

PANEL MEETING

ABCD: Continuing the Arc of Development

July 21-22, 2025

9:00 AM ET

Virtual: <https://videocast.nih.gov>



Neurocognition & Neuroimaging Pre-Meeting May 29, 2025

Participants

External Experts

Avram Holmes – Rutgers University

Catherine Hartley – New York University

Jennifer Pfeifer – University of Oregon

Jungmeen Kim-Spoon - Virginia Polytechnic Institute and State University

Sarah Yip – Yale University

Ted Satterthwaite – University of Pennsylvania

Tammy Vanderwal - University of British Columbia

ABCD Experts

Anthony Dick – Florida International University

Monica Luciana – University of Minnesota

Planning Team

Elizabeth Hoffman – National Institute on Drug Abuse (NIDA)

Gaya Dowling – NIDA

Michael Charness – US Department of Veterans Affairs

Traci Murray – NIDA

Vani Pariyadath – NIDA

Summary

The ABCD program's neuroimaging protocol currently includes structural and diffusion MRI, 20 minutes of resting state fMRI and three task-based scans; a complementary neurocognitive battery is designed to assess cognitive factors associated with risk/resilience to substance use. The group discussed the strengths and limitations of the current approach, emphasizing the need for both continuity and innovation as the study moves into its next phase.

Neurocognitive Assessments

The existing battery is generally effective for capturing risk and resilience, but some tasks—such as the Game of Dice (risk-taking)—have underperformed in predictive value. There is a notable gap in measuring reward learning and cognitive flexibility, though adding such tasks is challenged by time constraints and feasibility. Social decision-making (including reward learning) and working memory tasks were suggested as valuable additions,

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particularly if they can be administered remotely. The NIH Toolbox remains the most widely used set of measures in published manuscripts, while fMRI task data is less utilized. There is interest in leveraging community input to prioritize which tasks to retain or add.

Neuroimaging Considerations

Maintaining backwards compatibility and sufficient data quality—especially for resting state fMRI—is a priority, with 15-20 minutes considered the minimum for robust analysis. However, participant burden and data loss due to motion remain significant issues. The group discussed the potential for more intentional study design, such as subsampling tasks or distributing scans across ages to maximize developmental insights. There is support for staggering task intervals rather than uniform administration, and for considering more detailed data collection in smaller cohorts if resources are limited.

Resting State vs. Naturalistic Viewing

While resting state fMRI is foundational, there is growing field interest in naturalistic, movie-based scanning which may offer richer data and greater engagement, and could replace task-based imaging if it is underutilized. ABCD should ensure that there is not a reduction in predictive power when reducing the amount of resting state data and that replacing it with something else increases predictive power.

Additional Modalities and Practical Constraints

The appetite for adding new imaging modalities is low due to participant burden and logistical challenges. Quantitative Susceptibility Mapping was mentioned but not prioritized over existing measures.

Cross-Cutting Themes

Funding uncertainty and participant retention are ongoing challenges, particularly as participants age. Remote and sensor-based data collection may help reduce burden and enrich phenotyping. The group emphasized the importance of dynamic, reciprocal measurement of brain and behavior over time (e.g., synergy between brain and behavior assessment tools to tap into how they impact one another), and the need for flexibility and innovation in protocol design.

June 4, 2025

Dear Colleagues,

We participated in the scientific experts panel held virtually on May 29th about neuroimaging protocols for any future versions of the ABCD Study. A note of agreement emerged at the tail-end of that meeting, and we wanted to send a brief note to underscore those final suggestions.

- (1) We wanted to reinforce how much more useful the preprocessed data would be if it could be provided at a less proscribed level. If it were ever possible to share preprocessed data at the time-series level, that would greatly impact usability. A second-best option would be to provide connectivity at the ROI-to-ROI level.
- (2) The second point was about the potential impact of adding a movie-watching run or additional scan (even if only for a subset of participant who 'opt-in' to a slightly longer scan) to the data collection. We think that the use of movie-watching data will be high and potentially impactful. This is because:
 - movie-watching data enables brain-behavior correlations and predictions in both clinical and developmental populations (sometimes even when rest or task have failed)
 - movie-watching data enable analytic approaches that cannot be done with the existing conditions (e.g., intersubject analyses), which are emerging as powerful tools in developmental work
 - youth enjoy watching movies, and making the scan session more engaging might help with retention without decreasing data amount per session

We realize there is a fundamental tension between protecting the backwards compatibility with prior sessions in this landmark longitudinal study, which is an absolute priority. Each of us would be happy to discuss these issues further or answer any questions as you tackle design issues amidst that tension.

Thanks for the work you do, and for considering these suggestions.

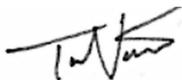
Sincerely,



Avram Holmes
Rutgers University



Ted Satterthwaite
University of Pennsylvania



Tammy Vanderwal
University of British Columbia



Sarah Yip
Yale University