Dimensional Connectomics of Anxious Misery (DCAM) 1.0 Data Release: Reference Manual

20 July 2023

A Connectomes Related to Human Disease Project
Project Number:

U01MH109991-01

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1.0 Overview

The purpose of the Differential Impact of Anxious Misery Psychopathology on Multiple Representations of the Functional Connectome from the Center for Neuromodulation in Depression and Stress (CNDS) study was to find whether different dimensions of psychopathology require different representations of the connectome to generate reproducible associations. To this end, this work examined transdiagnostic associations between six data-driven dimensions of AM symptomology (anxiety sensitivity, anxious arousal, ruminative thought, anhedonia, insomnia, and negative affect) and functional connectivity using three different modeling approaches. This manual describes Dimensional Connectomics of Anxious Misery project (DCAM) data release 1.0. Deidentified data are available through the National Institutes of Mental Health Data Archive (NDA).

There were 4 primary goals in the DCAM study:

1. Acquire and make public a vast database of brain imaging and behavioral data from patients with anxious misery. By acquiring a broad array of behavioral, neurocognitive, and imaging measures multiple investigators will be able to test hypotheses about various disorders involving anxious misery in a rich database.
2. Implement and test the Human Connectome Project (HCP) imaging and behavioral protocols at the University of Pennsylvania.
3. Collect proposed baseline data including imaging, demographic, neurocognitive and genetic samples across n=250 participants evaluated using all HCP protocols.
4. Characterize multidimensional negative valence system (NVS) disorders and correlate severity of sustained threat and loss symptoms with dissociable circuit abnormalities.

The DCAM study collected magnetic resonance imaging, clinical and cognitive/neurological measures from adults (18 – 45) who are experiencing symptoms and healthy comparators. Data was collected from 242 symptomatic individuals; 194 of whom scored greater than one standard deviation above the population mean on the Neuroticism scale on the Neuroticism-Extraversion-Openness Five-Factor Inventory (NEO-FFI).

2.0 Participating Sites

This project was a collaboration between 3 departments in the Perelman School of Medicine at the University of Pennsylvania, along with the Psychology department of the University of Pennsylvania

Clinical and cognitive/neuropsychological characterization and Recruitment, data curation, and study management:

1. *Center for Neuromodulation in Depression and Stress, Department of Psychiatry, Perelman School of Medicine, University of Pennsylvania, United States*
    a. *Site PI: Dr. Yvette Sheline; Other Personnel: Elizabeth Harders, Janet Stock, Darsol Seok, Marc Jaskir, Adna Jaganjac, Walid Makhoul, Joyce Wong, Christopher Byrd, Clay Gueits, Irem Aselcioglu, Morgan Scully, Gabriella Green, and Hannah B. Long*

2. *Boundaries of Anxiety and Depression Laboratory, Psychology Department, University of Pennsylvania, United States*
    a. *PI: Dr. Ayelet Ruscio*
3. *Brain Behavior Laboratory. Neurodevelopment and Psychosis Section, Psychiatry Department, University of Pennsylvania, United States*
    a. *PI: Dr. Ruben Gur; Other Personnel: Dr. J. Cobb Scott*
4. *Mood and Anxiety Disorders Treatment and Research Program, Psychiatry Department, Perelman School of Medicine, University of Pennsylvania, United States*
    a. *PI: Dr. Michael Thase*
5. *Psychiatry Department, Perelman School of Medicine, University of Pennsylvania, United States*
    a. *Personnel: Anu Asnaani, Daniel Wolf, Theodore Satterthawaite*

Imaging and Analyses:

6. *Penn Statistics in Imaging and Visualization Center, Department of Biostatistics, Epidemiology, and Informatics, Perelman School of Medicine, University of Pennsylvania, United States*
    a. *Personnel: Joanne Beer and Russell Shinohara*
7. *Department of Radiology, Perelman School of Medicine, University of Pennsylvania, United States*
    a. *Personnel: Phillip Cook, Mark Elliot, Paul Yushkevich, Christos Davatzikos, James C. Gee*
8. *Department of Physics and Astronomy, University of Pennsylvania of Arts and Sciences, United States*
    a. *Dr. Dani S. Bassett*

3.0 Study Sample (Inclusion/Exclusion Criteria)

200 anxious misery participants were recruited through the Mood and Anxiety clinic at the University Pennsylvania and the Philadelphia VA by screening for people with high neuroticism. 50 healthy volunteers were recruited from the community. Furthermore, we reached out to patients via advertising with flyers in the community, with web ads on our website, Facebook, Craigslist, and both print and online news sources/magazines (e.g., The Metro), and placement of brochures in clinics, but all patients initiated contact with us via telephone or a screening survey on REDCap. Healthy volunteers also found out about the study via advertisements.

Key Inclusion Criteria:

- Individuals aged 18-45
- Individual is fluent in English.
- For the experimental group, subjects presented anxious misery symptoms.
- Individuals must have a smart phone to download the Beiwe app.

Key Exclusion Criteria:

- Significant handicaps (e.g. mental delays) that would interfere with testing procedures
- MRI contraindications (e.g. foreign metallic implants, pacemaker)

- Known neurological disorders including multiple sclerosis, encephalopathy, seizure disorder, brain tumors
- Current alcohol or substance abuse disorder, schizophrenia, or other psychotic disorder.
- Does not speak English
- Cannot give informed consent
- Any other factor that in the investigators' judgment may affect patient safety or compliance (e.g. distance greater than 100 miles from clinic)

4.0 Participant Schedule and Study Procedures

Many study procedures took place at the University of Pennsylvania in the Richards Building, except otherwise noted.

Phone Screen: Participants who contact the Center for Neuromodulation in Depression and Stress (CNDS) spoke with study staff regarding the study procedures, study timeline, and compensation: those interested in participating completed a series of screening questions over the phone to confirm eligibility. Those eligible were scheduled for Visit 1.
Self-Report Screen: Participants also had the option of filling out a self-report, pre-screening survey on REDCap if that was more convenient for them. This was stored for CNDS staff to review. Participants were then contacted via phone or e-mail to be scheduled for visit 1 or told that they did not qualify. The survey can be accessed through the following web address: https://is.gd/cndslab.

Visit 1: Informed consent was obtained upon arrival for the initial visit and before any study-related procedures are conducted. Screening procedures also occurred during this visit, which included a structured diagnostic interview (SCID-5 to assess for diagnoses which fall under umbrella of anxious misery), psychiatric and medical evaluation, and collection of demographic information. If the individual was eligible for the study, they also completed clinical interviews, computerized neurocognitive assessments, and several self-report assessments of thoughts, mood, and behaviors. At the end of the first visit, participants were given an actiwatch to wear for the next week. Staff explained the at-home mood monitoring and schedule. The first study visit took approximately 3-4 hours to complete in full. Patients were assessed using clinical assessments and neurocognitive assessments. The 2nd study visit was approximately 1-week after the initial visit and patients underwent a 2-hour MRI along with more neurocognitive assessments.

At-Home Monitoring: Participants completed approximately 1 week of at-home monitoring. Participants were asked to wear an actigraph for 24 hours/day for 4-7 days (depending on when the next study visit was scheduled) and to download the Beiwe application onto their phone. Passive data was collected by both the actigraph and the Beiwe application. This passive data included number of footsteps, Call and SMS logs, location determined by GPS, and device usage. In addition to the passive data, active data was also collected through daily questionnaires on Beiwe.

Visit 2: The second visit consisted of an fMRI, optional saliva and blood collection, self-report emotion assessments, computerized neurocognitive assessments, and a behavioral, startle task. At the beginning of second study session, participants were taken to the Prisma 3T scanner for neuroimaging. An experienced technician and a member of the study team were present during the

MR session to ensure participant safety and well-being. If the participant complained of feeling claustrophobic and did not wish to complete the MRI, the MRI was terminated. Emergency personnel and equipment were immediately available to the MRI room should the need arise.

During the startle task, the research team monitored psychophysiological biomarkers, including heart rate, respiration rate, skin conductance, and electromyography. RCT monitoring included: (1) successful recruitment, retention; (2) patient adherence; (3) safety and tolerability. Participants were provided time to discuss the startle task upon completion and prior to leaving the University of Pennsylvania.

Participants were re-contacted at 3 months to check in and to update contact information. Visit #3/6 month follow up: fMRI, short interviews with study staff, questionnaires (2-3 hours) Visit #4/12 month follow up: short interviews with study staff, questionnaires (1-2 hrs)

We allowed for some flexibility with the order in which study procedures occurred over the course of a participant's enrollment. The time of visits and time given to complete procedures were also varied to accommodate participants.

Participants were asked if some aspects of their study participation could be recorded for educational and training purposes only. The recordings were not used as part of the data collection and were optional. Individuals were informed that there would be no loss of benefits if they do not wish to have procedures recorded. As this study required a high level of clinical interview and cognitive testing, we used the video recordings for training purposes and to ensure adequate levels of inter-rater reliability for members of the CNDS. A separate informed consent was provided so that participants were clear that that was not a required part of study participation.

5.0 Non-MRI participant characterization

Structured Clinical Interview
Current and lifetime psychiatric disorders were determined by trained staff. Diagnoses were given according to the Diagnostic and Statistical Manual of Mental Health Disorders, 5th Edition (APA, 2013).

Clinician Administered Measures

1. **Montgomery–Åsberg Depression Rating Scale (MADRS)**
    a. 10-item diagnostic questionnaire used to measure the severity of depressive episodes (Montgomery and Åsberg, 1979).
    b. Assessment scores will not be included in the NDA data release.
2. **Hamilton Rating Scale For Depression (HRSD)**
    a. 17-item diagnostic questionnaire to assess the severity of, and change in, depressive symptoms (Hamilton, 1960).
    b. Assessment scores will not be included in the NDA data release.
3. **Columbia Suicide Severity Rating Scale (C-SSRS)**

a. Individuals were interviewed using the Columbia Suicide Severity Rating Scale (Posner et al. 2011). If an individual was deemed to be at imminent clinical risk (e.g., endorsed suicidal intent) by the interviewing researcher, they were unenrolled from the study and appropriate measures were taken.
b. Assessment scores will not be included in the NDA data release.

4. **NEO-FFI-3**
    a. 60-item measure of the 5 domains of personality (Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness) (McCrae & Costa, 2007).
    b. Assessment scores will not be included in the NDA data release.

Self-Report Measures

5. **SF-12 Health Survey**
    a. 12-item, self-report measure that assesses the impact of health on an individual's everyday life (Ware, Kosinski, & Keller, 1996)
    b. Assessment scores will not be included in the NDA data release.
6. **Sheehan Disability Scale (SDS)**
    a. 5-item, self-report questionnaire to assess functional impairment in three inter-related domains; work/school, social and family life (Sheehan, 1983).
    b. Assessment scores will not be included in the NDA data release.
7. **Insomnia Severity Index (ISI)**
    a. 7-item, self-report measure rating respondents' nature and symptoms of their sleep problems (Bastien, Vallières, & Morin, 2001).
    b. Assessment scores will not be included in the NDA data release.
8. **Fagerstrom Nicotine Dependence**
    a. 6-item, self-report measure assessing the intensity of physical addiction to nicotine (Heatherton, et al., 1991).
    b. Assessment scores will not be included in the NDA data release.
9. **Mood & Anxiety Symptoms Questionnaire (MASQ)**
    a. 62-item, self-report measure of anxiety and depressive symptoms (Watson and Clark, 1991)
    b. Assessment scores will not be included in the NDA data release.
10. **Threat Sensitivity (TF 20)**
    a. 20-item, self-report measure of threat sensitivity
    b. Assessment scores will not be included in the NDA data release.
11. **Behavioral Inhibition System & Behavioral Activation System (BIS/BAS)**
    a. 24-item self-report questionnaire designed to measure two motivational systems: the behavioral inhibition system and behavioral activation system (Carver & White, 1994)
    b. Assessment scores will not be included in the NDA data release.
12. **Ruminative Thought Scale (RTS)**
    a. 22-item self-report measure of describing one's responses to depressed mood (Treynor, Gonzalez, and Nolen-Hoeksema (2003).
    b. Assessment scores will not be included in the NDA data release.
13. **Anxiety Sensitivity Index (ASI-3)**
    a. 18-item self-report scale measuring different concerns someone could have regarding their anxiety (Taylor, et. al., 2007).
    b. Assessment scores will not be included in the NDA data release.

14. **Snaith-Hamilton Pleasure Scale (SHAPS)**
    a. 14-item, self-report questionnaire assessing one's ability to experience pleasure (Snaith et al. 1995).
    b. Assessment scores will not be included in the NDA data release.
15. **Life Events Scale (LES)**
    a. 43-item scale of stressful life events that can contribute to illness, helps identify whether a person is experiencing a high amount of stress (Holmes & Rahe, 1967).
    b. Assessment scores will not be included in the NDA data release.
16. **Childhood Trauma Questionnaire (CTQ)**
    a. 70-item self-report questionnaire identifying and measuring the prevalence of childhood trauma (Bernstein & Fink, 1994).
    b. Assessment scores will not be included in the NDA data release.
17. **PTSD Checklist for DSM-5**
    a. 20-item self-report measure that assesses 20 DSM-5 symptoms of PTSD (Weathers, et. al., 1991).
    b. Assessment scores will not be included in the NDA data release.
18. **Life Events Checklist (PCL-5 & LEC)**
    a. 16-item self-report measure designed to screen for potentially traumatic events in a respondent's lifetime (Gray, Litz, Hsu, & Lombardo, 2004).
    b. Assessment scores will not be included in the NDA data release.
19. **Social Adjustment Scale (SAS)**
    a. 54-item self-report scale measures instrumental and expressive role performance over the past 2 weeks (Weissman, 1999)
    b. Assessment scores will not be included in the NDA data release.
20. **MACE 1 to 17**
    a. 52-item self-report measure that assesses overall exposure of ten types of maltreatment (Teicher& Parigger, 2015).
    b. Assessment scores will not be included in the NDA data release.

Cognitive and Neuropsychological Measures

Individuals completed 18 computerized measures from standardized batteries: eleven from the NIH toolbox (Gershon et al., 2013; Heaton et al., 2014), seven from the University of Pennsylvania Computerized Neuropsychological Test Battery (Gur et al., 2010). Tests, putative cognitive/neuropsychological domains assessed, and NDA structure the data were mapped to are:

1. **Penn Measures**
    a. Penn Word Memory Test. Verbal episodic memory. **pwmt01**
    b. **Penn Progressive Matrices.** Abstraction and mental flexibility. **pmat01**
    c. Penn Emotion Recognition Tests. Facial emotion recognition. **er4001**
    d. Penn Trail Making Task A. Executive functioning. **not included in NDA data release**
    e. Penn Trail Making Task B. Executive functioning. **not included in NDA data release**
    f. Penn Word Memory Test – Delayed Recall. Verbal episodic memory. **not included in NDA data release**
    g. **Penn Delay Discounting.** Impulsivity/self-regulation **deldisk01**
2. **NIH Toolbox**
    a. Picture Vocabulary Comprehension Test. Receptive vocabulary. **tpvt01**
    b. Flanker Inhibitory Control and Attention. Inhibition/attention. **flanker01**

c. **List Sorting Working Memory Test.** Working memory. **lswmt01**
d. **Dimensional Change Card Sort Test.** Cognitive flexibility/attention. **dccs01**
e. **Pattern Comparison Processing Speed Test.** Processing speed. **pcps01**
f. **Picture Sequence Memory Test.** Episodic Memory. **psm01**
g. **Negative Affect.** Emotional Health. **tlbx_sadness01**
h. **Stress and Self-Efficacy.** Emotional Health. **self_effic01**
i. **Psychological Well-Being.** Emotional Health. **not included in NDA data release**
j. **Social Relationships.** Social support, companionship, and distress. **tlbx_socwit01**
k. **PROMIS Anxiety SF v1.0 – 8a.** Fear, anxious misery, hyperarousal, and somatic symptoms. **not included in NDA data release**

6.0 MRI Acquisition

Acquisition Protocol

Participants were scanned using a Siemens Prisma 3 T whole-body MRI system equipped with a 64-channel head/neck array with 80mT/m maximum gradient amplitude and a 200 T/m/s maximum slew rate. Stimuli were presented using an MRI-compatible LCD panel (InVivo SensaVue), with responses collected via a 4-button response box corresponding to the four non-thumb digits, held in the right hand. All participants had a heart rate monitor attached to their left index finger during scanning and a respiration belt placed around their diaphragm. To ensure consistency across participant sessions, all technicians followed a uniform procedure during scanning. The protocol consisted of:

- **Diffusion MRI:** 2 pairs of acquisitions = 4 acquisitions total, TE = 89.20 ms, TR = 3.23 s, acquisition time = 5:37, FOV = 210 mm × 210 mm, slice orientation = T > C-20.0, FA = 78, phase encoding = AP and PA, echo spacing = 0.69 ms, voxel size = 1.5 mm isotropic, diffusion weightings = 2, b-Values = 1500, 3000 s/mm2, # of directions = 93 (b = 1500), 92 (b = 3000), # of b0 = 14.
- **EPI fMRI:** TE = 37.00 ms, TR = 0.80 s, FA = 52, multi-band acceleration factor = 8, resting-state acquisition time = 5:46, EIT acquisition time = 4:02, IPT acquisition time = 3:12, EPT acquisition time = 4:42, FOV = 208 × 208 mm, slice orientation = T > C-20.0, phase encoding = AP/PA, echo spacing = 0.58 ms, number of volumes = 420, slice thickness = 2.00 mm, fat suppression = fat saturation, receiver bandwidth = 2290 Hz/Px
- **Spin Echo:** TE = 66.00 ms, TR = 8.00 s, FA = 90, acquisition time = 0.32, FOV = 208 mm × 208 mm, slice thickness = 2.00 mm, slice orientation = T > C-20.0, phase encoding = AP and PA, echo spacing = 0.58 ms, fat suppression = fat saturation, receiver bandwidth = 2290 Hz/Px.
- **T1w MRI**: TE = 2.22 ms, TR = 2.40 s, FA = 8, acquisition time = 6:38, FOV = 256 × 256 mm, slice thickness = 0.80 mm, fat suppression = water excitation, orientation = sagittal, receiver bandwidth = 220 Hz/Px.

Imaging Tasks

1. **Resting State Task:** During resting state scans, participants viewed a gray screen with a white crosshair. Participants were instructed to fixate on the crosshair, while blinking normally and keeping their eyes open. This was performed in two sets of two, for a total of four scans, each of which lasted for 5:46 min (resulting in a total scan time of 23:04 for resting state). Participants were given a series of follow-up questions after each run concerning their mental state during

the scan (e.g. frequency of thought wandering, frequency of sleeping) and responded via the 4-button box.

2. **Emotional Interference Task (EIT) or CONFLICT Task:** This task aims to capture deficits in cognitive control in the presence of negatively-valenced emotional distractors. In this event-related design adapted from Fales et al. (2008) and Vuilleumier et al. (2001), participants are instructed to indicate through button press whether two pictures on either the horizontal or vertical axes are identical or different. After a cue indicating which axis to attend to, four images are briefly shown on the top, bottom, left and right of the screen, and participants are given a short period to respond. Images are either human faces or houses. Further, faces can have either a neutral expression or a fearful one. Images sharing an axis will always be of the same category and emotion, if applicable. Therefore, there are four conditions of interest that were entered into our task modeling procedures: attending to fearful faces, attending to neutral faces, ignoring fearful faces, and ignoring neutral faces. Each condition is presented 24 times across all runs of this task. After a 1 s fixation cross, images are presented for 250 ms, and participants are allotted 2.2 s to respond. Intertrial intervals of 2150, 4660, 9680 and 12190 ms are randomly and equally distributed throughout each run. Total run duration is 3:54 and the task is run 4 times, resulting in a total scan time of 15:36 for this task.
3. **Emotional Processing Task (EPT) or FACES Task:** This task aims to capture abnormalities in the processing of emotional faces and follows the same design as the one implemented in the HCP (Van Essen et al., 2013). In this block-related design originally adapted from Hariri et al. (2002); participants are presented with three images and are instructed to indicate through button press whether the image on the left or the image on the right matches the image at the top. Images can belong to one of four categories: fearful faces, neutral faces, happy faces and control stimuli (e.g. fruits and vegetables). These four categories were the four event types entered into our task modeling procedures. Images are present for 3 s each and each block is composed of six images of the same category, resulting in a block duration of 18 s. Each of the four categories, in addition to a baseline condition (white fixation cross on a black background), is allocated three blocks, resulting in a total run time of 4:32. Each participant completes two runs, resulting in a total scan time of 9:04 for this task.
4. **Incentive Processing Task (IPT) or GAMBLING Task:** This task addresses neural abnormalities in reward processing and follows the same design as the one implemented in the HCP (Van Essen et al., 2013). In this block-related design originally adapted from Delgado et al. (Delgado et al., 2000), a question mark is presented on screen, and participants must guess whether the number obscured by the question mark (which can range 1–9) is greater than or less than five (Fig. 4a). If the participant guesses correctly, a green arrow pointing upwards with text indicating "+$1.00" is shown. If the participant guesses incorrectly, the participant sees a red arrow pointing downwards with text indicating "-$0.50". If the number was five, a gray double-headed arrow is presented, indicating that money was neither gained nor lost. If the participant does not respond within the time allocated for the trial (1.5 s after the question mark is presented), then the text "no response" is presented, along with an indication that no money is gained or lost that round. Participants were told that they should perform the task as if they would earn real money, but no rounds were actualized in participant payoff. Each trial is composed of the question mark cue for 1.5 s, followed by feedback images for 1.0 s. Each trial is separated by a 1.0 s inter-trial interval. Blocks are composed of 8 trials each, resulting in a block length of 28 s. Runs are composed of two "reward" blocks, two "loss" blocks and a baseline condition block (fixation cross, 15 s), for a total run duration of 3:02. Each participant completes two runs, for a total scan time of 6:04 for this task.

Many subjects have missing data associated with primarily the Incentive Processing Task, as well as the other imaging tasks, due to issues with the MRI scans running late. Therefore, not all subjects have unprocessed data affiliated with this fMRI task.

In addition, in some subjects with Incentive Processing Task data the tfMRI task timing files are missing. Refer to the DCAM_1.0_Release_Completeness.csv to determine if individual subjects are affected

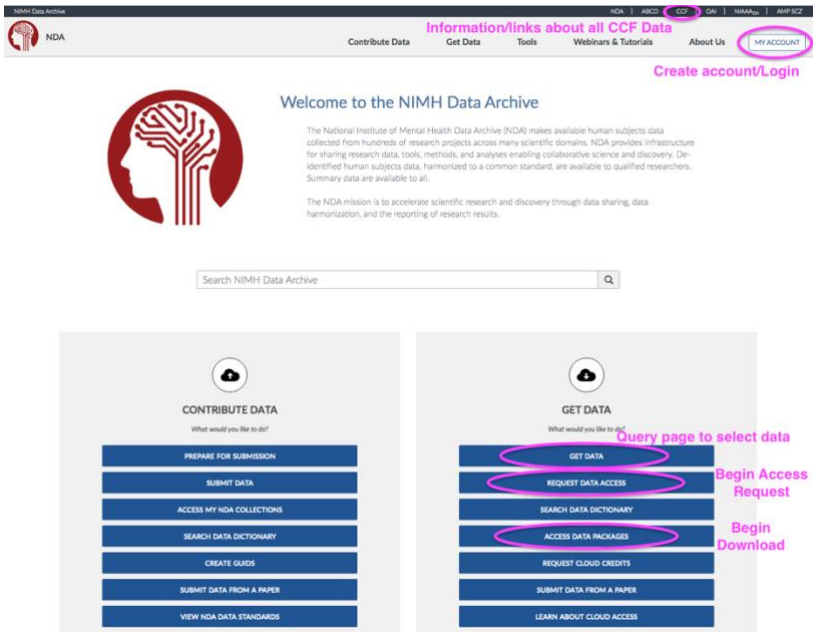
7.0 DCAM 1.0 Data Release

Requesting Access to NDA

Connectomes Related to Human Disease (CRHD) projects like DCAM, PDC, HCP-EP, BANDA, and the Lifespan HCP (Aging & Development) projects that are managed and data processed by the Connectome Coordination Facility (CCF) are being released through the NIMH Data Archive (NDA), a data repository funded by the National Institutes of Health (NIH) and are currently only being shared through that platform (not on the cloud or other data sharing platforms). Requesting NDA access is a multistep process that may take some time, possibly a few weeks, to gather the necessary information and signatures, especially if you are at an institution that must establish the eligibility requirements. Full instructions for obtaining access on NDA, including screenshots of the process, are available in the Lifespan HCP 2.0 Release Data Access & Download Instructions. Once approved, access is valid for one full year. To maintain access, a renewal request should be submitted through the same process.

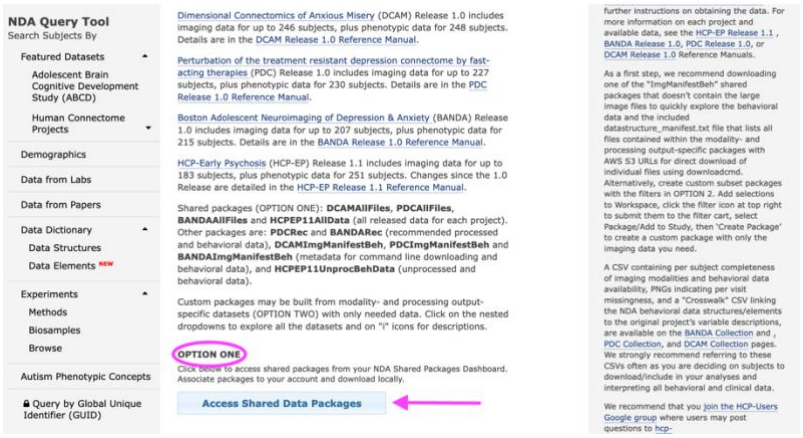
Selecting Data for Download

To obtain data from the Dimensional Connectomics of Anxious Misery 1.0 project, go to the Connectomes Related to Human Disease Featured Datasets query page. You can also get to this page by selecting "Get Data" from the NDA home page (pictured right), then selecting "Human Connectome Projects > Connectomes Related to Human Disease" at the top left of the query page. On the Connectomes Related to Human Disease Featured Datasets query page, the user has two options for accessing the DCAM data (scroll down to view options one and two). Read through the next section and choose the one that best fits your needs.



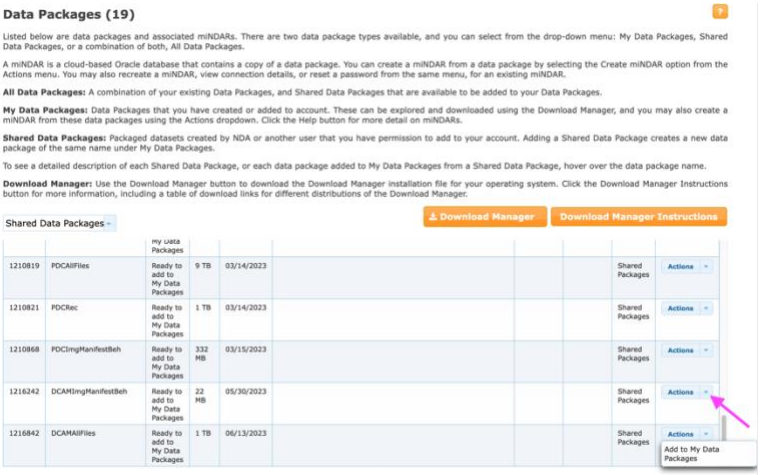
OPTION ONE

OPTION ONE accesses 2 premade, Dimensional Connectomics of Anxious Misery (DCAM) Release 1.0 shared data packages that we recommend as a starting point for download for many users. The DCAMAllFiles package contains all released data and DCAMImgManifestBeh contains unprocessed imaging metadata (no imaging data files), including the datastructure_manifest.txt file containing AWS S3 URLs for all released data files useful for command line downloading of specific files of interest. Both packages contain the full released clinical and behavioral data.



Click on the “Access Shared Data Packages” button (pink arrow) to take you to your Data Packages page.

Scroll down to the DCAM packages at the bottom of the list. In the Actions column in the row of the package you are interested in, select “Add to My Data Packages” (pink arrow). It will take some time (seconds to several minutes depending on size) to add the package to your account and there should be a notification at the top of the page when it is complete. In the meantime, you can proceed with downloading and setting up the NDA Download Manager or nda-tools for downloading on the command line. Full instructions for using these download options are available in the Lifespan HCP 2.0 Release Data Access & Download Instructions and on this wiki.

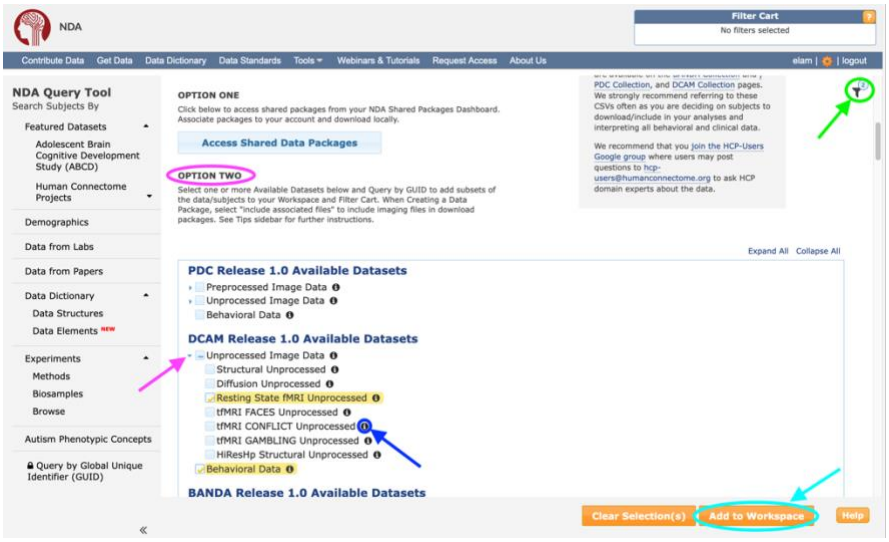


OPTION TWO

OPTION TWO allows the user to select modality- and processing output-specific “HCP-style package” filters to access part of the released data by clicking the nested dropdown options under DCAM Release 1.0 Available Datasets.

On the Connectomes Related to Human Disease Featured Datasets query page, under OPTION TWO, click the triangles next to the data types to reveal all the subset options (pink arrow). Click the black “i” information buttons (blue arrow) to see a description of the subset package. Select the checkboxes of the subsets of the data you are interested in and click the “Add to Workspace” button at

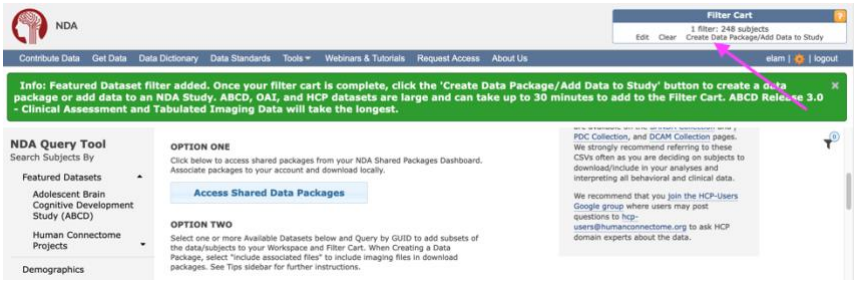
the bottom of the page (cyan arrow).



Note: The OPTION TWO subset package filters for data from all released subjects and are additive (if you make more than one selection), so total data sizes may become large. If you are interested in downloading one or a few subjects, see Filtering by Subjects in the [Lifespan HCP 2.0 Release Data Access & Download Instructions].

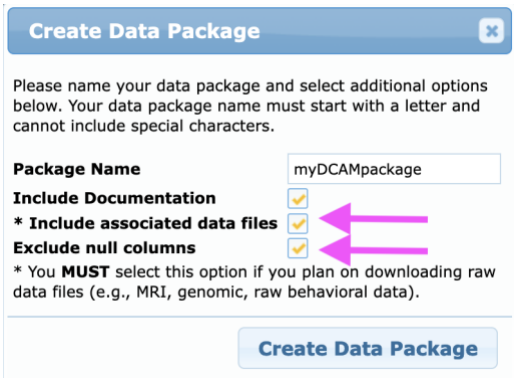
Click on the Filter funnel icon at the top right (green arrow) showing the number of filters you added. This will show your Workspace, click “Submit to Filter Cart” at the bottom. It can take several minutes to update the Filter Cart at the top right.

When finished, click on “Create Data Package/Add to Study” (pink arrow) at the bottom of the Filter Cart box at the top right.



On the Data Packaging page, you’ll see the data you selected listed in NDA Data Structure categories (mostly useful for Behavioral data, click on the “i” buttons to see a tabular preview of the data).

Click the “Create Data Package” button to create your custom package. Enter a Package Name, be sure to click the “Include associated data files” checkbox (MRI data are considered associated data files), and “Exclude null columns” (pink arrows), so the behavioral data will not have extraneous columns for unused variables.



Click “Create Data Package”. The process of creating the package will take several minutes and can be tracked from your Packages Dashboard, with “My Packages” selected at the top left. You may need to refresh the page to see the status change.

While you are waiting, follow the instructions in the [Lifespan HCP 2.0 Release Data Access & Download Instructions] to download the NDA Download Manager or command line download tools. You can also track package creation within the NDA Download Manager GUI by clicking the Reload Packages button until your package is listed as ready to download.

Files and Directory Structure

The user may download the MRI unprocessed data and the behavioral data by selecting prepackaged data or choose to create their own custom package as described above.

The data package will download to the Save To: location on your file system with the top directory name matching the package name (<Package_YourPkgNumber>, or, e.g., Package_1210439).

If your package contains all Unprocessed Image Data and Behavioral Data, the high-level <Package_YourPkgNumber> directory will contain:

<Package_{YourPkgNumber}>/

dataset_collection.txt	Info on PDC NDA collection
datastructure_manifest.txt	S3 URIs for every per subject file
dccs01.txt	
deldisk01.txt	
er4001.txt	
experiments/	tfMRI and rsfMRI stimuli info and block design
flanker01.txt	
imagingcollection01/	Unprocessed image data
imagingcollection01.txt	
lswmt01.txt	
md5_values.txt	md5 checksums for download verification
ndar_subject01.txt	
package_info.txt	Info on NDA filters used to create download package
pcps01.txt	
pmat01.txt	
psm01.txt	
pwmt01.txt	
README.pdf	NDA default README
self_effic01.txt	
tlbx_sadness01.txt	
tlbx_socwit01.txt	
tpvt01.txt	

We are using the NDA data structure imagingcollection01 (full directory structure described in Filenames and Directory Structure Appendix available from the DCAM 1.0 Documentation page) to organize the unprocessed per subject data into the same directory structure as that of previously released HCP Young Adult data, so that it is compatible with the expected inputs of processing through the HCP Pipelines.

The imagingcollection01/ directory contains unprocessed data of all modalities.

Under this directory, are high level <SubjectID_MR>, directories. We have organized the data into per subject, unprocessed “packages” by modality in the directory structure required for input to the HCP pipelines. When you download CCF data (Including DCAM data) from NDA it will be in this HCP-style file structure.

Behavioral Data Structures

Behavioral and clinical measures were mapped to the NDA behavioral data structures listed below. If you include Behavioral data in your download package, tab-

delimited text files for all DCAM behavioral structures will be included in the **<Package_{YourPkgNumber}>/** directory (e.g. er4001.txt).

NDA Structure	Measure Name
ndar_subject01.txt	Research Subject, sex, race, visit date
dccs01.txt	Dimensional Change Card Sort Test
deldisk01.txt	Delay Discounting Task
er4001.txt	Penn Emotion Recognition Task
flanker01.txt	NIH Toolbox Flanker Inhibitory Control and Attention Test
lswmt01.txt	NIH Toolbox List Sorting Working Memory Test
pcps01.txt	Pattern Comparison Processing Speed
pmat01.txt	Penn Matrix Reasoning Test
psm01.txt	Picture Sequence Memory
pwmt01.txt	Penn Word Memory Test
self_effic01.txt	NIH Toolbox Emotion Domain - Self-Efficacy Survey
tlbx_sadness01.txt	NIH Toolbox Emotion Domain - Sadness Surveys
tlbx_socwit01.txt	NIH Toolbox Emotion Domain - Social Withdrawal and Positive Peer Interaction Surveys
tpvt01.txt	NIH Toolbox Picture Vocabulary Test

Additional Documentation:

Filenames and Directory Structure Appendix:

DCAM_1.0_Release_Appendix.pdf: Listing of files and directory structure of imaging data packages available for download.
https://www.humanconnectome.org/storage/app/media/documentation/DCAM1.0/DCAM_1.0_Release_Appendix.pdf

Completeness Document:

DCAM_1.0_Release_Completeness.csv: Overview of available imaging and behavioral data for all subjects collected at all time points.

Crosswalk Document:

DCAM_1.0_Release_Crosswalk.xlsx: Contains information about mapping of REDCap variables to NDA elements for all available behavioral, neurocognitive, and demographic measures.

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