

NEWS

Clinical research: Larger brains in autism, fragile X

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Repetitive resonance: The caudate nucleus, an area of the brain associated with repetitive behavior, is enlarged in children with fragile X syndrome.

Young boys with **fragile X syndrome** and those with autism have larger brains overall compared with controls, but the two groups show enlargement of different parts of the brain, according to an imaging study published in September in the *Journal of the American Academy of Child and Adolescent Psychiatry*¹.

Fragile X syndrome is the most common genetic cause of intellectual disability. Children with the syndrome have social difficulties, language impairment and **repetitive behaviors**, and about one-third meet diagnostic criteria for autism. Like autism, the syndrome also primarily affects boys.

Children with autism or fragile X syndrome also often show enlarged head size, or **macrocephaly**. Many studies over the past decade have looked at **patterns of brain growth** in people with autism.

In the new study, researchers used magnetic resonance imaging to measure brain volume in 53 boys with fragile X syndrome, 68 with autism and two groups of controls: 19 with developmental delay and 31 typically developing children.

Boys with fragile X syndrome or autism have larger brains than controls, the researchers found.

The researchers scanned the children's brains when they were 2 to 3 years old, and again 24 months later, at age 4 or 5.

The brains of children with autism or fragile X syndrome are larger than those of controls at age 2 to 3, and maintain the size difference at the later ages, the researchers found. Other studies have also found that brain overgrowth in autism **happens early in life**.

The researchers also measured gray matter, which contains the cell bodies of neurons, and white matter, which consists of the long fibers that connect neurons to each other, as well as the volume of different parts of the brain.

This analysis showed that different parts of the brain are enlarged in children with fragile X syndrome than in those with autism.

For example, children with fragile X syndrome have more white matter in the temporal lobe, more gray matter in the cerebellum, a larger caudate nucleus and a smaller amygdala compared with controls.

In contrast, children with autism have more brain tissue throughout the cortex than controls do.

The results suggest that different underlying brain anatomy gives rise to similar symptoms in autism and fragile X syndrome. A 2008 study similarly found **differences in brain function** between people with fragile X syndrome and those with autism.

The researchers plan to scan the same group of participants later in childhood and into adolescence. They are particularly interested in the caudate nucleus, an area of the brain associated with repetitive behavior. This behavior often worsens in people with fragile X syndrome as they reach school age.

Studies have suggested that adults with fragile X syndrome **still have enlarged brains**, but that brain volume **shrinks later in life** in people with autism.

References:

1: Hazlett H.C. *et al. J. Am. Acad. Child Adolesc. Psychiatry* 51, 921-933 (2012) **PubMed**