Research could improve understanding of risky behavior, addiction

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(Medical Xpress)—It follows logically: If you are unable to predict how a decision might affect your life, your decisions may be more impulsive.

New research from the University of Florida in rats backs that up.

A study found that rats with impulsive tendencies tend to have poorer working memories. In humans, scientists define working memory as the ability to hold details like a name or phone number in mind.

On the other hand, rats that avoided risky situations tended to have poor cognitive flexibility, which in this case means they were unable to learn a new way to get a food pellet after they had been trained to expect it from a different lever. By studying the rats' behavior, the researchers are examining the ways impulsivity, working memory and cognitive flexibility may or may not interact.

The research, published online in March ahead of print in the journal Neurobiology of Learning and Memory, could provide animal models for people with certain mental disorders such as anorexia or addiction, said Kristy Shimp, a doctoral candidate in the UF College of Medicine's department of neuroscience. People with anorexia tend to have poorer cognitive flexibility, whereas people with addiction often engage in risky behavior.

Shimp studies in the lab of UF Health neuroscientist Barry Setlow, who examines the connections between risky behavior, decision-making and

addiction, as well as disorders such as anorexia, schizophrenia and attention deficit hyperactivity disorder. Shimp, who is the paper's lead author, said the study of risky behavior is significant.

"Instead of treating psychiatric disorders based on a cluster of symptoms and a single diagnosis, the National Institutes of Health is shifting to treating separate symptoms," Shimp said. "Researching things like risky decision-making, impulsivity and other features that are part of multiple disorders is becoming more important."

To study impulsivity, Shimp's rats were presented with two levers. Pressing the first lever yielded the rats one pellet right away. If the rats pressed the other lever, however, they got three pellets of food—but only after a delay. The delay increased as the test went on. Shimp found that some rats were able to delay gratification, continuing to choose the large reward even when they had to wait for it. But other rats still opted for the smaller amount of food that came more quickly. This showed a greater preference for immediate gratification and indicated impulsivity, the researchers said.

Shimp's finding that the impulsive rats have poor working memories echoes research done at Virginia Tech with people addicted to methamphetamine, who also have poor working memories and are shown to be more impulsive than non-users. But, this research showed, when given computer-based working memory training, the subjects' working memory strengthened and their impulsivity decreased, which could help them reduce relapse. The similarities between the results of Shimp's study and the Virginia Tech study could give researchers a new animal model to study the neurobiology underlying addiction.

"Better working memory leads to less impulsivity. Intuitively, if you have a more salient recall that, 'hey, if I do drugs, bad things will happen,' you'd be less likely to use drugs," she said.

In humans, it is difficult to study whether their behavior is a result of genetics or a result of other environmental factors, or both. Setlow, who is also an author on the paper, said his team's goal is to examine both the genetic and environmental causes of risky behavior, impulsivity and addiction.

"In this experiment, the rats all came from a very homogenous background," Setlow said.

Understanding how these features are connected may help change medical treatment for people with attention deficit hyperactivity disorder, schizophrenia, addiction and other disorders associated with risk-taking.

"While pharmaceuticals can be very helpful, there may be side effects. Things like exercise and mental diversion in addition to typical kinds of therapies could be helpful," Shimp said. "We can find natural ways that can help people modify their behavior in a healthy way—and give them scientific credence to help advance their cause."

Provided by University of Florida

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