

NIH Pediatric MRI Release 5.0 Notes

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Introduction

As of August 2012, the NIH Pediatric MRI Data Repository – Release 5.1 is available to qualified researchers.

New in Release 5.1 are high resolution (2.5mm) expanded diffusion tensor imaging (eDTI) data and raw MRSI data. Stereotaxically aligned anatomic MRI files that were previously excluded in Release 5 have been made available again to researchers in Release 5.1.

Release 5, made available in March 2012, included longitudinally-registered anatomic MRI images and derived volumetric measures, processed single-voxel MRS data which has been corrected for CSF voxel content, raw single-voxel MRSI files, low resolution diffusion tensor imaging (DTI), additional demographic measures and revised biospecimen collection dates. The additional demographic measures added to this release were child race, child ethnicity, and a continuous adjusted family income variable. The biospecimen dates are now included as the month of collection or month of lab processing. Release 5 also featured the database's migration to the National Database for Autism Research (NDAR) infrastructure. With this migration, variable names were shortened and revised; and the data dictionary, revised. The new infrastructure and procedures for querying data are described in these notes.

Release 4, made available in June 2010, included non-longitudinally registered anatomic MRI scans and derived volumes, cortical surface analysis data for Objective 1 (ages 4 ½ and older) and for a portion of Objective 2 (down to 2 years of age) for all timepoints, as well as age-specific brain atlases. Included as part of the cortical surface analysis data were surfaces in native space, transformation to stereotaxic space, gray and white surfaces, cortical thickness at each of 40,962 vertices per hemisphere, gyrification index, and surface mean curvature. MRI atlas templates included both symmetric and asymmetric atlases for the following overlapping age groups, generally corresponding to pubertal stages: 4.5 to 8.5 years (pre-pubertal), 7 to 11 years (pre- to early puberty), 5.5 to 13.5 years (pre- to mid-puberty), 10 to 14 years (early to advanced puberty), and 13 to 18.5 years (mid-puberty through post-puberty). These, as well as the clinical/behavioral data included in release 4, remain unchanged in Release 5 and 5.1.

Release 3, made available in September 2009, included anatomic MRI scans and data for all timepoints and clinical/behavioral data for all subjects, aged 10 days post delivery to young adult (both "Objective 1" and "Objective 2").

This release replaces (rather than supplements) earlier releases. Users should use this version for new analyses and, in all cases, reference the release version of the dataset used in any publications. Version number is a variable listed in the data dictionary and can be downloaded with other variables of interest. This should not be confused with the version numbers that follow the names of data structures which refer to revisions/versions of the data dictionary. The project homepage has also now moved to www.pediatricmri.nih.gov.

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White papers describing data acquisitions and processing are available for each of the imaging modalities (anatomic MRI, conventional, low-resolution DTI and extended high-resolution DTI separately, and spectroscopy) as well as for the clinical/behavioral measures.

General Information

Powered by NDAR

The Pediatric MRI Data Repository is now hosted within the National Database for Autism Research (NDAR) infrastructure. With this migration, former users will notice a significantly different database interface. These release notes will instruct former and new users how to query and download data through NDAR's Query Tool.

Data Structures

The data structures, listed below, are available for querying in this release using the new database interface powered by NDAR. Some of these data structures have been renamed from prior releases.

1. Demographics
2. Neuropsychological
3. Physical
4. Psychiatric & Personality
5. Diffusion Tensor Imaging (DTI)
6. Expanded Diffusion Tensor Imaging (eDTI)
7. Longitudinally Registered Anatomic MRI Variables
8. Non-longitudinally Registered Anatomic MRI Variables
9. Spectroscopy
10. Bayley Scales of Infant Development, Second Edition, Behavior Rating Scale
11. Bayley Scales of Infant Development, Second Edition, Mental Scale
12. Bayley Scales of Infant Development, Second Edition, Motor Scale
13. Brief Telephone Screening Interview
14. BRIEF: Behavior Rating Inventory of Executive Function - Adult Version (Informant Report)
15. BRIEF: Behavior Rating Inventory of Executive Function - Adult Version (Self Report)
16. BRIEF: Behavior Rating Inventory of Executive Function - Parent Form
17. CANTAB: Cambridge Neuropsychological Test Automated Battery
18. Carey Temperament Scales, Behavioral Style Questionnaire (3 to 7 Years)
19. Carey Temperament Scales, Early Infancy Temperament Questionnaire (1 to 4 Months)
20. Carey Temperament Scales, Revised Infant Temperament Questionnaire, (4 to 11 Months)
21. Carey Temperament Scales, Toddler Temperament Scale (1 and 2 Years)
22. C-DISC-4: Computerized Diagnostic Interview Schedule for Children – Parent and Youth Version
23. CVLT-C: California Verbal Learning Test for Children
24. CVLT-II: California Verbal Learning Test, Second Edition

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25. DAS: Differential Ability Scales
26. DPS-4: DISC Predictive Scales
27. Family Biographical History Form (0:0 to 4:5 y:m)
28. FIGS MRI: Family History Interview for Genetic Studies - MRI - Version 1
29. FIGS MRI: Family History Interview for Genetic Studies - MRI - Version 2
30. Full Telephone Screening Interview - Version 1
31. Full Telephone Screening Interview - Version 2
32. Handedness (1:0 to 2:11)
33. Handedness (3:0 to 5:11) Part 1
34. Handedness (3:0 to 5:11) Part 2
35. Handedness (6:0+)
36. JTCI: Junior Temperament and Character Inventory - Parent Report
37. JTCI: Junior Temperament and Character Inventory - Self Report
38. MRI Child History Form (4:6+)
39. NEPSY Verbal Fluency (Semantic & Phonemic)
40. NEPSY Verbal Fluency (Semantic)
41. Physical and Neurological: (0:0 to 0:1 y:m) Examination
42. Physical and Neurological: (0:2 to 0:11 y:m) Examination
43. Physical and Neurological: (1:0 to 2:11 y:m) Examination
44. Physical and Neurological: (3:0 to 4:5 y:m) Examination
45. Physical/Neurological Examination
46. PLS-3: Preschool Language Scale-3
47. PSI: Parenting Stress Index
48. Pubertal Status Questionnaire
49. Purdue Pegboard - Full Board
50. Purdue Pegboard - Half Board
51. Screening and Exclusion Form (0:0 to 4:5 y:m)
52. Spectroscopy Scans
53. TCI: Temperament and Character Inventory - Parent Report
54. TCI: Temperament and Character Inventory - Self Report
55. Urine and Saliva
56. WAIS-R: Wechsler Adult Intelligence Scale - Revised - Digit Span and Digit Symbol
57. WASI: Wechsler Abbreviated Scale of Intelligence
58. WISC-III: Wechsler Intelligence Scale for Children, Third Edition - Digit Span and Coding
59. WJ3: Woodcock-Johnson III

Data Dictionary

An updated data dictionary accompanies Release 5 (now available at http://ndar.nih.gov/ndar_data_dictionary.html?type=All&source=Pediatric+MRI&category=All). Updates to the data dictionary were made for a variety of reasons including new data structures and fields and enhanced field descriptions. Additionally, many variable/element names (aka field names) were shortened due to character length restrictions in NDAR. Both the revised Release 5 and previous

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Release 4 variable/elements names have been included in the data dictionary spreadsheet. The significant changes to the data dictionary are included within these notes.

Using the NDAR Infrastructure

Overview

Users will now see a different login site for the Pediatric MRI Data Repository as shown below in **Figure 1**. This site, henceforth called the NDAR portal, will take users into the Pediatric MRI Data Repository. Note that once a user has successfully logged in to the NDAR portal, the user may optionally associate his or her NIH eRA Commons credentials to his or her account via the “NIH eRA Commons” button on the login page shown below.

Powered by NDAR

Login

Welcome to the Pediatric MRI Data Repository.

This site provides information about the NIH MRI Study of Normal Brain Development (Pediatric MRI Study) and resulting Pediatric MRI Data Repository. This website serves as the portal through which data can be obtained by qualified researchers. The overarching goal of the Pediatric MRI Study is to foster a better understanding of normal brain maturation as a basis for understanding atypical brain development associated with a variety of disorders and diseases.

What is NDAR? [Learn about NDAR](#)

Username *

Password *

or [NIH eRA Commons](#)

Click [Signup](#) to request an account.

Forgot your password? [Click here](#) to reset your password.

NDAR runs best on Internet Explorer 8, Firefox 3.5 or higher, Safari 5 or higher, and Chrome

Warning Notice
This is a U.S. Government computer system, which may be accessed and used only for authorized Government business by authorized personnel. Unauthorized access or use of this computer system may subject violators to criminal, civil, and/or administrative action.

All information on this computer system may be intercepted, recorded, read, copied, and disclosed by and to authorized personnel for official purposes, including criminal investigations. Such information includes sensitive data encrypted to comply with confidentiality and privacy requirements. Access or use of this computer system by any person, whether authorized or unauthorized, constitutes consent to these terms. There is no right of privacy in this system.

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Figure 1: New login site powered by NDAR

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On the homepage of the NDAR portal, users will be able to view the permission groups associated with their account and apply for access, if desired, to the autism data within NDAR. Note that several functionalities within the NDAR portal are designed for other researchers to submit autism data to NDAR. These include the “Submit Data” button and “Submissions” tab on the NDAR portal homepage – these items have no functionality for Pediatric MRI users and should be ignored.

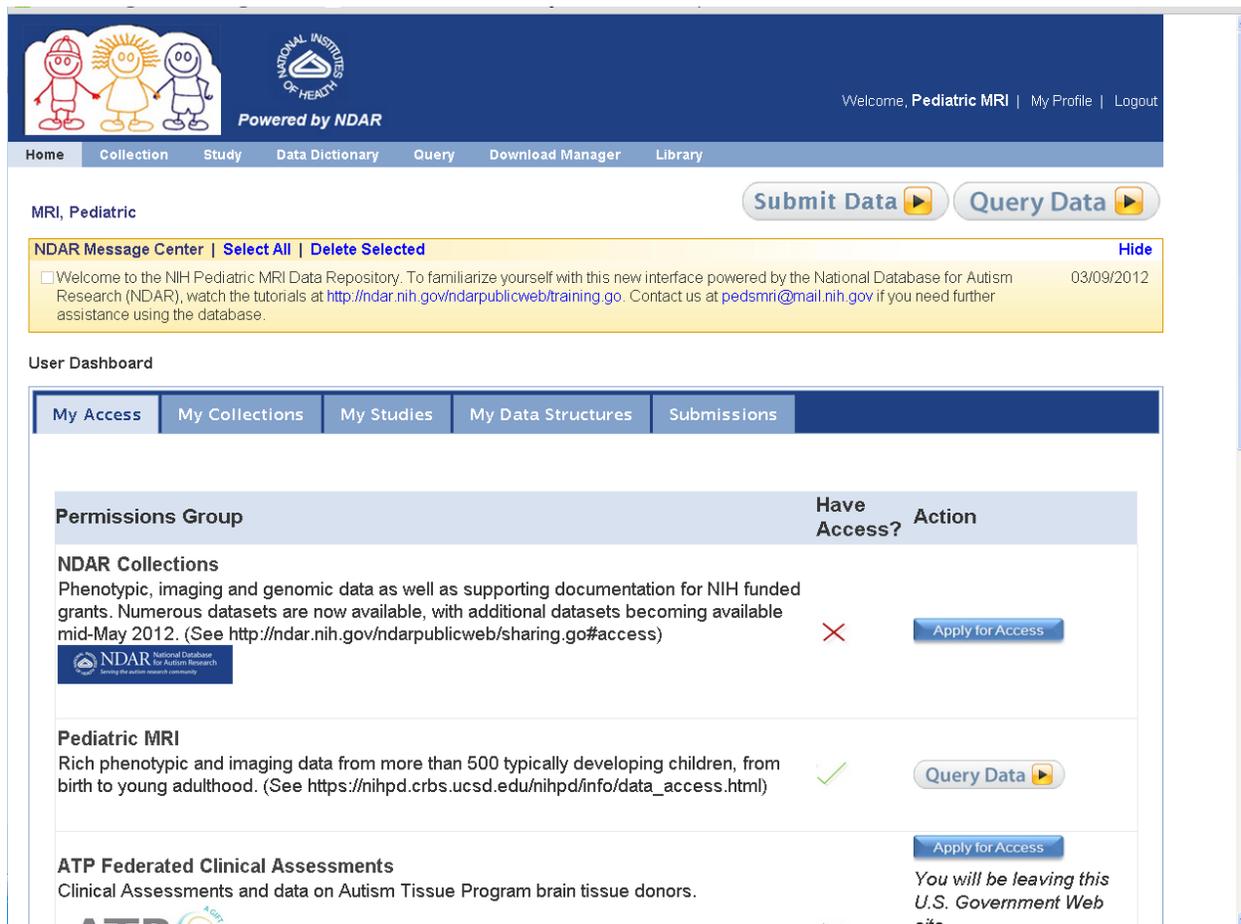


Figure 2: NDAR portal homepage

New database terminology, including “Collection” and “Study”, may be unfamiliar to previous users. An NDAR Collection contains all data related to a project. The collection containing all data from the NIH Pediatric MRI Study of Normal Brain Development is titled “Pediatric MRI.” By selecting this collection from either the “Collection” page in the top menu or the “My Collections” tab on the user dashboard (Figure 3), the user will come to the Pediatric MRI Collection details page as shown in Figure 4.

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User Dashboard

My Access	My Collections	My Studies	My Data Structures	Submissions		
Create a Collection Submit Data						
ID	Collection Title	Owner	Institution	Data	Collection Status	Collection State
NDARCOL0001151	Pediatric MRI	Pediatric MRI	U.S. NATIONAL INSTITUTE OF MENTAL HEALTH	CI	General Access	Shared

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Figure 3: My Collections tab in the User Dashboard

Collection Overview

Collection ID	NDARCOL0001151	Owner	Pediatric MRI	Delete Collection
Collection Title	Pediatric MRI	Owners email	pedsmri@mail.nih.gov	
Collection Status	General Access	Collection State	Shared	
Collection Phase	Completed			

Collection Details

Collection Title Pediatric MRI

Collection Overview Pediatric MRI Release 5.0. Visit our website at <https://nihpd.crbs.ucsd.edu/> for more information about this project.

Principal Investigator PEDIATRIC STUDY CENTERS: Michael J. Rivkin, M.D., Boston Children's Hospital; William S. Ball, M.D., Children's Hospital Medical Center of Cincinnati; Dah-Jyuu Wang, Ph.D., Children's Hospital of Philadelphia; James T. McCracken, M.D., University of California at Los Angeles; Michael Brandt, Ph.D., and Jack Fletcher, Ph.D., University of Texas Health Science Center; Robert McKinstry, M.D., Washington University. DATA COORDINATING CENTER: Alan Evans, Ph.D., Montreal Neurological Institute Center. CLINICAL COORDINATING CENTER: Kelly Botteron, M.D., Washington University. DIFFUSION TENSOR PROCESSING CENTER: Carlo Pierpaoli, M.D., National Institute of Child Health and Human Development. SPECTROSCOPY PROCESSING CENTER: Joseph O'Neill, Ph.D., University of California at Los Angeles.

[Click here to launch NDAR Query Tool to view data for this collection.](#)

Administrative Files

File Name	File Type	Expiration Date
ndar_submission_request.pdf	NDAR Data Submission Agreement	06/06/2011

To add files, please select one or more files from above

Navigation

- [NDAR Home](#)
- [Create New Study](#)
- [Submit Data](#)

Actions

- [View My Collections](#)
- [Edit Collection](#)
- [Manage Permissions](#)
- [View Attribution Report](#)

Figure 4: Pediatric MRI Collection page

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The Pediatric MRI Collections page lists all study investigators and documentation for the project. The Datasets listed at the bottom of this page simply reflect how the data is grouped within NDAR: Clinical/Behavioral Data, Anatomic MRI and Spectroscopy Data, Diffusion Tensor Imaging Data, and Phantom Data. These groups will be useful when querying data through NDAR's Query Tool.

Other new terminology used within NDAR are the "GUID" and "Dataset ID." The GUID is NDAR's Global Unique Identifier which labels all subjects within NDAR. The Pediatric MRI subjects were assigned these IDs in addition to their original project study IDs (which are labeled `src_subject_id`) when the database migrated to NDAR. A Dataset ID is a number assigned to each dataset; this in no way reflects the release version of the data and is simply a systematic notation made by NDAR that can generally be ignored by Pediatric MRI Users.

Finally, the NDAR Study is a tool with which researchers can save their queries and define any study specific to a publication on which they are working. This functionality is described in more detail later.

Query Tool

NDAR's Query Tool will allow researchers to download any or all clinical/behavioral and imaging data. Users may access the Query Tool through either the "Query Data" buttons on the portal homepage or the "Query" tab in the top menu.

Within the Query Tool, users may select the data structures they wish to view. All clinical and behavioral assessments are listed under the "Clinical Assessments" tab. All imaging structures are listed under the "Imaging" tab. Note that nearly all structures begin with "Peds - "; this is to better group and display data structures to users who have access to other NDAR data structures. The version numbers listed after each data structure are only an NDAR notation of the assessment's data dictionary version number (the number of times the structure has been revised within NDAR). **This is NOT the release version number and should generally be ignored by Pediatric MRI users.**

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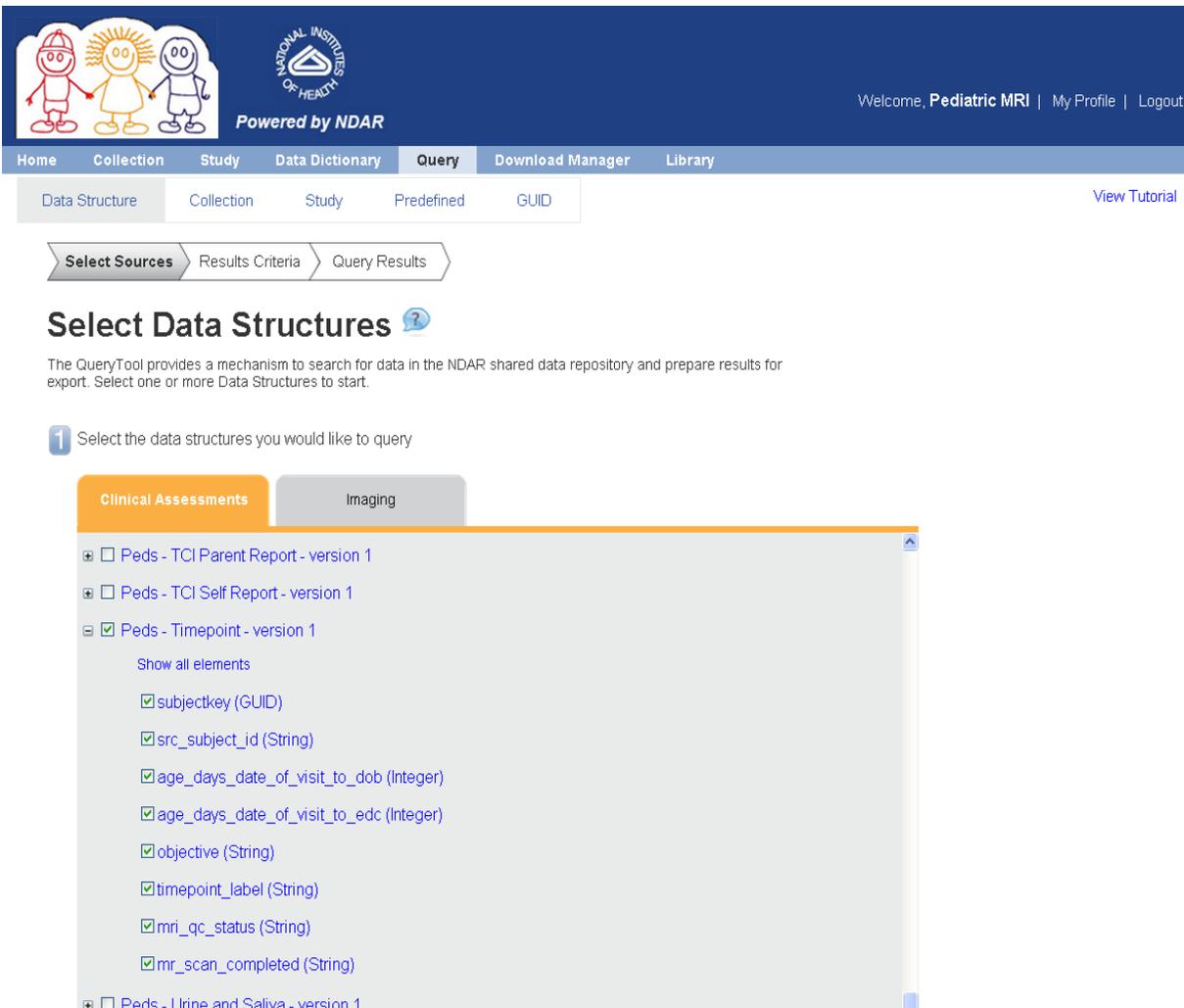


Figure 5: Select data structures in the Query Tool

The `src_subject_id` (Pediatric MRI Subject ID) and `timepoint_label` elements are available under each data structure. However, `objective` number is only available under “Peds – Timepoint” as shown in **Figure 5**. Users should select the Timepoint data structure if this field is desired in download. Once all desired structures have been selected, the user should select the “Results Criteria” button at the bottom of the page as shown in **Figure 6**.

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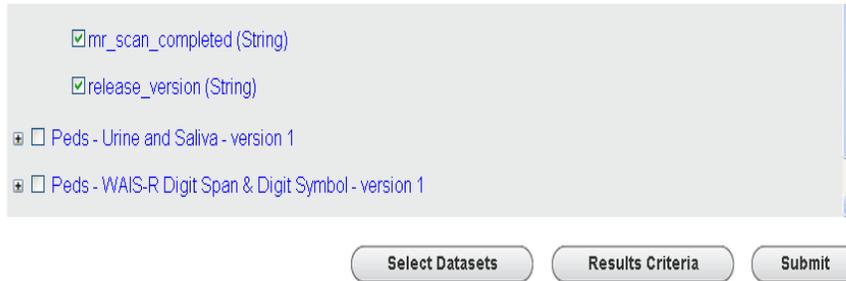


Figure 6: Click the Results Criteria button after selecting desired data structures

The Results Criteria page allows users to specify data for download, merge or join data into a single dataset, or filter data using one or more criteria. If the user has selected multiple structures and wishes to join data by `src_subject_id` and `timepoint_label`, the user should select Matching Join and add the criteria displayed in **Figure 7**. Matching join will give the user only those variables shared across two datasets joined by the specified variables. Thus, if one data structure includes variables with no match in the other data structure, they will not be downloaded. Nonmatching join allows users to download both variables with and without a match in another dataset. Optionally, you may choose to download your data individually using the basic query and combine the data using the tool of your choice (Excel, MySQL, Oracle, etc.)

The Advanced criteria box allows users to specify other query conditions, such as age, objective number, or any other element value within the selected structures. Specific variables and values for those variables may be used to filter the records selected.

Data Structure Collection Study Predefined GUID

Select Sources **Results Criteria** Query Results

Results Criteria ?

3 The query method will determine how the data in your results will be returned and prepared for download. Select a query method and presentation mode for your data. Only one query method and presentation mode may be selected.

QUERY METHODS

Simple - Query data and return the results as separate stand-alone datasets. (No Join)

Matching Join - Connect data to combine the data into one dataset where there are matching values from each source based upon the specified data elements. (Inner Join)

src_subject_id = src_subject_id Remove

timepoint_label = timepoint_label Remove

+ Add Additional Row

Non-matching Join - Combine data into one resulting dataset. All values in the first dataset will be returned along with matching value in the second and additional datasets. (Outer Join)

PRESENTATION MODE

Separate Tables - Display each data structure as a separate table

Single Table - Display all data structures in a single table

Advanced - Specify multiple conditions to filter the data returned. (Where Clause)

Peds - Handedness (6:0+ y:m) - version 1

[] = [] Remove

+ Add Additional Row

Peds - Timepoint - version 1

objective = 1 Remove

+ Add Additional Row

Distinct - Remove duplicated rows from the results

Back Save Query Submit

Figure 7: Results Criteria page

After clicking the “Submit” button on the Results Criteria page, the Query results will be displayed in an HTML table. To export the query table results and any imaging files, the user must select the “Export” button at the top of the Query Results page. The user can then add a description to the download package and launch the NDAR Download Manager. *NOTE: The NDAR Download Manager requires Java 6 to be installed on your computer.*

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Query Results

Select export to prepare your results for download then use [Download Manager](#) to retrieve your results. You can also [save the query](#) or [add the query to a study](#).

Use check boxes to select rows to include in export

Show Data Definition

Now displaying results 1 through 500 of 1074 total results

01 02 03 Next Last

SELECT ALL <input checked="" type="checkbox"/>	SOURCE	COLLECTION	DATASET_ID	SUBJECTKEY	SRC_SUBJECT_ID	TIMEPOINT_
				THE NDAR GLOBAL UNIQUE IDENTIFIER (GUID) FOR SUBJECTS WHICH IDENTIFIES A SUBJECT IN NDAR	THE SITE OR STUDY SUBJECT IDENTIFICATION	TIMEPOINT/ A LABEL SE THE SITE AT REGISTRA NEW TIME THE DATA LABEL IS GROU INSTRU ADMINIST SUBJECT / TIMEP
<input checked="" type="checkbox"/>	NDAR	Pediatric MRI	7857	NDAR_INVVH538JZD	1307	v
<input checked="" type="checkbox"/>	NDAR	Pediatric MRI	7857	NDAR_INVAH763KUH	1031	v
<input checked="" type="checkbox"/>	NDAR	Pediatric MRI	7857	NDAR_INVBC852UX0	1121	v
<input checked="" type="checkbox"/>	NDAR	Pediatric MRI	7857	NDAR_INVGU836ZA0	1016	v

Figure 8: Query Results page

The NDAR Download Manager, shown below in **Figure 9**, allows users to select a download directory. The status column will indicate when the package is Ready for Download. Note that the status may take several minutes to update for larger query packages. When the status is “Ready for Download”, put a check mark beside the package and then select the “Start Downloads” button. The download is complete once the status shows “Download Complete” as shown below in **Figure 10**.

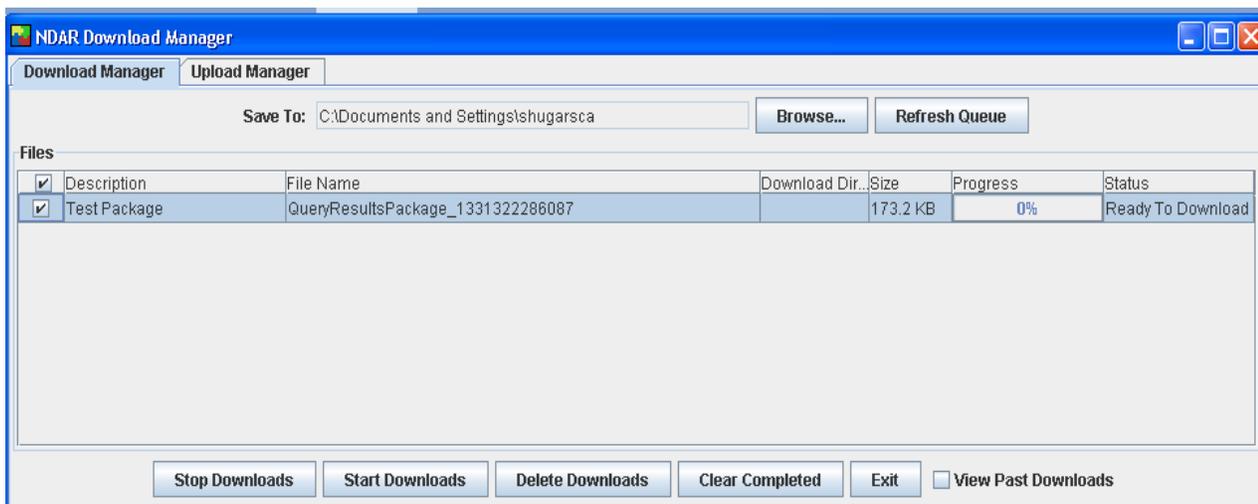


Figure 9: Package ready for download in the Download Manager

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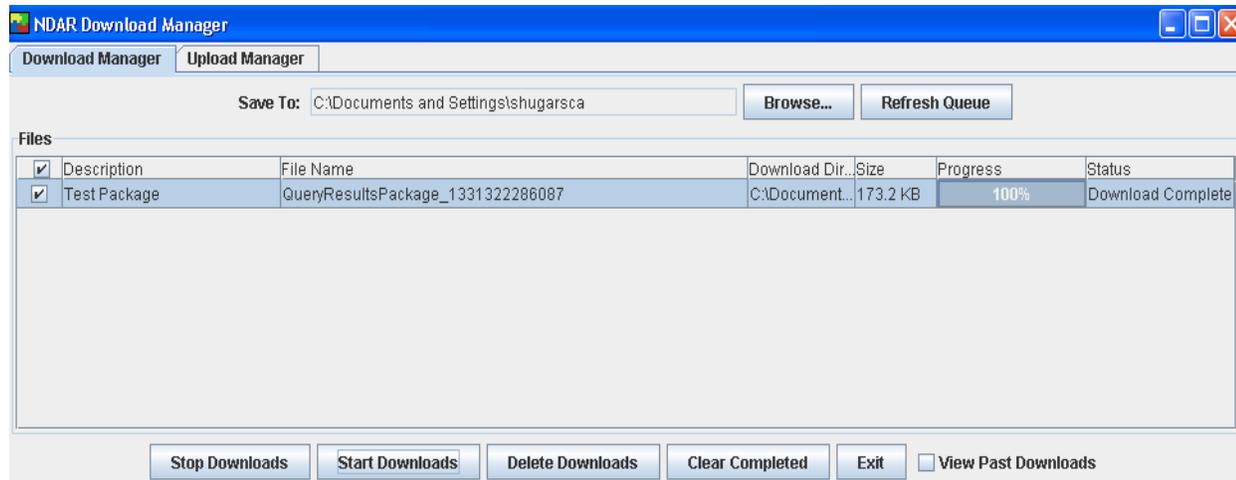


Figure 10: Package download complete

To learn more about the NDAR Query Tool, view the online tutorial at http://ndar.nih.gov/ndarpublicweb/help/querytool/Query_Tool_Tutorial.html. The tutorial will demonstrate how to design more advanced queries, select specific datasets, and filter query results. *Note that there is a limit of 100GB per download. If more data is needed, contact pedsMRI@mail.nih.gov.*

Create a Study

The NDAR Study tool allows researchers to define the specific subjects associated with their project or study and later associate this data with a publication. This will also be a useful tool for users to save their queries in the Query Tool. Please view the online tutorial at <http://ndar.nih.gov/ndarpublicweb/training/html> for instructions on creating a Study. Whenever a user's publication results become available in PubMed, NDAR will also provide a link from PubMed to the user's Study.

Imaging Data

The imaging modalities available are anatomic MRI (aMRI), proton MR spectroscopy (MRS) and MRS imaging (MRSI), conventional diffusion tensor imaging (DTI), and expanded diffusion tensor imaging (eDTI). Approximate scan counts available with this release are as follows:

aMRI:

1381 datasets from 538 subjects, inclusive of 1316 longitudinally-registered datasets from 527 subjects

Single-voxel MRS:

273 datasets (4 voxels each) corrected for CSF voxel content from 145 subjects

MRS imaging (MRSI):

57 Single-voxel datasets from 34 subjects

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DTI:

498 datasets from 274 subjects

eDTI:

193 datasets from 152 subjects

Left-right orientation of images:

Anatomic scans follow the neurologic convention (left side of brain appears on the left of the image). A watermark on the most inferior slice of the anatomic images has been provided to indicate this orientation. MRS/I and DTI used the radiologic convention (left brain on right side of image).

All imaging data is accessible through NDAR's Query Tool shown below in **Figure 11**.

The screenshot shows the NDAR Query Tool interface. At the top is a navigation bar with tabs: Home, Collection, Study, Data Dictionary, Query (selected), Download Manager, and Library. Below this is a sub-navigation bar with tabs: Data Structure (selected), Collection, Study, Predefined, and GUID. A progress indicator shows three steps: 'Select Sources' (active), 'Results Criteria', and 'Query Results'. The main heading is 'Select Data Structures' with a help icon. Below the heading is a paragraph: 'The QueryTool provides a mechanism to search for data in the NDAR shared data repository and prepare results for export. Select one or more Data Structures to start.' A numbered instruction '1' says 'Select the data structures you would like to query'. Below this is a list of data structures under the 'Imaging' tab, which is highlighted in orange. The list includes: 'Image - version 2', 'Peds - Diffusion Tensor Imaging - version 3', 'Peds - Diffusion Tensor Imaging - version 4', 'Peds - Expanded Diffusion Tensor Imaging (eDTI) - version 2', 'Peds - Non-longitudinally Registered aMRI Variables - version 3', 'Peds - Longitudinally Registered aMRI Variables - version 2', and 'Peds - Spectroscopy - version 2'. Each item has a plus icon and a checkbox.

Figure 11: Image structures in the Query Tool

Release 5.1 images of subjects are available in the following data structures: Diffusion Tensor Imaging, Expanded Diffusion Tensor Imaging (eDTI), Non-longitudinally Registered aMRI Variables, Longitudinally Registered aMRI Variables, and Spectroscopy. Phantom imaging data is available in the Image and

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Diffusion Tensor Imaging (version 4) but needs to be filtered by the phantom GUIDs as defined in section (Phantom Data) below

All imaging structures contain queryable data elements and file names. From within the Query Tool, one can click on any one file name to open and preview the file. Once a query package is selected for download, the path names will appear in the CSV output file. Use this file path to find the imaging files in the downloaded query package as shown in **Figure 12**.

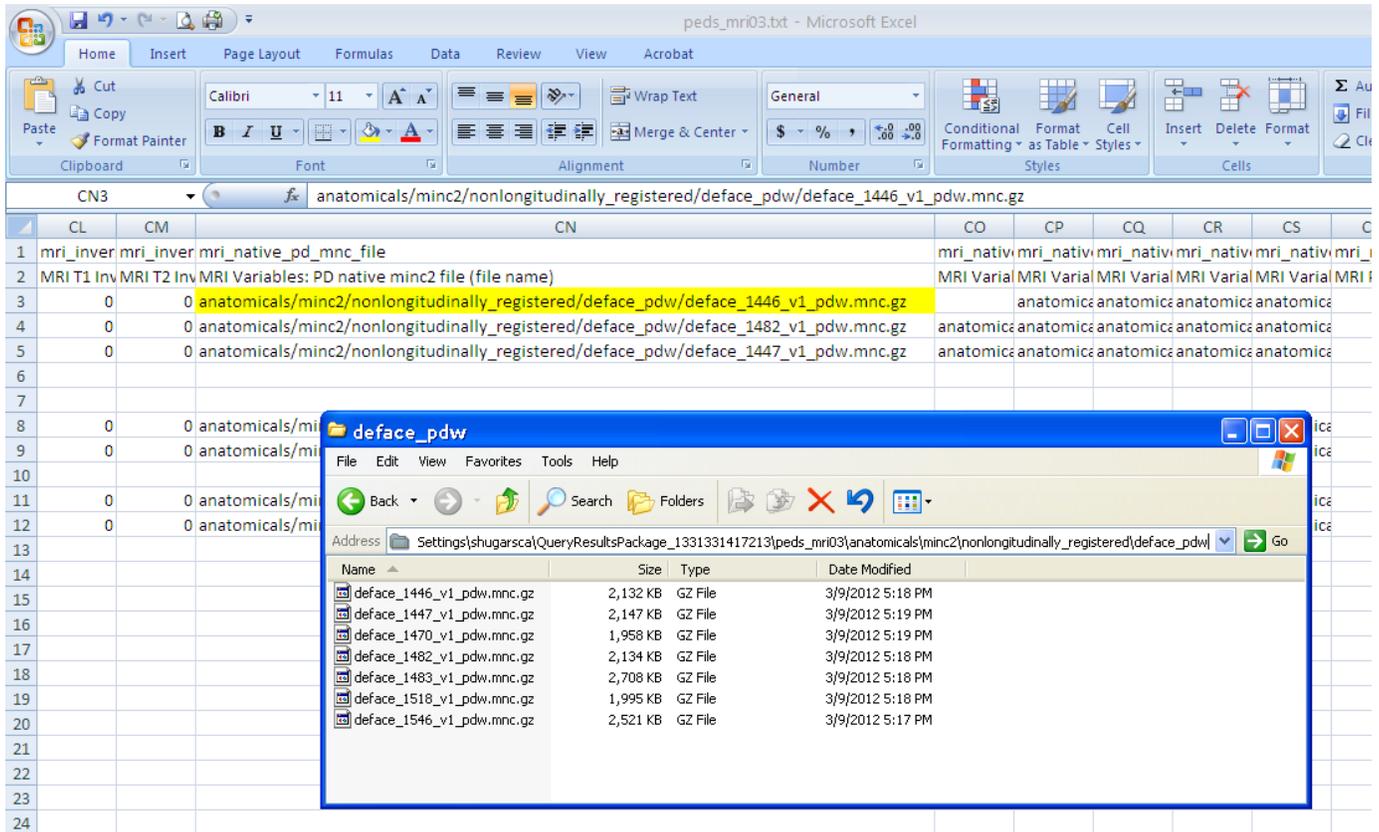


Figure 12: Use the file names in the query package .TXT file to find the image files

Anatomic MRI

For the Non-longitudinally Registered Anatomic MRI Variables and Longitudinally Registered Anatomic MRI Variables data structures, both MINC2 and NIFTI files are available for download through the NDAR Query Tool. Both sets of file names have a .gz suffix. The .gz indicates that these files have been compressed using the gzip standard.

Volumetric measures for whole brain white matter, gray matter and cerebrospinal fluid (CSF) and for several regional volumes, e.g., each cerebral lobe (e.g., right frontal white matter, left occipital gray matter), cerebellum, brainstem) are also provided. Also included are cortical thickness and surface analysis measures. See anatomic MRI white paper.

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Spectroscopy Data

Both raw and processed single-voxel proton spectroscopy files are listed in the Spectroscopy data structure. Processed images are in .png format and should be viewable using a standard web browser. Raw files are in .pfile, DICOM, and .rda formats. These may be viewed using LCMoDel (available at <http://s-provencher.com/pages/lcmoDel.shtml>) or MRUI (available at <http://sermn02.uab.es/mrui/>).

Release 5 reflects the enhanced, reprocessed single-voxel proton spectroscopy data which has now been corrected for voxel CSF content. Data contained in release 4 had not been corrected for voxel CSF content and have been replaced. In addition, a small amount of new data has been added from one of the sites.

The spectroscopy data includes 273 single-voxel datasets from 145 Objective 1 subjects (ages 4 ½ to 18 at time 1) across their three timepoints. The four voxels sampled were from frontal white matter, thalamus, and parietal white matter (all on the left) and midline occipital gray matter. Spectra with their corresponding LC model printouts were provided, along with scalar values for the levels of three neurometabolites-- *N*-acetyl-aspartate+*N*-acetyl-aspartyl-glutamate (“NAA”), creatine+phosphocreatine (“Cr”), and choline-containing compounds (“Cho”), relative to the magnitude of the unsuppressed and suppressed water in the voxel and relative to creatine+phosphocreatine and quality-control (QC) parameters, principally the spectral linewidth (expressed as full-width at half-max; FWHM) and the spectral signal-to-noise ratio (S/N).

Release 5 also includes files that display and verify the proper anatomic placement of the MRS voxels on the anatomic MR images and tissue composition (gray matter, white matter, CSF) and correction of metabolite levels for voxel CSF-content. MRS data not meeting spectral and/or tissue QC criteria have now been excluded from the database.

Note the metabolite NGA+NAAG values are rounded in the Query Tool. That data is not rounded in the image files, but is specified in detail in the database.

Phantom Data

As defined in procedure manuals, a series of images were acquired from and a living human phantom who was scanned at all sites at several timepoints. These have been made available in both MINC2 and NIFTI formats and reside in the “Release 5.0 – Phantom Data” dataset. They can be downloaded through the “Image” and “Diffusion Tensor Imaging (NDAR data structure version 4)” data structures. All phantom records are assigned a GUID number NDAR_INVCH863XA1. Each file name defines the phantom subject ID, the site at which the data was collected for that individual, and the time in days between scans. For example, the file name /LIVING_PHANTOM_1_SITE_2_8518 represents living phantom 1, Site 2.

The number 8518 represents the duration in days from an arbitrary date defined for all phantom scans. The actual number is meaningless except that it is relative to the other phantom scans. For example, living phantom scan PHANTOM_1_SITE_6_8872 occurred exactly 354 days after LIVING_PHANTOM_SCAN_1_SITE_2_8518. This can be determined by subtracting 8518 from 8872.

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A standard American College of Radiology (ACR) physical phantom was also scanned in the project at each site across time. The user may compare the number of days from the arbitrary date for the subject against those for the ACR phantom using the `acr_age_days_arbitrary_of_t1` in the Non-longitudinally Registered MRI Variables section of the database. This variable corresponds to the last number in the living phantom IDs.

The Living phantom data was acquired at intervals of about 1 year on the scanner that was being used to acquire data at each site at that time. The living phantom data that has been released has passed the visual quality control inspection.

Diffusion Tensor Imaging

This Diffusion Tensor Imaging (DTI) data release contains data collected with higher resolution (2.5mm) acquisition protocol and data collected with lower resolution (3mm) or the “conventional” DTI protocol. DTI data was sometimes collected in sessions that were separated from the other measures in time. When this occurred, a visit number was assigned based on age and proximity to the other data acquisitions. In some instances, the corresponding clinical/behavioral data for that visit number may be unavailable.

For the low resolution DTI data, two sets of data are available for download; DTI release 1 (REL01) contains datasets that were virtually artifact-free and therefore did not need additional post-processing with artifact remediation strategies (85 scans from 62 unique subjects), while DTI release 2 (REL02) contains all DTI data that passed set quality criteria (498 scans from 274 unique subjects).

The higher resolution, expanded DTI (eDTI) data includes low ($b=0s/mm^2$) and high ($b=1100s/mm^2$) image volumes, but also includes a number of intermediate b-values as well ($b=100s/mm^2$, $b=300s/mm^2$, $b=500s/mm^2$, and $b=800s/mm^2$). Up to nine (9) files of tensor derived quantities are included in the database: Directionally encoded color maps (DEC); Eigenvalues (EV) as 4D image file with volumes in the order of $\lambda_1, \lambda_2, \lambda_3$; Fractional anisotropy (FA); Lattice index (LI); Relative anisotropy (RA); Trace of the diffusion tensor (TR) (equal to $3 \times \text{Mean Diffusivity}$); Chi-Squared map of the fitting (CS) – a measure of the goodness of fit of the tensor model; Outlier map (OUT) – indicates the percentage of data points identified as outliers and removed from the tensor fitting on a voxel-by-voxel basis; and Brain mask (MS).

Timepoint

The Timepoint data structure when combined with other data structures enables a user to identify the objective (1 or 2), timepoint (1-3 for Objective 1; up to 10 for Objective 2), subject id and age in days.

Visits beginning with the letter “i” (or “i” followed by another letter, e.g., ia, ib, ic) indicate an incomplete visit and should correspond to age in days for an appropriate timepoint.

Demographics

Demographics contains information about each research participant's demographic profile. The following changes/issues are identified with demographics in this release.

Child Race and Child Ethnicity

Child race and child ethnicity variables were derived from parent race and ethnicity variables and added to Release 5. If the child's parents were of the same race and/or ethnicity, then the child is listed as also being of that race or ethnicity. If the parents were of different races, then both races are listed under child_race_. If only one parent was Hispanic or Latino, then the child was listed as "Part Hispanic or Latino".

Adjusted Family Income Calculation

The categorical income variable used for sampling and included in earlier releases ("HUD_Adjusted_Family_Income") has been replaced with a more continuous income variable labeled adjusted_family_income in Release 5. The methods and formula for deriving this new income variable are included in the Clinical/Behavioral White Paper – Release 5.

Biospecimen Dates

All biospecimen collection and lab processing dates have been converted to months for Release 5. This affects all dates within the Urine and Saliva data structure. The months are listed numerically (1=January, 2=February, etc).

Clinical Assessments

The following notes are intended to give the user an overview of issues related to the clinical assessments and alert the user to changes made to the data dictionary for this data release.

Missing Data; "NA" Designation

Data may be "missing" for a variety reasons, e.g., (1) Instrument inappropriate for the age of the child, (2) instrument appropriate but not administered or not completed by the child, or (3) instrument administration did not pass quality control checks. Generally, and throughout the database, the use of "NA" does not specifically indicate anything other than the fact that no data has been inputted for that cell. Thus, NA or a blank cell each communicates only "no data."

Bayley Scales of Infant Development II: Mental, Motor and Behavioral Rating Scale

Users should refer to the Objective 2 procedure manual for clarification of how ages were calculated for the BSID-Mental Development Index (MDI), Psychomotor Development Index (PDI) and BRS.

Children coming in for a 36 month testing visit (e.g., between 1073 and 1122 days old) were given the BSID-PDI only.

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Cambridge Neuropsychological Test Automated Battery (CANTAB)

CANTAB data is included only for individual ages 1643 days (4.67 years) and older. Data for children between 4:6 and 7:0 should be used with caution due to variations in data collection procedures in comparison to older children.

Following Visit 1 data collection with the CANTAB, the publishers upgraded the CANTAB to the CANTAB eclipse version which was used for Visits 2 and 3. Please see the following General CANTAB or subtest specific sections for definitions and explanations of specific CANTAB variables used during Visit-1. Also, see CANTAB website (<http://www.cantabeclipse.com>).

Carey Temperament Scales

The Carey was utilized only in Objective 2.

Child Behavior Checklist (CBCL)

Four versions of the CBCL were used, corresponding to ages 1.5 to 5, 4 to 18, 6 to 18, and the Young Adult Self Report.

Note that an erroneous value of 255 was found in a number of result variables at the time of this release. More information will be posted related to this data error as that information becomes known. .

Computerized Diagnostic Inventory Schedule for Children (DISC) –Parent Version

The following nonexclusionary DISC diagnoses are included with Release 5.

DISC_P_Encopresis_Past_Month	DISC_P_Encopresis_Past_Year
DISC_P_Enuresis_Diurnal_Past_Month	DISC_P_Enuresis_Diurnal_Past_Year
DISC_P_Enuresis_Nocturnal_Past_Month	DISC_P_Enuresis_Nocturnal_Past_Year
DISC_P_Nicotine_Dependence	DISC_P_Social_Phobia_Past_Month
DISC_P_Social_Phobia_Past_Year	DISC_P_Specific_Phobia_Past_Month
DISC_P_Specific_Phobia_Past_Year	DISC_Y_Encopresis_Past_Month
DISC_Y_Encopresis_Past_Year	DISC_Y_Enuresis_Diurnal_Past_Month
DISC_Y_Enuresis_Diurnal_Past_Year	DISC_Y_Enuresis_Nocturnal_Past_Month
DISC_Y_Enuresis_Nocturnal_Past_Year	DISC_Y_Nicotine_Dependence
DISC_Y_Oppositional_Defiant_Disorder_Past_Month	DISC_Y_Oppositional_Defiant_Disorder_Past_Year
DISC_Y_Separation_Anxiety_Disorder_Past_Month	DISC_Y_Separation_Anxiety_Disorder_Past_Year
DISC_Y_Social_Phobia_Past_Month	DISC_Y_Social_Phobia_Past_Year
DISC_Y_Specific_Phobia_Past_Month	DISC_Y_Specific_Phobia_Past_Year

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Differential Ability Scales (DAS)

The Differential Ability Scales spans both Objective 1 and Objective 2 as it was used for children 3:0 to 5:11. Users should refer to the Objective 2 procedure manual for clarification of how ages were calculated for the DAS.

The Differential Ability Scales has two parts, the School Age DAS and the Preschool DAS. Only the Preschool Age DAS was used in the project. The Preschool DAS is further divided into the Lower Preschool and the Upper Preschool DAS. Both versions of the Preschool DAS were used for the project. Refer to the DAS manual for an explanation of the differences between the two versions.

The Differential Ability Scales does **not** use traditional raw scores (i.e., the subject is **not** given credit for items that appear below the starting point). In order to calculate a continuous raw score in the current version of the release (e.g., a raw score similar to one found in the WASI), users must manually calculate the raw scores to correct for the DAS variation.

Family Interview for Genetic Studies (FIGS)

Minor modifications were made to the FIGS following the first visit for Objective 1. Thus, two versions of the FIGS were utilized in the project. In Objective 1, all subjects' Visit 1 FIGS data was collected using Version 1 of the FIGS, following which a transition was made to Version 2. However, approximately half of the Objective 2 subjects utilized Version 1 FIGS for their first visit, and approximately half utilized Version 2.

These two versions are referenced elsewhere as Year 1 (meaning Version 1) and Year 3 (corresponding to Version 2).

Handedness

Handedness was measured via three age-appropriate assessments on the project, i.e., 1:0-2:11; 3:0-5:11, 6:0 and older. Handedness 1:0-2:11 was only used on Objective 2; Handedness 3:0-5:11/Handedness Form A covers both objectives, Handedness 6:0/Handedness Form B (ages 6:0 and older) was only used on Objective 1.

Handedness 3:0-5:11 is currently divided into two files in the database: Handedness 3:0-5:11 – Part 1 for Objective 2 and Handedness 3:0-5:11 – Part 2 for Objective 1. Thus, in order to download the complete dataset, it is necessary to download and concatenate both files to achieve Handedness 3:0-5:11.

It should be noted that in Handedness 3:0-5:11, the child actually performs the tasks, while for Handedness 6:0 and up, the child pantomimes the task. Handedness 3:0-5:11 and Handedness 6:0 and up share five common tasks (i.e., hand used to write; hand used to eat; hand used to cut with scissors, hand used to hammer, and hand used to throw a ball). This provides an age-range from 3:0 through 18:0 and older.

Handedness has very precise administration and measurement directions. These directions are critical to successful administration and scoring of all three of the handedness assessments.

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NEPSY Semantic Verbal Fluency (Verbal Fluency)

The NEPSY is divided into two versions—the Semantic and the Semantic and Phonemic. Children between 3:0 and 6:11 were administered the Semantic portion of the NEPSY only. Data for the Semantic version span both Objective 1 and Objective 2.

To create a dataset of Semantic data that spans all ages above 3:0, users must download both the Semantic and Semantic and Phonemic versions of the NEPSY and concatenate them together.

The word list (e.g., word responses of the child) are included in the database for the 3:0 to 6:11 Semantic version, but are not included for the Semantic and Phonemic versions (7:0 and up).

Neurological Exams (i.e., Physical Neurological Exams)

Four age-specific neurological exams were used for Objective 2 (but only one for Objective 1).

Parental Stress Index

Available scores are limited to raw data for Summary Scores (e.g., Total Stress Raw Score).

Pre-School Language Scale

Users should refer to the Objective-2 procedure manual for clarification of how ages were calculated for the PLS-3.

Rather than beginning testing at one year below the child's chronological age as suggested in the PLS-3 manual, examiners began testing with items six month below the child's targeted testing age to help streamline the time required for the Objective 2 testing battery (see Objective 2 procedure manual for more information regarding targeted testing ages).

Purdue Pegboard

Two versions of this instrument were used—the Half Board (for younger children) and the Whole Board (for older children). The Half Board was administered to children 3:0 to 5:11 and spans both objective, i.e., includes data from young children in both objectives 1 and 2. If a child was unable to complete a trial, the trial was left blank and the administration was discontinued.

It is possible to make a dataset of Purdue data which spans all ages above 3:0 by downloading data for the Purdue Half Board and the Purdue Whole Board.

Forms and Data not available in the Database

Several forms available in the procedure manuals (most used for internal tracking of data collection) are not included in the database. For example, for objective 2, such forms include the Contact Sheet, Consent and Assent Forms, etc.