

Males and females with autism show an extreme of the typical male mind

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(Medical Xpress)—The largest ever psychological study of sex differences in adults with autism has found that both males and females with autism on average show an extreme of the typical male mind, where systemising (the drive to look for underlying rules in a system) is stronger than empathising (the ability to recognize the thoughts and feelings of others and to respond to these with appropriate emotions).

A team of researchers, led by Professor Simon Baron-Cohen and Dr Meng-Chuan Lai from the Autism Research Centre at the University of Cambridge, tested 811 adults with [autism](#), of whom 454 were female.

They compared them to 3,906 typical adults, of whom 2,562 were female. Large samples are needed in order to test for subtle sex differences reliably. This is the first time such a large sample, especially of [females](#) with autism, has been studied, since autism is less common in females. The results are published today in the journal *PLOS ONE*.

All adults took three questionnaires online: the Autism Spectrum Quotient (AQ) that counts the number of autistic traits a person has, the Empathy Quotient (EQ) that measures how easily a person shows social sensitivity to others, and the Systemising Quotient (SQ) that measures how interested a person is in systems (such as maps, machines, numbers, and collecting things).

Results showed clearly that typical females scored higher on the EQ, and typical males scored higher on the AQ and SQ. This sex difference was preserved but significantly reduced in adults with autism, and both males and females showed an extreme of the typical male profile on these measures.

The researchers also analysed the results in terms of 'brain types', which look at the difference between an individual's EQ and SQ. The most common brain type in typical females is Type E, where EQ is higher than SQ. The most common brain type in typical males is Type S, where SQ is higher than EQ. The most common brain type in people with autism – both males and females – were Type S and an extreme of Type S, where EQ is below average whilst SQ is either average or even above average.

Professor Baron-Cohen said: "Our study provides strong evidence in support of the 'extreme male brain' theory of autism. Importantly, extreme Type S manifests differently in males and females with autism, but these measures nevertheless reveal its presence. The results also fit with other research showing that children who go on to have autism

show elevated prenatal levels steroid hormones (such as testosterone), which affect the development of the brain and the mind."

Dr Meng-Chuan Lai said: "For decades, the role of sex and gender was relatively under-investigated in autism. Females with autism are now beginning to be studied in their own right. In this new study, typical [sex differences](#) were reduced in autism, but not abolished. In addition, females with autism as a group show greater variation on these measures, compared to males with autism. We need more research into the differences between males and females with autism, and how these affect the identification of autism, and what support they need."

Professor Baron-Cohen added: "These results also have implications for education and employment. People with autism – both males and females – love systems, which are rule-based, precise, and predictable, and find the world of emotions, thoughts, motives and intentions fuzzy and confusing. To achieve their full potential at school, college or at work, information should be presented with exactness, avoiding ambiguity."

More information: Baron-Cohen S, Cassidy S, Auyeung B, Allison C, Achoukhi M, et al. (2014)" Attenuation of Typical Sex Differences in 800 Adults with Autism vs. 3,900 Controls." *PLoS ONE* 9(7): e102251. [DOI: 10.1371/journal.pone.0102251](https://doi.org/10.1371/journal.pone.0102251)

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