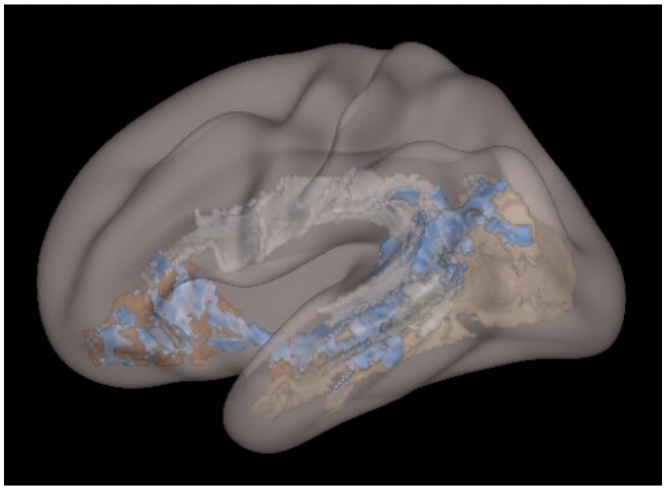
Screen-based media associated with structural differences in brains of young children

4 November 2019



This lateral brain image of a child exposed to significant screen time shows lower level levels of white matter structural integrity. These effected areas are in blue. Credit: Cincinnati Children's

A new study documents structural differences in the brains of preschool-age children related to screen-based media use.

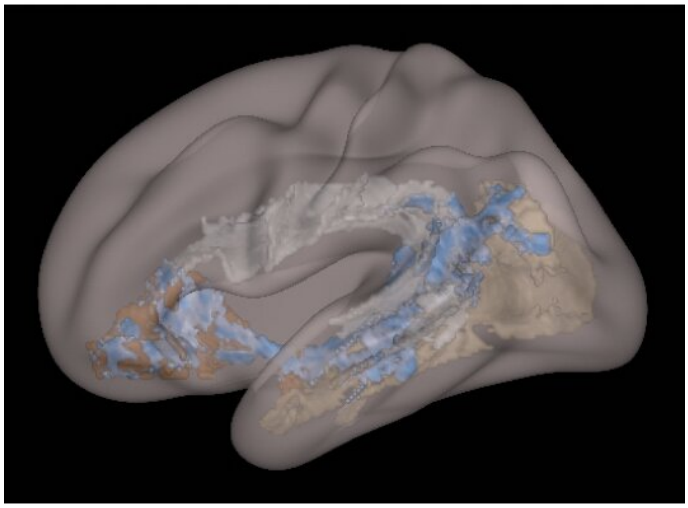
The study, published in *JAMA Pediatrics*, shows that children who have more screen time have lower structural integrity of white matter tracts in parts of the brain that support language and other emergent literacy skills. These skills include imagery and executive function—the process involving mental control and self-regulation. These children also have lower scores on language and literacy measures.

The Cincinnati Children's Hospital Medical Center study assessed screen time in terms of American Academy of Pediatrics (AAP) recommendations. The AAP recommendations not only take into account time spent in front of screens but also access to screens, including portable devices; content; and who children are with and how they interact when they are looking at screens.

"This study raises questions as to whether at least some aspects of screen-based media use in early childhood may provide sub-optimal stimulation during this rapid, formative state of brain development," says John Hutton, MD, director of the, Reading & Literacy Discovery Center at Cincinnati Children's and lead author of the study. "While we can't yet determine whether screen time causes these structural changes or implies long-term neurodevelopmental risks, these findings warrant further study to understand what they mean and how to set appropriate limits on technology use."

Among the AAP recommendations:

- For children younger than 18 months, avoid use of screen media other than video-chatting. Parents of children 18 to 24 months of age who want to introduce digital media should choose high-quality programming, and watch it with their children to help them understand what they're seeing.
- For children ages 2 to 5 years, limit screen use to 1 hour per day of high-quality programs. Parents should co-view media with children to help them understand what they are seeing and apply it to the world around them.
- Designate media-free times together, such as dinner or driving, as well as media-free locations at home, such as bedrooms.



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"Screen-based media use is prevalent and increasing in home, childcare and school settings at ever younger ages," says Dr. Hutton. "These findings highlight the need to understand effects of screen time on the brain, particularly during stages of dynamic brain development in early childhood, so that providers, policymakers and parents can set healthy limits."

Provided by Cincinnati Children's Hospital Medical Center

Dr. Hutton's study involved 47 healthy children—27 girls and 20 boys—between 3 and 5 years old, and their parents. The children completed standard cognitive tests followed by diffusion tensor MRI, which provides estimates of white matter integrity in the brain. The researchers administered to parents a 15-item screening tool, the ScreenQ, which reflects AAP screen-based media recommendations. ScreenQ scores were then statistically associated with cognitive test scores and the MRI measures, controlling for age, gender and household income.

Among the key findings:

- Higher ScreenQ scores were significantly associated with lower expressive language, the ability to rapidly name objects (processing speed) and emergent literacy skills.
- Higher ScreenQ scores were associated with lower brain white matter integrity, which affects organization and myelination—the process of forming a myelin sheath around a nerve to allow nerve impulses to move more quickly—in tracts involving language executive function and other literacy skills.