

# Does TV Rot Your Brain?

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By R. Douglas Fields



We all heard the warning as kids: “That TV will rot your brain!” You may even find yourself repeating the threat when you see young eyes glued to the tube instead of exploring the real world. The parental scolding dates back to the black-and-white days of *I Love Lucy*, and today concern is growing amid a flood of video streaming on portable devices. But are young minds really being harmed?

With brain imaging, the effects of regular TV viewing on a child's neural circuits are plain to see. Studies suggest watching television for prolonged periods changes the anatomical structure of a child's brain and lowers verbal abilities. Behaviorally, even more detrimental effects may exist: although a cause-and-effect relation is hard to prove, higher rates of antisocial behavior, obesity and mental health problems correlate with hours in front of the set.

Now a new study hits the pause button on this line of thinking. The researchers conclude that the entire body of research up to now has overlooked an important confounding variable, heredity, that could call into question the conventional wisdom that TV is bad for the brain. Further study will be needed to evaluate this claim, but the combined evidence suggests we need a more nuanced attitude toward our viewing habits.

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## Replaying the evidence

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To understand the argument against television, we should rewind to 2013, when a team of researchers at Tohoku University in Japan, led by neuroscientist Hikaru Takeuchi, first published findings from a study in which the brains of 290 children between the ages of five and 18 were imaged. The kids' TV viewing habits, ranging from zero to four hours each day, were also taken into account. Takeuchi and his colleagues found that the more television these kids watched, the bulkier the brain's hypothalamus, septum, sensorimotor area and visual cortex became. These areas are implicated in multiple processes, including emotional responses, arousal, aggression and vision, respectively. In addition, the brain showed thickening in a frontal lobe region, the frontopolar cortex, that is known to lower language-based reasoning ability. Testing confirmed that verbal IQ scores, which measure vocabulary and language skills, fell in proportion to the hours of TV the children watched. The changes in brain tissue occurred regardless of the child's sex or age or his or her family's income.

Some of these brain differences could be benign: an increase in the visual cortex's volume is likely caused by exercising eyesight while watching TV. But thickening in the hypothalamus is characteristic of patients with borderline personality disorder, increased aggressiveness and mood disorders. Perhaps watching TV shows, with their high density of drama, action and comedy, engages circuits of arousal and emotion such that these areas, rather than circuits of intellect, strengthen. This change could lead to psychological and behavioral issues. Previous studies have shown that for each additional hour of television watched in childhood, the odds of developing symptoms of depression increase by 8 percent and the odds of being convicted of a crime increase by 27 percent. And other findings suggest that for every two hours watched in one's youth, the odds of developing type 2 diabetes increase by 20 percent.

There are many possible explanations for these links. TV viewing is generally sedentary and solitary, denying children many health benefits of physical activity and socialization. The development of verbal proficiency, reasoning and other intellectual abilities could atrophy from passively viewing a screen. "Guardians of children should consider these effects when children view TV for long periods," Takeuchi and his colleagues concluded.

But the correlation between TV viewing and brain and behavioral changes does not necessarily tell us the whole story. The quandary scientists face is determining whether TV viewing causes changes in brain and behavior or whether preexisting personal traits or other conditions underlie binge watching.

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Fast-forward to the new study, by criminologists Joseph Schwartz of the University of Nebraska Omaha and Kevin Beaver of Florida State University. Schwartz and Beaver analyzed middle and high school students to look for associations between TV viewing and a range of factors such as race, gender, antisocial behavior and incarceration for violent crimes. Researchers checked back with nearly 15,000 of these children about two years later and again after they had reached adulthood, between the ages of 18 and 26. Much like previous studies, they found that young adults who had watched more television during early adolescence were more likely to engage in antisocial behavior, to be arrested at least once and to be incarcerated as an adult.

The researchers then added one more factor to their analysis. The study included more than 3,000 sibling pairs (that is, half-siblings, full siblings, and identical and nonidentical twins). The correlation between nearly all the negative behavior and time spent watching TV vanished after the researchers statistically accounted for relatedness. Genetics, they concluded, shapes brain and behavior, which in turn has wide-ranging consequences, including how many hours of TV individual children tend to watch and how their brains respond to it. “For example,” Schwartz says, “children with increased predisposition toward aggressive behavior may be more drawn to TV.” Similarly, those who are genetically inclined to depression or obesity may be more likely to spend their free time watching TV in the family room rather than shooting hoops on the basketball court.

Research suggests that heredity accounts for approximately half of the risk of developing antisocial behavior, with the remaining risk explained by environmental influences. In particular, genes that influence neural signaling involving dopamine and serotonin are associated with increased criminality, antisocial behavior and psychological disorders. “[Our findings] suggest that the changes in neurobiological functioning observed by Takeuchi et al. would have occurred regardless of the actual amount of television watched,” Schwartz says.

## Stay tuned

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It would appear that researchers have been weighing the evidence out of balance by neglecting the important factor of heredity in TV habits. But this chicken-or-egg dilemma resolves as it does with real chickens: this is an interdependent cycle. For instance, a 1990 study comparing adopted and nonadopted children raised in the same home found that genetics was the most important factor in determining how many hours of TV kids watched. But the study also found that the higher a mother's IQ, the fewer hours both her biological and adopted children spent glued to the tube.

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Everyone's brain is different, and what you do with your brain—especially at a young age, when it is developing—does affect its physical structure and function. If a child has inherited risk factors predisposing him or her to behavioral difficulties, he or she will likely spend more time watching TV, but doing that is not helping the situation. “Watching more TV may trigger various neurobiological changes that ultimately exacerbate any underlying inclinations toward aggressive behavior,” Schwartz warns. In such cases, limiting exposure to TV could be helpful. For other children, TV may not have this risk.

Recognizing this fact, parents will want to regulate their children's TV viewing in the context of those children as individuals. Ultimately, Mom is right: the more time spent sitting on the couch, the less time spent in physical activity, reading, and interacting with friends. The lack of physical activity and intellectual pursuits has obvious physical and cognitive consequences. TV may or may not rot the brain, but sitting perched in front of the screen for so long does seem to waste it.