

Differences in dopamine may determine how hard people work

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Whether someone is a "go-getter" or a "slacker" may depend on individual differences in the brain chemical dopamine, according to new research in the May 2 issue of *The Journal of Neuroscience*. The findings suggest that dopamine affects cost-benefit analyses.

The study found that people who chose to put in more effort — even in the face of long odds — showed greater [dopamine](#) response in the striatum and ventromedial prefrontal cortex, areas of the [brain](#) important in reward and motivation. In contrast, those who were least likely to expend effort showed increased dopamine response in the insula, a brain region involved in perception, social behavior, and self-awareness.

Researchers led by Michael Treadway, a graduate student working with David Zald, PhD, at Vanderbilt University, asked participants to rapidly press a button in order to earn varying amounts of money. Participants got to decide how hard they were willing to work depending on the odds of a payout and the amount of money they could win. Some accepted harder challenges for more money even against long odds, whereas less motivated subjects would forgo an attempt if it cost them too much effort.

In a separate session, the participants underwent a type of brain imaging called positron emission tomography (PET) that measured dopamine system activity in different parts of the brain. The researchers then examined whether there was a relationship between each individual's dopamine responsiveness and their scores on the motivational test

described earlier.

Previous rodent research also showed that dopamine activity in motivational centers is important for long-shot decisions. However, in the current study, the researchers were surprised to find that those with increased dopamine activity in the insula were the least likely to expend effort on the task. "These results show for the first time that increased dopamine in the insula is associated with decreased motivation — suggesting that the behavioral effects of dopaminergic drugs may vary depending on where they act in the brain," said lead study author Treadway.

"Previous research has indicated that dopamine influences the motivation to seek out rewards. Now, this elegant new study provides the clearest evidence to date that individual differences in dopamine-related motivation might be a trait," said Marco Leyton, PhD, an expert on dopamine at McGill University, who was not involved in the study. "A striking implication highlighted by the authors is that abnormal dopamine transmission could affect a wide range of decision-making processes and susceptibility to depression."

Provided by Society for Neuroscience

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