Dopamine linked to mentalizing abilities, may have implications for future Parkinson's treatment

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A link between the neurotransmitter dopamine and the mentalizing abilities of healthy people has been identified for the first time in a new study.

Mentalizing describes the act of attributing and understanding mental states (such as thoughts, feelings or intentions) in other people and in oneself. Researchers at the University of Birmingham have been able to show that changing people's brain dopamine levels affects their mentalizing abilities. Their results are published in *PLOS Biology*.

Dopamine is a neurotransmitter, a chemical messenger in the brain that is well known for the role it plays in pleasure, motivation and learning. In addition, researchers know that low levels of dopamine in areas of the brain that control movement underpin the primary symptoms of conditions such as Parkinson's disease.

At the same time, socio-cognitive problems, such as difficulties with emotion recognition or mentalizing, are also associated with Parkinson's—yet no definitive link has been made between these problems and dopamine imbalances.

More commonly, in fact, theory of mind difficulties have been associated with psychosocial changes such as isolation and social withdrawal that are a common feature of dopamine-related disorders.

Lead author, Dr. Bianca Schuster, of the University of Birmingham's School of Psychology, said, "While the mentalizing abilities of people who are struggling with Parkinson's may not be the main focus of treatment, it nonetheless has a huge impact on people with the disease.

"Gaining a better understanding of how dopamine imbalances may affect mentalizing processes in the brain could therefore be really significant for individuals, as well as gaining a better understanding of the secondary effects of the drugs prescribed for Parkinson's and other disorders."

In the study, the researchers worked with a cohort of 33 healthy

volunteers. They used a double-blind, placebo-controlled experiment, in which participants were given haloperidol, a drug which blocks dopamine receptors in the brain. The volunteers took part in the same set of experiments on two separate days and on one of the days they were given the drug, and on the other day, a placebo.

Participants were asked to complete an animations task, in which they were shown brief videos of triangles 'interacting' with each other. They were asked to interpret the videos by choosing the label they thought best described the ongoing scene.

In a separate experiment, the researchers also investigated participants' ability to judge emotions depicted by whole-body point light displays.

The researchers found that after taking haloperidol, participants were significantly less able to accurately ascribe mental states to the interactions depicted in the animations. This was related to effects of the drug on emotion recognition.

"The main implication of our work is that in disorders with dopamine dysfunctions, in addition to producing the primary symptoms associated with these disorders (such as motor symptoms in Parkinson's disease), the dopamine imbalance also affects individuals' socio-cognitive abilities," added Dr. Schuster.

"This work could have implications for the way in which we treat Parkinson's in the future, but also the way in which we use any drugs which affect the action of dopamine in the brain."

More information: Bianca A. Schuster et al, Dopamine challenge reduces mental state attribution accuracy, *PLOS Biology* (2024). dx.doi.org/10.1371/journal.pbio.3002652 , On *BioRxiv*: DOI: 10.1101/2023.07.21.550065