

# Neural reward response may demonstrate why quitting smoking is harder for some

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Credit: Vera Kratochvil/public domain

For some cigarette smokers, strategies to aid quitting work well, while for many others no method seems to work. Researchers have now identified an aspect of brain activity that helps to predict the effectiveness of a reward-based strategy as motivation to quit smoking.

The researchers observed the brains of nicotine-deprived smokers with

[functional magnetic resonance imaging](#) (fMRI) and found that those who exhibited the weakest response to rewards were also the least willing to refrain from [smoking](#), even when offered money to do so.

"We believe that our findings may help to explain why some smokers find it so difficult to quit smoking," said Stephen J. Wilson, assistant professor of psychology, Penn State. "Namely, potential sources of reinforcement for giving up smoking—for example, the prospect of saving money or improving health—may hold less value for some individuals and, accordingly, have less impact on their behavior."

The researchers recruited 44 smokers to examine striatal response to monetary reward in those expecting to smoke and in those who were not, and the subsequent willingness of the smokers to forego a cigarette in an effort to earn more money.

"The striatum is part of the so-called reward system in the brain," said Wilson. "It is the area of the brain that is important for motivation and goal-directed behavior—functions highly relevant to addiction."

The participants, who were between the ages of 18 and 45, all reported that they smoked at least 10 cigarettes per day for the past 12 months. They were instructed to abstain from smoking and from using any products containing nicotine for 12 hours prior to arriving for the experiment.

Each participant spent time in an fMRI scanner while playing a card-guessing game with the potential to win money. The participants were informed that they would have to wait approximately two hours, until the experiment was over, to smoke a cigarette. Partway through the card-guessing task, half of the participants were informed that there had been a mistake, and they would be allowed to smoke during a 50-minute break that would occur in another 16 minutes.

However, when the time came for the cigarette break, the participant was told that for every 5 minutes he or she did not smoke, he or she would receive \$1—with the potential to earn up to \$10.

Wilson and his colleagues reported in a recent issue of *Cognitive, Affective and Behavioral Neuroscience* that they found that smokers who could not resist the temptation to smoke also showed weaker responses in the [ventral striatum](#) when offered monetary rewards while in the fMRI.

"Our results suggest that it may be possible to identify individuals prospectively by measuring how their brains respond to rewards, an observation that has significant conceptual and clinical implications," said Wilson. "For example, particularly 'at-risk' [smokers](#) could potentially be identified prior to a quit attempt and be provided with special interventions designed to increase their chances for success."

Provided by Pennsylvania State University

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