

Researchers explore how activities affect brain development in kids

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Parents wondering how video games, athletic pursuits or sleeping habits may affect their kids' brains may get some answers thanks to a massive effort underway at 21 institutions across the country.

Researchers are recruiting 11,500 kids aged 9 or 10 to participate in the largest study of its kind on the affects—good and bad—of myriad activities on adolescent brain development. They plan to create a giant new database available to researchers everywhere that could inform everything from public policy to education to parenting.

"This will answer so many questions about brain development," said Dr. Linda Chang, a neurologist and co-lead investigator heading a team of more than a dozen people at the University of Maryland School of Medicine, which is among the participating institutions and plans to recruit close to 600 kids. "We'll see, for example, if children who sleep less than six hours a night have their memories affected or if those who do drugs have trouble paying attention in school."

Some of the questions have been asked before, and this database can be used not only to confirm or refute previous findings but to drill down on differences among urban and suburban children or those of different ethnicities, genders or income levels, Chang said. That could lead to changes in public health policy or methods of educating students with different backgrounds, for example.

The children will answer questions, provide saliva samples to measure

hormone levels and submit for MRI scanning of their brains over the next decade. The data will be available to any scientist around the globe who wants to use it.

Chang, a professor in the department of diagnostic radiology and nuclear medicine and the department of neurology, has some questions of her own. She has studied the affect of drugs used by pregnant women on their children and plans to use the database to reaffirm her findings and go a bit further. The children in this study will be 19 or 20 when the data collection stops.

Known as the ABCD Study for Adolescent Brain Cognitive Development, the \$300 million effort is funded by several federal agencies within the National Institutes of Health, as well as the U.S. Centers for Disease Control and Prevention and the Department of Justice, with support from the institutions where children are being recruited. Maryland will use its own MRI machine and provide the staff, including Chang, investigators administering the questionnaire, health staff and data experts to harness the information.

Christine C. Cloak, the study's site coordinator, has been recruiting students through schools in Baltimore and surrounding counties, mainly by passing out fliers. She said going through schools ensures a broad spectrum of children participate. There are a few restrictions, such as certain brain conditions or braces that are metal and can't be put in an MRI machine, which relies on magnets.

Recruitment began in 2016 and enrollment ends at year's end. At Maryland, about 300 children already have joined the study and researchers hope to get up to 300 more signed up before the end of summer.

Lisa Tanner, a Laurel mother, saw a flier sent home from school about

the ABCD Study. She said she was excited about the possibilities for science.

"You read about this study or that study and wonder where it is happening and who are these real people," said Tanner, who signed up her 9-year-old son Alex and 10-year-old daughter Rachel.

She wanted her kids to be those real people and see how such studies are conducted. The \$350 stipend per child per visit was a bonus. The money will go into the kids' college funds, or perhaps help pay for art school or other endeavors.

In her first trip to Maryland, Tanner thought her answers would be the same for both children—parents and kids both answer the hundreds of questions on the questionnaire. Both kids said they are big readers. But Rachel loves art and writing, too. Alex is into karate, Ninja Warrior and make-believe adventures, meaning they spend more time on different activities than their mother previously thought.

For her part, Rachel said the MRI image of her brain was "interesting" and wondered what it would look like over time.

"Twenty is kind of a big number for me," she said of how old she'll be when the study concludes.

Alex also was not so sure what he'd be like in 10 years.

"I don't think I can predict," he said.

Researchers, too, will be interested in what becomes of his brain over the next decade. Chang said they will see how reading, screen time, sports, drugs, coffee and any number of other things will influence their development.

"Does playing a musical instrument have a positive effect?" Chang said. "What about a lack of sleep? We're going to find out."

The children and parents will not be asked to change any behavior, just to report their actions (to ensure truthfulness, children won't have to tell their parents about their activities such as drug use or sexual encounters.)

Chang said the idea behind starting with 9- and 10-year-olds is to get them before they launch too heavily into drug experimentation or other more grown-up changes. The children get a psychological screening, and she said the families of those who expressed depressive thoughts were referred for services. Imaging staff identified brain tumors on the MRIs of two other [children](#) and they were sent for follow-up care.

But mostly, the questions and brain images are recorded and loaded into the NIH-minded database and updated annually. Researchers will call the families every six months to keep in contact and make sure they remain willing to participate.

About 7,500 kids have been enrolled nationally so far, and NIH released the first data in mid-February on about 4,500 of them. The 30 terabytes of data is about three times the size of the Library of Congress' collection, according to the NIH.

"Sharing ABCD data and other related data sets with the research community, in an infrastructure that allows easy query, data access and cloud computation, will help us understand many aspects of health and human development." said Dr. Joshua A. Gordon, director of the National Institute of Mental Health, at the time the collection was released. "These data sets provide extraordinary opportunities for computational neuroscientists to address problems with direct public health relevance."

At the same time, the researchers coordinating the data from across the country at the University of California, San Diego also touted the collection of information.

"Working together and using new assessment technologies, this diversified national team of scientists will answer important questions about brain and behavior development from childhood through adolescence and into young adulthood," said Sandra Brown, UC San Diego's vice chancellor for research and co-director of the ABCD Coordinating Center. "ABCD findings can lead to new understanding of the learning process, and potentially, novel approaches to personalized education. Combining genetic and environmental data will clarify the unfolding of common problems that emerge during adolescence."

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