
ABCD Human Subjects Study

Adolescent Brain Cognitive Development – ABCDSTUDY.org

Release Notes for Annual Release 1.1

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Structural Magnetic Resonance Imaging (sMRI)

October 31, 2018

List of Instruments

Instruments	Short Name
ABCD sMRI Part 1	abcd_smrip101
ABCD sMRI Part 2	abcd_smrip201

General Information

The following information refers to the Adolescent Brain Cognitive Development (ABCD) Study October 2018 patch release (ABCD Release 1.1) available from <https://data-archive.nimh.nih.gov/abcd>. An overview of the ABCD Study is at <https://abcdstudy.org> and detailed descriptions of elements of the study are listed in <https://abcdstudy.org/scientists-publications>.

This document describes the contents of various instruments available for download. To understand the context of this information, see *Release Notes ABCD README FIRST* and *Release Notes ABCD Imaging Instruments*.

- Image types
 - T₁-weighted (T₁w) 3D structural images
 - T₂-weighted (T₂w) 3D structural images
- Image processing
 - corrected for gradient nonlinearity distortions (Jovicich, et al., 2006)

- T₂w images registered to T₁w images using mutual information (Wells, et al., 1996)
- intensity non-uniformity correction based on tissue segmentation and sparse spatial smoothing
- resampled with 1 mm isotropic voxels into rigid alignment with an atlas brain
- Cortical surface reconstruction
 - FreeSurfer v5.3.0 (<https://surfer.nmr.mgh.harvard.edu>)
 - skull-stripping (Segonne, et al., 2004)
 - white matter segmentation, initial mesh creation (Dale, et al., 1999)
 - correction of topological defects (Fischl, et al., 2001; Segonne, et al., 2007)
 - surface optimization (Dale, et al., 1999; Dale and Sereno, 1993; Fischl and Dale, 2000)
 - nonlinear registration to a spherical surface-based atlas (Fischl, et al., 1999b)
- Morphometry
 - subcortical regional volume
 - cortical volume
 - cortical thickness (Fischl and Dale, 2000)
 - cortical area (Chen, et al., 2012; Joyner, et al., 2009)
 - sulcal depth (Fischl, et al., 1999a)
- Image intensity measures
 - T₁w and T₂w intensity measures in white matter (-0.2 mm from gray/white boundary)
 - T₁w and T₂w intensity measures in gray matter (+0.2 mm from gray/white boundary)
 - Normalized T₁w and T₂w cortical gray/white intensity contrast (Westlye, et al., 2009)
- Regions of interest (ROIs)
 - subcortical structures labeled with atlas-based segmentation (Fischl, et al., 2002)
 - cortical regions labeled with the Desikan atlas-based classification (Desikan, et al., 2006)
 - fuzzy-cluster parcels, based on genetic correlation of surface area (Chen, et al., 2012)

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