Prairie voles display signs of human-like depression, show promise as animal model

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Sergio Iñiguez, Ph.D., a professor of psychology at The University of Texas at El Paso, points out the symptoms of depression in voles to doctoral student Minerva Rodriguez. They are among the co-authors of a study published in the Journal of Affective Disorders which posits that the small rodents can be effectively used as animal models to further the study of clinical depression. Credit: The University of Texas at El Paso.

Psychology researchers at The University of Texas at El Paso are making progress towards understanding the biological underpinnings of depression, a leading cause of disability that affects approximately 280 million people around the world.

In a study published this April in the *Journal of Affective Disorders*, UTEP psychologist Sergio Iñiguez, Ph.D., and his co-authors make the case that prairie voles, small rodents that are found throughout the central United States and Canada, can be effectively used as animal models to further the study of clinical depression.

"The findings of this investigation are important because we show, for the first time, that prairie voles display some of the core symptoms of depression after chronic stress exposure—just like humans," Iñiguez said. "This is exciting because we can now use this animal model to potentially uncover the biological factors that underlie illnesses like depression and anxiety."

The UTEP study focuses on the impact of "bullying" on voles' behavioral patterns. Researchers observed what happened when individual male voles were bullied by more aggressive males over the course of ten days, inducing what Iñiguez refers to as "social defeat stress."

Iñiguez explained that that the voles who were bullied exhibited changes in body weight, performed worse on spatial memory tests and were less sociable with other voles compared to those who were not bullied. Where voles generally show a preference for sugar water, the bullied voles showed no preference when given a choice between regular water and sugar water, a pattern known as anhedonia, or loss of pleasure in regular activities, Iñiguez said.

Iñiguez and his fellow researchers concluded that "social defeat"

activated the voles' stress response and became a risk factor for symptoms that mirrored those of depression in humans.

Iñiguez, a professor in the Department of Psychology at UTEP who studies behavioral neuroscience, said that while depression has certain defining characteristics—such as sadness, lack of pleasure in normal activities, and disruption in sleep and eating patterns—researchers don't yet have a full picture of what causes it.

"We have some information about the many factors that contribute to depression, but the ethical implications of doing neurobiological research in humans make it difficult to pinpoint the biology behind this debilitating condition," Iñiguez said.

Rats and mice are often used in psychology studies, but prairie voles share several unique characteristics with humans that make them better candidates for research, such as having monogamous relationships, raising vole pups in pairs, and even taking on parental roles for orphaned pups.

Psychology doctoral student Minerva Rodriguez is the lead author of the study.

"These unique and special animals have opened doors to understanding aspects of depression we simply could not with mice and rats," Rodriguez said. "Their distinct social behaviors provide fresh research avenues, demonstrating the prairie vole's immense value as a model for delving into the neurobiology of social stress-induced depression."

Future studies will examine how the voles rebound from depression-like experiences and how they respond to antidepressant medications like Prozac or ketamine.

More information: Minerva Rodriguez et al, Chronic social defeat stress in prairie voles (Microtus ochrogaster): A preclinical model for the study of depression-related phenotypes, *Journal of Affective Disorders* (2024). DOI: 10.1016/j.jad.2024.02.001