**Autism Genes Linked to Higher Intelligence**

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Genetic variations associated with autism spectrum disorders (ASDs) have been linked to better cognitive ability in individuals who do not have the condition, new research suggests.

A large population-based study showed that individuals in the general population who carry more of the genetic variations associated with ASD perform slightly better on cognitive function tests than those who carry fewer of the genetic variants, although the advantage conferred by ASD-associated genes appears to be small.

"Links between autism and better cognitive function have been suspected and are widely implied by the well-known Silicon Valley syndrome and films such as *Rain Man*," coinvestigator Nick Martin, PhD, Queensland Institute for Medical Research, Brisbane, Australia, said in a statement.

"This study suggests genes for autism may actually confer, on average, a small intellectual advantage in those who carry them, provided they are not affected by autism."

The study was [published online](http://www.nature.com/mp/journal/vaop/ncurrent/full/mp201512a.html) March 10 in *Molecular Psychiatry*.

**Effect Size Underestimated?**

The relationship between autism and intelligence is unclear. The investigators report that as many as 70% of individuals with autism have an intellectual disability. However, others with the disorder have relatively well preserved, or even higher than average, nonverbal intelligence.

For the current study, the researchers tested whether polygenic profile scores for both ASD and attention-deficit/hyperactivity disorder (ADHD) are associated with cognitive ability in the Generation Scotland: Scottish Family Health Study (GS:SFHS).

The GS:SFHS involves a population-based cohort of 9863 individuals. Polygenic risk for ASD and ADHD was calculated from genome-wide association studies of ASD and ADHD from the GS:SFHS cohort as well as from two Lothian birth cohorts and the Brisbane Adolescent Twin Sample (BATS).

"Polygenetic risk for ASD was positively associated with general cognitive ability in GS:SFHS," the authors note.

Specifically, greater polygenic risk for ASD was associated with better cognitive function in three of four cognitive tests: one for logical memory, one for vocabulary, and one for verbal fluency.

A 1-unit increase in genetic risk score was associated with between a 0.04- and 0.07-unit increase in each of these scores. A positive association between the polygenic risk score and full- scale IQ was found in the BATS cohort as well.

In contrast, genetic risk for ADHD was negatively associated with IQ at the age of 11 years in the combined Lothian birth cohorts (*P* = .001), although not in other cohorts.

"The effect sizes we found were small," lead author Toni-Kim Clarke, MD, University of Edinburgh, in Scotland, told *Medscape Medical News*, "as the genetic risk scores explained less than one half of a percentage of the variation in cognitive test scores."

Still, she added, "I don't think this implies that the extent of the genetic overlap between ASD and cognitive ability is small, it's just that the method we used in this study tends to underestimate the extent of the genetic overlap between traits."

Clinical implications from these observations are still limited, said Dr Clarke.

Nevertheless, "we hope that as research into the area continues, we'll understand specifically about how ASD genes impact cognitive function, and by understanding that, you'll understand more about the biological origins of both traits, ASD and cognitive ability," she said.

**Intellectual Disability Overestimated?**

Commenting on the study for *Medscape Medical News*, Francesca Happé, FBA, professor of cognitive neuroscience, King's College London, in the United Kingdom, said that the approach taken by the researchers is "completely novel" and taps into the great interest in why autism seems to be associated with talent and high ability, at least in some cases.

"We have not done molecular genetic investigations like this one, but we've done behavioral genetics with twin studies," Dr Happé said.

A 2009 study published in the *British Journal of Psychiatry* (2009;195:531-536) suggested that there was a large genetic overlap between being gifted at math or music or art and having autisticlike traits, particularly features such as insistence on sameness that seemed to go along with talent in the general population.

Dr Happé disputed the cited prevalence of intellectual disability among individuals with autism.

"That 70% figure might be true for real core autism, but I think within the full spectrum autism as it's now recognized, far fewer individuals have intellectual disability," she said.

"We know that that there are probably many people with very autistic traits who manage to compensate and cope and find a niche sufficiently well that they never come to diagnostic attention, and these are the ones who are likely to have average or high IQ," said Dr Happé.

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