

# Extra testosterone reduces your empathy

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A new study from Utrecht and Cambridge Universities has for the first time found that an administration of testosterone under the tongue in volunteers negatively affects a person's ability to 'mind read', an indication of empathy. The findings are published this week in the journal *Proceedings of the National Academy of Sciences*.

In addition, the effects of [testosterone](#) administration are predicted by a fetal marker of prenatal testosterone, the 2D:4D ratio. The study has important implications for the androgen theory of autism (testosterone is an androgen) and confirms earlier rodent research that shows that testosterone in early brain development organizes the activation of the very hormone in later life.

Professor Jack van Honk at the University of Utrecht and Professor Simon Baron-Cohen at the University of Cambridge designed the study that was conducted in Utrecht. They used the 'Reading the Mind in the Eyes' task as the test of [mind reading](#), which tests how well someone can infer what a person is thinking or feeling from photographs of [facial expressions](#) from around the eyes.

Mind reading is one aspect of empathy, a skill that shows significant [sex differences](#) in favour of females. They tested 16 young women from the general population, since women on average have lower levels of testosterone than men. The decision to test just females was to maximize the possibility of seeing a reduction in their levels of empathy.

The researchers not only found that administration of testosterone leads

to a significant reduction in mind reading, but that this effect is powerfully predicted by the 2D:4D digit ratio, a marker of prenatal testosterone. Those people with the most masculinized 2D:4D ratios showed the most pronounced reduction in the ability to mind read.

Jack van Honk said: "We are excited by this finding because it suggests testosterone levels prenatally prime later testosterone effects on the mind."

Simon Baron-Cohen commented: "This study contributes to our knowledge of how small hormonal differences can have far-reaching effects on empathy."

The new study has several important implications. First, that current levels of testosterone directly affect the ability to read someone else's mind. This may help explain why on average women perform better on such tests than men, since men on average produce more testosterone than women.

Second, that the digit ratio (2D:4D), a marker of fetal testosterone, predicts the extent to which later testosterone has this effect. This suggests testosterone levels in the womb have an 'organizing' or long-range effect on later brain function. Finally, given that people with autism have difficulties in mind reading, and that autism affects males more often than females, the study provides further support for the androgen theory of autism.

**More information:** Jack van Honk, Dennis J. Schutter, Peter A. Bos, Anne-Wil Kruijt, Eef G. Lentjes, and Simon Baron-Cohen (2011) Testosterone administration impairs cognitive empathy in women depending on second-to-fourth digit ratio *Proceedings of the National Academy of Sciences* [www.pnas.org/cgi/doi/10.1073/pnas.1011891108](http://www.pnas.org/cgi/doi/10.1073/pnas.1011891108)

Provided by University of Cambridge

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