

## News Release

### Title

The association between screen time and genetic risks for neurodevelopmental disorders in children

### Key Points

- Screen time for children between the ages of 18 and 40 months can be divided into four main groups.
- Genetic predisposition to ASD increases screen time from early childhood.
- Genetic predisposition to ADHD increases screen time with age, even if it is initially short.

### Summary

A team led by Associate Professor Nagahide Takahashi of the Department of Psychosomatic Medicine of Parents and Children, Nagoya University Hospital, Tokai National University Organization, and Specially Appointed Professor Kenji Tsuchiya of the Research Center for Child Mental Development, Hamamatsu University School of Medicine, conducted a study as part of the Hamamatsu Mother and Child Birth Cohort Study (HBC Study) of the Center to determine the degree of genetic change associated with autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD) ("genetic risk of ASD/ADHD") and screen time of children at 18, 32 and 40 months of age. First, the screen time of children between 18 and 40 months of age was divided into three groups: those who had only about one hour of screen time per day (27.9%), those who started with about two hours and gradually increased (19.0%), those who continued with about three hours per day (20.3%), and those who had more than four hours of screen time from the beginning (32.8%).

The analysis of how much genetic risk for ASD/ADHD increases the likelihood of belonging to each group showed that those with a genetic risk for ASD were about 1.5 times more likely to be in the group with about 3 hours of screen time per day and about 2.1 times more likely to be in the group with more than 4 hours of screen time. Although there was no direct relationship between genetic risk for ADHD and longer screen time from the beginning, we did find that screen time tended to gradually increase in children with a higher genetic risk for ADHD.

Although it has been discussed that long childhood screen time may be a

cause of ASD/ADHD, the results of this study suggest that long screen time is related to the disposition for ASD and may be an early sign rather than a cause. It would also seem that children at risk for ADHD are at risk for having too much screen time, and therefore, caution should be exercised.

The results of this study were published in *Psychiatry Research*, a highly prestigious international English-language journal of the American Medical Association.

## **Research Background**

- Social Background "Longer Screen Time in Children with Neurodevelopmental Disorders"

Autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD) are two of the most frequent neurodevelopmental disorders, with ASD characterized by poor social communication and obsessiveness, and ADHD characterized by hyperactivity and impulsivity that makes it difficult to sit still and inattention that makes it difficult to maintain focus. It is reported that ASD is found in approximately 2.5% of children under the age of 18 and ADHD in approximately 5% of children under the age of 18. Screen time refers to the amount of time spent looking at the screen of digital devices, such as watching videos on TV, iPads, etc., or playing games, and it is generally known that children with neurodevelopmental disorders tend to have longer screen time.

This year, a Japanese group published an article in *JAMA Pediatrics*, a leading medical journal in the U.S., suggesting that screen time may be a risk factor for ASD. Professor Tsuchiya published a paper in *JAMA Pediatrics* that showed that social communication skills do not decline even with long screen time, and can be improved by increasing outdoor play. Thus, the association between screen time and neurodevelopmental disorders has been inconclusive, with conflicting results reported.

- Scientific Background "Is Screen Time a Cause or a Consequence of Neurodevelopmental Disorders?"

Most previous studies have reported some association between screen time and neurodevelopmental disorders, but the causal relationship has not been clear. On the other hand, although environmental and genetic factors are associated with the development of ASD and ADHD, a combination of frequent genetic changes found in many individuals has been found to be particularly important.

Therefore, the Center focused on the genetic changes associated with the development of ASD/ADHD ("genetic risk of ASD/ADHD" = susceptibility to ASD/ADHD based on genetic changes) to determine whether the length of screen time is associated with the genetic risk of ASD/ADHD. We conducted a study to

determine whether the length of screen time is associated with the genetic risk of ASD/ADHD.

## **1. Overview of the study**

Screen time from children at 18, 32, and 40 months was obtained through interviews with parents and grouped to examine the association with genetic risk of ASD/ADHD.

Of the children entered at birth into the Hamamatsu Mother and Child Birth Cohort Study (HBC Study) at Hamamatsu University School of Medicine, 437 were interviewed at 18, 32, and 40 months and consented to genetic analysis. Their DNA was analyzed for changes in approximately 6.5 million polymorphisms, and a "polygenic risk score" was calculated, a genetic risk index for ASD/ADHD that takes into account the number and effect size of changes in genes associated with ASD/ADHD, while referring to the results of large-scale genetic studies overseas. We then examined the association between these polygenic scores and screen time.

## **2. research findings**

(1) Screen time in childhood is divided into four groups according to progress.

First, we found that screen time for children between 18 and 40 months of age was divided into three groups: Group 1: 27.9% of children had only about one hour of screen time per day, Group 2: 19.0% of children had screen time that gradually increased from about two hours per day, Group 3: 20.3% of children had screen time that continued for about three hours per day, and Group 4: 32.8% of children had screen time of four hours or more from the beginning. (Group 3: 20.3%), and Group 4: 32.8%) who had more than 4 hours of screen time from the beginning.

(2) Those with a higher genetic susceptibility to ASD (genetic risk of ASD) tend to have longer screen time from early childhood.

When examining the risk of children belonging to each of the above groups, it was found that those with a higher genetic risk of ASD have a higher risk of belonging to the group whose screen time lasts about 3 hours a day throughout the observation period (Group 3) and the group whose screen time is 4 hours or longer from the beginning (Group 4). The risk of belonging to a group with screen time of 4 hours or more from the beginning (Group 4) was found to be increased. For ADHD, we also found that a high genetic risk for ADHD did not result in longer screen time from the beginning, but rather a gradual increase in screen time (Group 2).

## Research Summary and Future Perspective

To summarize the results of this study, the genetic risk of ASD and ADHD was associated with the length of screen time for children between 18 and 40 months of age, particularly for children with a high genetic risk of ASD, who tended to have longer screen time from the beginning, and for children with a high genetic risk of ADHD, who gradually screen time may increase gradually in children with a higher genetic risk of ADHD. This suggests that longer screen time is not a risk for ASD, but rather an early sign, and that children at high genetic risk for ADHD may need to make early commitments to use digital devices.

The novelty of this study is that it was able to show a causal relationship, albeit not completely, by using the variable of genetic risk, as previous studies examining the association between screen time and ASD/ADHD have had difficulty identifying a causal relationship. This was possible because while it is theoretically possible that genetic risk for ASD/ADHD affects screen time, it is theoretically impossible that screen time affects genetic risk for ASD/ADHD.

In the future, we hope that these results will be replicated in other age groups of children and adults. As a result, when parents wonder if it is safe for their children to watch so many videos, they may be able to think, "Perhaps the child is constitutionally prone to long screen time," or they may receive less criticism from others who say, "If you show your child a smartphone all the time, he or she will develop neurodevelopmental disorders. On the other hand, we hope that having siblings will help to reduce the number of children who have neurodevelopmental disorders. On the other hand, we would like to share with you that we have also obtained data indicating that having a brother or sister may lead to shorter screen time.

## Publication

The association between screen time and genetic risks for neurodevelopmental disorders in children.

Psychiatry Research (September 2023)

DOI: 10.1016/j.psychres.2023.115395

Japanese ver.

[https://www.med.nagoya-u.ac.jp/medical\\_J/research/pdf/Psy\\_230821.pdf](https://www.med.nagoya-u.ac.jp/medical_J/research/pdf/Psy_230821.pdf)