

# Children with conduct disorder show widespread brain structural differences, finds new international study

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Conduct disorder in young people is associated with differences in surface area across much of the brain, compared to the brains of

typically developing children, new research shows.

Conduct disorder (CD) is a common yet under-recognized condition with symptoms including antisocial or aggressive behaviors, such as fighting, bullying and rule-breaking. It is usually diagnosed in childhood or adolescence, and often leads to poor social and [mental health outcomes](#). Unlike more widely recognized disorders such as ADHD and autism, CD is far less researched and understood, even though it is estimated to affect around 3% of children and adolescents worldwide.

In the largest study of its kind, researchers at the Universities of Bath and Birmingham, in collaboration with research teams across Europe, North America, and Asia, investigated brain structure in 1,185 children with a clinical diagnosis of CD and 1,253 typically developing children.

They found that the surface area of the brain's outer layer, the cortex, is significantly reduced in children with CD, suggesting that the development of the brain is different. They also found that the volume of multiple subcortical brain regions—located deep within the brain—was reduced. Their findings are [published](#) today in *The Lancet Psychiatry*.

The joint lead author on the study, Dr. Yidian Gao, from the School of Psychology and Centre for Human Brain Health at the University of Birmingham, said, "We know very little about this disorder even though it can carry a high burden for families and societies. The sample included in our study is 10–20 times larger than previous studies and contains data on children from North America, Europe and Asia. It provides the most compelling evidence to date that CD is associated with widespread structural brain differences."

In the study, the researchers analyzed MRI data from 15 different cohorts across 11 countries, including India and China. Although the

study did not distinguish between children from different races or ethnicities, it did take gender into account, with more than 300 girls with CD included in the research. This was a particular achievement, since the disorder is significantly less common among girls and so they are often excluded from smaller studies.

Importantly, each research site used standardized methods established through the global ENIGMA Consortium to collect and analyze the data, making it also the most robust and reliable study into CD published to date.

By analyzing MRI data from each of the participants, the team was able to show extensive differences in brain structure among the [young people](#) with CD, specifically in the brain's cortical surface area, which was significantly reduced in many areas, including the prefrontal cortex. This brain region is involved in many aspects of our behavior and emotional regulation.

In particular, the researchers found alterations in areas such as the amygdala, an area of the brain already implicated in antisocial behavior, which is thought to be involved in understanding other people's emotions and recognizing facial expressions. Although the analysis showed that their main findings are independent from the comorbidity with ADHD, some of the brain differences they identified in children with CD were similar to those found in children with ADHD in previous studies.

The differences observed, however, were particularly distinctive for the children with CD and callous-unemotional traits, who are characterized by limited empathy, a lack of guilt, and shallow affect. The researchers did not find any significant differences between girls and boys with CD; both groups showed differences in [brain structure](#) compared to typically developing children. This highlights the importance of including girls in future studies.

"It's important to note that CD is not just restricted to Western countries—children living in lower- and middle-income countries can also develop this condition," added Dr. Graeme Fairchild, from the Department of Psychology at the University of Bath. "CD is linked to the greatest health burden of any psychiatric disorder in children and is actually far more costly to health services to treat because of the varied and complex mental health issues that it underpins."

Marlene Staginnus, joint lead author from the Department of Psychology at the University of Bath, said, "Although we don't yet know how the differences that we have identified could be used to improve treatment for children with CD, it is clear that children who have this disorder cannot simply be labeled 'naughty.' Given that CD is such a significant contributor to our global mental health burden, we really need to see investment in research at similar levels to that of ADHD and autism."

In future research, the team hopes to investigate some of the potential underlying causes of those brain changes in [children](#) with CD, as well as how CD may affect the onset and development of other mental disorders later in life.

Dr. Stephane De Brito from the Centre for Human Brain Health at the University of Birmingham concluded, "There is a lot of work examining potential risk factors for CD, but it is still unclear what are the causes of those brain structural differences in young people with CD. We suspect that early adversities—for example, experiences of childhood maltreatment—might play an important role. And by understanding how CD links to later issues, including criminality in adulthood, but also anxiety and depression, we start to see how important it is to understand and help young people with CD and their families."

**More information:** Cortical structure and subcortical volumes in conduct disorder: A coordinated analysis of international cohorts from

the ENIGMA Antisocial Behavior working group, *The Lancet Psychiatry* (2024). [www.thelancet.com/journals/lan ... \(24\)00187-1/fulltext](http://www.thelancet.com/journals/lan.../S2468-2648(24)00187-1/fulltext)

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