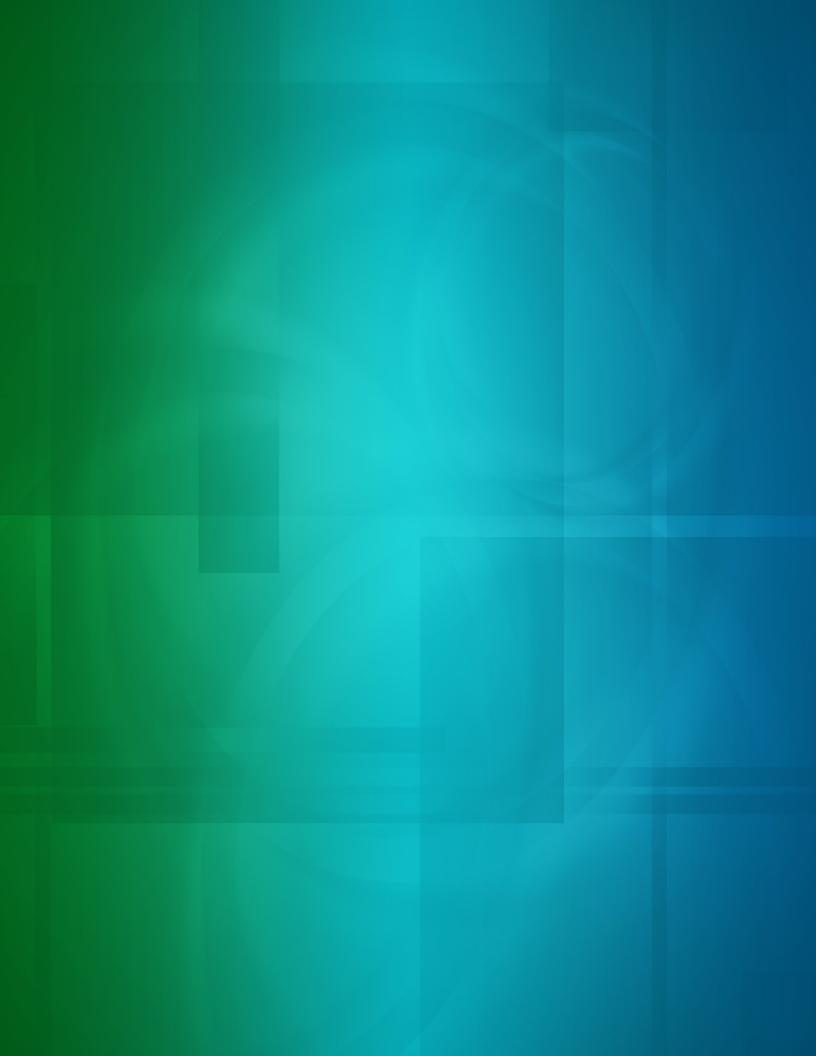
PROTOCOL SUMMARY

VISIT 3: 3-9 MONTHS



HEALthy Brain and Child Development Babies · Brains · Bright Futures

HBCDStudy.org



The HEALthy Brain and Child Development Study

The HBCD Study is the largest longitudinal study of early brain and child development in the United States. Knowledge gained from this research will have lasting impacts on future generations of children.

This ambitious project will enroll over 7,000 participating families from across the United States and follow them from pregnancy through early childhood. The HBCD Research Consortium consists of the HBCD Consortium Administrative Core (HCAC), the HBCD Data Coordinating Center (HDCC), and 27 recruitment sites across the country (see map).

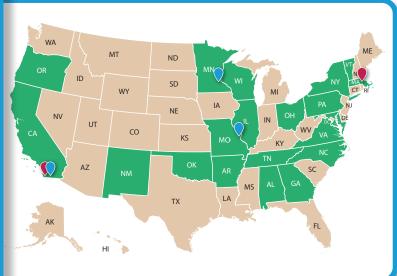
Leading researchers in the fields of child development and neuroscience will work with participating families and their children to understand how the brain develops and how exposure to substances and other environmental, social, and biological factors during pregnancy and after birth impact outcomes.

HBCD Open Science Model

The data generated in the study will be made broadly available to the research community through an open science model and serve as a resource to support numerous additional studies and foster new hypotheses to be explored.

Locations of HBCD Recruitment Sites in the United States

Sites	Cedars-Sinai Medical Center Children's Hospital of Los Angeles Children's Hospital of Philadelphia Cincinnati Children's Hospital Emory University Johns Hopkins University/Kennedy Krieger Institute New York University School of Medicine Northwestern University Oklahoma State University Center for Health Sciences Oregon Health & Science University Pennsylvania State University-University Park Pennsylvania State University College of Medicine University of Alabama at Birmingham University of Alabama at Tuscaloosa University of Arkansas for Medical Sciences University of Maryland University of Morth Carolina Chapel Hill University of North Carolina Chapel Hill University of Wisconsin-Madison University of California, San Diego Vanderbilt University Virginia Tech Washington University	WA OR NV CA AK
HCAC	University of California San Diego Boston Children's Hospital Harvard Medical School	
HDCC	University of California San Diego University of Minnesota Washington University	



3-9 Months of Age

American Psychiatric Association (APA) DSM-5 Level 1anxiety, sleep functioning, et functioning, etAPA Patient-Reported Outcome Measurement Information System (PROMIS) Level 2More detailed symptoms, inc disturbances, r and personalitDSM-5 Severity Scales - Acute Stress or Post-Traumatic Stress Disorder (PTSD)Severity of acuEdinburgh Postnatal Depression Scale (EPDS)Symptoms of pAlcohol, Smoking and Substance Involvement Screening Test (ASSIST)Lifetime and cSalivaGenome-wide	assessment of current mental health luding anxiety, depression, anger, sleep mania, obsessive-compulsive behaviors,	2.5					
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Stress or Post-Traumatic Stress Severity of acuitable Disorder (PTSD) Symptoms of p Edinburgh Postnatal Depression Symptoms of p Scale (EPDS) Symptoms of p Alcohol, Smoking and Substance Lifetime and co Involvement Screening Test Lifetime and co Saliva Genome-wide		2.5					
Scale (EPDS) Symptoms of p Sym	te stress and PTSD symptoms	5					
Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) Lifetime and contract of the second seco	postnatal depression	3*					
Involvement Screening Test (ASSIST) Lifetime and contract of the second	Substance Use						
Saliva Genome-wide	urrent substance use (last 3 months)	5					
	Biospecimens						
	association studies (GWAS), Epigenome- on studies (EWAS), transcriptomes	0 10*					
Stool Metabolome,	microbiome 1	5					
Urine Metabolites ar	nd environmental exposures 5	5					
Social and Environmental Determinants							
Patient-Reported Outcome Measurement Information System (PROMIS) Social Support / Perceived StressAvailability of s during the pase	social support and perceptions of stress t month	4					
Residential History for Geocoded Data LinkageHome, work, c to external date	r other frequented addresses for linking casets	5					
Transitions in Care							
	ss whether there were changes in child's	3					
	since the last visit	nued next page >					

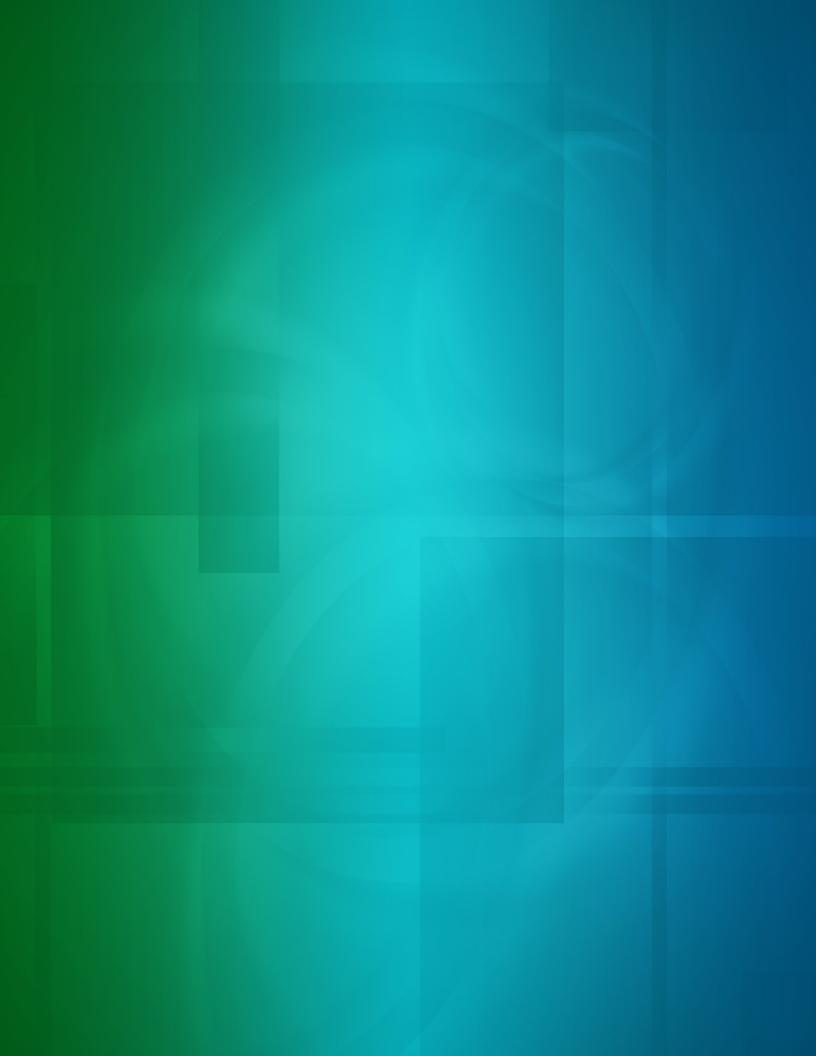
*Measure to be completed by the birthing parent only.

3-9 Months of Age

HBCD Measure	What it Measures	Child (min)	Adult (min)			
Physical Health						
2-Item Food Insecurity Screen	Household food insecurity		1			
Head Circumference, Height, Weight	Child's physical growth	5				
PhenX Breastfeeding Questionnaire	Whether the infant was breastfed, breastfeeding duration, and introduction of solid foods		1			
	Novel Technology/Wearables					
Activity Surveys	Child activity levels and functioning of movement and heart rate sensors, assessed once daily for 72 hours		12			
Heart Rate Sensors	Child heart rate, SpO2, and respiratory rate using LED sensors	72 hours, worn at home	5			
Movement Sensors	Child movement and sleep/wake cycles using sensors with an accelerometer and gyroscope	72 hours, worn at home	5			
	Brain Imaging					
Outside the Scanner	Pre-Scan & Post-Scan Surveys: Sleep information, social behavior, transportation, scheduling, etc.		40			
	Diffusion MRI	13				
	Functional MRI (resting state)	16				
Magnetic Resonance Imaging (MRI)	MR Spectroscopy	10				
	Quantitative MRI	4				
	Structural MRI (T1/T2)	10				
	Brain Activity					
Outside of Electroencephalogram (EEG)	Pre-EEG and Post-EEG Measurements	30				
	Faces Task	4				
	Mismatch Negativity/Auditory Oddball Task	12				
Electroencephalogram (EEG)	Video Resting State	3				
	Visual Evoked Potential Task	1				
Continued next pag						

3-9 Months of Age

HBCD Measure	What it Measures	Child (min)	Adult (min)		
Neurocognition and Language					
Multilingual Language Development Survey	Assessment of child's exposure to different languages		3		
	Cognitive and Executive Function (gaze-based and touch-based tasks)	10			
National Institutes of Health (NIH) Baby Toolbox	Language (Mullen receptive, expressive, and observation tasks)	10			
	Memory	10			
Sensory Processing Measure 2 (SPM-2)	Vulnerabilities in the child's sensory systems, including under- and over-reactivity, sensory seeking behaviors, and perception		15		
Ве	havior and Caregiver-Child Interactions				
Early Regulation in Context Assessment (ERICA)	Affect and self-regulation behavior in children and families	45			
ecPROMIS - Caregiver-Child Interactions	Social relationships between the caregiver and child		2		
Family Culture Matters (FCM)	Culturally important differences in the caregiver's socialization goals for the child		10		
Infant Behavior Questionnaire- Revised (IBQ-R)	Child affect and temperament, including surgency, negative affect, effortful control, and inhibition		10		
Multidimensional Assessment Profile Temper Loss Scale (MAP- DB TL)	Child temperament and temper modulation		5		
Total Visit Time (min)		3	52		





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