

Social motivation in voles differs by species and sex

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Prairie voles are naturally social rodents that provide an opportunity to study the biology of forming social bonds. Credit: Beery Lab

Being with friends and family may be a positive experience for some voles but it is merely tolerable to others, suggests a study published today in *eLife*.

The findings hint at what goes on in the brain of voles when different types of relationships are formed and shows that social motivations may vary by individual, sex and species. As similar hormones and brain structures are involved in social interactions in many species, including humans, this new information may lay the groundwork for better understanding some of the foundations of social differences.

Voles make good model [animals](#) for studying social behaviors because they are naturally social creatures. Some vole species, such as [prairie voles](#), form lasting social bonds with both their mates and same-sex peers. Meadow voles, on the other hand, only form communities to help survive the winter and then part ways in the warmer months.

"We wanted to determine why voles of these two species spend time in social contact," says first author Annaliese Beery, who directed this research in her laboratory at Smith College in Northampton, Massachusetts, US, and is currently in the Department of Integrative Biology at the University of California, Berkeley, US. "Specifically, we wanted to know what role social motivation plays in their behavior, or to what extent social selectivity is more about avoiding strangers."

To answer these questions, Beery and her colleagues trained both prairie voles and meadow voles to push a bar to receive food as a reward. They then replaced food rewards with brief access to a familiar vole of the same species, or a stranger, to see how often the voles would push the bar to get close to the other animal. With each successive press of the bar, it became more difficult to gain access to the other [vole](#), with the animals needing to press the bar again for more access.

"There were striking species and sex differences in who the voles would work to be closer to," Beery says. Her team found that female prairie voles worked harder to see familiar voles than strangers, but male prairie voles did not show this preference for their acquaintances. Instead, the males worked hard to access any females, but showed less interest in males. But the males still huddled with familiar animals when they were together. The meadow voles, which were female only, did not work as hard as the female prairie voles to reach familiar animals.

Together, the results suggest that prairie voles find social interactions with familiar animals rewarding, while the meadow voles were more likely to tolerate friends and family over unfamiliar animals but were not highly motivated by these interactions.

Finally, the researchers discovered that the individual variation in behavior was associated with the density of receptors in the brain for oxytocin—a hormone linked to [social interaction](#). Animals with more oxytocin receptors in a part of the brain called the nucleus accumbens worked harder to socialize. By contrast, animals with more oxytocin receptors in a part of the brain called the bed nucleus of the stria terminalis were more likely to be aggressive towards other animals.

"Our study illustrates the difference between social reward and social selectivity," says co-author Sarah Lopez, who worked on the study as a student researcher in the Beery Social Neuroendocrinology Lab at Smith College, and is now a medical student at the University of Pittsburgh, US. "We've shown that selectivity can come from avoidance and lack of avoidance, as well as from social reward."

Beery adds, "Knowing more about how the mechanisms supporting social relationships are similar and different across species and sexes will help us understand which mechanisms are universal and which are species-specific. This insight may in turn aid our understanding of how

species-typical patterns of [social behavior](#) might evolve over time."

More information: Annaliese K Beery et al, Social selectivity and social motivation in voles, *eLife* (2021). [DOI: 10.7554/eLife.72684](https://doi.org/10.7554/eLife.72684)

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