

Supplementary Online Materials

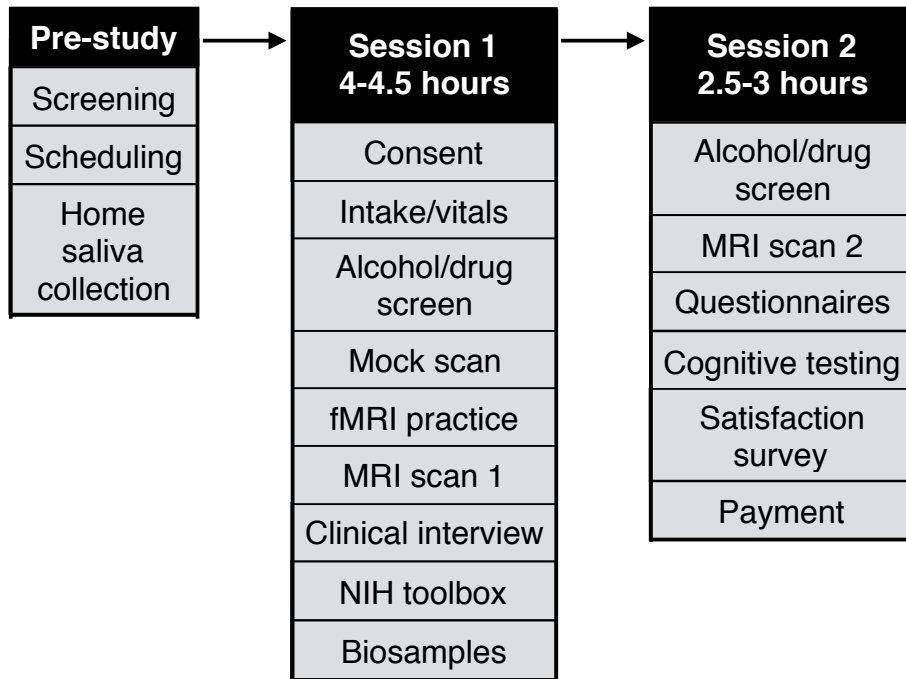
To Accompany

The Lifespan Human Connectome Project in Development: A large-scale study of brain connectivity development in 5-21 year olds

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Supplementary Figure 1. Study flow for 18-21 year old participants.



Supplementary Table 1. Detailed inclusion and exclusion criteria.

Category	Exclusions
Insufficient English	Participant and/or parent speaks English “not well” or “not at all” per parent/participant or RA judgment or Participant or parent’s English not sufficient to complete screening and consent
Premature birth	Born >3 weeks early or Weighed <5 pounds at birth or Stayed in neonatal ICU for 2 days or longer
Lifetime history of serious medical conditions	Brain tumor or Stroke or Brain aneurysm or Brain hemorrhage or Subdural hematoma or Cerebral palsy or Multiple sclerosis or Cystic fibrosis or Sickle cell disease or Diabetes or Thyroid problems or Vision <20/200 or Two or more seizures (since age 5, not accompanied by fever)
Serious endocrine conditions	Diagnosed precocious puberty or Untreated human growth hormone deficiency
Treatment for serious medical problem	Hepatitis or HIV or Rheumatoid arthritis or Lupus or Preventing transplant rejection or Long-term use of steroids or Long-term use of immunosuppressants or Cancer (stage 4 or treated with chemotherapy or radiation) or Daily prescription treatment for migraines

<p>Treatment for >12 months by specialist</p>	<p>Attention Deficit Hyperactivity Disorder (ADHD) or Autism spectrum disorder (ASD) or Obsessive compulsive disorder (OCD) or Conduct disorder or Bipolar disorder or Major depression or Schizophrenia or Tourette’s syndrome or Developmental language disorder (stuttering, dyslexia)</p>
<p>Head injury</p>	<p>Head injury involving loss of consciousness or requiring hospitalization:</p> <ul style="list-style-type: none"> • At least 3 separate instances, OR • <3 instances, but 1 or more within the past year and accompanied by at least one of the following: <ul style="list-style-type: none"> · Loss of consciousness for >30 minutes · Amnesia for >24 hours · Confusion or disorientation for >24 hours · CT scan showing insult
<p>Hospitalization for at least two days</p>	<p>Heart problems or Schizophrenia or Bipolar disorder or Anxiety, stress, or nervousness or Major depression or Alcohol or drug problems or Any other neurologic or psychiatric problems (exclusion decided on case by case basis)</p>
<p>Receiving special services at school</p>	<p>Dyslexia or other learning disability or Sensorimotor integration disorder or Intellectual disability or Speech or language impairment</p>
<p>MRI-ineligible</p>	<p>Unsafe metal implanted in body (determined on case-by-case basis, at times consulting MR technologist) or possible metal fragments in body (shrapnel, metal in eye) or unsafe metal dental or orthodontic work (braces, permanent retainers, spacers, expanders, gold teeth, etc.) or nonremovable hair extensions/hairpiece or tattoos/permanent makeup on head or neck or nonremovable piercings or weight >275 pounds or impairing claustrophobia or current pregnancy</p>

Supplementary Table 2. Summary of Task fMRI designs.

	Reward Magnitude	Inhibitory control	Emotion
Frames per run	280	300	178
Run duration (including SRef and discarded acquisitions)	3:55	4:11	2:33
Number of runs	2 #	2 #	1
Design type	Event-related, also possible to model as block design	Event related	Block
Blocks	6 High stakes 6 Low stakes	N/A	3 Face 3 Shape
Block components	Block cue Trials [Guess (x4), Feedback (x4)]	N/A	Block cue Trials [Face or Shape (x6)]
Duration of task initiation countdown at start of run	8 s	8 s	8 s
Duration of stimulus presentation	1.5 s Cue 2 s Guess 1 s Feedback	600 msec	3 s Block cue 2 s Face/Shape
Block duration	28 s	N/A	21 s
Duration of fixation ISI/ITI	1.5, 2 or 2.5 s (jittered) for Guess-Feedback ISI (mean 2 s) 1, 1.5, or 2 s (jittered) for Feedback-Guess ITI (mean 1.625 s)	1.0-4.5 s jittered ITI	1 s ITI
Additional Fixation	8 s between blocks	None	None
Trial types to be modeled in GLM and (count)	High stakes cue (6) Low stakes cue (6) Guess (48) High win feedback (12) Low win feedback (12) High loss feedback (12) Low loss feedback (12)	Go (136) NoGo- Previous win (24) NoG- Previous loss (24)	Face block (3) Shape block (3)

5-7 year old participants complete one run.

Preprocessing of fMRI data for all tasks

Initial preprocessing of fMRI data was conducted using the public release HCP Pipelines v3.22 (available on GitHub at <https://github.com/Washington-University/Pipelines>). The HCP “fMRIVolume” pipeline (see (Glasser et al., 2013)) includes correction for gradient nonlinearity, motion correction, fieldmap-based EPI distortion correction, brain-boundary-based registration of EPI to structural T1-weighted scan, non-linear (FNIRT) registration into MNI152 space, and grand-mean intensity normalization. The HCP “fMRISurface” pipeline (Glasser et al., 2013) registers the data into a standard grayordinate space by projecting cortical gray matter onto registered surface meshes with a standard number of vertices and projecting subcortical data to a set of subcortical gray matter parcel voxels. The fMRISurface pipeline applies a small amount of spatial regularization using a 2 mm full-width-half-maximum (FWHM) spatial filter (in 2D on the cortical surface and in 3D for the subcortical and cerebellar voxels). Following preprocessing, during task fMRI analysis (“TaskfMRIAnalysis” pipeline), additional spatial smoothing was conducted to bring the applied total smoothing to 4 mm FWHM. Temporal filtering of the 4D time series and the general linear model (GLM) design was conducted with a Gaussian-weighted linear high-pass filter with a soft cutoff of 200 s. The 4D timeseries was prewhitened within FILM to correct for autocorrelations in the fMRI data.

Additional details on Reward Magnitude task

The Reward Magnitude task isolates neural responses during the cue period indicating an upcoming block of high or low magnitude outcomes, the guessing period, and each of four feedback types (large win, large loss, small win, small loss). On each trial, participants view a guess cue (“?”) for 2 s, a jittered interstimulus interval (ISI; 1.5, 2, or 2.5 s), and then view feedback (1 s) indicating whether they were correct (winning money) or incorrect (losing money). Guessing trials are embedded within two contexts, a “Low” magnitude block where small monetary outcomes are at stake (\$0.20 for wins and -\$0.10 for losses) and a “High” magnitude block where large monetary outcomes are at stake (\$1.00 for wins and -\$0.50 for losses). The losses are half as large as gains in accordance with prior work indicating that losses are over-weighted in human valuation processes (Tversky & Kahneman, 1991). A block of trials begins with either a low stakes or high stakes cue screen (1.5 s), which indicates whether the next four trials will be played for Low or High stakes (Figure 6A). A fixation cross (8 s) is presented at the end of each block of four trials.

Feedback is pre-programmed and is not yoked to the participant’s actual guess. If participants fail to respond during the “?” screen, they are instructed that the computer will guess for them. As a result, participants all receive the identical outcomes of their guesses, at a rate of 50% correct (resulting in a win), and 50% incorrect (resulting in a loss). In each run, there are 24 trials total presented within six blocks (three Low, three High stakes), composed of 6 high win outcomes, 6 low win outcomes, 6 high loss outcomes, and 6 low loss outcomes. Participants aged 8-21 complete two runs in total whereas participants aged 5-7 complete a single run of the task. The cumulative monetary outcomes result in \$7.20 of winnings (\$3.60 for 5-7 year olds), paid in cash after the scan. Button responses are monitored to ensure wakefulness, but are not otherwise used to specify GLM-based modeling. Response times for guesses could be compared between high and low stakes blocks to test for behavioral response invigoration by high stakes.

All participants experienced a child-friendly version of the task in which they are instructed to guess whether a baby or an adult is “hiding behind” the question mark (Gaffrey et al., 2018), indicating their response with either the left (baby) or right button (adult) each time they see a question mark. Cue and feedback stimuli were designed to have both text and

graphic-based depictions (i.e., coins) of low and high magnitudes (to facilitate the High vs Low distinction even for young children).

Additional details on Inhibitory Control task

During this event-related task, participants view shape stimuli and are instructed to press a button as quickly as possible (“Go”) to every shape except for the circle and the square. “Go” shapes are six different shapes that had not been seen previously (e.g., hexagon, trapezoid). Each shape stimulus is presented for 600 msec with a 1.5 interspersed with a variable-duration fixation cross (range: 1.0-4.5 s). Overall, there are 24 NoGo trials per run (12 previous-win shape, 12 previous-loss shape) and 68 Go trials per run (for total of 92 trials per run). Participants aged 8-21 complete two runs and participants aged 5-7 complete a single run.

The higher frequency of Go trials is a common characteristic of Go/NoGo tasks, used to induce a motor prepotency that makes withholding a motor response to the NoGo trials more difficult. There are 2, 3, or 4 consecutive Go trials between each NoGo trial. This task structure reduces the predictability of NoGo trial presentation and allows for potential analyses investigating whether NoGo errors of commission are more common if a motor prepotency response was built up by more consecutive Go trials (or alternatively, whether participants engage in proactive strategies to inhibit their response with greater success after more consecutive Go trials).

Response data can be used to compute accuracy statistics. Button presses are attributed to a given trial if they occur within 800 ms of the onset of presentation of the shape, which includes the 600 ms duration and 200 ms of fixation. Responses are marked “correct” for Go trials if there was at least 1 press within the response window, and for NoGo trials if there were no presses within the response window, and incorrect otherwise. Individual trial-by-trial performance will be incorporated into the intended event related general linear modeling analysis to isolate correct and incorrect trials for Go, previous-reward NoGo, and previous-loss NoGo events

Additional details on Emotion task

Trials are presented in blocks of 6 of the same stimulus type (face or shape), with each trial presented for 2 s followed by a 1 s intertrial interval (ITI). Each block is preceded by a 3 s task cue (“shape” or “face”), so that each block is 21 s including the cue. The task consists of a single run that presents 3 face blocks and 3 shape blocks. There are three sets of face stimuli in total (each of which partially overlapped with the HCP-YA set), with sets randomized across participants for the cross-sectional participants as well as the first session for the longitudinal participants, such that a third of participants within each age year (i.e., 9 year olds, 10 year olds, etc.) see each of the stimulus sets. For longitudinal follow-up appointments, participants view a new set of face stimuli to prevent possible habituation effects (Johnstone et al., 2005; Wright et al., 2001). This ensures that age is not confounded with stimulus set in the longitudinal component. Button responses are monitored to ensure wakefulness but are not otherwise targeted for analysis.

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Completed by parent (continued)	5	6	7	8	9	10	11	12	13	14	15	16	17	18+	P
29. Adult Self Report (ASR)															X
43. Family history of alcohol use															X
30. Substance Abuse (NIDA)															X
5. NIH Toolbox Parent Report 5-7	X	X	X												
5. NIH Toolbox Parent Report 8-12				X	X	X	X	X							
5. NIH Toolbox Adult															X
1. KSADS – Parent About Child	X	X	X	X	X	X	X	X	X	X	X	X	X		
15-Month Follow-Up	5	6	7	8	9	10	11	12	13	14	15	16	17	18+	P
29. Adult Self Report (ASR)														X	X
29. Youth Self Report (YSR)							X	X	X	X	X	X	X		
30. Substance Abuse (NIDA) – Participant reports about self								X	X	X	X	X	X	X	
44. Positive and Negative Affect Scale (PANAS)				X	X	X	X	X	X	X	X	X	X	X	
9/37. Health Conditions Update	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	
16. Puberty Development Scale (PDS)	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	
18. Menstrual Cycling (Females) *	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	
Biosamples	5	6	7	8	9	10	11	12	13	14	15	16	17	18+	P
Urine Drug Screen [#]								X	X	X	X	X	X	X	
Breathalyzer [#]								X	X	X	X	X	X	X	
RUCDR Saliva for DNA banking [#]	X	X	X	X	O	O	O	O	O	O	O	O	O	O	
RUCDR Blood for DNA banking [#]					O	O	O	X	X	X	X	X	X	X	
Salimetrics Saliva for hormones	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Hair for hormones	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Blood for HbA1c [#]					O	O	O	X	X	X	X	X	X	X	

P = parent. X = customary to complete; O = optional to complete (see main text for further description). White X = completed by parent about themselves. All other measures are taken about the participant. [#] = the same instrument is administered in HCP-A. [^] = NIH Toolbox was administered identically for HCP-A, with the exception that HCP-D collects odor discrimination and pegboard test while HCP-A does not. N/A = not applicable as no participant will be 5 years old at follow-up.

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Instruments acquired

Cognitive domain:

- Flanker inhibitory control and attention
- List sorting working memory
- Dimensional change card sort
- Pattern comparison processing speed
- Picture sequence memory
- Oral reading recognition

Motor domain:

- 9-hole pegboard dexterity
- grip strength
- 4-meter walk gait speed @
- 2-minute walk endurance

Emotion domain

- Positive affect ^
- General life satisfaction ^
- Meaning and purpose #
- Emotional support ^
- Instrumental support #
- Friendship ^
- Loneliness ^
- Perceived rejection ^
- Perceived hostility ^
- Self-efficacy ^
- Perceived stress *
- Fear ^
- Fear-somatic arousal #
- Sadness ^
- Anger ^

- Anger-physical aggression #

Sensory

- Pain intensity #
- Pain interference #
- Visual acuity
- Odor identification
- Words-in-noise

@ administered for ages 7+ years

^ administered for ages 8+ years

* administered for ages 13+ years

administered for ages 18+ years

- Standard methods.
- See Intake Interview.
- See Intake Interview.
- See Intake Interview.
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- See Intake Interview.
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Supplementary Table 4. Intake interview.

A. Interview for parents of children 5-17 years of age

	Yes	No
Review inclusion criteria		
Age 5-17	X	
Obtained assent/consent to participate	X	
Ability to give valid informed consent	X	
Review exclusion criteria		
Hospitalization for 2 or more days for any psychiatric or neurological disorder, or cardiovascular disease		X
Hospitalization for stroke, brain aneurysm, hemorrhage, or subdural hematoma		X
Multiple sclerosis or cerebral palsy		X
Diagnosis of epilepsy or 2 or more non-provoked (e.g., not due to fever) seizures after age 5		X
Any known genetic disorder, such as cystic fibrosis or sickle cell disease		X
Any brain tumor		X
Any cancer treated with chemotherapy and/or radiation, or any stage 4 (i.e., metastatic) cancer even if not treated		X
Diagnosis of and/or treatment for rheumatoid arthritis, HIV, lupus (systemic lupus erythmatosis or SLE), or another condition requiring long-term use of steroids or other immunosuppressants		X
Pharmacological or behavioral treatment by a psychiatrist, neurologist, for any of the following disorders:		
Attention Deficit Hyperactivity Disorder (ADHD)		X
Autism Spectrum Disorder (ASD)		X
Obsessive Compulsive Disorder (OCD)		X
Conduct disorder		X
Bipolar disorder		X
Major depression		X
Schizophrenia		X
Tourette's Syndrome		X
Any developmental language disorder (e.g., dyslexia, stuttering)		X
Currently receiving services at school or work for any of the following:		
Dyslexia or other learning disability		X
Sensorimotor integration disorder		X
Intellectual disability		X
Speech or language impairment		X
Premature birth, before 37 weeks or less than 5 lbs. at birth		X
Any perinatal condition requiring 2 or more days in Neonatal Intensive Care Unit		X
Diabetes		X
Additional medical exclusions:		
Head injury with loss of consciousness for > 30 minutes		X
Head injury with amnesia for > 24 hours		X
Head injury with change in mental status for > 24 hours		X
Head injury with CT findings consistent with traumatic brain injury		X
Three or more concussive (mild) incidences of head injury		X
Diagnosis of thyroid problems or precocious puberty		X
Current use of medication to prevent migraines <i>Exception: Migraines allowed if not taking daily psychoactive medications</i>		X
Pregnancy		X
Unsafe metal or devices in the body (e.g. cardiac pacemaker, cochlear implant,		X

aneurysm clip)		
Moderate to severe claustrophobia		X
List of current medications		
Is your child taking any medication, either prescription or over-the-counter? These include pills, liquid medications; skin patches, eye drops, creams, salves, inhalers and injections. Please don't include vitamins or supplements.		Names, dosages, frequencies
Language learning		
How many languages does your child know?		Number, names
Sort languages by order of dominance		Sort
Sort languages by order of acquisition		Sort
Please list what percentage of the time your child is currently and on average exposed to each language (your percentages should add up to 100%).		%s
When choosing a language to speak with a person who is equally fluent in all your child's languages, what percentage of time would your child choose to speak each language? Please report percent of total time (percentages should add up to 100%).		%s
For each language listed, age when your child first: - began acquiring - became fluent speaking in - began reading in - became fluent reading in		Ages or N/A
For each language listed, on a scale from 0 to 10, please select your child's level of proficiency in: - Speaking - Understanding spoken - Reading		Rating (0 none – 10 perfect)
In your perception, how much of a foreign accent does your child have in [each language]?		Rating (0 none - 10 pervasive)
For each language, please rate how frequently others identify your child as a non-native speaker based on your child's accent (please use scale below).		Rating (0 never - 10 always)
Participant Demographics		
Are you the child's Biological Mother?		Yes/No
Are you the child's Biological Father?		Yes/No
- If not, are you the child's custodial parent?		Yes/No
- What is your relationship to the child?		Fill in
What grade is your child in (if it is summer, indicate their grade starting in the fall)?		K-12
Was your child adopted?		Yes/No
- If yes, how old were they when you adopted them?		Age
What sex was your child assigned at birth, on their original birth certificate?		M/F
What is your child's current gender identity? [<i>Male, Female, Trans male, Trans female, Genderqueer/nonconforming, Different identity (specify), Refused, Don't know</i>]		Selection
What race do you consider your child to be? Please select 1 or more of these categories: [<i>Native American, Asian, Black/African American, Native Hawaiian/Other Pacific Islander, White, More than one race, Don't know</i>]		1 or more selections
Do you consider your child Hispanic/Latino/Latina?		Yes/No
In which country was your child born?		Name
How many years has your child lived in the United States?		Number
Parent Demographics		
What is your current gender identity? [<i>Male, Female, Trans male, Trans female, Genderqueer/nonconforming, Different identity (specify), Refused, Don't know</i>]		Selection

What race do you consider yourself to be? Please select 1 or more of these categories: <i>[Native American, Asian, Black/African American, Native Hawaiian/Other Pacific Islander, White, More than one race, Don't know]</i>	1 or more selections
Do you consider yourself Hispanic/Latino/Latina?	Yes/No
In which country were you born?	Name
In which country was the child's biological father born?	Name
In which country was the child's biological mother born?	Name
How many years have you lived in the United States?	Number
Are you now: <i>[Married, Widowed, Divorced, Separated, Never married, or Living with a partner]?</i>	Selection
What is the highest grade or level of school you have completed or the highest degree you have received? <i>[Kindergarten-Professional/Doctoral]</i>	Selection
We would like to know about what you do --are you working now, looking for work, retired, taking care of children, a student, or something else? <i>[Working now, Only temporarily laid off, Sick leave, Maternity leave, Unemployed/looking, Unemployed/not looking, Retired, Disabled, Taking care of children/raising children/taking care of aging parent, Student, Other: specify]</i>	Selection
- If working now	Full/part time
- If student	Full/part time
With regard to your current or most recent job activity: what kind of business/industry do/did you work in?	Fill in
With regard to your current or most recent job activity: what kind of work do (did) you do? (Job title)	Fill in
How much did you earn, before taxes and other deductions, during the past 12 months? <i>[<\$5,000, \$5,000-\$11,999, \$12,000-\$15,999, \$16,000-\$24,999, \$25,000-\$34,999, \$35,000-49,999, \$50,000-\$74,999, \$75,000-\$99,999, \$100,000-\$199,999, \$200,000+, Don't know, Refuse]</i>	Selection
The following questions are about your <i>[parent's]</i> partner. Your "partner" refers to any significant figure in your life that helps you in raising your children or has helped you for more than 2 years. This person should be involved in 40% or more of the daily activities your child does. For example, your partner could be your spouse. However, your partner could also be a boyfriend/girlfriend or relative. If you have no partner, leave those questions blank.	
Do you have a partner?	Yes/No
Is your partner the child's biological parent?	Yes/No
What is the highest grade or level of school your partner completed or the highest degree they received? <i>[Kindergarten-Professional/Doctoral]</i>	Selection
We would like to know about what your partner does--are they working now, looking for work, retired, taking care of children, a student, or something else? <i>[Working now, Only temporarily laid off, Sick leave, Maternity leave, Unemployed/looking, Unemployed/not looking, Retired, Disabled, Taking care of children/raising children/taking care of aging parent, Student, Other: specify]</i>	Selection
- If working now	Full/part time
- If student	Full/part time
With regard to your partner's current or most recent job activity: what kind of business/industry do/did they work in?	Fill in
With regard to your partner's current or most recent job activity: what kind of work do (did) your partner do? (Job title)	Fill in

How much did your partner earn, before taxes and other deductions, during the past 12 months? [$< \$5,000$, $\$5,000-\$11,999$, $\$12,000-\$15,999$, $\$16,000-\$24,999$, $\$25,000-\$34,999$, $\$35,000-49,999$, $\$50,000-\$74,999$, $\$75,000-\$99,999$, $\$100,000-\$199,999$, $\$200,000+$, <i>Don't know, Refuse</i>]	Selection
The following questions are about your family and household.	
Please state your TOTAL COMBINED FAMILY INCOME for the past 12 months? This should include income (before taxes and deductions) from all sources, wages, rent from properties, social security, disability and/or veteran's benefits, unemployment benefits, workman's compensation, help from relatives (including child payments and alimony), and so on. <i>Note: For 18-21 year olds, pertains to primary parent's household</i>	Number
Household size (number of people living in the home)	Number
In the past 12 months, has there been a time when you and your immediate family experienced any of the following:	-
- Needed food but couldn't afford to buy it or couldn't afford to go out to get it?	Yes/No
- Were without telephone service because you could not afford it?	Yes/No
- Didn't pay the full amount of the rent or mortgage because you could not afford it?	Yes/No
- Were evicted from your home for not paying the rent or mortgage?	Yes/No
- Had services turned off by the gas or electric company, or the oil company wouldn't deliver oil because payments were not made?	Yes/No
- Had someone who needed to see a doctor or go to the hospital but didn't go because you could not afford it?	Yes/No
- Had someone who needed a dentist but couldn't go because you could not afford it?	Yes/No
Caffeine Use (Asked to child)	
(For each visit) Was caffeine used in the past 24 hours?	Yes/No
- If yes, what form of caffeine was most recently used prior to visit?	Fill in
- Type	Fill in
- Time	Fill in
- Same day/prior day	Selection

B. Interview for participants 18-21 years of age

	Yes	No
Review inclusion criteria		
Age 18-21	X	
Obtained assent/consent to participate	X	
Ability to give valid informed consent	X	
Review exclusion criteria		
Hospitalization for 2 or more days for any psychiatric or neurological disorder, or cardiovascular disease		X
Hospitalization for stroke, brain aneurysm, hemorrhage, or subdural hematoma		X
Multiple sclerosis or cerebral palsy		X
Diagnosis of epilepsy or 2 or more non-provoked (e.g., not due to fever) seizures after age 5		X
Any known genetic disorder, such as cystic fibrosis or sickle cell disease		X
Any brain tumor		X
Any cancer treated with chemotherapy and/or radiation, or any stage 4 (i.e., metastatic) cancer even if not treated		X
Diagnosis of and/or treatment for rheumatoid arthritis, HIV, lupus (systemic lupus erythmatosis or SLE), or another condition requiring long-term use of steroids or other immunosuppressants		X
Pharmacological or behavioral treatment by a psychiatrist, neurologist, for any of the following disorders:		
Attention Deficit Hyperactivity Disorder (ADHD)		X

Autism Spectrum Disorder (ASD)		X
Obsessive Compulsive Disorder (OCD)		X
Conduct disorder		X
Bipolar disorder		X
Major depression		X
Schizophrenia		X
Tourette's Syndrome		X
Any developmental language disorder (e.g., dyslexia, stuttering)		X
Currently receiving services at school or work for any of the following:		
Dyslexia or other learning disability		X
Sensorimotor integration disorder		X
Intellectual disability		X
Speech or language impairment		X
Premature birth, before 37 weeks or less than 5 lbs. at birth		X
Any perinatal condition requiring 2 or more days in Neonatal Intensive Care Unit		X
Diabetes		X
Additional medical exclusions:		
Head injury with loss of consciousness for > 30 minutes		X
Head injury with amnesia for > 24 hours		X
Head injury with change in mental status for > 24 hours		X
Head injury with CT findings consistent with traumatic brain injury		X
Three or more concussive (mild) incidences of head injury		X
Diagnosis of thyroid problems or precocious puberty		X
Current use of medication to prevent migraines <i>Exception: Migraines allowed if not taking daily psychoactive medications</i>		X
Pregnancy		X
Unsafe metal or devices in the body (e.g. cardiac pacemaker, cochlear implant, aneurysm clip)		X
Moderate to severe claustrophobia		X
List of current medications		
Are you taking any medication, either prescription or over-the-counter? These include pills, liquid medications; skin patches, eye drops, creams, salves, inhalers and injections. Please don't include vitamins or supplements.		Names, dosages, frequencies
Language learning		
How many languages do you know?		Number, names
Sort languages by order of dominance		Sort
Sort languages by order of acquisition		Sort
Please list what percentage of the time you are currently and on average exposed to each language. (your percentages should add up to 100%)		%s
When choosing a language to speak with a person who is equally fluent in all the languages you know, what percentage of time would you choose to speak each language? Please report percent of total time (percentages should add up to 100%).		%s
For each language listed, age when you first: - began acquiring - became fluent speaking in - began reading in - became fluent reading in		Ages or N/A
For each language listed, on a scale from 0 to 10, please select your level of proficiency in: - Speaking		Rating (0 none – 10 perfect)

- Understanding spoken - Reading	
In your perception, how much of a foreign accent do you have in [each language]?	Rating (0 none - 10 pervasive)
For each language, please rate how frequently others identify you as a non-native speaker based on your accent (please use scale below).	Rating (0 never - 10 always)
Participant Demographics	
Were you adopted?	Yes/No
- If yes, how old were you when you were adopted?	Age
In which country were you born?	Name
How many years have you lived in the United States?	Number
What is your current gender identity? <i>[Male, Female, Trans male, Trans female, Genderqueer/nonconforming, Different identity (specify), Refused, Don't know]</i>	Selection
What race do you consider yourself to be? Please select 1 or more of these categories: <i>[Native American, Asian, Black/African American, Native Hawaiian/Other Pacific Islander, White, More than one race, Don't know]</i>	1 or more selections
Do you consider yourself Hispanic/Latino/Latina?	Yes/No
Are you now: <i>[Married, Widowed, Divorced, Separated, Never married, or Living with a partner]?</i>	Selection
What is the highest grade or level of school you have completed or the highest degree you have received? <i>[Kindergarten-Professional/Doctoral]</i>	Selection
We would like to know about what you do --are you working now, looking for work, retired, taking care of children, a student, or something else? <i>[Working now, Only temporarily laid off, Sick leave, Maternity leave, Unemployed/looking, Unemployed/not looking, Retired, Disabled, Taking care of children/raising children/taking care of aging parent, Student, Other: specify]</i>	Selection
- If working now	Full/part time
- If student	Full/part time
With regard to your current or most recent job activity: what kind of business/industry do/did you work in?	Fill in
With regard to your current or most recent job activity: what kind of work do (did) you do? (Job title)	Fill in
How much did you earn, before taxes and other deductions, during the past 12 months? <i>[<\$5,000, \$5,000-\$11,999, \$12,000-\$15,999, \$16,000-\$24,999, \$25,000-\$34,999, \$35,000-49,999, \$50,000-\$74,999, \$75,000-\$99,999, \$100,000-\$199,999, \$200,000+, Don't know, Refuse]</i>	Selection
The last year that you were living at home with your family (which might be this year), what was your family income? <i>[<\$5,000, \$5,000-\$11,999, \$12,000-\$15,999, \$16,000-\$24,999, \$25,000-\$34,999, \$35,000-49,999, \$50,000-\$74,999, \$75,000-\$99,999, \$100,000-\$199,999, \$200,000+, Don't know, Refuse]</i>	Selection
Household size (number of people living in the home)	Number
The following questions are about your parents.	
How old was your biological mother when you were born?	Number
How old was your biological father when you were born?	Number
In what country was your biological father born?	Selection
In what country was your biological mother born?	Selection
What is the highest grade or level of school your mother has completed or the highest degree she has received? <i>[Kindergarten-Professional/Doctoral]</i>	Selection

What is the highest grade or level of school your father has completed or the highest degree he has received? <i>[Kindergarten-Professional/Doctoral]</i>	Selection
Which of these categories best describes your TOTAL COMBINED FAMILY INCOME for the past 12 months? This should include income (before taxes and deductions) from all sources, wages, rent from properties, social security, disability and/or veteran's benefits, unemployment benefits, workman's compensation, help from relatives (including child payments and alimony), and so on.	Number
In the past 12 months, has there been a time when you and your immediate family experienced any of the following:	-
- Needed food but couldn't afford to buy it or couldn't afford to go out to get it?	Yes/No
- Were without telephone service because you could not afford it?	Yes/No
- Didn't pay the full amount of the rent or mortgage because you could not afford it?	Yes/No
- Were evicted from your home for not paying the rent or mortgage?	Yes/No
- Had services turned off by the gas or electric company, or the oil company wouldn't deliver oil because payments were not made?	Yes/No
- Had someone who needed to see a doctor or go to the hospital but didn't go because you could not afford it?	Yes/No
- Had someone who needed a dentist but couldn't go because you could not afford it?	Yes/No
Caffeine Use	
Was caffeine used in the past 24 hours?	Yes/No
- If yes, what form of caffeine was most recently used prior to visit?	Fill in
- Type	Fill in
- Time	Fill in
- Same day/prior day	Selection

Note: Questions listed in order of administration.

Supplementary Table 5. Full list of contributors to HCP-D (listed alphabetically within affiliation).

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Note: Individuals listed in italics are no longer affiliated with the project.