

# The National Longitudinal Study of Adolescent to Adult Health (Add Health)

Presented to the National Advisory Child Health and Human Development Council  
National Institutes of Health

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# Outline of Talk

1) Brief Add Health History, Motivations, & Evolution

2) Add Health Grows Up: Wave VI Goals, Design, and Data Collection

3) Glimpse of Descriptive Data from Wave VI of Add Health

4) Accessing Add Health Data

5) Acknowledgements

# 1) Brief Add Health History & Evolution

# Add Health Origins & Evolution

Developed in response to a 1993 Congressional mandate

Originally two waves (Waves I and II); evolved into multi-wave design in early 2000s

Originally the National Longitudinal Study of Adolescent Health; renamed the National Longitudinal Study of Adolescent **to** Adult Health with Wave V in 2014

NICHD primary funder from 1993 through 2020

Most recently (2021-25), Wave VI funded by NIA and five co-funding institutes & offices (NICHD, NIMHD, NIDA, OBSSR, ODP)

# Innovative Original Design

## Foundational attention to:

- Life course principles
- Health disparities
- Social contexts
- Biological processes
- Population representativeness & heterogeneity
- Core attention to major health & social issues in the US



Recipient of 2016 Golden Goose Award →

# Add Health Wave I Sample Design

## IN-SCHOOL SURVEY OF ADOLESCENTS

Grades 7–12 in 1994–1995

$n = 90,000+$

**RANDOM SAMPLE OF  
12,000+ ADOLESCENTS  
FROM ALL SCHOOLS**

## OVERSAMPLES:

**Ethnicity/race:** Puerto Rican, Cuban, Chinese, high-SES Black

**Disability:** Adolescents with physical disability

**Saturation:** All students in 16 schools

**Genetic:** MZ and DZ twins, full and half siblings, unrelated co-resident pairs

## IN-HOME SURVEY OF ADOLESCENTS AND PARENTS

$n = 20,745$



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HARRIS, KM, HALPERN, CT. 2022. THE NATIONAL LONGITUDINAL STUDY OF ADOLESCENT TO ADULT HEALTH (ADD HEALTH): AN UNDERUTILIZED RESOURCE FOR DEVELOPMENTAL SCIENCE. ANNUAL REVIEW OF DEVELOPMENTAL PSYCHOLOGY 4: 9.1-9.22



**Add Health**  
The National Longitudinal Study of Adolescent to Adult Health

# Add Health Substantive Motivations

Adolescent Behavior & AIDS Epidemic

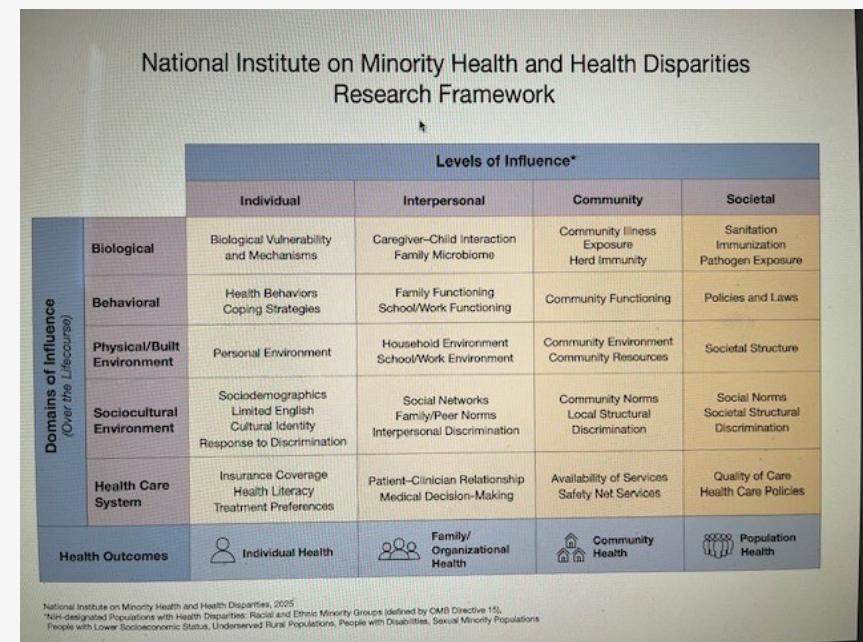
Relationships & Family Formation

Obesity Epidemic

Midlife Health & Mortality

Risk & Resilience for Cognitive & Physical Functioning

Stubborn and in some cases widening health & well-being disparities



# Add Health Longitudinal, Multi-level, Intergenerational Design

(Each wave also includes contextual and environmental data specific to various geographic levels)

Wave	Administrative	Survey Administration		Biological Data Collection	Cognitive Assessments	
Wave I 1994-95	Students N = 90,118 School Admin N = 144	Adolescents in Grades 7-12 N = 20,745	Parent N=17,670	Height, weight	Self-Reported GPA and Intelligence, Picture Vocabulary Test	
Wave II 1996	School Admin N = 128	Adolescents in Grades 8-12 N = 14,738		Height, weight	Self-Reported GPA and Intelligence, Picture Vocabulary Test	
Wave III 2001-02	High School Transcripts	Young adults Aged 18-26 N = 15,197	Partner N=1,507	Height, weight, STI, HIV, genetic (buccal cell DNA)	High School Transcripts: Grades & Coursework	
Wave IV 2008-09		Adults Aged 24-32 N = 15,701		Height, weight, waist, metabolic, immune, inflammation, cardiovascular, medications, candidate genes, GWAS	Number & Word Recall Tests	
Wave V 2016-18	Birth & Death Records	Adults Aged 33-43 N = 12,300	Parent N=3,000	Sexual Orientation & Health N=2,665	Height, weight, waist, metabolic, immune, inflammation, cardiovascular, renal, medications, gene expression, epigenetic, microbiome	Number & Word Recall Tests
Wave VI 2022-25	Birth & Death Records; College Records	Adults Aged 39-51 N=11,979	Parent N~5,000	Height, weight, waist, metabolic, immune, inflammation, cardiovascular, renal, medications, microbiome, physical & sensory functioning, neurocognitive	Number & Word Recall + Full Add CAPS Battery	

# Just a Few Areas in which Add Health-Based Papers Have Made Key Scientific Contributions Over the Years

Effects of Friendship Networks,  
Family Involvement, and  
Neighborhood Contexts on  
Adolescent & Young Adult Health

Emergence, Trajectories of, and  
Explanations for, Health Disparities

Tracking the Obesity Epidemic &  
Emerging Cardiovascular Health Risks

Disentangling genetic & social  
factors shaping adult health &  
health behavior

Understanding of incarceration for  
adult health & aging

Describing and modeling cognition  
& disparities therein during young  
adulthood & early midlife

# 2) Add Health Grows Up: Wave VI Goals, Design, and Data Collection

# Goals for Add Health Wave VI

(Average age = 44)

Collect & disseminate high-quality data on life course determinants and trajectories of health, cognition, health behavior, and health disparities among a large, nationally representative cohort aging into midlife.

- Substantial attention to racial/ethnic and socioeconomic heterogeneity of sample
- Substantial attention to 'pulls and tugs' of early midlife
- Substantial attention to quality control in data production & dissemination
- Substantial attention to confidentiality and protection of Add Health participants

# Context for Nationally Representative Add Health Data Collection in 2022-25

Declining response rates

Declining trust in institutions

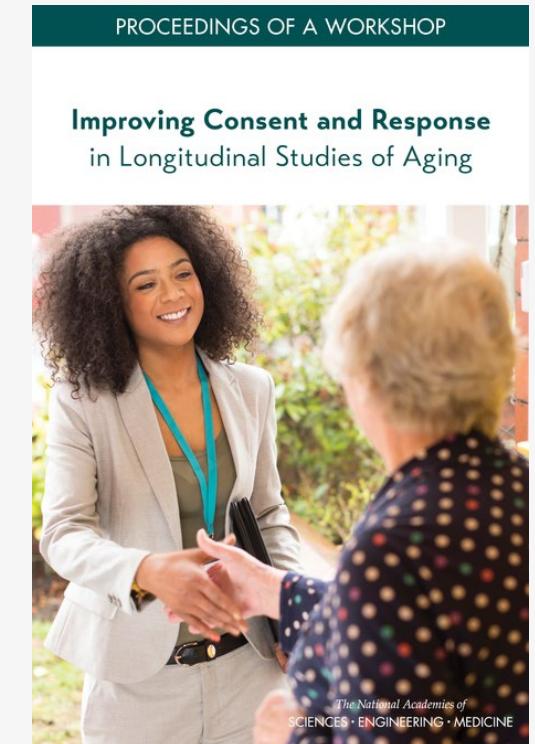
Competition for survey attention

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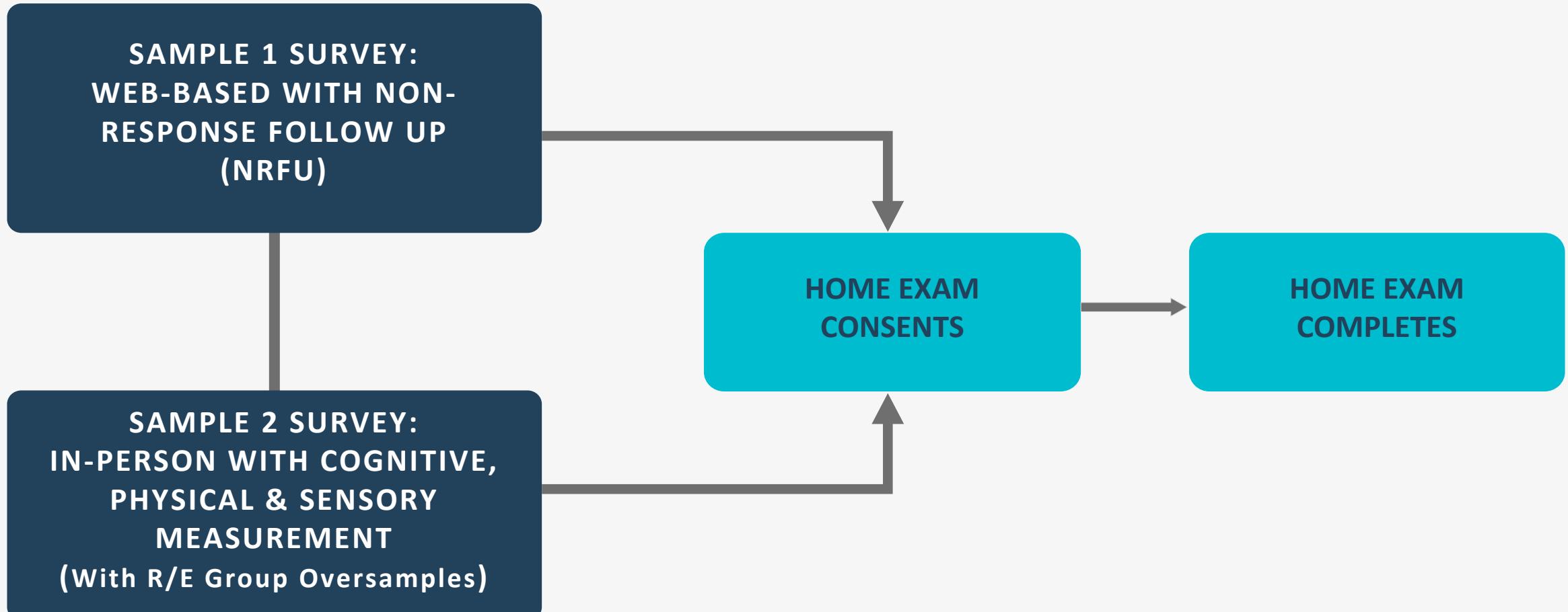
Average age of 44: they are busy!!!

Longer, complex instruments

Last collected data in 2016-18



# Wave VI Two Sample + Home Exam Design

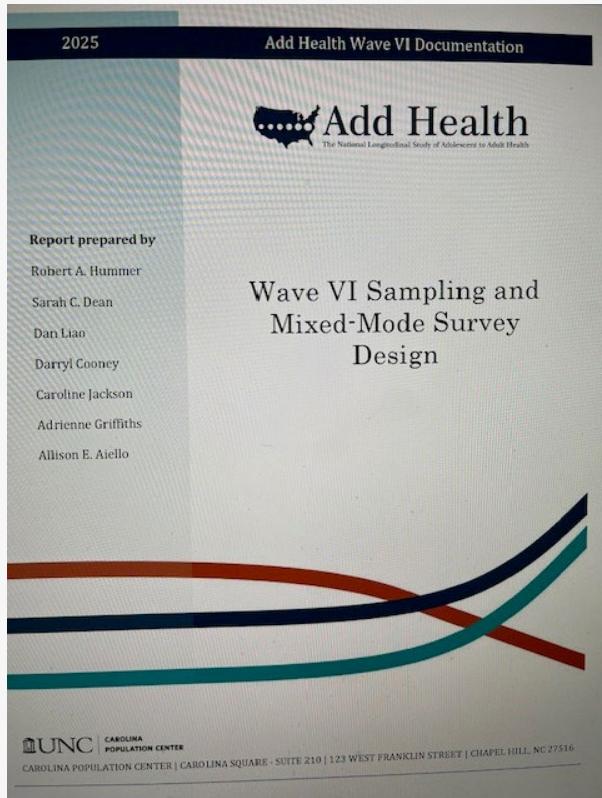


# Final Data on Wave VI Completes, with Comparison to Wave V

	Sample 1	Sample 2	Wave VI Totals	Wave V
Survey Completes	9,366	2,613	11,979	12,300
Home Exam Completes		-	6,073	5,381

## 3. A Brief Peek at Data from Wave VI

# Wave VI Survey Data



Let's take a look...



# Survey Data Sections Across Waves

## Waves I, II

Demographic  
Family, sibs, friends  
Education, work  
Physical & mental health  
Health Behaviors & Care  
Relationships  
Sexual & fertility histories  
Delinquency and violence  
Attitudes, religion  
Economics, expectations  
Psychological, personality  
Cognitive

## Wave III

Demographic  
Family, sibs, friends  
Education, work, **military**  
Physical & mental health  
Health Behaviors & Care  
Relationships  
Sexual & fertility histories  
**Involvement w/criminal justice sys**  
Attitudes, religion  
Economics, expectations  
Psychological, personality  
Cognitive  
**Children and parenting**  
**Civic participation**  
**Gambling**  
**Mentoring**

## Wave IV

Demographic  
Family, sibs, friends  
Education, work, military  
Physical & mental health  
Health Behaviors & Care  
Relationships  
Sexual, & fertility histories  
Involvement w/criminal justice sys  
**Work attitudes and chars**  
Attitudes, religion  
Economics, expectations  
Children and parenting  
Civic participation  
**Personality**  
**Psychosocial factors**  
**Stressors**  
**Cognitive function**

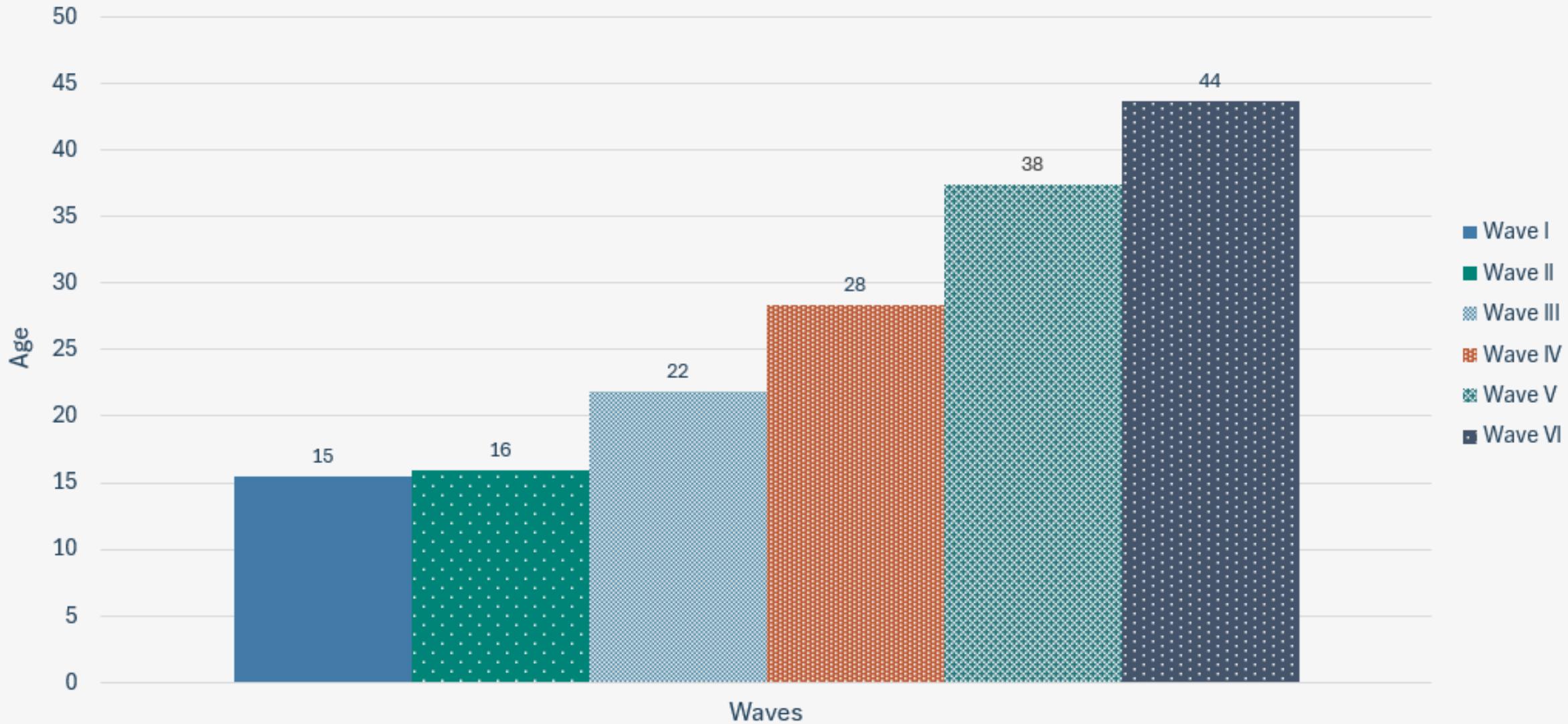
## Wave V

Demographic  
Family, sibs, friends  
Education, work, military  
Physical & mental health  
Health Behaviors & Care  
Relationships  
Sexual & fertility histories  
Involvement w/criminal justice sys  
**Work attitudes and chars**  
Attitudes, religion  
Economics, expectations  
Children and parenting  
Civic participation  
Personality  
Psychosocial factors  
Stressors  
Cognitive function  
**Retrospective child health & SES**

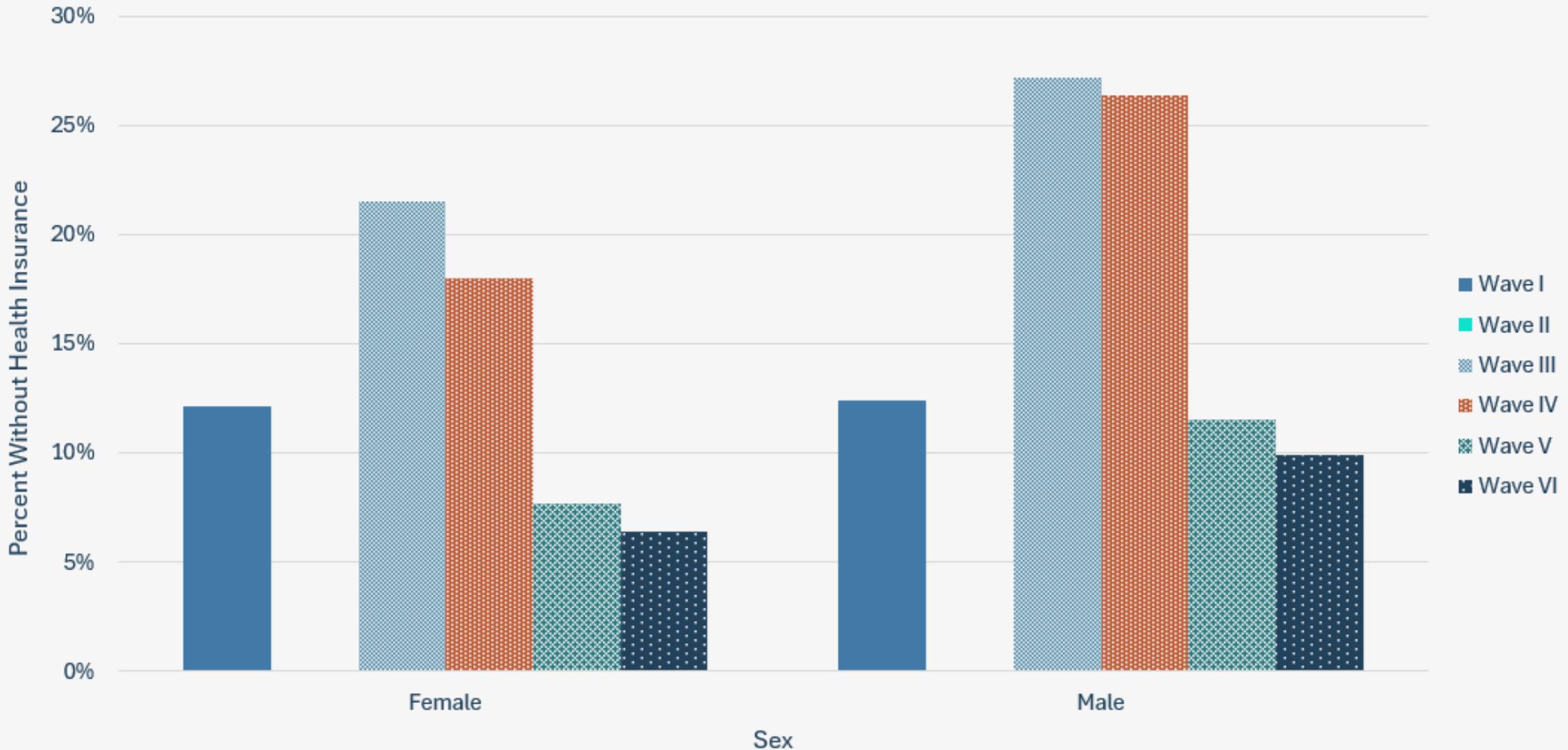
## Wave VI

Demographic  
Family, sibs, friends  
Education, work, **work-life balance**, military  
Physical & mental health (**many additions**)  
Health behaviors & care  
Relationships  
Sexual & fertility histories  
Involvement w/criminal justice system  
Work attitudes & characteristics  
Attitudes, religion  
Economics, children & parenting  
Civic participation  
Personality  
Psychosocial factors  
Stressors (**Anticipatory & Cumulative**)  
Caregiving  
Institutional trust  
Neighborhood Perceptions  
Discrimination  
Physical & Sensory Function  
Cognitive function (**Test My Brain**)

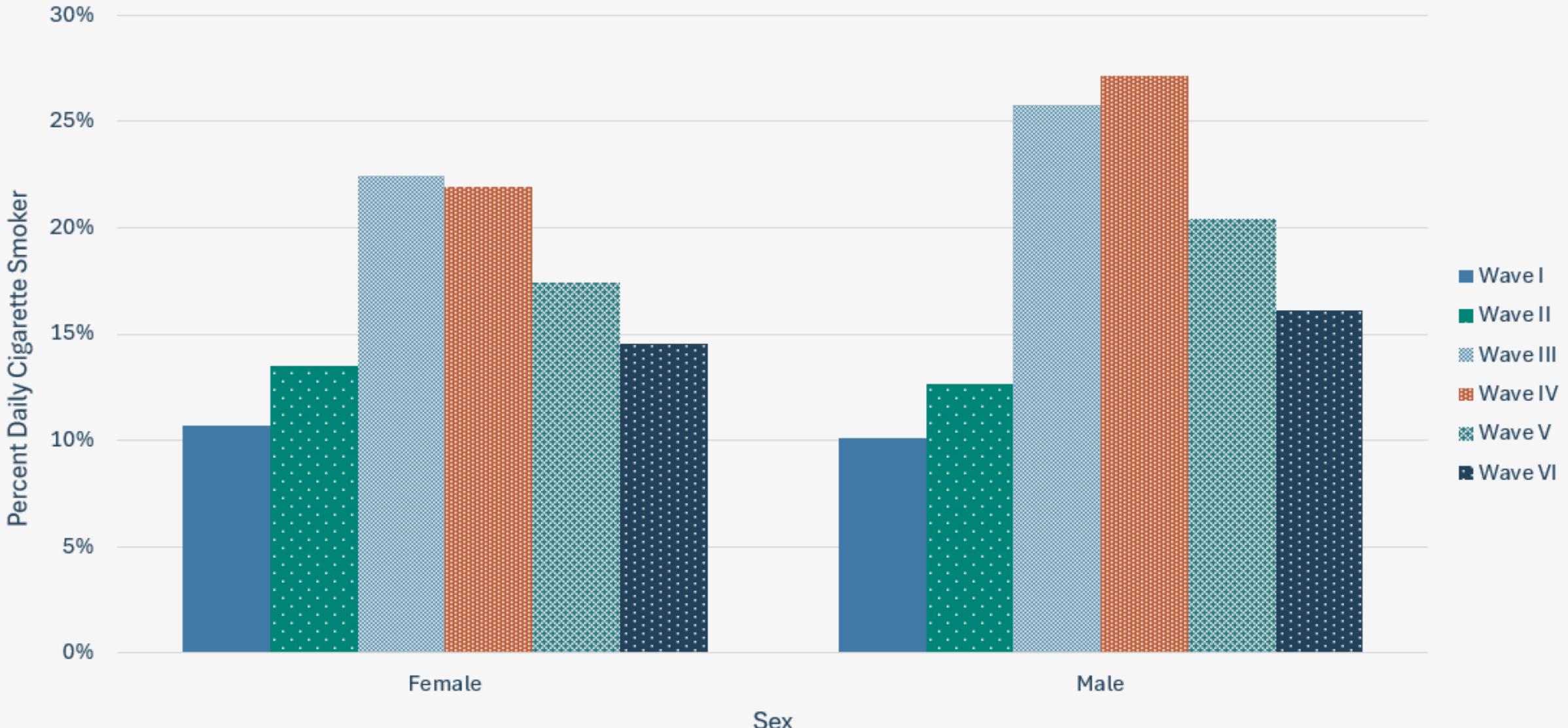
# Average Age of Participants Across Waves



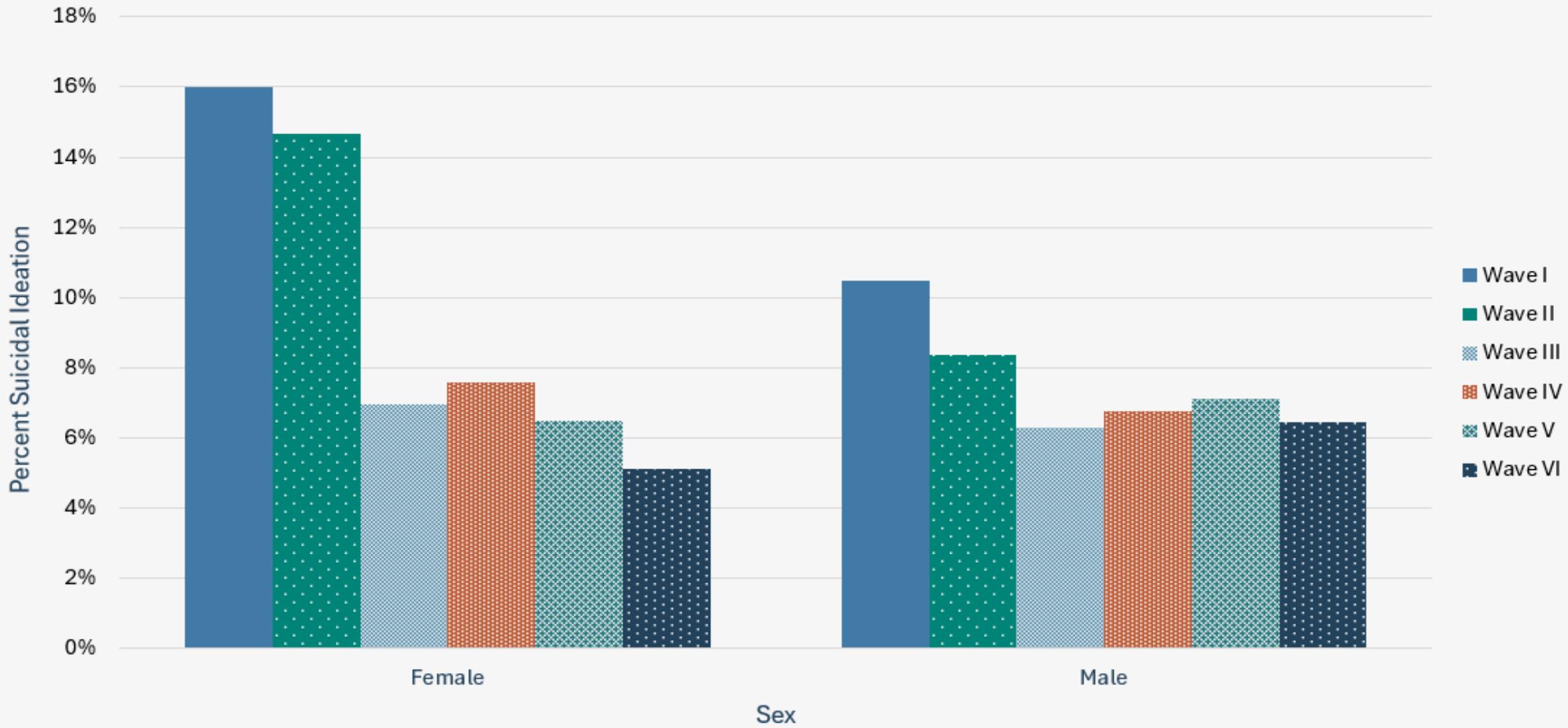
# Weighted Percent Without Health Insurance by Sex Across Waves



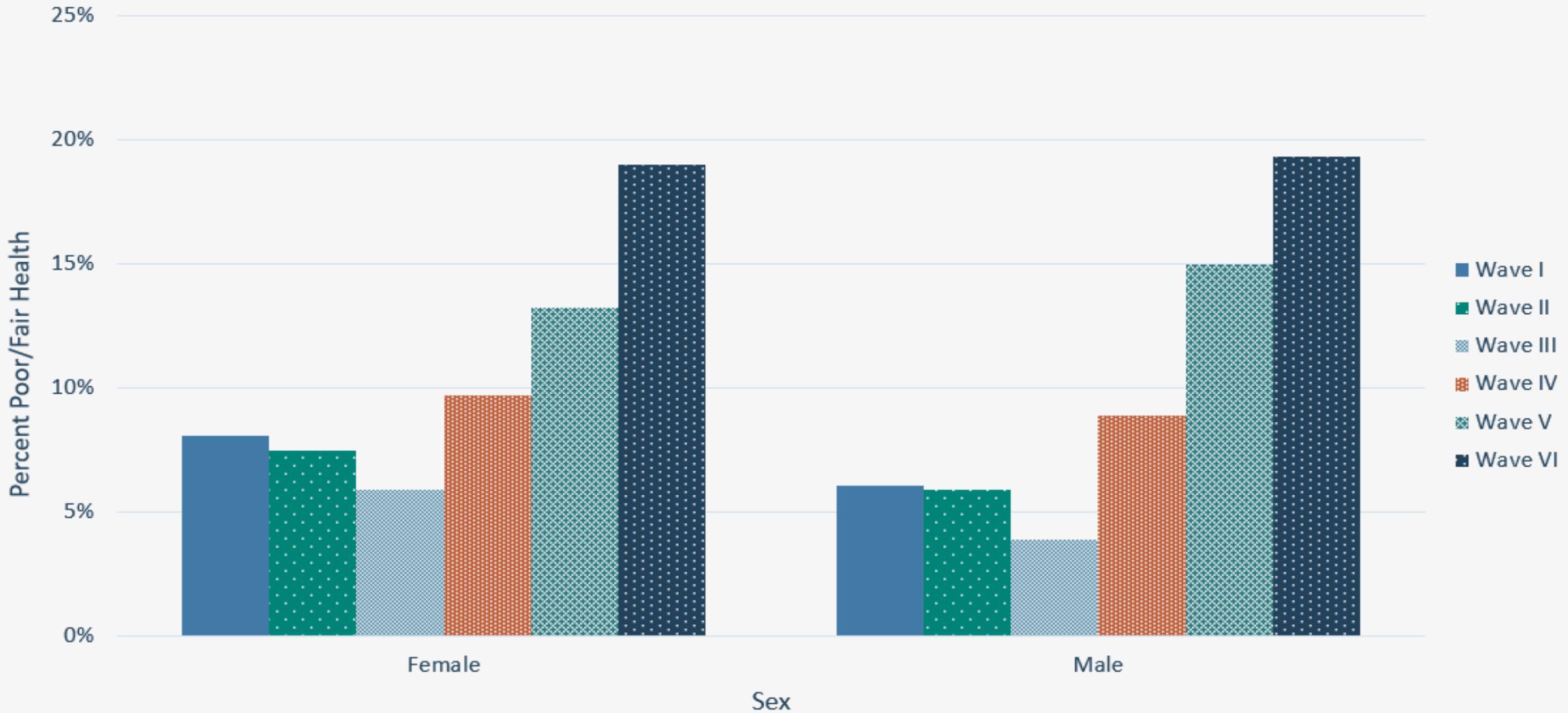
# Weighted Daily Cigarette Smoking by Sex Across Waves



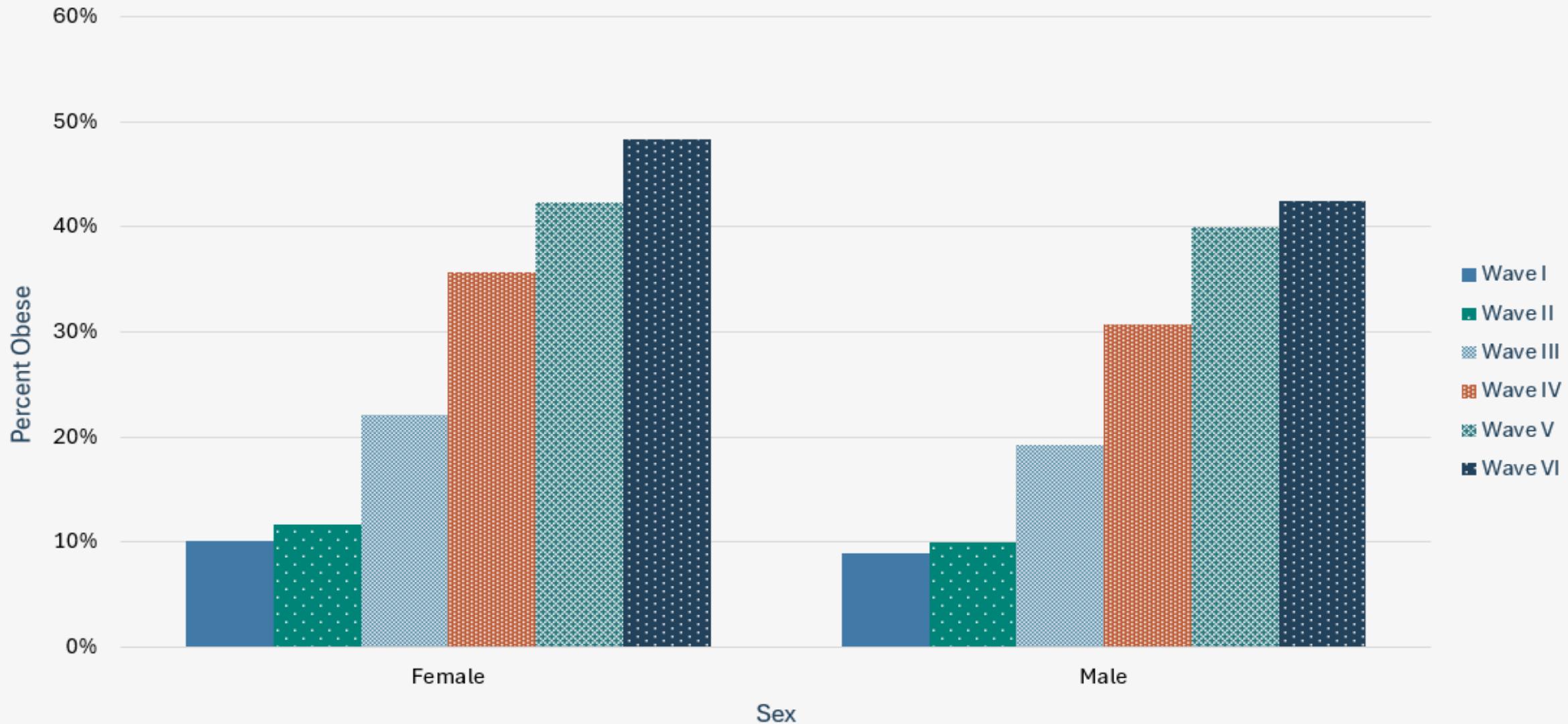
# Weighted Self-Reported Suicidal Ideation by Sex Across Waves



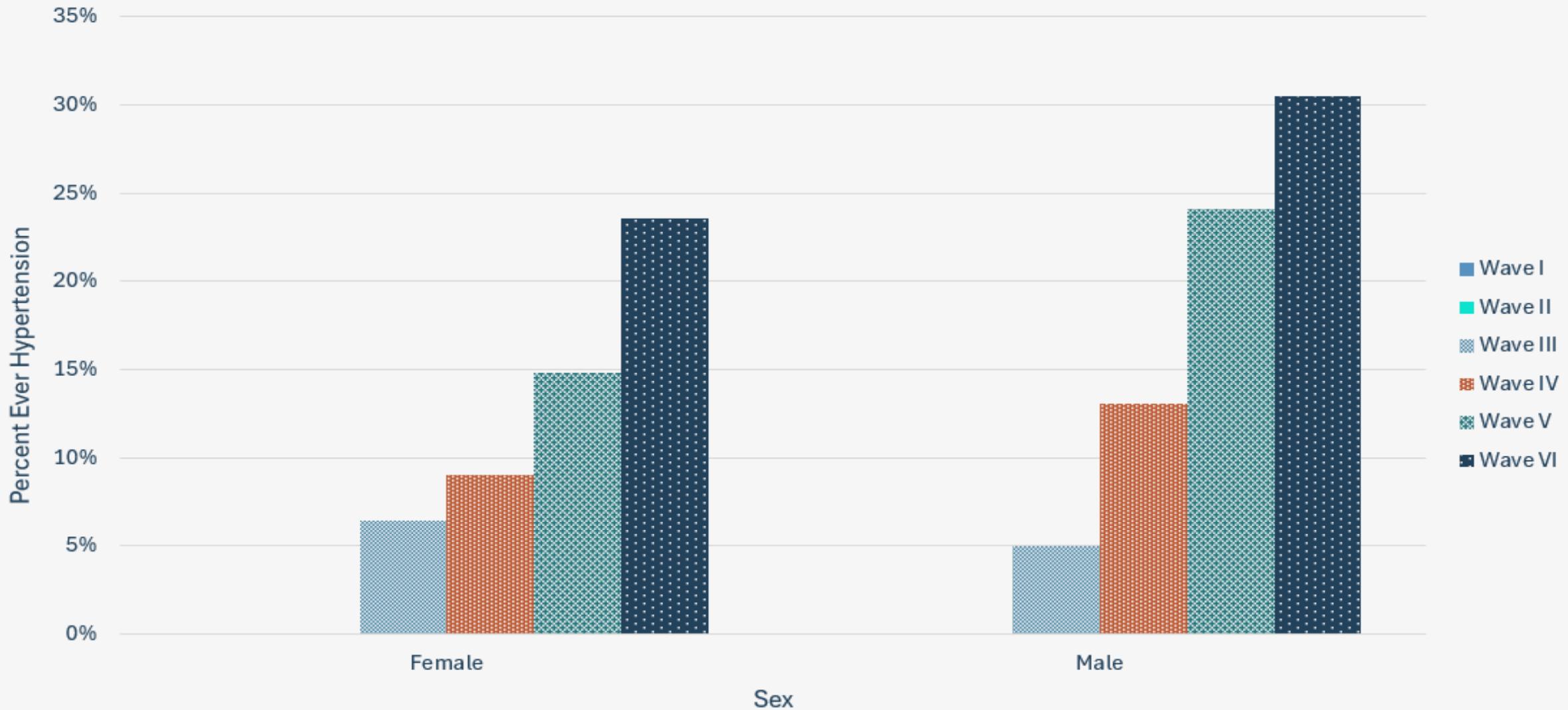
# Weighted Percent of Poor/Fair Health by Sex Across Waves



# Weighted Self-Reported Height & Weight (Obesity) by Sex Across Waves



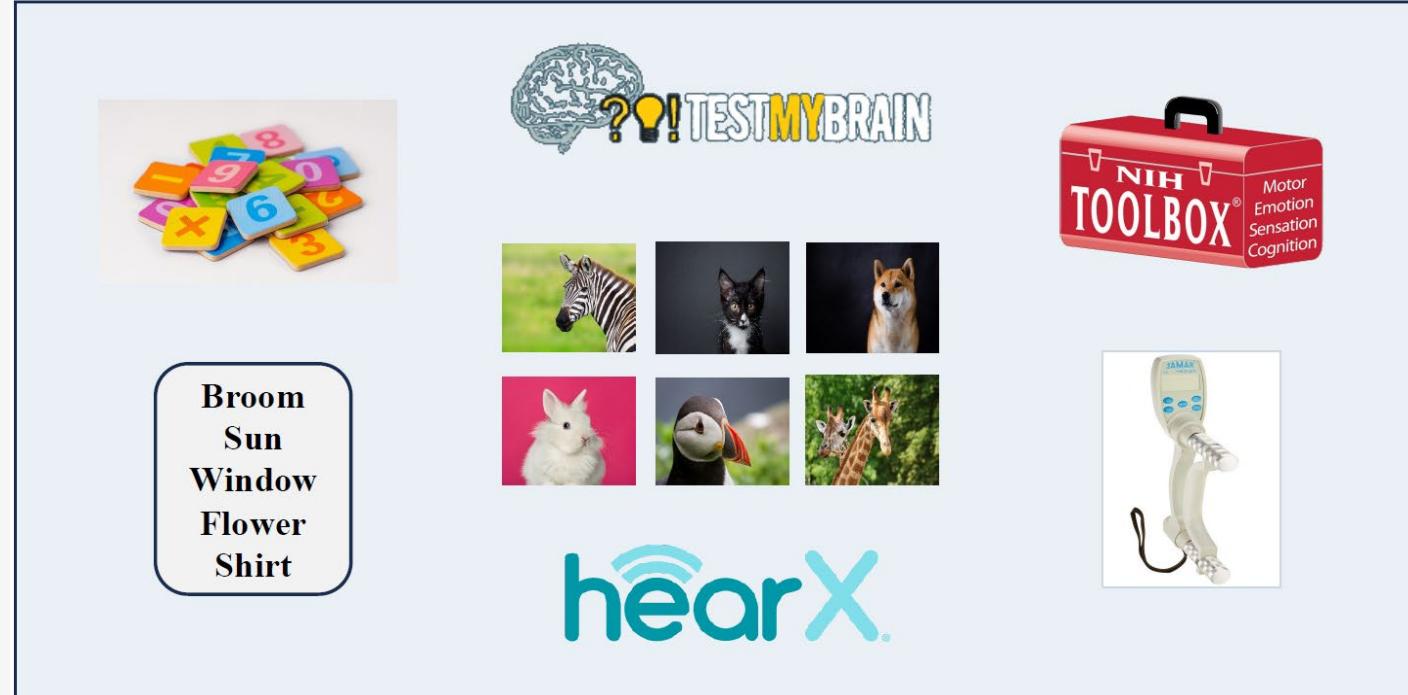
# Weighted Self-Reported Hypertension by Sex Across Waves



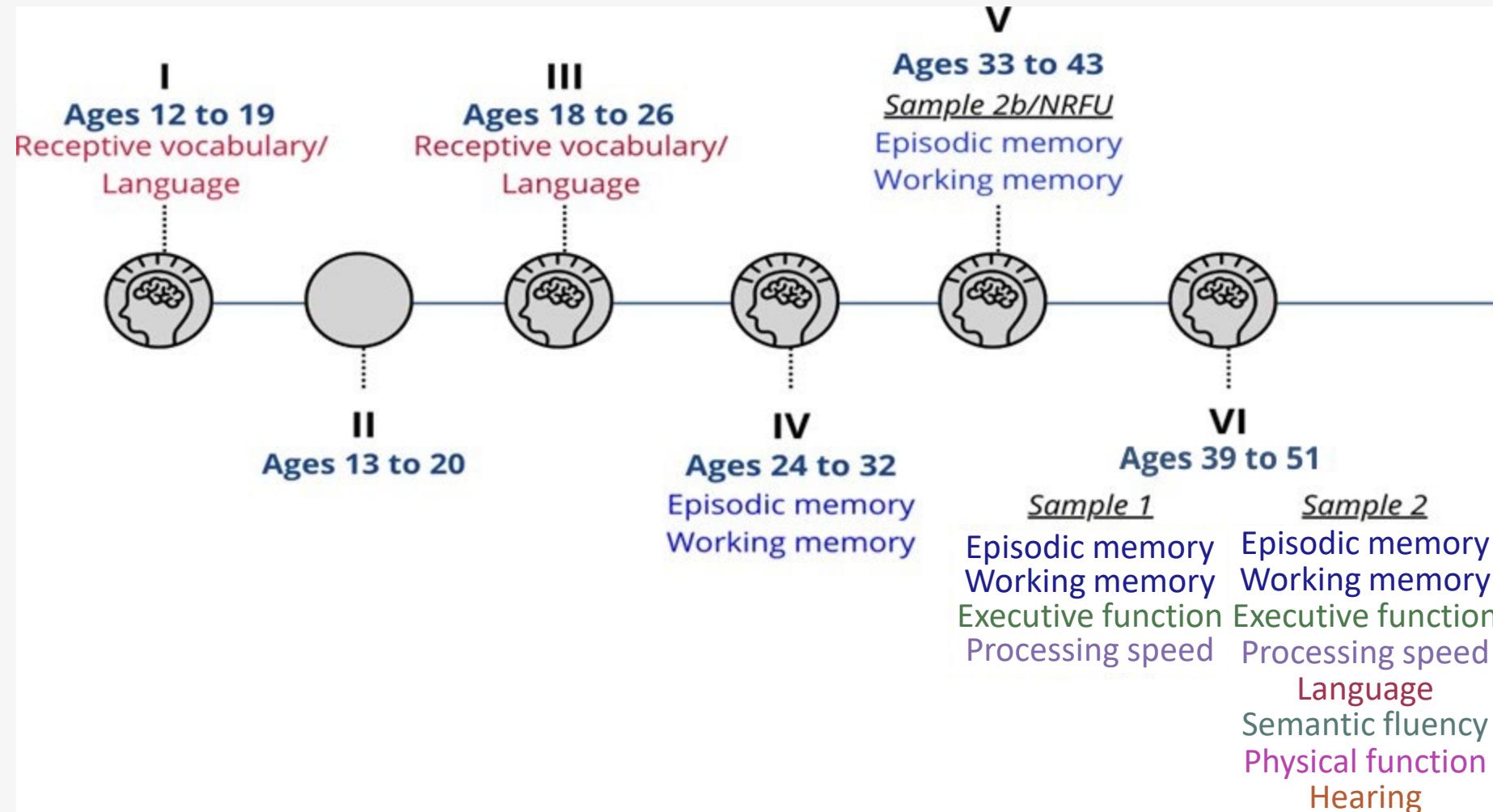
# Wave VI Measures of Cognitive, Sensory & Physical Functioning

# Add Health Cognitive Assessment, Physical, and Sensory Functioning (Add CAPS) Protocol

 **Add CAPS Assessments**  
Add Health Cognitive Assessment, Physical, and Sensory Function



# Cognitive domains in previous waves and Add CAPS domains in Wave VI of Add Health

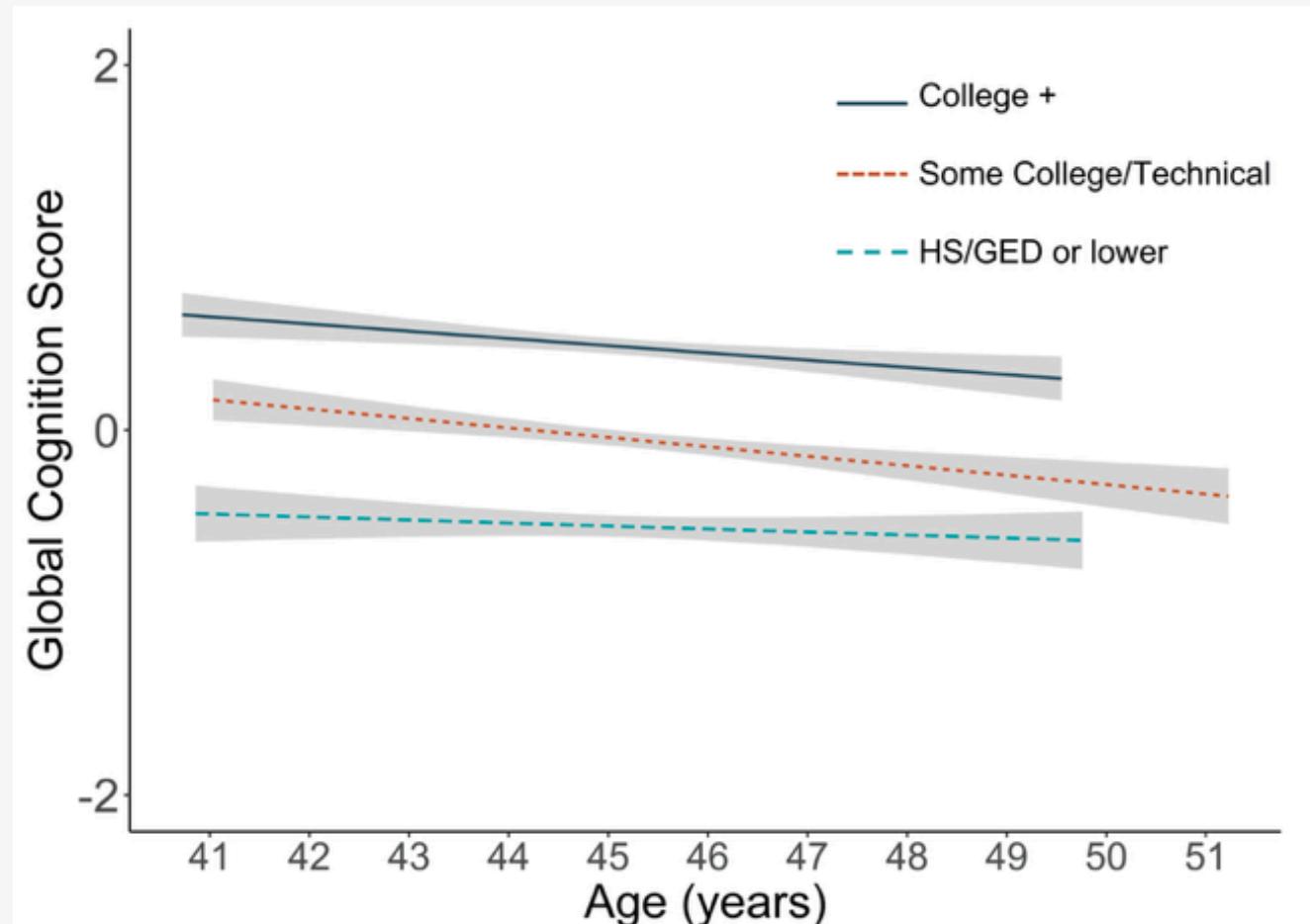


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# Global Cognition Z-Scores in Wave VI of Add Health, by Age and Educational Attainment



# Wave VI Home Examination Data

# Add Health Biological & Clinical Content, Waves I–VI

Domains	Waves I, II (ages 12-20)	Wave III (ages 18-26)	Wave IV (ages 24-32)	Wave V (ages 33-43)	Wave VI (ages 39-51)
Anthropometric	✓	✓	✓	✓	✓
Omics		✓	✓	✓	✓
Immune/Infectious		✓	✓	✓	✓
Cardiovascular			✓	✓	✓
Metabolic			✓	✓	✓
Medications			✓	✓	✓
Renal/ Liver				✓	✓
Microbiome				✓	✓
Neurocognitive					✓

# Wave VI Home Exam Data Sets (N = 6,073)

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Anthropometric  
Cardiovascular Measures  
Baroreflex Sensitivity  
Neurodegeneration Biomarkers  
Glucose Homeostasis  
Lipids  
Renal  
Hepatic Injury  
Inflammation and Immune Function  
Infection  
Biomarker Weights  
Home Exam Questionnaire and Medications

# Wave VI Add Health BMI Data: Comparison of Self-Reports vs Measured

	Percent BMI >30	
	<u>Female</u>	<u>Male</u>
Self-Reported Height and Weight	49%	42%
Measured Height and Weight	52%	46%

# Wave VI Add Health Hypertension Data: Comparison of Self-Reports vs Measured

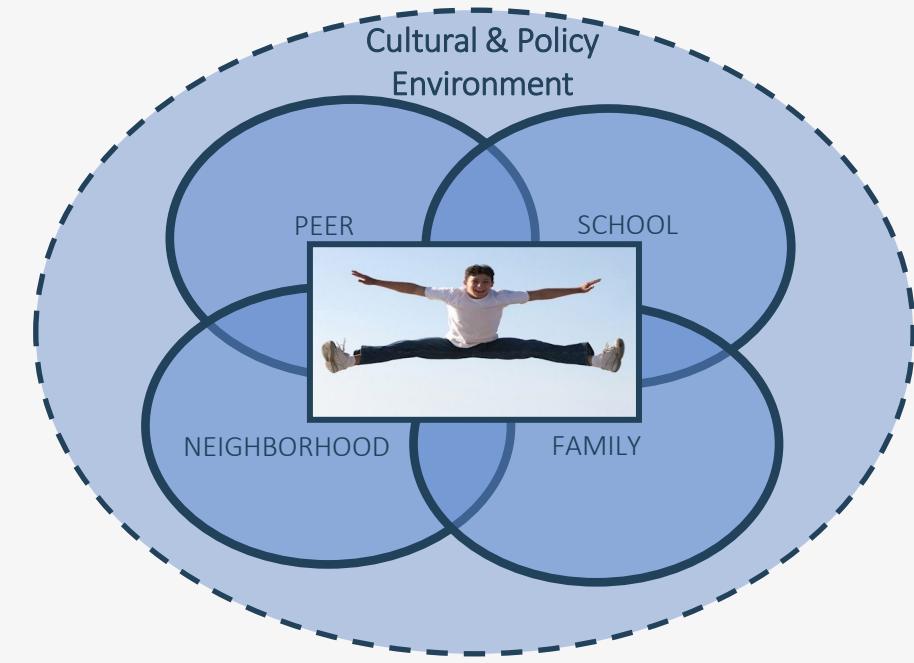
	<u>Percent Hypertension</u>	
	<u>Female</u>	<u>Male</u>
Self-Reported	24%	30%
Using Medication	22%	20%
Stage 1 Measured	29%	35%
Stage 2 Measured	17%	29%
Joint Classification (AHA/ACC)	56%	71%

# Contextual and Environmental Data

Core Emphasis in Add Health Since Wave I →

## Thousands of Available Variables

- Social, economic, health, commercial, policy, etc.
- Schools, neighborhoods, counties, states, etc.
- Searchable tool for users



## Wave VI Exposome Supplement

- Social Structure (Neighborhoods, Cities, Counties, States)
- Environmental (Pollutants, Noise, Water, etc.)
- All being linked to Wave I to Wave VI participant home addresses

# Wave VI Administrative Data

Decedent Records (N=769)



Birth Records (5 states so far)



College Educational Records (In Progress)



# 4. Accessing Add Health Data

# Add Health Users

## Restricted-Use Data

- Access requirement: Approved 5-year contract with UNC (renewable)
- ~400 current contracts, average 6 users apiece
- Many use our Secure Research Workspace (SRW); others use secure server at home institution
- Please visit the project website (<https://addhealth.cpc.unc.edu>) ... click on “Data”

## Public-Use Data Through ICPSR or Data Verse

- Access requirement: Data use agreement
- ~50,000+ researchers over the years
- Most highly-utilized data set in ICPSR’s archive in recent years

# 5. Acknowledgements

# Wave VI Acknowledgements

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Add Health was originally designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill. Add Health is currently directed by Robert A. Hummer; it was previously directed by Kathleen Mullan Harris (2004-2021) and J. Richard Udry (1994-2004).

# Wave VI Acknowledgements, continued

**Staff:** Sarah Dean, Caroline Jackson, Kathryn Carrier, Bob Angel, Tiffany Jensen, Anna Tortorici, Cherese Parker, Julie Kouzoukas, Jenna Gordon, Sarah Rodan, Vishali Muthuvinayagam, Mary Jane Hill, Janne Groner, Lixin Qu, Tim Monbureau, John Knapp, Jason Grago, Michelle Lemon-Russell, Elyssa Trani, Brandt Levitt, Brian Frizzelle, Stephen Loo, Ian Hoyt-McCullough, Ed Van Duinen, Lynn Ngo, Farizah Rob

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# Wave VI Acknowledgements, continued

## Add Health Participants

# Extra Slides

# Timeline of Selected Key Events During the Life Course of the Add Health Cohort

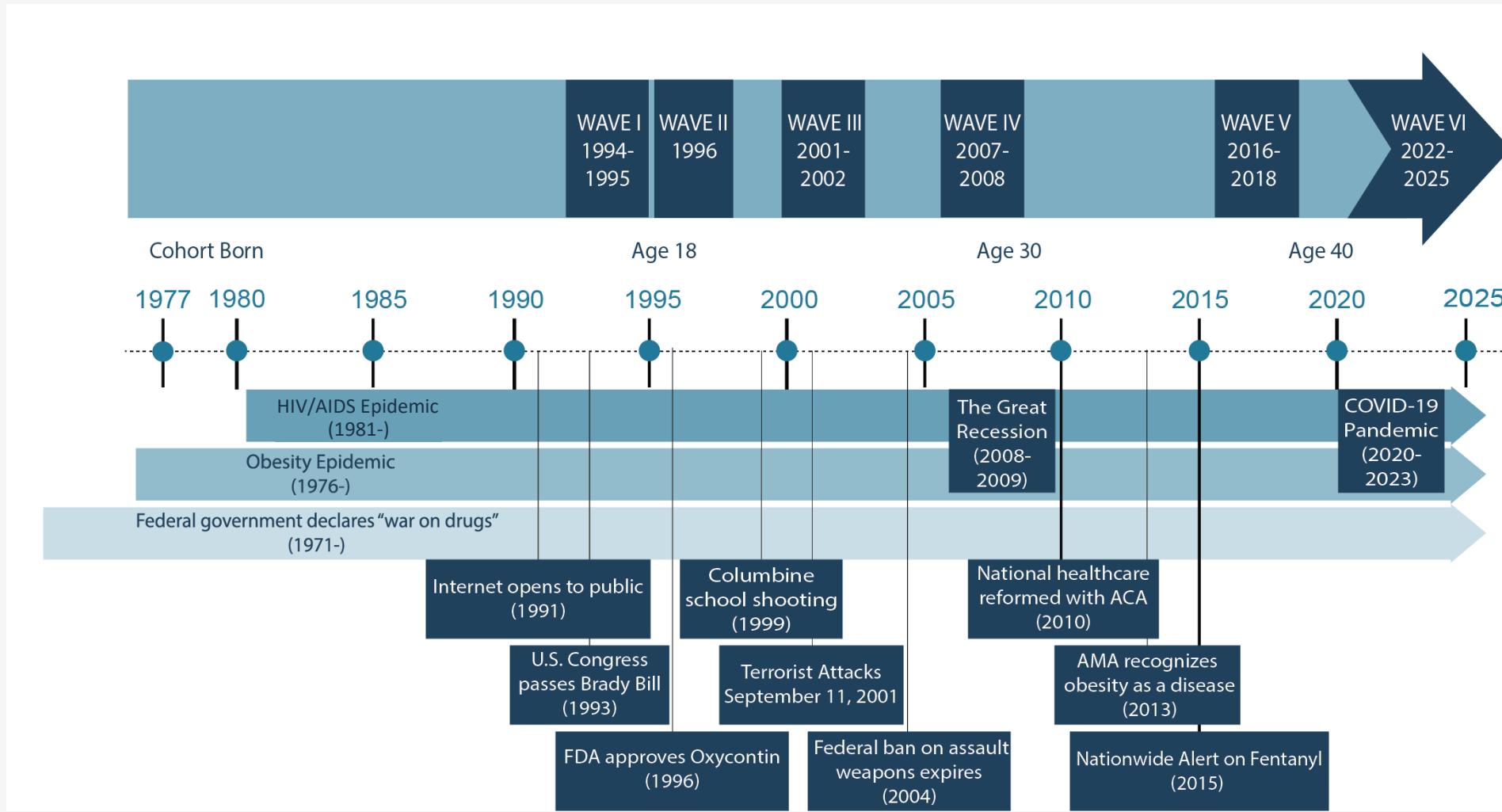
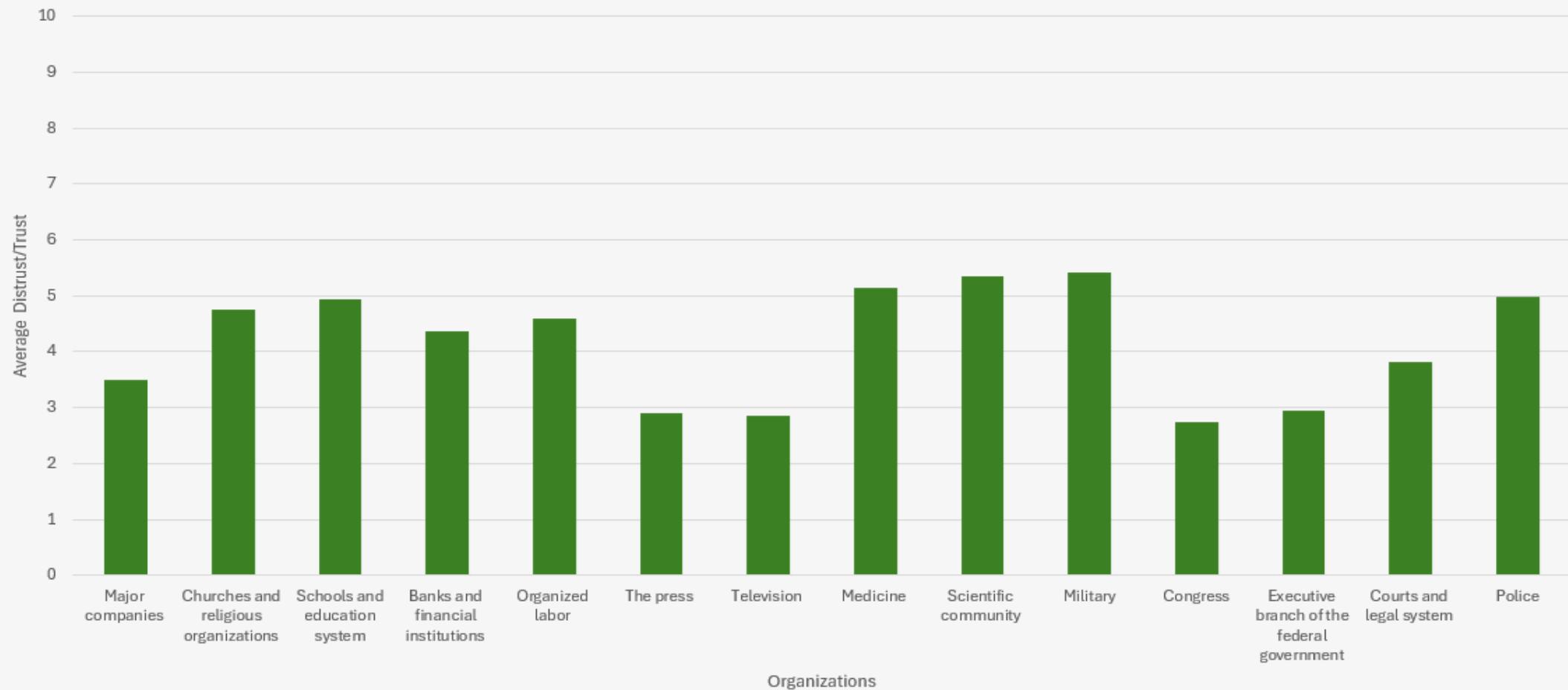


Figure taken from: Lawrence, E. M.; Trani, E. A.; Anthony, K. M.; Hummer, R. A.; Jensen, T.; Tuder, S.; Loehr, L. R.; Harris, K. M.; & Whitsel, E. A. (2024). Data Resource Profile: Add Health Mortality Outcomes Surveillance. *Int J Epidemiol.* vol. 53 (5), PMCID: PMC11398900

## Weighted Average Distrust/Trust in Organizations at Wave VI



# Test My Brain (TMB) Cognitive Test Battery (Samples 1 & 2)

## Verbal Paired Associates

4 of 25

ADVANTAGE - FACT

6 of 25

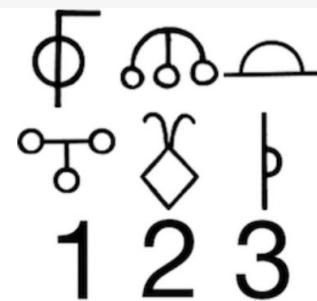
CHANCE - ?

1. IMPRESSION
2. AMOUNT
3. ACCOUNT
4. QUESTION

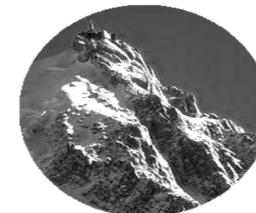


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## Digit Symbol Matching



## Gradual Onset Continuous Performance Test



## Backward Digit Span

532

Then press the numbers on the **keyboard** in **reverse** order.



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# Test My Brain (TMB) Measures and Timing: Sample 1 & Sample 2

Test Name	Construct	Main Outcome(s)	Time (min)
Verbal Paired Associates	Verbal Memory	# of words correctly recalled	5
Digit Symbol Matching	Processing Speed	Median reaction time of correct response	2
Gradual Onset Continuous Performance Test	Executive function, Response Inhibition, & Sustained Attention	Dprime	4
Backward Digit Span	Short-term memory	Maximum length of number string correctly recalled	3.5
<b>Total Time 14.5</b>			