

# Neuroimaging study: Negative messages less effective on those who are substance dependent

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This is Joshua Brown. Credit: Indiana University

What types of public messages will most likely deter drug and alcohol abuse or dissuade people from engaging in risky behavior? Negatively framed messages may not be an effective way to reach those most in need of persuasion, suggests a new study in *Psychology of Addictive Behaviors* by researchers from Indiana University and Wayne State University.

"The findings are somewhat ironic because a whole lot of public service announcements say, 'Drugs are bad for you,' 'Just say no,' or 'This is your brain on drugs' with an image of an egg frying," said principal investigator Joshua Brown, associate professor in the Department of

Psychological and [Brain Sciences](#) in IU Bloomington's College of Arts and Sciences. "What we're seeing is that negative messages are not having the same impact on the brain."

Using [neuroimaging techniques](#), the researchers examined the impact of different messages on the brains of substance-dependent individuals and compared them to their effects on non-substance-dependent individuals. They also sought to determine where the problem lies in the circuit between message, brain and behavior, where the signal goes wrong. Is it in the relationship between brain activity and behavior or in the impact of the message on the brain? Perhaps the brains of substance-dependent people are sensitive to risk, but the knowledge does not guide their behavior. Or perhaps substance-dependent people perceive messages differently in the first place.

To answer these questions, participants took part in a [virtual game](#), the Iowa Gambling Task, often used in [psychological studies](#) on decision-making. Four decks of cards appear on a screen, and the participants were told they will either win or lose money by choosing certain decks. The substance-dependent group showed less brain activity in response to the negatively framed message that a certain deck would lead to losses. The negative messages also led to significantly worse, riskier decisions in the substance-dependent group than in the non-user group.

The findings suggest that the level of [brain activity](#) in regions of the brain that assess risk is lower in substance-dependent individuals than those who are not drug- or alcohol-dependent. These two groups process the messages differently, particularly those messages that emphasize loss or reduced prospects for gain.

The research contributes to a growing body of health communication literature that examines the impact of particular types of messages on the neural mechanisms involved in making risky decisions. It also

contributes to a larger story about the regions of the brain that are activated in response to risk and danger. One particular region, the anterior cingulate cortex, is heavily involved in a variety of clinical disorders including drug abuse, ADHD, autism, schizophrenia and obsessive-compulsive disorder.

At stake, Brown notes, are hundreds of billions in health care costs and lost productivity, as well as questions about public policy and how best to discourage drug abuse.

"The government spends millions every year trying to discourage drug use, and a lot of the ads highlight the dangers of drugs," he said. "Should we spend more to highlight the benefits of staying clean instead?"

Brown said they can't yet say whether positive [messages](#) are more effective at reducing drug use because their experiment involved decisions about money rather than drugs. They are working on it, though, and have just started to look at how people make decisions with respect to drugs.

**More information:** The study, "Decisions During Negatively Framed Messages Yield Smaller Risk-Aversion-Related Brain Activation in Substance-Dependent Individuals," appears online at the *Psychology of Addictive Behaviors* ([DOI: 10.1037/a0030633](https://doi.org/10.1037/a0030633)).

Provided by Indiana University

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