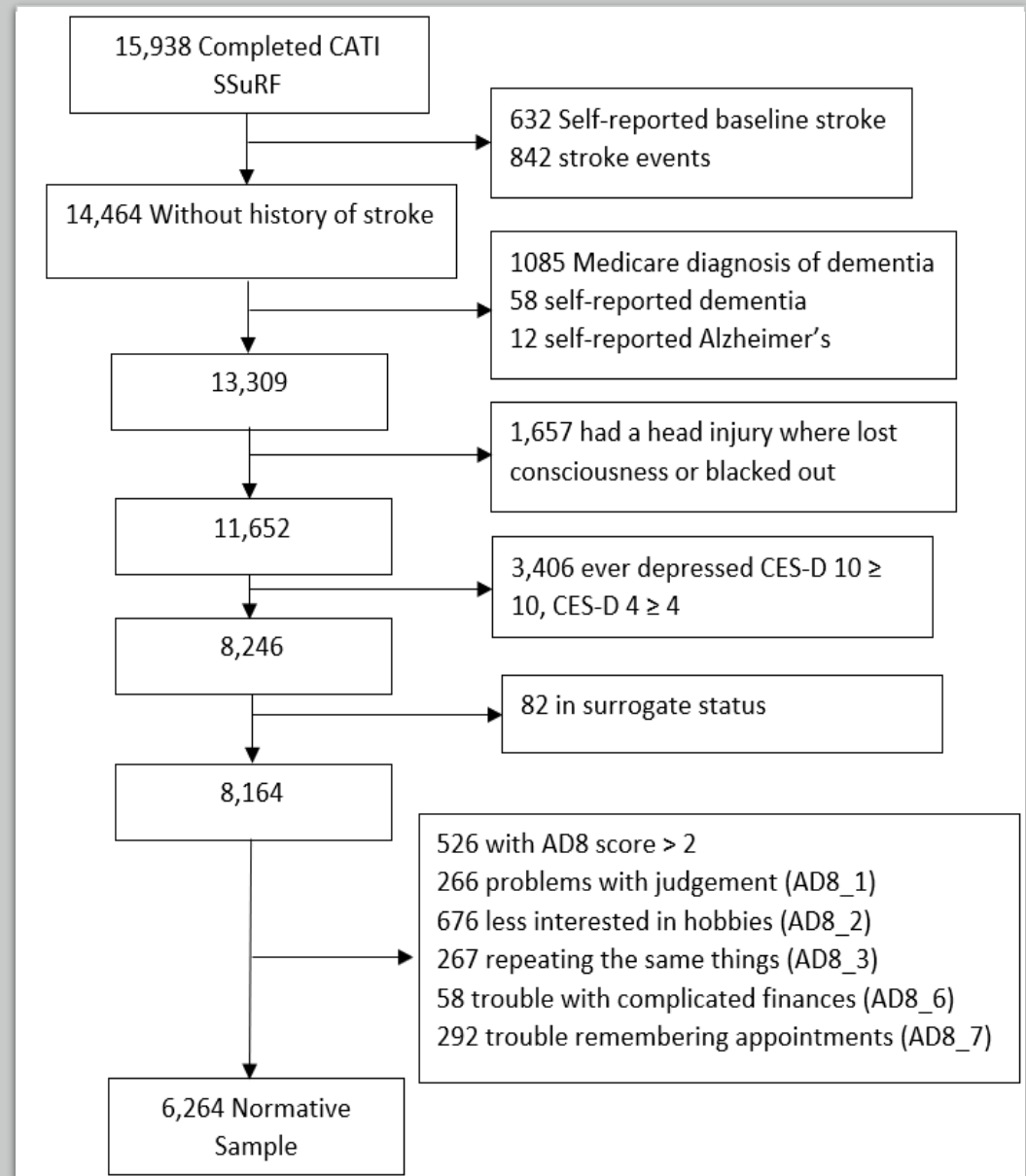
# Cognitive Assessments

- Enhanced Cognitive Battery (WLL, WLD, Animal fluency, Letter F)
- Word List Learning (WLL) and Delayed Recall (WLD) – Memory Domain
  - Administered every other year, scored automatically
- Semantic (Animal) Fluency and Phonemic (Letter F) Fluency – Fluency Domain
  - Administered every other year, recorded and scored by trained individuals
- Note about timing: Assessments began Jan 2006 at 18-month intervals, changed to 2 year intervals Feb 2008
  - Originally WLL/WLD and Animal Fluency on separate calls
  - Letter F added in Feb 2008
- Six Item Screener (SIS)
  - Administered annually, scored automatically



# Normative Sample

- The normative sample was selected by means of a pseudo-robust norms approach.
  - Used outcomes and second in-home visit questions to infer absence of clinically significant cognitive decline.



	Normative Sample N=6,264	Remaining CATI SSuRF completions N= 9,674	Remaining REGARDS Sample N=14,245
Follow-up time to SSuRF	9.0 (1.0)	7.3 (1.3)	9.1(1.0)
Age (Baseline), mean (SD)	61.6 (7.8)	64.3 (8.7)	66.7 (10.1)
SIS (Baseline), mean (SD)	5.7 (0.6)	5.6 (0.7)	5.5 (0.9)
Black, n (%)	2241 (35.8)	3737 (38.6)	6536 (45.9)
Female, n (%)	3447 (55.0)	5589 (57.8)	7596 (53.3)
Education, n (%)			
College grad+	3069 (49.0)	3545 (36.7)	3858 (27.1)
Some college	1630 (26.0)	2610 (27.0)	3850 (27.1)
High school grad	1271 (20.3)	2520 (26.1)	4013 (28.2)
Less than HS	293 (4.7)	997 (10.3)	2502 (17.6)
Income, n (%)			
less than \$20k	495 (7.9)	1610 (16.6)	3373 (23.7)
\$20k-\$34k	1158 (18.5)	2367 (24.5)	3782 (26.6)
\$35k-\$74k	2250 (35.9)	3050 (31.5)	3614 (25.4)
\$75k and above	1706 (27.2)	1523 (15.7)	1525 (10.7)
Refused	655 (10.5)	1124 (11.6)	1951 (13.7)

# Normative Sample

	Baseline		WLL/WLD		Animal Naming		Letter F	
	Female	Male	Female	Male	Female	Male	Female	Male
45-54	653	400	407	232	394	212	280	173
55-64	1648	1400	1356	1004	1315	989	1152	775
65-74	925	854	1197	1139	1288	1186	1418	1266
75-84	215	158	389	363	384	372	495	509
85+	6	5	36	28	36	36	57	51

- 6,151 with WLL/WLD
- 6,212 with animal naming
- 6,176 with letter f fluency

# Normative Sample

- Only “baseline” assessments used for calculation
- For each assessment, regression based approach was used to get predicted scores and standard deviations
  - Goal to take the predicted scores and standard deviations from these regression equations and use them to infer impairment for the entire REGARDS cohort
  - Created prediction equations for each assessment considering main effects for continuous age (at time of assessment), sex, education level, and race, and pair-wise interactions
  - Significant interactions were included in the final equations
  - Multiple significant interactions
    - WLD – considered and included a significant three-way interaction
    - Letter F – used a backwards stepwise regression approach to eliminate pair-wise interactions
- Education levels (College grad+, some college, HS, less than HS)



# Prediction Equations

- $WLL \sim \beta + \beta_{\text{age}} + \beta_{\text{education}} + \beta_{\text{sex}} + \beta_{\text{race}} + \beta_{\text{race}} * \text{education}$
- $WLD \sim \beta + \beta_{\text{age}} + \beta_{\text{education}} + \beta_{\text{sex}} + \beta_{\text{race}} + \beta_{\text{race}} * \text{education} * \text{sex} +$   
 $\beta_{\text{race}} * \text{education} + \beta_{\text{race}} * \text{sex} + \beta_{\text{education}} * \text{sex}$
- $\text{Animal Naming} \sim \beta + \beta_{\text{age}} + \beta_{\text{education}} + \beta_{\text{sex}} + \beta_{\text{race}} + \beta_{\text{race}} * \text{sex}$
- $\text{Letter f} \sim \beta + \beta_{\text{age}} + \beta_{\text{education}} + \beta_{\text{sex}} + \beta_{\text{race}} + \beta_{\text{age}} * \text{sex} +$   
 $\beta_{\text{race}} * \text{sex} + \beta_{\text{race}} * \text{education}$

# Cognitive Impairment Definition

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- The predicted scores and standard deviations, based on the normative sample “baseline” assessments, were used to define impairment for the entire REGARDS cohort
- Looked at impairment on a single follow-up call, if ever impaired considered impaired
- Considered impaired on an assessment when score was 1.5 standard deviations below the predicted score
- Considered impaired on the Enhanced Cognitive Battery if impaired on one assessment in each domain (memory and fluency)
  - Only calculated ECB impairment when all 4 assessments were administered on the same call
- For SIS: considered impaired if ever scored less than 4 **and** twice less than 5

# Cognitive Impairment Variables

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- CI\_ECB – cognitive impairment on the enhanced cognitive battery
- CI\_SIS – cognitive impairment on SIS
- Incident\_ECB – incident impairment on ECB (baseline impairment defined as first SIS  $\leq$  4)
- Incident\_SIS – incident impairment on SIS (baseline impairment defined as first SIS  $\leq$  4)
- Reason\_ECB – reason missing incident ECB impairment
- Reason\_SIS – reason missing incident SIS impairment
- Dates and ages of impairment

# Incident Impairment ECB

- Of the 30,183 REGARDS participants
  - 3,599 never had a scored ECB assessment
  - 7,110 never had all 4 assessments on the same call
  - 1,193 had base line impairment (First SIS  $\leq$  4)
  - Remaining sample 18,281

Cognitive Impairment	Frequency	Percent
Missing	11,902	39.4
ECB Control	17,279	57.3
Enhanced Cognitive Battery Case	1,002	3.3

# Incident Impairment SIS

- Of the 30,183 REGARDS participants
  - 566 never had a SIS assessment
  - 1,713 only had one and 1,844 only had two SIS assessments
  - 2,062 had baseline impairment (First SIS  $\leq$  4)
  - Remaining sample 23,998

Cognitive Impairment	Frequency	Percent
Missing	6185	20.5
SIS Control	21,663	71.7
SIS Case	2,365	7.8

	Missing ECB N=11,902	Have ECB N=18,281	Missing SIS N=6,185	Have SIS N=23,998
Baseline Age (mean, SD)	67.1 (10.1)	63.4 (8.7)	66.9 (10.3)	64.3 (9.1)
Follow-up time (mean, SD)	7.1 (4.9)	13.7 (3.8)	6.4 (5.5)	12.3 (4.5)
Deceased	59.5	25.4	59.2	33.6
Black	49.3	36.4	56.3	37.6
Female	51.8	57.3	50.3	56.4
Stroke	8.5	6.8	8.1	7.3
TIA	1.7	2.9	1.4	2.7
Education				
Less than high school	19.6	8.0	22.4	10.1
High School	28.1	24.4	28.8	25.1
Some College	26.4	27.1	25.1	27.3
College Grad +	25.8	40.5	23.8	37.6
Income				
<\$20k	25.4	13.4	28.3	15.5
\$20k - \$35k	27.1	22.3	27.5	23.4
\$35k - \$74k	23.7	33.3	21.4	31.6
\$75k +	9.6	19.7	8.6	17.6
Refused	14.2	11.2	14.2	11.9
Hypertension	65.1	55.5	65.7	57.6
Diabetes	28.3	18.0	29.7	20.1
BMI				
Underweight(<18.5)	1.4	0.8	1.7	0.9
Normal(18.5-24.9)	24.4	23.2	24.1	23.6
Overweight(25 -29.9)	35.9	37.6	35.7	37.2
Obese(30+)	38.3	38.4	38.5	38.3

	Enhanced Cognitive Battery Control N=17,279	Enhanced Cognitive Battery Case N=1,002	SIS Control N=21,633	SIS Case N=2,365
Baseline Age (mean, SD)	63.2 (8.6)	65.5 (8.9)	63.6 (12.3)	71.0 (8.1)
Follow-up time (mean, SD)	13.7 (3.8)	13.0 (3.6)	12.3 (4.6)	12.7 (3.6)
Deceased	24.4	42.8	31.6	52.7
Black	36.7	31.3	36.5	48.6
Female	57.1	59.7	57.1	49.4
Stroke	6.5	12.1	6.9	11.0
TIA	2.9	3.8	2.6	3.5
Education				
Less than high school	8.1	6.3	9.0	19.5
High School	24.7	20.2	24.8	27.8
Some College	27.2	25.2	27.8	22.8
College Grad +	40.0	48.4	38.4	29.9
Income				
<\$20k	13.1	19.2	14.8	22.3
\$20k - \$35k	22.1	26.8	22.9	27.7
\$35k - \$74k	33.4	32.0	32.2	26.7
\$75k +	20.2	11.1	18.5	9.3
Refused	11.2	11.0	11.1	13.9
Hypertension	55.1	63.2	56.7	66.2
Diabetes	17.5	26.9	19.7	23.9
BMI				
Underweight(<18.5)	0.8	0.8	0.9	0.8
Normal(18.5-24.9)	23.2	22.8	23.3	26.0
Overweight(25 -29.9)	37.6	37.8	37.1	38.2
Obese(30+)	38.4	38.6	38.7	35.0

# Next steps

- Compare SIS impairment to Enhanced Cognitive Battery Impairment for participants with both
- Domain specific impairment
- Impaired on more than one call
- After first impaired, were they impaired on a later call



# Any questions?

# Thank you!