**Discovery Science Data Collection Guide**

|  |  |
| --- | --- |
| PROTOCOL | PAGE NUMBER |
| Assessment Dictionary | 2 |
| Order of Procedures | 3-6 |
| MoCA | 7 |
| Actigraphy | 8 |
| Demos | 9 |
| Height, Weight, Vitals | 10 |
| Medications | 11 |
| Medical Conditions | 11 |
| Color Vision Test | 12 |
| Grip Strength | 13 |
| Tanner Scale | 14 |
| Blood Draw/Genetics | 15 |
| Urine Drug Test | 16 |
| Pregnancy Test | 17 |
| PENN CNP | 18 |
| BIRD | 19 |
| Hollingshead SES | 20 |
| SCID/KSADS & Consensus Dx | 21 |
| ACDS | 22 |
| Y-BOCS/CY-BOCS | 23 |
| YGTSS | 24 |
| MRI Mock Scan\* | 25-26 |
| MRI | 27-29 |
| 6-Minute Bike | 30 |
| Neuropsych Battery | 31 |
| MRN | 32-33 |
| ANT | 34 |
| Calculated Age | 35 |
| Family History Questionnaire | 36 |
| Vineland | 37 |
| Dot Probe | 38 |

|  |  |  |
| --- | --- | --- |
| Assessments by VisitVisit type and visit code in LORIS database |  Baseline Visit (after 2015)\*(BAS1,BAS2,BAS3) |  Baseline Visit (prior to 2015)(BAS1, BAS2, BAS3) |
| Consent |  |  |
| Demographic Questionnaire |  |  |
| Weight/Height, Vital Signs, Hip/Waist Measurement |  |  |
| MRI Screener |  |  |
| Blood Draw |  |  |
| Medications/Medical Conditions |  |  |
| Urine Drug Test (11+) |  |  |
| Connors Youth (8-17) |  |  |
| Connors Parent (6-17) |  |  |
| Tanner Staging (12-17) |  |  |
| Penn CNP~ |  |  |
| SCID~ (18-85) / KSADS (6-17) |  |  |
| 6-Minute Bike Test |  |  |
| Calculated Age |  |  |
| MRI |  |  |
| MRI-Questionnaire (13+) |  |  |
| ANT~ |  |  |
| DKEFS~ – Verbal Fluency (8+) |  |  |
| DKEFS~ – Trails (8+) |  |  |
| DKEFS~ – Design Fluency (8+) |  |  |
| DKEFS~ – Color-Word (8+) |  |  |
| DKEFS~ – Tower (8+) |  |  |
| DKEFS~ - ALL SUBTESTS (8+) |  |  |
| RAVLT~ (8+) |  |  |
| Grooved Pegboard |  |  |
| Digit Span |  |  |
| Family History Questionnaire |  |  |
| Hollingshead SES (18+) |  |  |
| ACDS (18+) |  |  |
| WASI~ |  |  |
| WIAT~ |  |  |
| Actigraphy\*\*\* |  |  |
| Color Vision |  |  |
| Grip Strength |  |  |
| MoCA~ |  |  |
| STAI~ (18-85) |  |  |
| BDI~ (18-64) |  |  |
| GDS~ (65+) |  |  |
| ASR / OASR~ (60+) |  |  |
| ASR-AF / OASR-AF~ (60+) |  |  |
| UCLA-PTSD~ (8+) |  |  |
| TSC~ |  |  |
| ATQ~ (16+) |  |  |
| ASSQ~(6-17) |  |  |
| BASC~ (6-17) |  |  |
| CAARS~ (18+) |  |  |
| CBCL~ (6-17) |  |  |
| CBCL-AF (6-17) |  |  |
| CBQ~ |  |  |
| CEBQ~ (6-11) |  |  |
| Demographics Supplement |  |  |
| EDEQ~ (13+) |  |  |
| EATQ~ (9-15) |  |  |
| FTND~ (18+) |  |  |
| FTQA (13-17) |  |  |
| IPAQ~ (15+) |  |  |
| IRI~ (13+) |  |  |
| Medical History Questionnaire |  |  |
| NIDA~ (12+) |  |  |
| NEO~ (12+) |  |  |
| PhenX Sexual History (13+) |  |  |
| PASE~ (38-71) |  |  |
| PSQI~ (13+) |  |  |
| Satisfaction Questionnaire |  |  |
| PDI-21~ (13+) |  |  |
| RBS-R~ (6-17) |  |  |
| SRS~ (6-17) |  |  |
| SWAN~ (6-17) |  |  |
| CHRLS~ (13+) |  |  |
| CFQ~ (12+) |  |  |
| CASI-A~ (11+) |  |  |
| TFEQ~ (12+) |  |  |
| Zip Code (18+) |  |  |
| ICU~ (13+) |  |  |
| Sex Role Identity Scale (13+) |  |  |
| Sexual Orientation Scale (13+) |  |  |
| UPPS~ (18+) |  |  |
| EHQ~ |  |  |
| YSR~ (11-17) |  |  |
| YRB (11-21) |  |  |
| YSR-AF (11-17) |  |  |
| MASC~ (8-17) |  |  |
| CDI~ (7-17) |  |  |
| BIRD~ |  |  |
| CY-BOCS~ |  |  |
| Dot Probe |  |  |
| Mock Scan |  |  |
| YGTSS~ |  |  |

\*Some assessments were dropped/added in the period around fall 2015.

~ Acronym is defined below in the Assessment Dictionary

\*\*\*Actigraphy not collected for all participants due to availability of equipment and participant willingness.

|  |
| --- |
| **Assessment Dictionary** |
| ACDS | Adult ADHD Clinical Diagnostic Scale |
| AIM | Affect Intensity Measure |
| ANT | Attention Network Test |
| ASR | Adult Self-Report |
| ASSQ | The High-Functioning Autism Spectrum Screening Questionnaire |
| ATQ  | Adult Temperament Questionnaire  |
| BASC | Behavior Assessment System for Children, 2nd Edition – Parent Rating Scale |
| BDI | Beck Depression Inventory - II |
| BIRD | The Behavioral Indicator of Resiliency to Distress |
| CASI  | The Comprehensive Addiction Severity Index for Adolescents  |
| CAARS | Conners Adult ADHD Rating Scale – Self Report, Short Version |
| CBCL | The Child Behavior Checklist – Parent Report Form |
| CBQ | The Children’s Behavior Questionnaire |
| CDI | The Children’s Depression Inventory 2 |
| CEBQ | The Children’s Eating Behavior Questionnaire |
| CFQ  | The Cognitive Failures Questionnaire |
| CHRLS | The Cambridge-Hopkins Restless Legs Syndrome |
| DKEFS | Delis-Kaplan Executive Functioning System  |
| DOSPERT | The Domain-Specific Risk-Taking Scale |
| EATQ | The Early Adolescent Temperament Questionnaire |
| EDEQ | Eating Disorder Examination Questionnaire |
| EHQ  | Edinburgh Handedness Questionnaire |
| ERQ | Emotional Regulation Questionnaire |
| FTND  | Fagerstrom Test for Nicotine Dependence |
| FTQA | Modified Fagerstrom Tolerance Questionnaire - Adolescents |
| ICU | Inventory of Callous Unemotional Traits |
| IPAQ  | International Physical Activity Questionnaire |
| IRI  | Interpersonal Reactivity Index |
| KSADS | Kiddie Schedule for Affective Disorders and Schizophrenia (Present & Lifetime Version) DSM-IV Edition |
| MASC | Multidimensional Anxiety Scale for Children |
| NEO  | NEO Five Factor Inventory - 3 |
| NIDA  | National Institute on Drug Abuse Questionnaire |
| PANAS-S | Positive and Negative Affect Scale – short form |
| PDI-21 | The 21-Item Peters et al. Delusions Inventory  |
| PENN CNP / GUR | Penn’s Computerized Neurocognitive Battery  |
| PSQI  | Pittsburgh Sleep Quality Index |
| PSWQ | Penn State Worry Questionnaire |
| PTQ | Perseverative Thinking Questionnaire |
| RAVLT | Rey Auditory Verbal Learning Test |
| RBS-R | Repetitive Behaviors Scale - Revised |
| RRS | Ruminative Response Scale |
| RVIP | Rapid Visual Information Processing task |
| Hollingshead SES | Hollingshead Four-Factor Index of Socioeconomic Status |
| SCID | Structured Clinical Interview for DSM-IV-TR Axis I Disorders |
| SIPI | Short Imaginal Process Inventory |
| SRS | Social Responsiveness Scale |
| STAI | State Trait Anxiety Inventory |
| SWAN | Strengths and Weaknesses of Attention-Deficit/Hyperactivity Disorder Symptoms and Normal Behavior Scale |
| TFEQ  | Three-Factor Eating Questionnaire |
| TSC-40  | Trauma Symptoms Checklist for Adults |
| UCLA PTSD – child | University of California at Los Angeles Posttraumatic Stress Disorder Reaction Index – Child |
| UPPS | Impulsive Behavior Scale |
| WASI | Weschler Abbreviated Scale of Intelligence Second Edition |
| WIAT | Weschler Individual Achievement Test – Second Edition Abbreviated |
| (C)YBOCS | (Child) Yale-Brown Obsessive Compulsive Scale |
| YGTSS | Yale Global Tic Severity Scale |
| YRBS-HS | Youth Risk Behavior Surveillance System – High School |
| YSR | Youth Self-Report |

Order of Procedures: Adult 2-Day Protocol



* **Consent Forms:** Consent, Demographics questionnaire, MRI screener, Contact Information
* **Bloods:** Weight/Height, Vital Signs, Hip/Waist Measurement, Medications/Medical Conditions, Grip Strength, Urine Drug Test, Blood Draw
* **MRN:** See pages 32-33.

Order of Procedures: Child\* 2-Day Protocol



\*The sample schedules shown here were completed by participants ages 12-17. Some of the assessments listed above (I.e. DKEFS, select MRN questionnaires) were not administered to younger participants. See individual assessments for administration age ranges.

* **Consent Forms:** Consent, Demographics questionnaire, MRI screener, Contact Information
* **Bloods:** Weight/Height, Vital Signs, Hip/Waist Measurement, Medications/Medical Conditions, Grip Strength, Urine Drug Test, Blood Draw
* **MRN:** See pages 32-33.

Order of Procedures: Adult 1-Day Protocol



* **Consent Forms:** Consent, Demographics questionnaire, MRI screener, Contact Information
* **Bloods:** Weight/Height, Vital Signs, Hip/Waist Measurement, Medications/Medical Conditions, Grip Strength, Urine Drug Test, Blood Draw
* **MRN:** See pages 32-33.

Order of Procedures: Child\* 1-Day Protocol



\*The sample schedules shown here were completed by participants ages 12-17. Some of the assessments listed above (I.e. DKEFS, select MRN questionnaires) were not administered to younger participants. See individual assessments for administration age ranges.

* **Consent Forms:** Consent, Demographics questionnaire, MRI screener, Contact Information
* **Bloods:** Weight/Height, Vital Signs, Hip/Waist Measurement, Medications/Medical Conditions, Grip Strength, Urine Drug Test, Blood Draw
* **MRN:** See pages 32-33.

**MoCA**

**Assessment Used:** Montreal Cognitive Assessment (MoCA)

References: Nasreddine, Z.S., Phillips, N.A., Bedirian, V., Charbonneau, S., Whitehead, V., Collin, I., Cummings, J.L., & Chertkow, H. (2005). The Montreal cognitive assessment, MoCA: a brief screening tool for mild cognitive impairment. *Journal of the American Geriatric Society, (4),* 53, 695-699.

**Administration:** MoCA was administered to all participants ages 38+. Prior to testing, participants were asked to turn off their cell phones to limit any potential distractions or interruptions. White noise machines were turned on outside of the testing room to limit any background noise coming from other parts of the testing center and ensure privacy. Participants were seated directly across from the examiner and all testing materials were hidden from participants’ view when not in use.

The participant was given the following introduction:

“*Today you will complete a short test that involves some things like drawing, remembering words, and answering questions. This will take just a few minutes.*

*Do you have any questions?*”

MoCA was then administered and scored according to the official administration and scoring guidelines. For more information see [www.mocatest.org](http://www.mocatest.org/)

**Actigraphy**

**Instruments used:** Philips Respironics Actiwatch 2

References: Gironda, R. J., Lloyd, J., Clark, M. E., & Walker, R. L. (2007). Preliminary evaluation of reliability and criterion validity of actiwatch-score. J Rehabil Res Dev, 44(2), 223-30.

**Administration:** The units were given to participants on the morning of the first visit. This occurred either at the consent visit or the baseilne visit, depending on availability of actigraphy watches and participant willlingness. They were then asked to wear it on their non-dominant wrist until they return for their next visit. Actigraphy data was obtained for a minimum of 24 hours and up to 1 week, depending on how far apart the participant’s two visits were. Participants were asked to wear the actigraphy unit continuously (unit is waterproof) and asked to press the event marker button right before they are about to go to sleep.

**Demos**

**Assessments Used:** Demographics Form

**Administration:** Participants (or their parents/guardians if they were under 18) were given the demographics form and asked to fill in their age, date of birth, sex, ethnicity, race, and native language at their baseline visit. Native language was defined as the primary language learned and spoken during childhood.

**Height, Weight, and Vital Signs**

**Administration:** The participant’s height, weight, and vital signs were taken in a medical exam room in the outpatient research department. The participant stepped onto a weighted scale and weight was recorded in pounds (and converted into kilograms thereafter). Blood pressure was taken using a digital sphygmomanometer (American Diagnostic Corporation e-sphyg) with a research assistant listening with a stethoscope simultaneously to ensure accuracy. A radial pulse was also recorded by the digital sphygmomanometer. Waist and hip measurements were also recorded in centimeters during this time.

**Medications & Medical Conditions**

**Administration:** All medications and supplements taken on a regular basis were recorded in a private testing room. All medications and supplements were recorded in their generic forms. A white noise machine was turned on outside of the testing room to ensure participant confidentiality. Participants (or their parent/guardian) were advised to compile a list of their medications and the dosages prior to coming in for their appointments in order to enhance accuracy of the self-report. Participants were also asked to self-report any illnesses or health conditions. This was cross-referenced with the primary indications on the medications form to ensure accuracy of the self-report.

**Color Vision Test**

**Assessment Used**: Ishihara’s Tests for Colour Deficiency (24 Plates Edition) 2007

Reference: Ishihara, S. The Series of Plates Designed as a Test for Colour-Deficiency. Tokyo, Japan: Kanehara Trading Inc. (1936).

**Test Administration:** The color deficiency test was administered in the NKI-RS outpatient research department medical examination room to ensure the room is lit adequately by daylight. The Ishihara’s Tests for Color Deficiency stimulus book plates were held 75cm from the subject and tiled so that the plate of the paper is at a right angle to the line of vision. The participant was asked to state (out loud) the number which is printed on the back of the plate. Responses were recorded indicating whether the subject could read the numeral(s).

**Tanner Scale**

**Assessments Used:** Tanner Scale

References: Marshall, W. A., Tanner, J., M. (1970). Variations in pattern of pubertal changes in boys. Archives of Disease in Childhood, 45 (239), 13.

Marshall W.A., Tanner J.M. (1996). Variations in pattern of pubertal changes in girls. Archives of Disease in Childhood, 44, 291-303.

**Administration:** Participants ages 12+ were asked to fill in the developmental scale by circling the image that best corresponded to their stage of development. For children under the age of 12, the scale was administered either to them or their parent/guardian, depending on a subjective assessment of the child’s level of comfort and maturity.

**Grip Strength**

**Instrument used:** Sammons Preston Jamar Plus+ Digital Hand Dynamometer

**Administration:** Participants were asked to squeeze the dynamometer as hard as possible, three times on each hand, switching back and forth between their left and right hands. All measurements were averaged for each hand, and participants reported which hand was dominant.

**Blood Collection & Genetics Sample Collection**

**Collection:** Three vials of blood were collected in the same order at the baseline visit to perform the following analyses:

|  |  |  |
| --- | --- | --- |
| **Vial** | **Panel(s)** | **Tests** |
| Vacuette 8mL Z Serum Sep Clot Activator (Red-top tube) | SMAC | Albumin                           Glucose                  Total Bili LDH Alk Phos                          Phosphorus  Total Protein Uric Acid BUN                                  Globulin                Triglycerides SGOT (AST)Potassium  SGPT (ALT)Cholesterol                       A/G Ratio              GFR Chloride CO2                             Creatine    Sodium                              |
|  | Thyroid Panel 1 | TSH, Free T4 |
| Vacuette 4 ml K3E K3eDTA tube(Lavender-top tube) | CBC | CBC (Dif + Platelets) |
| 5 ml K2 EDTA tube(Tan-top tube)  | Lead level (ages 6-17 only) | Lead level |

Three additional vial containing genetics samples was also collected. Immediately after collection, the genetics samples were packaged and sent to the RUCDR- Nelson Labs to be processed and made available through the NIMH Genetics Repository.

**Urine Toxicology**

**Test used:** CLIAwaived, Inc Rapid Drug Test Cup (CLIA-14-RDTC)

**Administration:** Urine was typically collected at the beginning of the day and tested for the presence of amphetamine, barbiturates, benzodiazepines, buprenorphine, cocaine, ecstasy, methadone, methamphetamine, marijuana, opiates, oxycodone, phencyclidine, propoxyphene, tricyclic antidepressants. Test lids were read approximately 5 minutes after activation. Urine toxicology was only administered to participants ages 11+.

**Urine Pregnancy Test**

**Test used:** Sure-Vue Urine hCG Strips (Fischer HealthCare)

**Administration:** All female participants under 18 who had begun menstruation were tested for pregnancy prior to the MRI with urine test strips. These were the only cases in which urine was occasionally collected from participants under 11 years old. Female participants over 18 were offered a pregnancy test prior to their MRI scan.

The test strips were then read after 3-4 minutes and a positive or negative result was determined and recorded. A positive test was a contraindication for the MRI.

**PENN CNP**

**Assessment Used:** University of Pennsylvania Computerized Neuropsychological Testing

References: Gur, R.C., et al. (2009). A cognitive neuroscience-based computerized battery for efficient measurement of individual differences: Standardization and initial construct validation. Journal of Neuroscience Methods, 187(2010), 254-262.

**Task Administration:** The following instruction was provided to the participant:

*“We will now do some memory and puzzle-like games on the computer. Some are easy and some are more difficult. Don’t worry if you make mistakes- everyone does. Try your hardest, work accurately and quickly. Some questions may take more time than others, and that’s OK. Just do your best for each one. I will let you know when you can take a break, if you want one. Do you have any questions?”*

All participants were given noise-cancelling headphones to wear during testing to prevent background noises from distracting them or interfering with the task.

The PENN CNP Battery was administered in the following order:

* Motor Praxis Test
* Emotional Recognition
* Penn Continuous Performance Test

OPTIONAL BREAK

* Penn Face Memory
* Penn Word Memory for Children
* Short Letter N-Back

OPTIONAL BREAK

* Penn Conditional Exclusion Test
* Measured Emotion Differentiation
* Short Finger Tapping (SKIPPED)

OPTIONAL BREAK

* Short Visual Object Learning Test
* Penn Verbal Reasoning

Throughout testing, participants were actively monitored by examiners. Extra assistance was provided as needed by providing verbatim instructions clearly as participants moved through the practice rounds. Extra assistance was only provided during the practice rounds and never during the tests themselves.  Coaching or assistance was never provided during Penn Conditional Exclusion Task.

**BIRD**

**Assessments used:** The Behavioral Indicator of Resiliency to Distress

Reference: Lejuez CW, Daughters SB, Danielson CW, Ruggiero K. The Behavioral Indicator of Resiliency to Distress (BIRD) 2006 Unpublished manual.

**Administration:** Participants were given the following instruction:

*“You will see ten numbered boxes (1-10) on the computer screen, as well as an image of a bird in a cage. A green dot will appear in one of the numbered boxes. Your job is to use the computer mouse to click on the numbered box where the green dot appears, before the green dot jumps to another number. Each time you manage to do that you get a point.*

*The first level will last 3 minutes. The better you do, the faster the green dot will jump.*

*The second level will last 4 minutes. It is more difficult than the first level.*

*The third and final level will last up to 5 minutes. During this level, you will always have an escape option. That is, you can end the game by clicking the “Quit Game” button on the computer screen at any time.”*

All participants were given noise-cancelling headphones to wear during testing. Subjects heard a pleasant sound and were awarded points each time they succeeded in the clicking the correct box. However, an unpleasant sound is played whenever the subjects did not click the box in time. Subjects were able to click a button to abort the game during the final portion of the test.

**Hollingshead SES**

**Assessment Used:** Hollingshead Four-Factor Index of Socioeconomic Status (SES)

Reference: Hollingshead, A. A. (1975). Four-factor index of social status. Unpublished manuscript, Yale University, New Haven, CT.

**Test Administration:** The Hollingshead SES was completed in a private testing room and a white noise machine was turned on outside of the testing room to ensure participant confidentiality. Participants were asked their highest level of education, highest grade completed, and highest level of occupation for themselves, their spouse , their mother, and their father (if known/applicable). Answers were recorded by the research assistant onto a paper version of the Hollingshead SES and were scored thereafter.

**SCID/KSADS & Consensus Diagnosis**

**Assessment Used:** Structured Clinical Interview for DSM-IV-TR Axis I Disorders (Nonpatient Edition), Kiddie Schedule for Affective Disorders and Schizophrenia (Present & Lifetime Version) DSM-IV Edition

Reference: First, M., B., Spitzer, R. L., Gibbon, M., and Williams, J.B.W.: Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Non-patient edition (SCID-I/NP, 1/2010 revision). New York: Biometrics Research, New York State Psychiatric Institute, November 2002.

Kaufman, J., et al. (1997). Schedule for affective disorders and schizophrenia for school-age children-resent and lifetime version (K-SADS-PL): Initial reliability and validity data. Journal of the American Academy of Child & Adolescent Psychiatry, 36(7), 980-988).

**Administration:** SCID was administered to participants ages 18+ , and was completed in accordance with the official interviewing and scoring guidelines outlined in the training materials published by the APA. During KSADS, participants under 18 years of age and their parents/guardians were interviewed separately in private rooms by trained research staff to determine past and present diagnoses. Consensus diagnoses were given only in the event that the examiner’s overall impression of a diagnosis differed from the diagnoses obtained through SCID/KSADS scoring.

**ACDS**

**Assessment Used:** Adult ADHD Clinical Diagnostic Scale (ACDS)

Reference: Kessler, R. C., Green, J. G., Adler, L. A., Barkley, R. A., Chatterji, S., Faraone, S. V., . . . Van Brunt, D. L. (2010). Structure and diagnosis of adult attention-deficit/hyperactivity disorder: Analysis of expanded symptom criteria from the adult ADHD clinical diagnostic scale. Archives of General Psychiatry, 67(11), 1168-78.

**Test Administration:** ACDS was administered to participants ages 18+. The ACDS was completed in a private testing room and a white noise machine was turned on outside of the testing room to ensure participant confidentiality. The participant was asked to focus on the “period of time before they became a teenager, roughly the time corresponding to elementary or primary school.” The research assistant was then asked questions A1 – A21 aloud and responses were recorded on paper according to the ACDS scoring guidelines. The participant was then asked to “think about only the past twelve months, that is, since [month, year].” The research assistant was then asked questions B1 – B21 aloud and responses were recorded on paper according to the ACDS scoring guidelines.

**Y-BOCS & CY-BOCS**

**Assessment Used:** Yale-Brown Obsessive-Compulsive Scale & Child Yale-Brown Obsessive-Compulsive Scale

Reference: Goodman, W.K., et al. (1989). The Yale-Brown Obsessive-Compulsive Scale. I. Developmental use and reliability. Archives of General Psychiatry, 46(11), 1006-11.

**Test Administration:** The CY-BOCS and Y-BOCS rating scales is 10-item semi-structured clinician –rating instruments that assessed the severity and type of OCD symptoms in children and adolescents (ages 6-14) and adolescents and adults (ages 14 and up). Severity of compulsions and obsessions were rated on a 5-point scale. The scale asked individuals to respond based on symptoms experiences only in the past week. Ratings were primarily based on the participant’s report, however the final ratings are based on the clinical judgment of the interviewer. Interviews were conducted in a private testing room with a white noise machine outside to ensure patient confidentiality.

**YGTSS**

**Assessment Used:** Yale Global Tic Severity Scale

Reference: Leckman J.F., Riddle M.A., Hardin M.T., Ort S.L., Swartz K.L., Stevenson J., et al. The Yale Global Tic Severity Scale: Initial testing of a clinician-rated scale of tic severity. Journal of the American Academy of Child and Adolescent Psychiatry. 1989;28:566–573.

**Test Administration:** The YGTSS rating scale is a 10-item semi-structured clinician-rating instrument that provides an evaluation of the number, frequency, intensity, complexity, and interference of motor and phonic symptoms. The items pertaining to the tic ratings were scored on two subscales: motor tics and phonic tics. Behaviors were rated on a 6-point scale. The scale asked individuals to respond based on symptoms experiences only in the past week. Interviews were conducted in a private testing room with a white noise machine outside to ensure patient confidentiality.

**Mock Scan**

**Instrument used:** 0T Mock Scanner, MoTrack Head Motion Tracking System, Brain Logics MR Digital Projection System, 32 Channel head coil, noise-cancelling headphones.

**Administration:** Participants were informed that they would be completing a mock scan, where they would be entering the MRI tunnel and looking at different movies and images on a screen without the machine taking any pictures of their brain. Staff explained that unlike the real scan, the mock scan would be performed in a different room and would not require them to wear ear plugs. Participants were assured that they would be able to speak with staff at any point if they became uncomfortable or claustrophobic during the mock scans.

After this orientation, participants were set up with the MoTrack device and headphones. After securing the coil, helmet, and knee cushion, participants were brought into the tunnel.

Participants were then read the following instruction to orient themselves to the task:

“*Now we are going to practice lying still inside the scanner. You will see an X. Your job is to keep that X in the green circle by staying as still as possible. You will see that if you move your head, the X will move. If you move outside of the green circle, a noise will remind you to stay still. Please do so, and I will put the X back in the middle of the green circle for you. Don’t try to put it back yourself, because you would be moving a lot then! So sometimes you’ll see the X jumping. That’s me putting it back in the green circle for you. Do you have any questions?*”

The participant then completed one practice trial and three mock scans, during which they were read the following instructions:

|  |  |
| --- | --- |
| **Computer Trial** | **Script** |
| Practice | “Try moving your head so you can hear the beep. Good job! Now try keeping your head still but moving your arms and legs. As you can see, when you move other parts of your body, your head will still move sometimes. That’s why you need to keep your entire body still when you hear the noises. Do you have any questions?” |
| Target | “Now you are going to practice lying still while I play some sounds in the background. This first scan is three minutes, so just make sure you tryy and keep that X in the green circle by staying as still as you can.” |
| Cartoon | “Now you are going to watch a cartoon just to give you more practice lying still. When you watch the cartoon this time, you will see that whenever you move, the cartoon stops. Just like the last san when you had to stay still to keep the X in the green circle, now you have to stay still to see the whole cartoon. Remember to stay still so that the cartoon finishes quickly! Any questions? Are you ready?” |
| 6 Minute Rest | “Now you are going to practice one of the scans that you are going to do in the real scanner so that you get really good at it. We are going to ask you to lie as still as you can for 6 minutes while you keep your eyes open and look at a white cross. You will see ‘Relax’ on the screen and after about 20 seconds, it will switch to the cross” |

**MRI & MRI Questionnaire**

**Instruments:** 3T Siemen’s MRI scanner, Linux computer, Lumina Box, AcqKnowledge 4.2 BIOPAC program, “Memory of Trees” CD by Enya, Biopac Systems Disposable RT electrodes, Biopac Systems Respiratory Efforts Transducer, Brain Logics MR Digital Projection System, 32 Channel head coil, noise-cancelling headphones, disposable earplugs

**Task Administration:**

Prior to scanning, participants were screened for contraindications including specific medical conditions and metal artifacts in or on their person to ensure safety. After the participants were cleared for the MRI, the research assistant provided instructions for each scan (included in the list below) upon walking participants to the scanner. Participants’ were asked to remove everything from their pockets as well as bags, jewelry, belts, hearing aids, dentures, hair clips, or piercings. Participants’ belongings were stored and locked in a secure room. If applicable, the time of participants’ caffeine intake prior to scanning was recorded.

To prepare participants for scanning, the research assistants provided practice instructions and related stimuli for each scan on a Linux computer. The participants were then taken into the scanning room by the MRI technician(s) and were fitted with a respiration belt around their waist, a pulse transducer, and electrodes on their fingers to record their respiration rate, pulse rate, and galvanic skin response (GSR), respectively. Additionally, participants were provided with ear plugs and headphones to reduce noise in the scanner. Participants were given an emergency button to alert the research assistant and technician(s) if they felt that they could no longer continue scanning. For specific scans, participants were also given a pad with four buttons to press in response to applicable stimuli.

Upon entering the MRI tunnel, the research assistant ensured that the participants were prepared for scanning via microphone, and checked that the microphone was at an appropriate volume for the participants. On the computer, the research assistant completed a calibration period in which they reviewed the respiration, pulse, and GSR waveforms through the AcqKnowledge 4.2 computer program to verify that the signals were clear. Throughout scanning, the research assistant provided the specific length and instructions to the participants for each upcoming scan by reading an established script verbatim. BIOPAC data were saved for each applicable scan by the research assistant from the AcqKnowledge program. Participants were reminded to remain as still as possible throughout scanning and were able to speak to the research assistant via microphone in between each scan.

The following table includes the names, lengths, and instructions for each scan that participants completed. During scans with music, a “Memory of Trees” CD by Enya was played.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name of Scan** | **BIOPAC Data** | **Music** | **Stimuli** | **Instructions** |
| BIOPAC Calibration | Waveforms reviewed, data not saved | Off | None | Participants were asked to inhale, hold their breath for 1-2 seconds, and exhale for a short period of time. MRI technicians adjusted participants’ sensors as necessary. |
| Localizer (1 minute) | Off | On | None | Participants were informed that the scan would be 1 minute long and would include music. Participants were instructed to keep their eyes open or closed, whichever was more comfortable. |
| REST\_645 | On | Off | Fixation | Participants were informed that the scan would be 10 minutes long and that they should keep their eyes fixated on the cross. |
| MPRAGE | Off | On | Fixation | Participants were informed that the scan would be 4 minutes long and would include music. They were told that they could keep their eyes open or closed. |
| REST\_1400 | On | Off | Fixation | Participants were informed that the scan would be 10 minutes long and that they should keep their eyes fixated on the cross. |
| REST\_CAP | On | Off | Fixation | Participants were informed that the scan would be 5 minutes long and that they should keep their eyes fixated on the cross. |
| CHECKER\_645 | On | Off | Checkerboard | Participants were told to keep their eyes focused on a red dot on the screen and to press any button each time they saw the checkerboard appear behind the dot. They were informed that the scan was 2 minutes long.  |
| CHECKER\_1400 | On | Off | Checkerboard | Participants were told to once again keep their eyes focused on a red dot on the screen and to press any button each time they saw the checkerboard appear behind the dot. They were informed that the scan was 2 minutes long. |
| BREATH\_HOLD\_1400 | On | Off | Breath Hold | Participants were instructed to follow the prompts on the screen for the duration of the 4 minute scan. They were reminded that they should breathe normally whenever they saw the word “rest” and that they should keep as still as possible when taking deep breaths. They were advised not to worry if they could not hold their breathe for the full interval indicated by the prompts, but to try their best.  |
| PCASL\_REST | On | Off | Fixation | Participants were informed that the scan would be 5 minutes long and that they should keep their eyes fixated on the cross. |
| DIFF\_137 | On | On | Fixation | Participants were informed that the scan would be 6 minutes long and include music. They were told that they would feel the table shake and vibrate, but that this was normal. They were also told to keep their eyes open or closed, whichever they preferred.  |
| HCP\_SPACE & FLAIR | Off | On | Fixation | Participants were informed that the final scan would be seven minutes long. They were reminded that they could keep their eyes open or closed.  |

Immediately after the scan, participants completed the MRI-Questionnaire (MRI-Q), a short survey detailing their experiences and thoughts during the MRI scan.

**6 minute bike**

**Bike Used:** Precor (RBK 10: HCOM 815)

**Test administration:**

1. A resistance level and estimated wattage at 70 RPM were determined based on participants’ age and gender.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Age | Resistance | Estimated Wattage at 70 RPM |
| Males | **< 35** | **8** | **133.16** |
|  | **35-55** | **7** | **121.89** |
|  | **>55** | **6** | **110.62** |
| Females | **<35** | **7** | **121.89** |
|  | **35-55** | **6** | **110.62** |
|  | **>55** | **5** | **99.35** |

1. A pulse oximeter was applied to the participant’s finger to monitor heart rate throughout testing. Participants were also instructed to grip the heart rate monitor on the bike’s handles throughout testing as a secondary way of measuring their pulse rate.
2. Participant’s initial heart rate was recorded from the bike and pulse oximeter.
3. Participants were instructed to begin pedaling at 70 rpm and the appropriate resistance level was set.
4. Participants were asked to cycle for 6 minutes, during which they were monitored to ensure that their speed was between 68-72 rpms. If the participant was unable to complete the full 6-minute interval, failure time was recorded.
5. Final heart rate was recorded from the bike and pulse oximeter at the end of the 6-minute interval, or at time of failure.

**Neuropsych Battery: Overview**

**Assessments used:** Delis Kaplan Executive Function System (DKEFS; Verbal Fluency, Trails, Design Fluency, Color-Word Interference, Tower), Rey Auditory Verbal Learning Test (RAVLT), Digit Span (Forward and Backward), Grooved Pegboard, Wechsler Abbreviated Scale of Intelligence II (WASI-II), Wechsler Individual Achievement Test II (WIAT-IIA).

**Test administration:** Prior to testing, participants were asked to turn off their cell phones to limit any potential distractions or interruptions. Participants were encouraged to take short breaks as needed in between assessments to prevent interruptions during individual parts of the battery. White noise machines were turned on outside of the testing room to limit any background noise coming from other parts of the testing center and ensure privacy. Participants were seated directly across from the examiner and all testing materials were hidden from participants’ view when not in use.

Each participant was read the following introduction to testing:

*We’ll be doing a lot of things today, like remembering words and numbers, answering questions, connecting circles on a page. Some of the things may be really easy for you, but some of them may be hard. Most people do not answer every question correctly or finish every item, but please try your best. Do you have any questions?*

The order of test/subtest administration was as follows:

1. DKEFS Verbal Fluency\*
2. RAVLT (Immediate Recall)\*
3. DKEFS Trails\*
4. Digit Span (Forward & Backward)
5. DKEFS Design Fluency\*
6. DKEFS Color-Word Interference\*
7. DKEFS Tower\*
8. Grooved Pegboard
9. RAVLT (Delayed Recall)\*
10. WASI
11. WIAT

\*only administered to participants ages 8-85.

Each individual assessment was administered and scored according to the official administration and scoring guidelines for that test or subtest. These materials were provided by the administration manuals published for the Delis Kaplan Executive Function System, Rey Auditory Verbal Learning Test, Digit Span, Grooved Pegboard, Wechsler Abbreviated Scale of Intelligence II, and Wechsler Individual Achievement Test. All assessments were double scored by research staff prior to entry.

Neuropsych batteries were typically completed first thing in the morning or directly after lunch. Assessments were not typically administered directly before or after computerized cognitive tests (ANT, Penn CNP, RVIP). If this did occur due to scheduling conflicts, participants were provided with a 15-minute break in between the neuropsych battery and computerized testing.

**MRN:** A set of self assessment questionnaires completed through the Mind Research Network (MRN) online interface. A description of each assessment can be found here:<http://fcon_1000.projects.nitrc.org/indi/enhanced/assessments/master_list.html>

**Administration:** Participants were seated at a computer and given the following instruction:

“*You’re going to be answering a lot of questionnaires about several different topics. You’ll notice the questionnaires are a bit repetitive, they are supposed to be that way to maintain validity for all responses. If you have any questions, feel free to ask.*”

Participants under 18 years of age and their parents/guardians completed the following assessments:

|  |  |
| --- | --- |
| **Child** | **Parent/Guardian** |
| ATQ (16-17)  | ASSQ (6-17)\*  |
| CASI-A (17) | BASC (6-17) |
| CDI (7-17) | CBCL (6-17) |
| CFQ (16-17) | CBCL-AF (6-17) |
| CHRLS (13-17) | CBQ (6-8)\* |
| Connors Youth (8-17) | CEBQ (6-11)\* |
| EDEQ (13-17) | Connors Parent (6-17) |
| EHQ (6-17)\* | Demos Supplement (6-17)\* |
| FTQA (11-17) | EATQ (9-15)\* |
| ICU-Y (13-17) | ICU-P (6-17)\* |
| IPAQ (15-17) | Medical Hx (6-17)\* |
| IRI (13-17) | RBS-R (6-17)\* |
| MASC (8-17) | SRS (6-17)\* |
| NEO (12-17) | SWAN (6-17)\* |
| NIDA (11-17) | UCLA Parent |
| PDI (13-17) | Zip Code (6-17)\* |
| PhenX Sex History (13-17) | Satisfaction Q – Adult (6-17) |
| PSQI (13-17) |  |
| Sex Role Identity (13-17) |  |
| Sexual Orientation (13-17) |  |
| TFEQ (12-17) |  |
| TSC-C (8-17) |  |
| UCLA-PTSD (8+) |  |
| YRBS-HS (14-17) |  |
| YRBS-MS (11-13) |  |
|  YSR (11-17) |  |
| YSR-AF (11-17) |  |
| CY-BOCS (6-13)\*\* |  |
| Y-BOCS (14+)\*\* |  |
| YGTSS\*\* |  |
| Satisfaction Q – Child (12-17) |  |

\*Assessment was completed at home

\*\*Assessment was completed at 2-day baseline visits only

Participants 18+ completed the following assessments:

|  |  |
| --- | --- |
| ASR (18-59)  | NEO\*  |
| ASR/OASR-AF | NIDA\*  |
| ATQ\*  | OASR (60-85)  |
| BDI (18-64)  | PASE (38-71)\* |
| CAARS\*  | PDI-21\*  |
| CASI-A\* | PhenX Sexual History  |
| CFQ\*  | PSQI\*  |
| CHRLS\* | Satisfaction Q |
| Demos Supplement\*  | Sex Role Identity Scale |
| DOSPERT\* | Sexual Orientation Scale  |
| EDEQ\*  | Social Network (22-85)\* |
| EHQ\*  | STAI |
| FTND\* | TFEQ\*  |
| GDS (65-85)  | TSC-40 |
| ICU\* | UCLA-PTSD |
| IPAQ\*  | UPPS\* |
| IRI\* | YRBS-HS (18-21) |
| Med Hx- Adult\* | Zip Code\* |
| YGTSS\*\* | Y-BOCS\*\* |

 \*Assessment was completed at home.

\*\*Assessment completed at 2-day baseline visits only

**ANT**

**Assessment Used:** Attention Network Task

References: Fan, J., McCandliss, B. D., Sommer, T., Raz, A., & Posner, M. I. (2002). Testing the efficiency and independence of attentional networks. Journal of Cognitive Neuroscience, 14(3), 340-7. doi:10.1162/089892902317361886

**Administration Test:** Participants 13 and older were given the following instruction:

*“This is an experiment investigating attention. You will be shown an arrow on the screen pointing either to the left or to the right. Your task is to press the left arrow key on the keyboard when the middle arrow points left and the right arrow when the middle arrow points right. Use your index finger for the left arrow and your right index finger for the right arrow”*

*“Sometimes the middle arrow will be surrounded by two arrows to the left and right. Your task is to respond only to the direction of the central arrow. Please make your response as quickly and accurately as possible.”*

*“There will be a cross in the center of the screen and the arrows will appear either above or below the cross. You should try to look at the cross throughout the experiment. On some trials there will be asterisks indicating when or where the arrow will occur. You may look at these asterisks when they appear”*

*“There is one practice session, which takes 2 minutes. Then there are 3 test sessions; each are 5 minutes long. You can take a short break between the sessions if you’d like. If you have any questions, please ask the experimenter. If you understand these instructions, you may start the practice session.”*

Participants under 13 were given a nearly identical task, but the arrows were instead represented by fish, which were “fed” by the participant with each correct response. For this version of the test, instructions were read verbatim from the ANT task on the computer screen.

All participants were given noise-cancelling headphones to wear during testing to prevent background noises from distracting them or interfering with the task. If participants began using one hand to select the arrow keys, they were reminded to use their right and left index fingers for the right and left arrow keys, respectively. All testing was performed in a quiet environment with active monitoring by an examiner.

**Calculated Age**

**Administration:** Participant’s exact age at the time of the MRI scan was calculated based on the date of the appointment and their date of birth. All calculations were made using 12-month years and 30-day months.

**Family History Questionnaires**

**Assessment Used:** Family History Questionnaire, custom created by NKI-RS investigators

**Test Administration:** The family history questionnaires were completed in a private testing room and a white noise machine was turned on outside of the testing room to ensure participant confidentiality. Participant was asked to identify their living or deceased biological family members (i.e., Mom, Dad, Siblings, Children). Participant then recorded family history questionnaires on paper assessments for each family member and returned completed questionnaires to research assistant when completed. These data are not available through the Data Usage Agreement due to privacy concerns.

**Vineland**

**Assessment Used:** Vineland Adaptive Behavior Scales, Second Edition

Reference: Sparrow, S., Cicchettim, D. & Balla, D. (2006). Vineland Adaptive Behavior Scales – Second Edition. Pearson Education.

**Test Administration:** Vineland was completed by participants parents/guardians in the presence of research staff in a private room. Research staff read through Vineland directions from the test booklet with participant parent/guardians. For each section, research identified the start point (based on child’s age) and pointed it out to the parent/guardian. Parents then completed each section with minimal interaction with staff. After entire form was completed, research staff checked each section to ensure that basal requirement was met (4 consecutive items scored 2). If not, the form was returned to the parent and the parent was instructed to complete items that preceded the start point in reverse order until the basal requirement was satisfied.

**Dot Probe**

References: Abend, R., Pine, D.S., Bar-Haim, Y. (2014). The TAU-NIMH Attention Bias Measurement Toolbox. Retrieved from <http://people.socsci.tau.ac.il/mu/anxietytrauma/research/>.

MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. Journal of Abnormal Psychology, 95, 15-20. doi:10.1037/0021-843X.95.1.15

**Administration:** In this task, a pair of faces, one threat-related and one either neutral or happy, were shown briefly side-by-side. A small probe replaced one of the faces immediately following offset. Participants were then required to respond as quickly as possible by pressing keys on a keyboard to indicate which face was replaced by a dot without compromising accuracy. The face stimuli were usually photographs of 16 different individuals (8 male, 8 female) taken from the NimStim set.

Instructions were read verbatim to the participant directly from the Dot Probe task on the computer screen. All participants were given noise-cancelling headphones to wear during testing to prevent background noises from distracting them or interfering with the task.