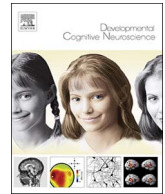




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## Review

## Demographic, physical and mental health assessments in the adolescent brain and cognitive development study: Rationale and description

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## ABSTRACT

The Adolescent Brain and Cognitive Development (ABCD) Study incorporates a comprehensive range of measures assessing predictors and outcomes related to both mental and physical health across childhood and adolescence. The workgroup developed a battery that would assess a comprehensive range of domains that address study aims while minimizing participant and family burden. We review the major considerations that went into deciding what constructs to cover in the demographics, physical health and mental health domains, as well as the process of selecting measures, piloting and refining the originally proposed battery. We present a description of the baseline battery, as well as the six-month interim assessments and the one-year follow-up assessments. This battery includes assessments from the perspectives of both the parent and the target youth, as well as teacher reports. This battery will provide a foundational baseline assessment of the youth's current function so as to permit characterization of stability and change in key domains over time. The findings from this battery will also be utilized to identify both resilience markers that predict healthy development and risk factors for later adverse outcomes in physical health, mental health, and substance use and abuse.

## 1. Introduction

As described in the opening paper in this Special Issue, the Adolescent Brain and Cognitive Development (ABCD) Study is a large and unprecedented study of youth that will inform our understanding of

the environmental, genetic, neurobiological, and behavioral factors that promote health and which put youth at risk for both physical and mental health problems. As described in the opening paper, this study is designed to run for at least 10 years, following youth recruited at age 9 and 10 into late adolescence/early adulthood. The ABCD study will

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collect a wide variety of data on each youth, as described in the other papers in this issue, including imaging data, biomarkers (e.g., hormones, DNA), cognitive function, substance use and abuse, and measures of the youth's family and environment. Importantly, the ABCD study incorporates a broad range of measures assessing predictors and outcomes related to both mental health and physical health in children and later in adolescence and young adulthood. The workgroup on mental and physical health assessment strove to develop a battery that would address a range of domains within the time constraints imposed by the need to capture the many different types of data described in the other articles included in this Special Issue. Here we review the major considerations that went into deciding what domains to cover in the mental and physical health battery and the process of selecting measures, as well as the piloting and refining of the originally proposed battery. We provide a description of the final baseline battery, the 6-month interim assessments and the one-year follow-up battery. Given that the data being collected as part of the ABCD study will be widely accessible to the scientific community, we hope that this description will be of use to the field by making clear what measures are available for assessing mental and physical health in the study participants, so that such measures can be related to the other assessments of brain structure and function, biomarkers, cognition, environment, and substance use in the same youth. Further, we hope that this information will be informative for researchers who are deciding which measures of similar constructs to include in their own studies.

## 2. Considerations shaping the choice of the baseline instruments

A number of different considerations went into both the choice of domains and the selection of measures for the baseline mental and physical health battery. In terms of domains, a first major consideration was to cover the domains explicitly requested by the Request for Applications (<https://grants.nih.gov/grants/guide/rfa-files/RFA-DA-15-014.html>), which asked for assessment of a broad range of mental health and physical health related constructs, both as starting point evaluations that establish a baseline from which to assess changes, and as indicators of change or outcome. The choice of constructs to be assessed was also influenced by extant data in the literature as to the constructs that would be important for understanding both healthy brain development and risk for substance use and risk behavior. Another set of considerations related to the developmental stage of the sample. Assessments designed to collect data from parents about their children needed to be appropriate for reports about 9- and 10-year-old children. Assessments designed to collect data from the youth needed to be appropriate for use with 9- and 10-year old children. As such, for youth, the reading level needed to be age-appropriate and the concepts assessed needed to be ones that children would be able to understand. At the same time, we also needed measures that would “stand the test of time” in a longitudinal study. Thus, they needed either to be measures that could feasibly be used through early adulthood, or measures that had parallel versions that were appropriate for older ages. Further, the battery needed to focus on measures where the responses would not become invalid as measures of the constructs of interest due to repeated assessments or practice effects. In this way ABCD will be able to validly map stability and change for relevant phenotypes of interest across child, adolescent, and young adult development (i.e., homotypic continuity) as well as chart the progression of different phenotypes that are nonetheless related over the course of development (heterotypic continuity) (Kagan and Moss, 1962; Rutter et al., 2006).

A further consideration was that the assessments needed to be feasible and reliable for use in this large sample with multiple sites and many assessors. Thus, the selected measures needed to comprise a short and standardized assessment amenable for use in a computerized battery that would permit either easy administration by a research assistant or self-administration by the youth or parent. Another important consideration was the availability of strong psychometric evidence for

**Table 1**  
Members of the ABCD Physical and Mental Health Assessment Workgroup.

Name	Role	Institution
Deanna M. Barch	Chair	Washington University in St. Louis
Kenneth Sher	Co-Chair	University of Missouri at Columbia
Mathew Albaugh	Member	University of Vermont
Nelly Alia-Klein	Member	Mount Sinai School of Medicine
Ruben Alvarez	Member	National Institute of Child Health and Human Development
Shelli Avenevoli	Member	National Institute of Mental Health
Dara Blachman-Demner	Member	Office of Behavioral and Social Sciences Research
Linda Chang	Member	University of Maryland Baltimore
Duncan Clark	Member	University of Pittsburgh Medical School
Ian Colrain	Member	Stanford Research Institute
Meyer Glantz	Member	National Institute on Drug Abuse
Rebekah S. Huber	Member	University of Utah
James J. Hudziak	Member	University of Vermont
Margie Hernandez Mejia	Member	University of California at San Diego
Carrie Mulford	Member	United States Department of Justice
Yunsoo Park	Member	United States Department of Justice
Martin Paulus	Member	Laureate Institute
Alexandra Potter	Member	University of Vermont
Devin Prouty	Member	Stanford Research Institute
Susan Tapert	Member	University of California at San Diego
Deborah Yurgelun-Todd	Member	University of Utah
Robert Zucker	Member	University of Michigan

scale reliability and validity. Where possible, we chose measures that were also being used in other large-scale studies, so as to support the possibility of harmonization across studies and/or independent replication. A corollary of this last consideration was that where possible, we chose measures that had been recommended as common data elements by the PhenX initiative (Stover et al., 2010; Hamilton et al., 2011; Maiese et al., 2013; McCarty et al., 2014) or other NIH assessment initiatives (Conway et al., 2014; Barch et al., 2016). All prospective studies run the risk of selecting measures and methods that are state-of-the-art when launched, but in hindsight look anachronistic ... “the danger that 20 years later one is stuck with what could prove to be dated and trivial data” (Mednick and McNeil 1968) In ABCD, we believe that the range of constructs assessed, attention to developmental factors, use of multiple informants, use of both dimensional and categorical measures, and attention to psychometric properties mitigate this type of threat inherent to long-term prospective studies.

## 3. Workgroup and development process

The composition of the ABCD Mental and Physical Health workgroup is shown in Table 1 and consists of members from many of the participating sites, as well as scientific and program officers from ABCD Federal Collaborators. We met by teleconference weekly during the development of the battery and met as needed to evaluate the pilot data and refine the initial battery. We continue to meet to review the accumulating data, and to plan for follow-up batteries. This committee nominated and selected measures to assess the constructs of interest based on reviewing the literature, documented scale reliability and validity, and consulted with other experts about their experiences in recent or ongoing studies. In addition, before piloting, we sent the proposed battery to a number of experts in the field who were not involved in ABCD for feedback about the proposed measures and constructs, and made additional modifications based on this input. The initial baseline battery proposed by the group is shown in Tables 2–4. This battery was evaluated by the ABCD external advisory committee and then piloted across sites in children and their parents. Piloting indicated that the combined battery was longer than we believed was feasible for the planned study, especially the protocol to be administered to the children. Consequently, we shortened the mental and physical health battery, particularly the components for the children. In

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