

Scientists reveal that autism and hyperactivity have the same cause

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Although Dustin Hoffman gave one of the most famous portrayals of autism in the film Rainman, his co-star Tom Cruise's hyperactive performance on Oprah Winfrey's sofa recently may also be a good depiction, if recent science is to be believed! Amazingly 1 in 3 individuals with autism are hyperactive and inattentive, a condition known as ADHD (attention deficit hyperactivity disorder).

Perhaps a lead role involving both autism and ADHD would be too ambitious even for Dustin, but off-screen, autism and ADHD are closely linked. Both conditions begin in childhood and are associated with differences in the brain. It might be, however, that brain differences do not cause autism or ADHD, but arise as a consequence of living with autism or ADHD. On the other hand, we know that genes play a part – but until now we didn't know whether the same genes cause autism and ADHD.

That is why my colleagues and I at the Institute of Psychiatry carried out a study on autism and ADHD in over 6000 pairs of twins. No study up until now has had the scope to tackle this issue. TEDS (the Twins Early Development Study) included identical twins, who share all their genes, and fraternal twins, who share half their genes.

Double trouble

We compared how alike one twin's level of autistic behaviours were with the other twin's amount of ADHD behaviours. If the same genes cause both autism and ADHD it is expected that in identical twin pairs, who share all their genes, the level of

autistic behaviours in one twin and the amount of ADHD symptoms in the other twin will be the same. Less similarity between autistic and ADHD behaviours would be expected in fraternal twins because they do not share all their genes. This is what we found.

The results showed that at the genetic level, autism and ADHD weren't so different. It became clear from our findings that more than half the genes for one were also influencing the other.

Symptom-specific effects

Of course it is not that simple. A complication is that both autism and ADHD consist of several different types of symptoms. Odd social interaction, communication problems and obsessive and repetitive behaviours are all part of autism, and ADHD includes inattentiveness and hyperactivity. Earlier work by our group has shown that the different autistic symptoms are caused by mostly different genes. So as well as just looking at the overlap between autism and ADHD as a whole, we needed to look at overlap between the separate symptoms.

In this next stage, we found that it was the communication difficulties in autism that were caused by the same genes as ADHD. In contrast, the obsessive and repetitive behaviours showed very little overlap with ADHD.

As Professor Robert Plomin, a co-author on the study and the deputy director of the Social Genetic and Developmental Psychiatry centre, commented, 'It's startling that there appears to be greater genetic overlap between autistic communication difficulties and ADHD than there is genetic overlap within autism itself'. In other words, children with autism appear genetically to have much more in common with children with inattention and hyperactivity than previously expected.

Back to the Brain

Why is this important? The findings will help figure out better treatments for autism and ADHD, through providing a clearer understanding of changes that occur as a result of these genes. It is likely that the genes that influence autism and inattention and hyperactivity will have effects in the brain. It will be important to understand these changes in brain development that may underlie both conditions. For example, brain areas thought to be affected in autism, such as those involved in processing social information like faces, might also be involved in ADHD.

Finally, these findings may change the way we view and study autism and ADHD. Autism is five times more common in males and recently Professor Simon Baron-Cohen put forward the extreme male brain theory. He says that we can understand autism better if we think of it as an extreme form of male characteristics, such as being good at figuring out systems and focussing less on empathising. Could we suggest the same theory might apply to ADHD then, given that it is also five times more common in males?

That, says the professor, is ‘an important question for future research.’

For more information on autism spectrum conditions and ADHD, visit the National Autistic Society website www.nas.org.uk and the National Attention Deficit Disorder Information and Support Service website www.addiss.org.uk.

Biography

After completing her undergraduate degree in Experimental Psychology in 2000, Dr Angelica Ronald spent a year in advertising selling snack food. Yearning for a more academic life, she returned and did her PhD at the Social Genetic and Developmental Psychiatry Centre at the Institute of Psychiatry in London, on the causes of children's social development and cognitive ability. Her thesis focused on the causes of autism spectrum conditions. She is currently working as a postdoctoral researcher on genetic research into autism and related conditions. In her free time she likes to paint and explain her research to her non-scientist friends.