

A different take on differences between men's and women's brains

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Credit: public domain

There is greater variety in the size of men's brains than of women's. This could help explain why some psychiatric disorders such as ADHD and autism are more prevalent in boys. Leiden brain researcher Lara Wierenga has published an article about this in the international journal *Cerebral Cortex*.

Brain researcher Lara Wierenga studied 1234 children and young adults aged between three and 21 from a large MRI database at the University

of California, San Diego. She compared the variation in [brain volume](#) in men with the variation in brain volume in women. What she found was that there was greater variation in brain volume in men than in women, so there are more boys than girls with exceptionally large or exceptionally small brain structures. These findings may explain why some developmental disorders such as ADHD or autism are more prevalent in boys than in girls.

Genetic difference

Prior studies of children's [school performance](#) have found greater variation in boys than in girls. Wierenga: "I wanted to research whether we also see these [differences](#) in the brain and how they are given shape in the brain. I also wanted to know if the differences in variation between boys and girls were already present at an early stage or whether they develop over time. The former proved to be the case: differences in brain variation are already apparent at the age of three and remain stable as children become older. This suggests a genetic effect in the brain. The relationship with school performance was not investigated in this study. We suspect that environmental factors increase the differences between boys and [girls](#) in variation in school performance."

Possible explanation

Wierenga says that a possible explanation for the difference could be that men have only one X chromosome. "If this X chromosome contains a gene that is related to a smaller brain structure, you will therefore see this in all brain structures in men. Women's two X [chromosomes](#) mean a tendency towards the average. As a different X chromosome is active in one brain cell than the other, the extremes balance each other out."

The results indicate that typical 'male' [psychiatric disorders](#) may be

linked to the greater variation in brain volume in men and the single X chromosome. This may provide new insights into ADHD and autism. Incidentally, it is not the case that all men and all women differ from each other, nor is it the case that there are no outliers among women. Furthermore, there are no differences between the [brain](#) structure of most men and women. However, the number of men at either extreme is greater and thus more apparent.

"This study shows that you can test genetic models by comparing differences between men and differences between women," Wierenga continues. "Many other studies look at average differences between the groups, so between all men and all women. In small studies in particular you run the risk of finding average differences between men and [women](#) that you would not find if you took a larger sample."

More information: Lara M. Wierenga et al. A Key Characteristic of Sex Differences in the Developing Brain: Greater Variability in Brain Structure of Boys than Girls, *Cerebral Cortex* (2017). [DOI: 10.1093/cercor/bhx154](#)

Provided by Leiden University

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