



Adolescent Brain Cognitive Development

Teen Brains. Today's Science. Brighter Future.

Gaya J. Dowling, Ph.D.

Director, ABCD Project

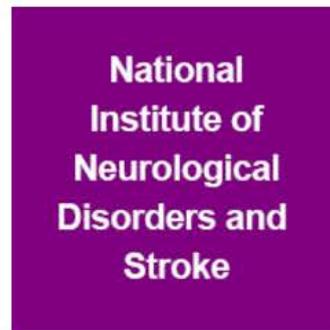
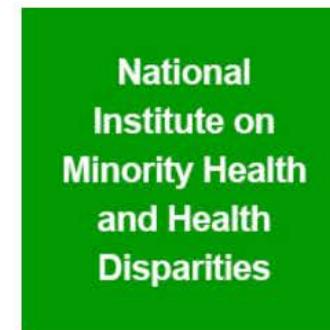
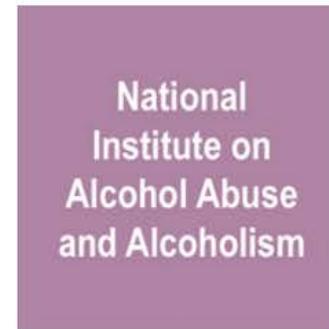
Division of Extramural Research, NIDA

May 3, 2017



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Federal Collaborators



ABCD Youth Protocol Summary: Baseline

Physical Health

PhenX Anthropometrics (height/weight/waist measurements)
Snellen Vision Screener
Edinburgh Handedness Inventory
Youth Risk Behavior Survey: Exercise
Pubertal Development Scale
Menstrual Cycle Survey (pubescent girls)
Screen Time Survey

Brain Imaging

Structural MRI

- 3D T1 - Weighted
- 3D T2 - Weighted
- Diffusion Tensor Imaging

Functional MRI (fMRI)

- Resting State
- Monetary Incentive Delay Task
- Stop Signal Task
- Emotional N-Back Task

Biospecimens

Breathalyzer and Oral Fluids (subset)
Saliva Samples for DNA, Puberty
Blood Samples (subset)
Hair Sample
Baby Teeth

Mental Health

Kiddie Schedule for Affective Disorders and Schizophrenia

- Background Items Survey
- Diagnostic Interview for DSM-5 (5 modules)

PhenX UPPS-P for Children Survey

PhenX Behavioral Inhibition/Behavioral Approach System (BIS/BAS) Scales

Prodromal Psychosis Scale

Youth Resilience Scale

Neurocognition

NIH Toolbox Tasks:

- Picture Vocabulary
- Flanker Inhibitory Control & Attention
- List Sorting Working Memory
- Dimensional Change Card Sort
- Pattern Comparison Processing Speed
- Picture Sequence Memory
- Oral Reading Recognition

Rey Auditory Verbal Learning Task

Cash Choice Task

Little Man Task

Matrix Reasoning Task

RAVLT Delayed Recall

Culture & Environment

Prosocial Tendencies Survey

PhenX Acculturation Survey

Parental Monitoring Survey

Acceptance Subscale from Children's Report of Parental Behavior Inventory (CRPBI) - Short

PhenX Family Environment Scale - Family Conflict

PhenX Neighborhood Safety/Crime Survey

PhenX School Risk & Protective Factors Survey

Substance Use

For most participants*:

Timeline Follow-Back Survey

PhenX Peer Group Deviance Survey

PATH Intention to Use Tobacco Survey

Caffeine Intake Survey

Participant Last Use Survey (PLUS) for substance use within the last 24 hrs

Other Data Sources

Geocoding from Residential History

School Records

FitBit® (subset)

Brief Problem Monitor - Teacher Form



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*For participants with differing levels of substance use (low, moderate, heavy), follow-up items include: iSay II Q2 Sipping items; Tobacco Low-Level Use Measure; MJ Low-Level Use Measure; PhenX Acute Subjective Response to Alcohol, Tobacco, or MJ; Hangover Symptom Scale; Rutgers Alcohol Problem Index (RAPI); Nicotine Dependence (PATH); Drug Problem Index (MAPI); MJ Problem Index (MAPI)

ABCD Parent Protocol Summary: Baseline

Physical Health

PhenX Demographics Survey
Medical History Questionnaire
Developmental History Questionnaire
PhenX Medications Survey
Menstrual Cycle Survey
Sleep Disturbances Scale for Children
Sports and Activities Involvement Questionnaire
Screen Time Survey
Ohio State TBI Screen - Short

Mental Health

Kiddie Schedule for Affective Disorders and Schizophrenia

- Background Items Survey
- Diagnostic Interview for DSM-5

Child Behavior Checklist
General Behavior Inventory - Mania
Adult Self Report Survey
Family History Assessment Survey

Substance Use

Parent Rules Survey
PhenX Community Risk and Protective Factors
Participant Last Use Survey (PLUS) for substance use within the last 24 hrs.

Culture & Environment

Vancouver Index of Acculturation - Short Survey
Multi-Group Ethnic Identity Measure-R Survey
Prosocial Tendencies Survey
Mexican American Cultural Values Scale
PhenX Acculturation Survey
PhenX Family Environment Scale - Family Conflict
PhenX Neighborhood Safety/ Crime Survey
Native American Acculturation Scale



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ABCDStudy.org



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Enrollment Progress

Locations of ABCD Research Sites in the United States



Coordinating Center

University of California, San Diego



Data Analysis and Informatics Center

University of California, San Diego

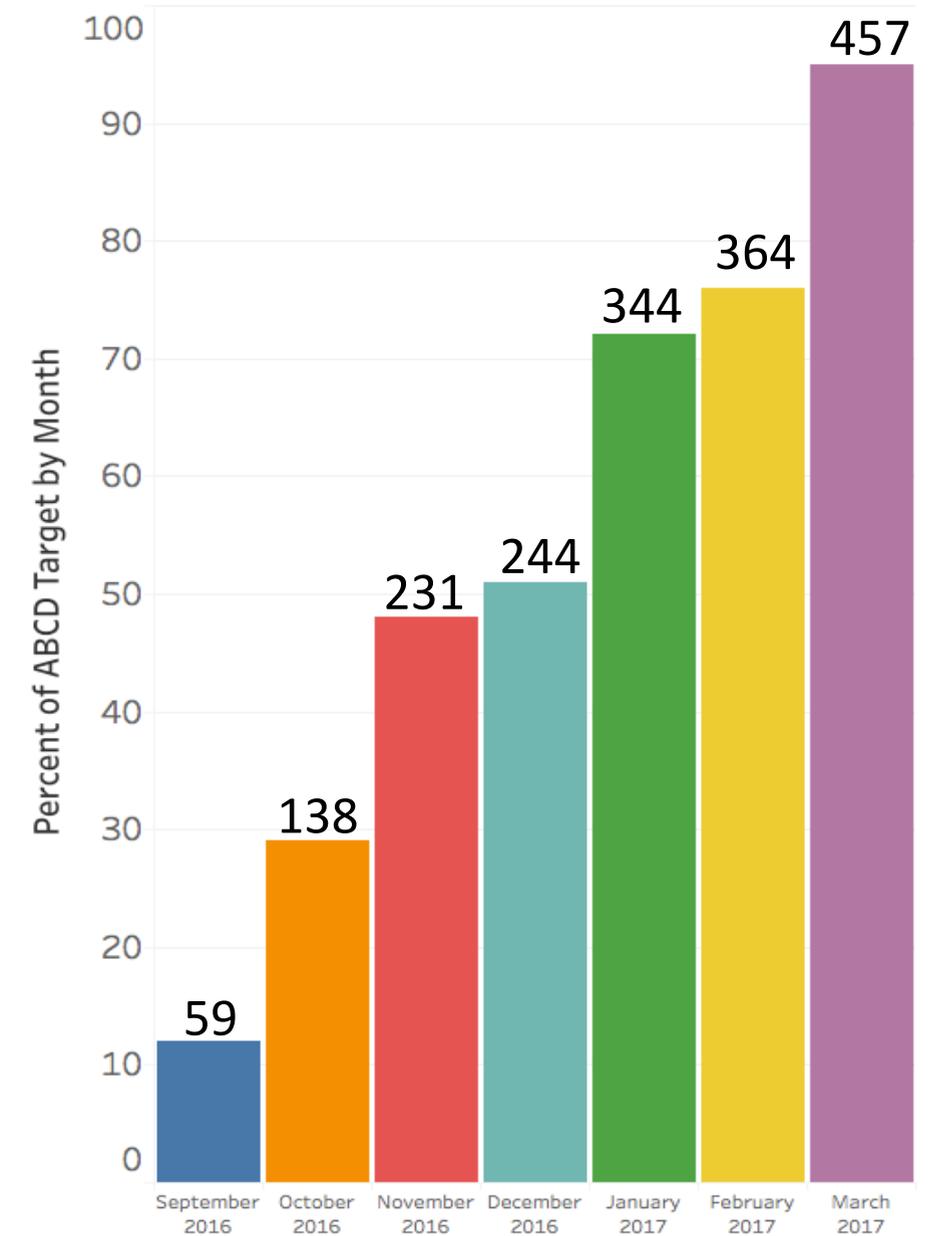
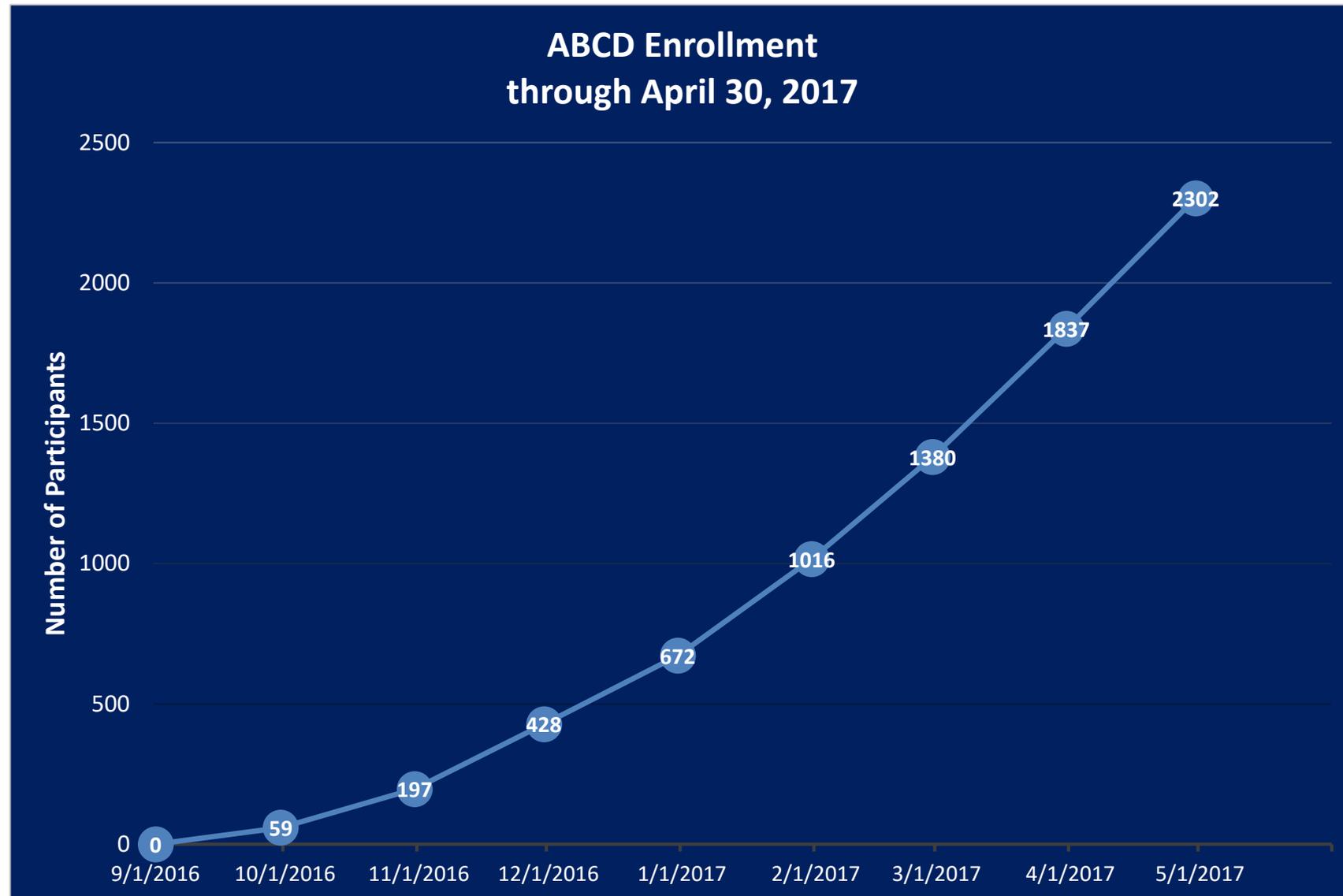


Research Sites

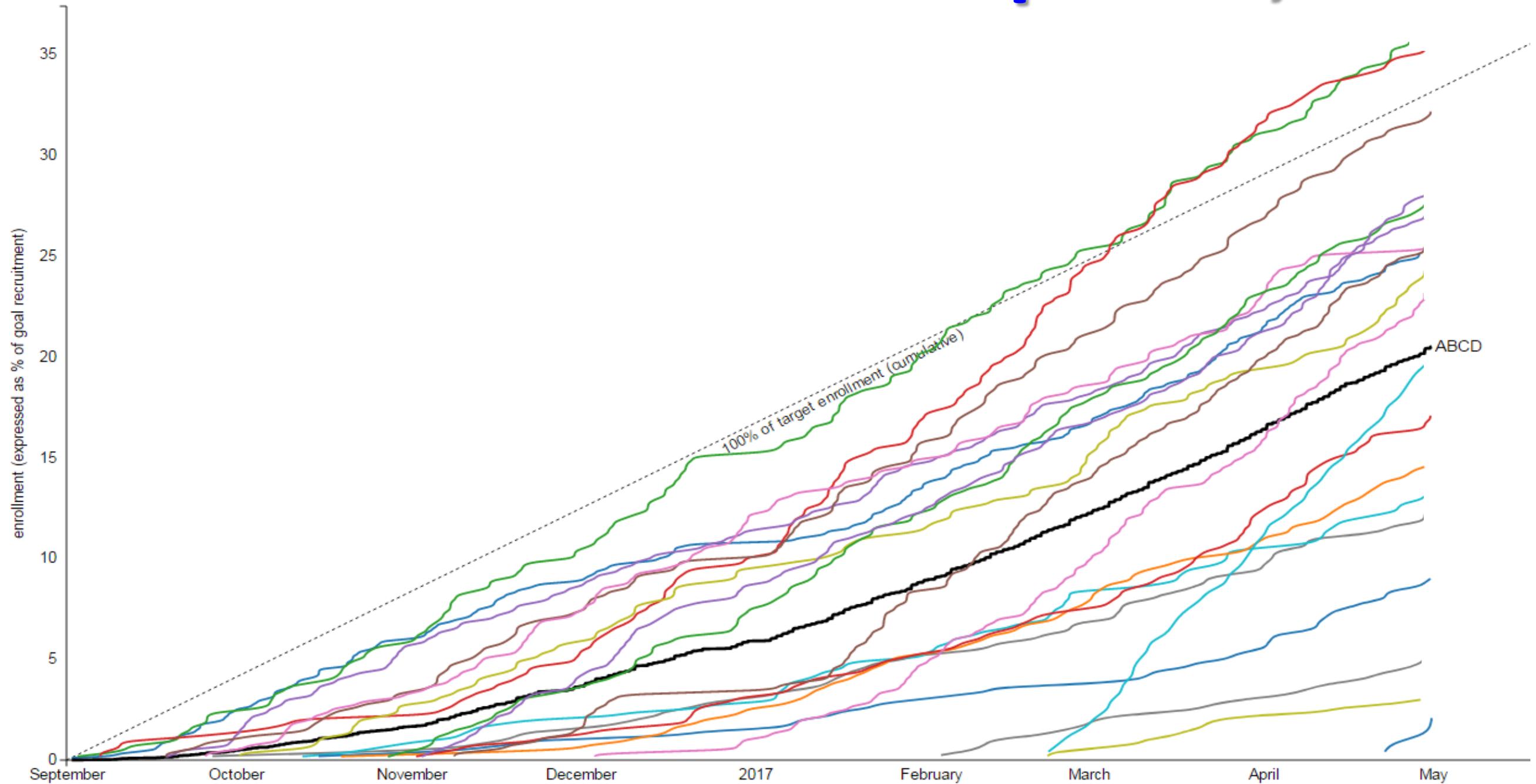
Children's Hospital of Los Angeles
 Florida International University
 Laureate Institute for Brain Research
 Icahn School of Medicine at Mount Sinai
 Oregon Health & Science University
 SRI International
 University of California, Los Angeles
 University of California, San Diego
 University of Colorado
 University of Florida
 University of Maryland
 University of Michigan
 University of Minnesota
 University of Pittsburgh
 Medical University of South Carolina
 University of Utah
 University of Vermont
 Virginia Commonwealth University
 Washington University in St. Louis
 University of Wisconsin-Milwaukee
 Yale University



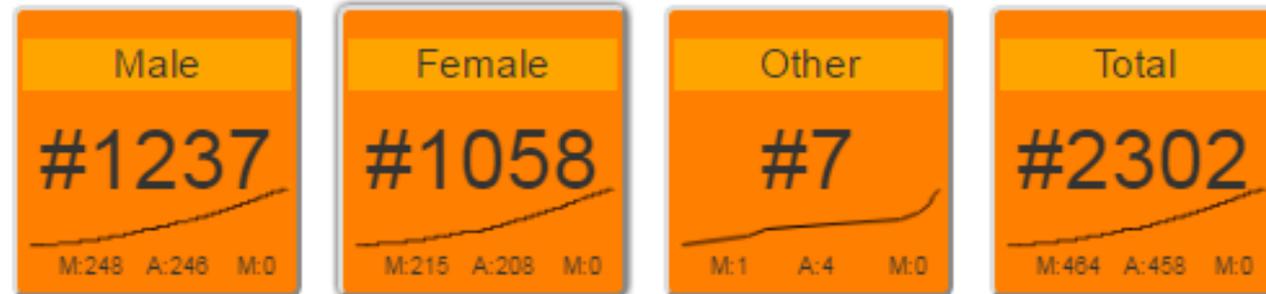
ABCD Enrollment as of April 30, 2017



ABCD Enrollment as of April 30, 2017



ABCD Demographics as of April 30, 2017



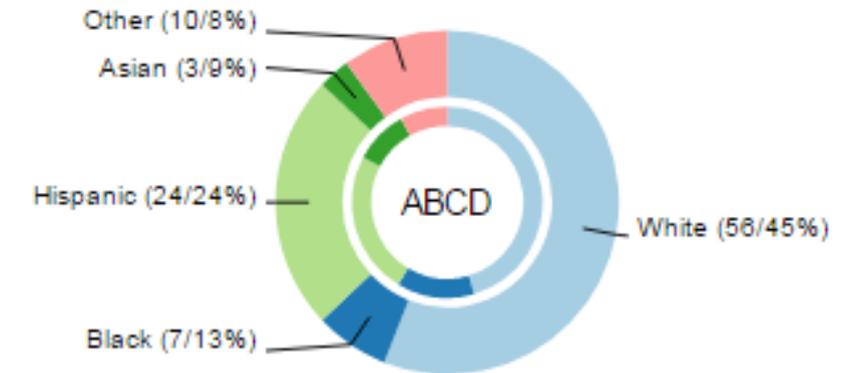
54%

46%

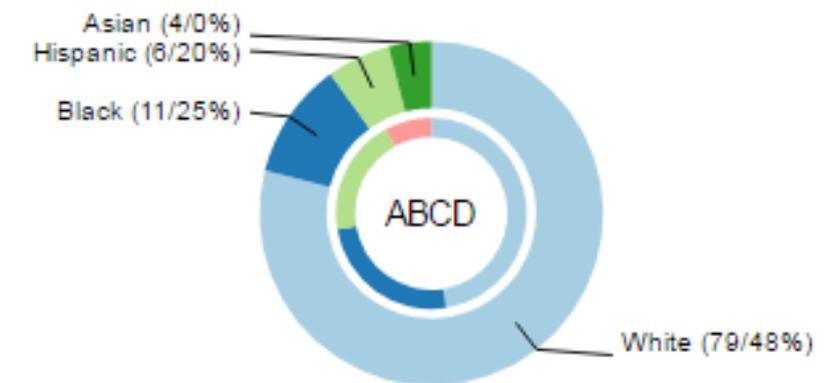


57%

43%

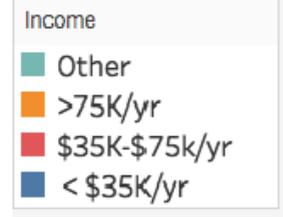


Singletons

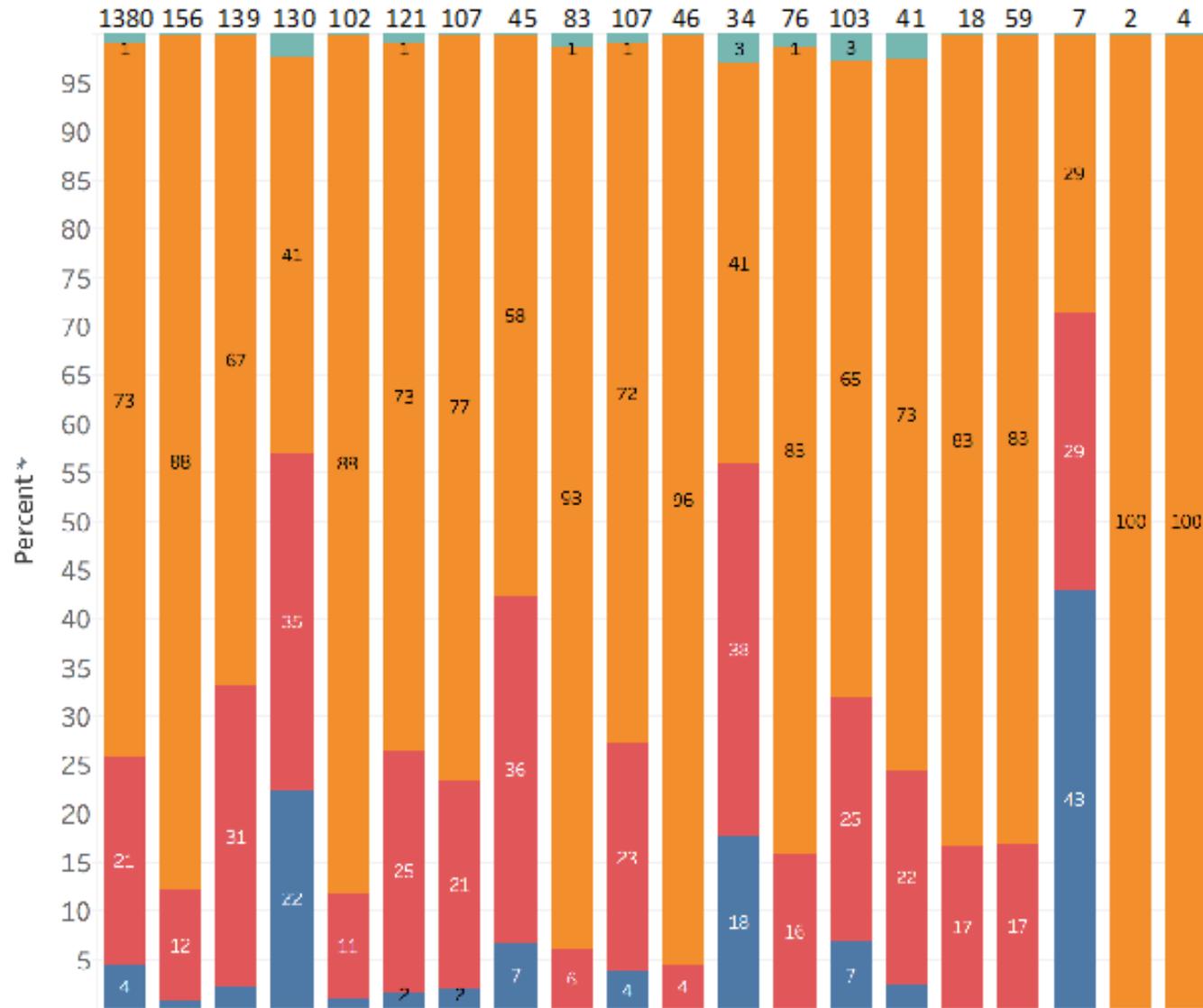


Twins

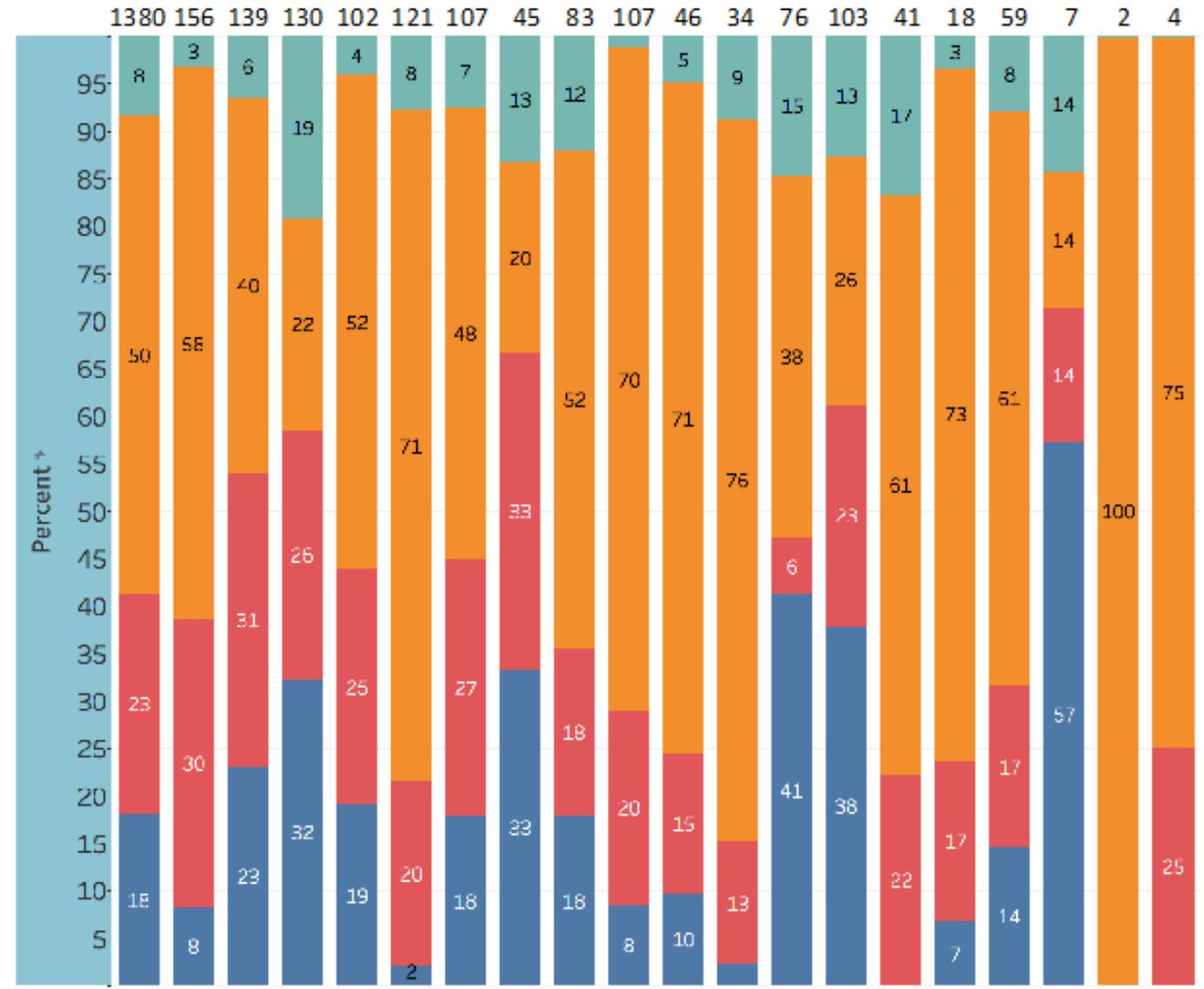
ABCD SES (n=1380)



Education



Income





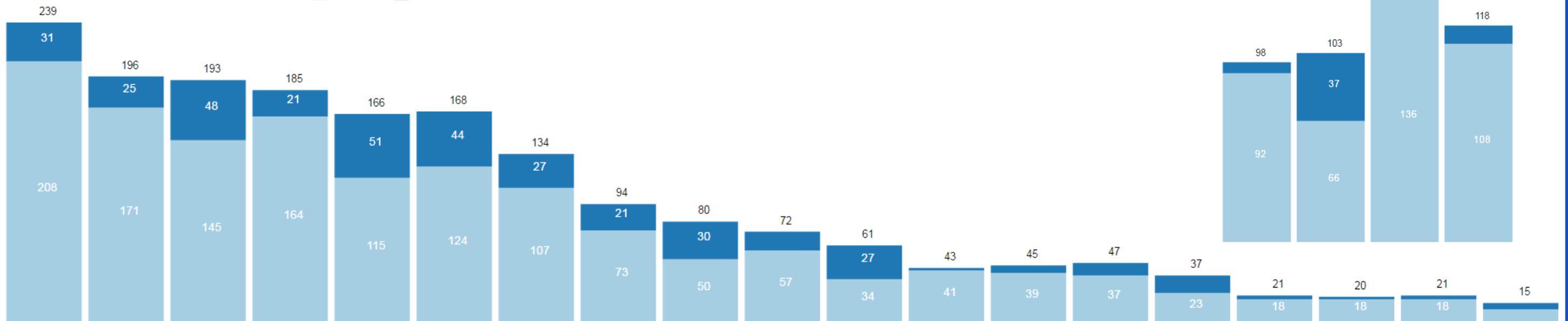
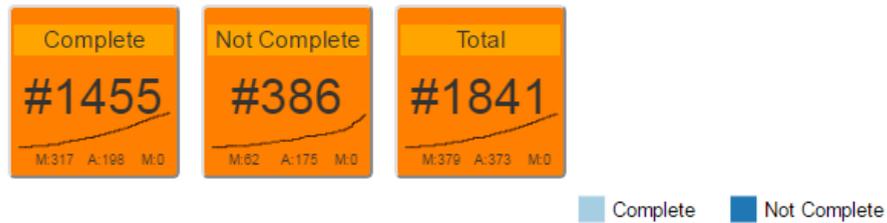
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Non-Imaging Assessments

Assessment Completeness as of April 30, 2017

Singletons



Twins



Complete Not Complete

Substance Use

N=1839 (through 3/31/17); Valid percents presented

Heard Of:		Use:		Peer Use: ³	
Alcohol	97.2%				
Tobacco	94.2%				
MJ	57.6%				
MJ-synth	6.3%				
RX misuse	37.5%				
Inhalants	27.8%				
Other	13.3%				
stimulants	5.5%				
heroin	2.5%				
Fake drug	1.5%			³ a few, some or most	

Substance Use

N=1839 (through 3/31/17); Valid percents presented

Heard Of:		Use:		Peer Use: ³	
Alcohol	97.2%	Sip of alcohol	25.9%		
		Full drink of alcohol	0.7% (n=3)		
Tobacco	94.2%	Tobacco puff	0.5% (n=7)		
		Tobacco more than puff	0.0%		
		Other tobacco/nicotine ¹	0.5% (n=7)		
		¹ pipe, cigar, e-cig, hookah, chew, nicotine replacement			
MJ	57.6%	Marijuana puff/taste	0.1% (n=1)		
MJ-synth	6.3%	Other marijuana use ²	0.1% (n=1)		
		² tincture			
RX misuse	37.5%				
Inhalants	27.8%	Inhalants	0.3%		
Other	13.3%				
stimulants	5.5%				
heroin	2.5%				
Fake drug	1.5%				³ a few, some or most

Substance Use

N=1839 (through 3/31/17); Valid percents presented

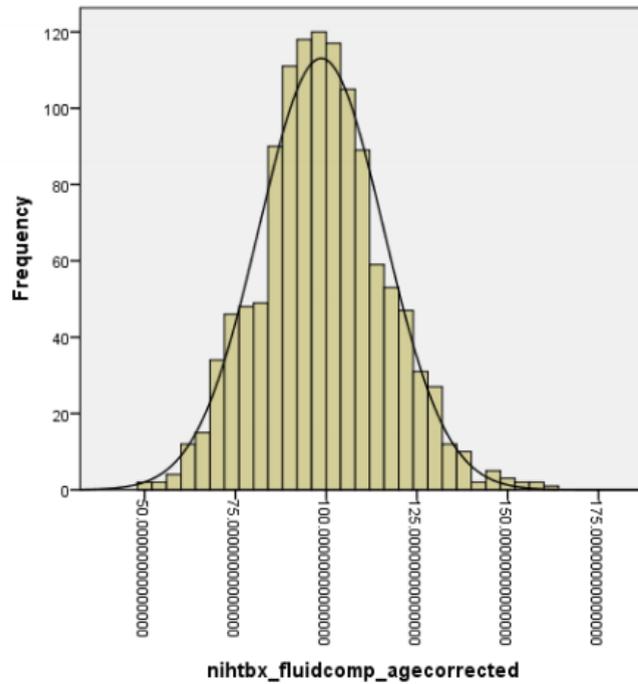
Heard Of:		Use:		Peer Use: ³	
Alcohol	97.2%	Sip of alcohol	25.9%	Drink alcohol	3.2%
		Full drink of alcohol	0.7% (n=3)	Get drunk	1.0%
Tobacco	94.2%	Tobacco puff	0.5% (n=7)	Smoke cigarettes	1.7%
		Tobacco more than puff	0.0%	Use other nicotine	0.9%
		Other tobacco/nicotine ¹	0.5% (n=7)		
		¹ pipe, cigar, e-cig, hookah, chew, nicotine replacement			
MJ	57.6%	Marijuana puff/taste	0.1% (n=1)	Use marijuana	0.5%
MJ-synth	6.3%	Other marijuana use ²	0.1% (n=1)		
		² tincture			
RX misuse	37.5%				
Inhalants	27.8%	Inhalants	0.3%		
Other	13.3%			Alc/drug Problems	1.0%
stimulants	5.5%			Sell/give drugs	0.5%
heroin	2.5%				
Fake drug	1.5%			³ a few, some or most	

Neurocognition Analysis

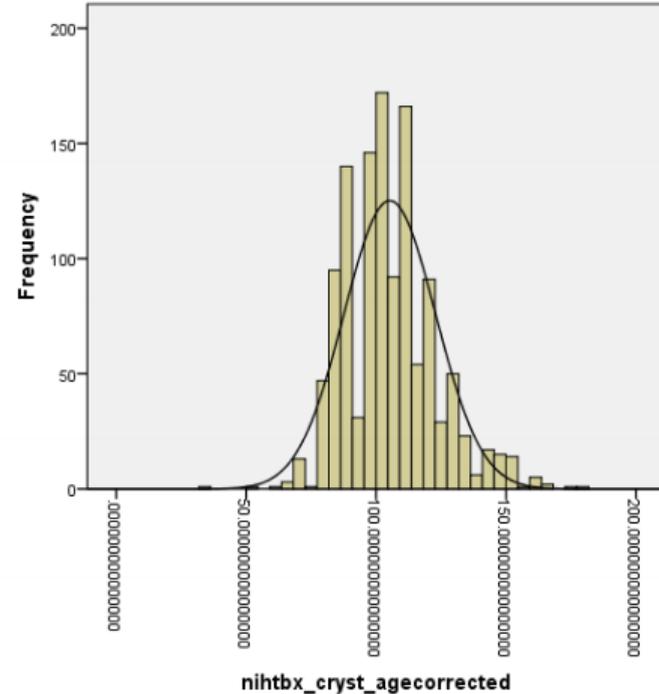
NIH ToolBox

Would you rather have \$75 in three days or \$115 in 3 months?

Fluid Composite



Crystallized Composite



cash_choice_task * hr_score Crosstabulation

Count		hr_score		Total
		0	1	
cash_choice_task	1	287	259	546
	2	427	340	767
	3	16	14	30
Total		730	613	1343

No significant differences by risk status

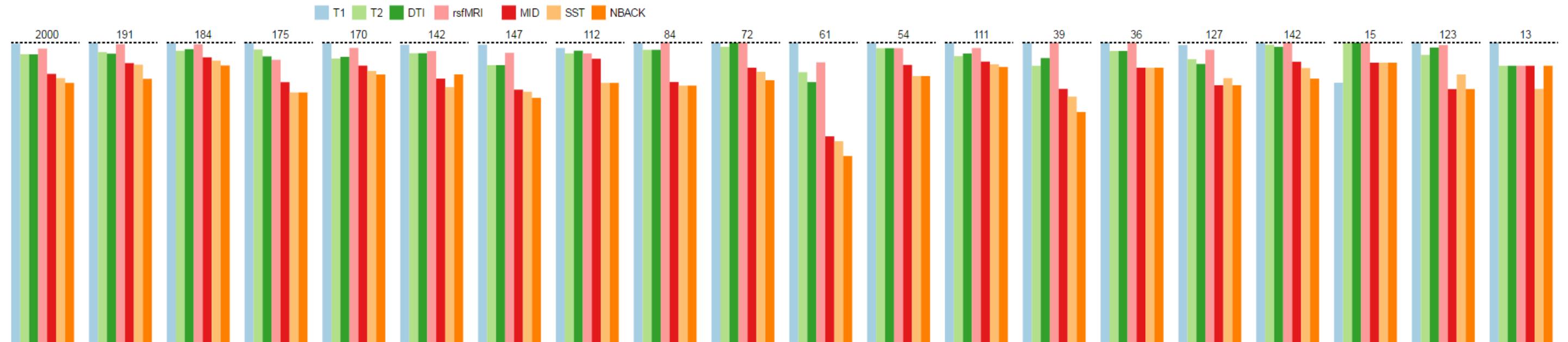


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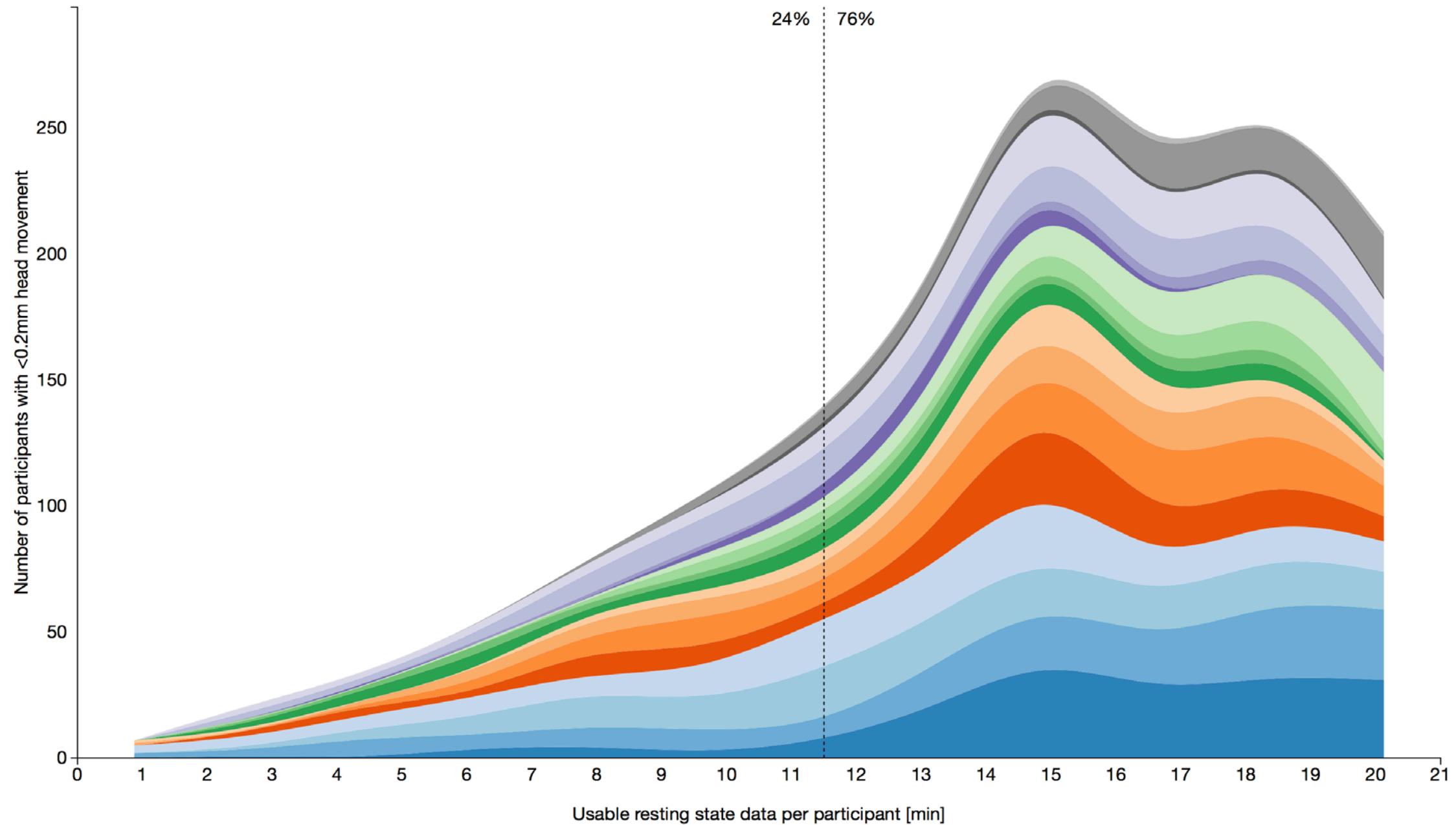
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Imaging

Imaging Completeness as of April 30, 2017



Resting State Motion



ABCD-NDA Imaging Data Sharing (fast-track)

Unprocessed raw DICOM data with minimal demographic information:

NDA pGUID, Age*, DOB*, Sex

In review by Informatics workgroup

Patient name	Patient ID	Age	Study Description	Modality	ID	Date Acquired	# Im	# seri...	Date Added	Date of Birth	Ndar_invx1368r5
Y Ndar_invx1368r5	NDAR_...368R5	10 y	Adolescent Br...elopment Study	MR	0	1/21/17, 3:20 PM	5,611	38	2/12/17, 12:43 PM	12/15/06	Adolescent Brain Cognitive... MR 1/21/17 5,611 images
SIEMENS original (baseline_year_1_arm_1)			localizer_32ch	MR	1	1/21/17, 3:05 PM	3		2/12/17, 12:43 PM		
SIEMENS original (baseline_year_1_arm_1)			ABCD_T1w_MPR_vNav_setter	MR	2	1/21/17, 3:06 PM	32		2/12/17, 12:43 PM		
SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_T1w_MPR_vNav	MR	3	1/21/17, 3:07 PM	166		2/12/17, 12:43 PM		
ABCD-T1 SIEMENS original (baseline_year_1_arm_1)			ABCD_T1w_MPR_vNav	MR	4	1/21/17, 3:07 PM	176		2/12/17, 12:43 PM		
ABCD-T1-NORM SIEMENS original (baseline_year_1_arm_1)			ABCD_T1w_MPR_vNav	MR	5	1/21/17, 3:07 PM	176		2/12/17, 12:43 PM		
ABCD-fMRI-FM-PA SIEMENS original (baseline_year_1_arm_1)			ABCD_fMRI_DistortionMap_PA	MR	6	1/21/17, 3:15 PM	60		2/12/17, 12:43 PM		
ABCD-fMRI-FM-AP SIEMENS original (baseline_year_1_arm_1)			ABCD_fMRI_DistortionMap_AP	MR	7	1/21/17, 3:15 PM	60		2/12/17, 12:43 PM		
ABCD-rsMRI SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_fMRI_rest	MR	8	1/21/17, 3:16 PM	44		2/12/17, 12:43 PM		
ABCD-fMRI-FM-PA SIEMENS original (baseline_year_1_arm_1)			ABCD_fMRI_DistortionMap_PA	MR	10	1/21/17, 3:18 PM	60		2/12/17, 12:43 PM		
ABCD-fMRI-FM-AP SIEMENS original (baseline_year_1_arm_1)			ABCD_fMRI_DistortionMap_AP	MR	11	1/21/17, 3:18 PM	60		2/12/17, 12:43 PM		
ABCD-rsMRI SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_fMRI_rest	MR	12	1/21/17, 3:20 PM	383		2/12/17, 12:43 PM		
ABCD-rsMRI SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_fMRI_rest	MR	14	1/21/17, 3:25 PM	383		2/12/17, 12:43 PM		
ABCD-Diffusion-FM-PA SIEMENS original (baseline_year_1_arm_1)			ABCD_dMRI_DistortionMap_PA	MR	16	1/21/17, 3:52 PM	81		2/12/17, 12:43 PM		
ABCD-Diffusion-FM-AP SIEMENS original (baseline_year_1_arm_1)			ABCD_dMRI_DistortionMap_AP	MR	17	1/21/17, 3:53 PM	81		2/12/17, 12:43 PM		
ABCD-DTI SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_dMRI	MR	18	1/21/17, 3:54 PM	103		2/12/17, 12:43 PM		
SIEMENS original (baseline_year_1_arm_1)			ABCD_T2w_SPC_vNav_setter	MR	19	1/21/17, 3:41 PM	32		2/12/17, 12:43 PM		
SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_T2w_SPC_vNav	MR	20	1/21/17, 3:41 PM	122		2/12/17, 12:43 PM		
ABCD-T2 SIEMENS original (baseline_year_1_arm_1)			ABCD_T2w_SPC_vNav	MR	21	1/21/17, 3:41 PM	176		2/12/17, 12:43 PM		
ABCD-T2-NORM SIEMENS original (baseline_year_1_arm_1)			ABCD_T2w_SPC_vNav	MR	22	1/21/17, 3:41 PM	176		2/12/17, 12:43 PM		
ABCD-fMRI-FM-PA SIEMENS original (baseline_year_1_arm_1)			ABCD_fMRI_DistortionMap_PA	MR	23	1/21/17, 3:49 PM	60		2/12/17, 12:43 PM		
ABCD-fMRI-FM-AP SIEMENS original (baseline_year_1_arm_1)			ABCD_fMRI_DistortionMap_AP	MR	24	1/21/17, 3:48 PM	60		2/12/17, 12:43 PM		
ABCD-rsMRI SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_fMRI_rest	MR	25	1/21/17, 3:49 PM	383		2/12/17, 12:43 PM		
ABCD-rsMRI SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_fMRI_rest	MR	27	1/21/17, 3:55 PM	38		2/12/17, 12:43 PM		
ABCD-rsMRI SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_fMRI_rest	MR	28	1/21/17, 3:57 PM	119		2/12/17, 12:43 PM		
ABCD-fMRI-FM-PA SIEMENS original (baseline_year_1_arm_1)			ABCD_fMRI_DistortionMap_PA	MR	30	1/21/17, 4:00 PM	60		2/12/17, 12:43 PM		
ABCD-fMRI-FM-AP SIEMENS original (baseline_year_1_arm_1)			ABCD_fMRI_DistortionMap_AP	MR	31	1/21/17, 4:00 PM	60		2/12/17, 12:43 PM		
ABCD-rsMRI SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_fMRI_rest	MR	32	1/21/17, 4:04 PM	383		2/12/17, 12:43 PM		
ABCD-fMRI-FM-PA SIEMENS original (baseline_year_1_arm_1)			ABCD_fMRI_DistortionMap_PA	MR	34	1/21/17, 4:06 PM	60		2/12/17, 12:43 PM		
ABCD-fMRI-FM-AP SIEMENS original (baseline_year_1_arm_1)			ABCD_fMRI_DistortionMap_AP	MR	35	1/21/17, 4:07 PM	60		2/12/17, 12:43 PM		
ABCD-nBack-fMRI SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_fMRI_task_Emoational_n-back	MR	36	1/21/17, 4:09 PM	45		2/12/17, 12:43 PM		
ABCD-nBack-fMRI SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_fMRI_task_Emoational_n-back	MR	40	1/21/17, 4:16 PM	370		2/12/17, 12:43 PM		
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ABCD-MID-fMRI SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_fMRI_task_Monetary_incentive	MR	46	1/21/17, 4:29 PM	411		2/12/17, 12:43 PM		
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ABCD-fMRI-FM-AP SIEMENS original (baseline_year_1_arm_1)			ABCD_fMRI_DistortionMap_AP	MR	49	1/21/17, 4:35 PM	60		2/12/17, 12:43 PM		
ABCD-SST-fMRI SIEMENS mosaic original (baseline_year_1_arm_1)			ABCD_fMRI_task_Stop	MR	50	1/21/17, 4:36 PM	445		2/12/17, 12:43 PM		
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NIMH Data Archive

<https://data-archive.nimh.nih.gov/#abcd-anchor>



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Dissemination

ABCD Meetings/Symposia

- American Psychiatric Association – May 23, 2017; San Diego, CA
- American Psychological Association – August 5, 2017; Washington, DC
- ACNP (submitted) – December 3-7, 2017; Palm Springs, CA

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Posts

ABCD Study
April 17 at 2:16pm · 🌐

Do you know how the ABCD Study began? Learn about its implications for #youth #braindevelopment research: <https://abcdstudy.org/about-history.html>

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About See All

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@abcdstudy

This is the official Twitter of the ABCD Study. For more information about the study, please visit our homepage.

United States
abcdstudy.org
Joined December 2015

Tweet to ABCD Study

@abcdstudy hasn't Tweeted

When they do, their Tweets will show up here.

Who to follow

Cleveland Clinic MD
Follow

Jorge Atiles @jatliles
Follow

Peter Beckel @peterbeckel
Follow

Trends

#TheCircle
Watch #TheCircle team's live chat about the film at 11am PST-2pm ET
Promoted by The Circle Movie

#MondayMotivation
@staphealth is Tweeting about this
#DrupalCon



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For More Information, Please Visit:

ABCDSStudy.org

High Risk Screener

(very true or often true = 2; somewhat or sometimes true = 1; not true = 0)

Externalizing Domain (2 or more)

- Is disobedient at school?
- Lies or cheats?
- Destroys things belonging to his/her family or others?
- Steals outside the home?
- In the past six months, has anyone who lives with your child (e.g., you, a spouse or partner) smoked a cigarette, e-cigarette, or any other type of tobacco?

(0/1)

Internalizing Domain (1 or more on both components)

- Is too fearful or anxious?
- Is unhappy, sad, or depressed?
- Experiences physical problems that are without known medical cause—such as aches or pains, feeling sick, headaches, stomachaches, rashes, or vomiting?

- Tends to be slow at making friends?
- Finds life to be stressful?

