

Data scientists find causal relation in characteristics of ADHD

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Credit: Radboud University

Hyperactivity seems to be the result of not being able to focus one's attention rather than the other way around. This was proposed in an article in *PLOS ONE*, written by researchers at Radboud university medical center and Radboud University. It seems to suggest that more attention should be given to the AD than to the HD component.

ADHD is a combination of having difficulties with focusing one's <u>attention</u> (attention deficit, AD) and overly active, <u>impulsive behaviour</u> (<u>hyperactivity</u> disorder, HD). Interestingly enough, many people often struggle with a combination of both characteristics. Very often they are both easily distracted and impulsive, in other words, both AD and HD. "Which leads to the question of whether this involves a correlation, a



coincidental combination, or perhaps a causal relation," states computer scientist Tom Heskes.

Algorithms

Tom Heskes investigated this question together with psychiatrist Jan Buitelaar, brain researcher Jeffrey Glennon, geneticist Barbara Franke and several other colleagues at Radboud university medical center and Radboud University. Heskes is specialised in using computer algorithms to search for causal relations in large amounts of data. An example he enjoys sharing is that children who have a large shoe size often get good marks for geography. At first sight, those two facts seem unrelated; it's just a correlation. "But when you add another factor – older children (who have had more geography lessons) have larger feet – the correlation becomes more of a causal relation."

Genes and sex

Heskes also applied this approach to ADHD. "You very often see the characteristics combined, but you can't say that inattention - attention deficit – leads to hyperactivity. Nor can you say that hyperactivity leads to inattention. Just as in the example above, you need at least a third factor that can provide information about a possible causal relation." In his search, Heskes used the information provided by the other researchers. It is known that some genetic variations generate a higher chance of the existence of ADHD. Similarly, we know that men exhibit ADHD more often than women. Heskes: "In both cases, our computer algorithms find a causal relation that runs from a lack of attention to hyperactive, impulsive behaviour. And not the other way around; in three separate, independent datasets, there seems to be no indication that impulsive, hyperactive behaviour caused by the inability to concentrate, to focus your attention on something."



Attention!

"This causal relation was also suggested in early psychiatric literature," says psychiatrist Jan Buitelaar, "but as far as we know there was never any hard evidence supporting this claim. It's interesting to see that this mathematical approach enables us to talk with more certainty about a causal relation. And it would be even more interesting, for example, to study whether we can find a more neurological basis for that relation. This knowledge would also enable a therapeutic approach because, if inattention is in fact the force behind impulsive, hyperactive behaviour, treatment could focus on dealing with the lack of attention rather than on hyperactivity. This study indicates that the chance of reducing hyperactivity by reducing inattention may be more successful than trying to do it the other way around."

More information: Elena Sokolova et al. Statistical Evidence Suggests that Inattention Drives Hyperactivity/Impulsivity in Attention Deficit-Hyperactivity Disorder, *PLOS ONE* (2016). DOI: 10.1371/journal.pone.0165120

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