

Females react differently than males to social isolation

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Credit: Martha Sexton/public domain

While male and female mice have similar responses to physical stress, research from the Hotchkiss Brain Institute at the University of Calgary, Canada, suggests females, not males, feel stressed when alone.

The findings, to be published in the journal *eLife*, provide further proof

that strategies for coping with stress are sex-specific. They also highlight the importance of a social network for [females](#) in particular and pave the way for future research into whether females befriend others as a coping mechanism during stressful situations.

"Many species, including humans, use [social interaction](#) to reduce the effects of stress. In fact, the lack of a social network may itself be stressful," says senior author Jaideep Bains, PhD, Professor of Physiology & Pharmacology at the University of Calgary, Cumming School of Medicine.

"Recent research suggests that young girls are more sensitive to social stress than boys. This could mean that social networks are more important for females in general, and that young females from different species, such as mice, may be more sensitive towards social isolation than males."

To test whether isolating individuals from their social group impacts on the brain in sex-specific ways, Bains and his team studied preadolescent mice that had been housed in same-sex groups after weaning. These mice were either left in their same-sex groups, housed in pairs, or were isolated altogether from their littermates for 16 to 18 hours. Following this period, the team examined the effects on the animals' brain cells that control the release of stress hormones.

"Isolating the female mice from their littermates for less than a day led to the release of a signalling chemical called corticosterone, which is produced in response to [stressful situations](#) and decreases the excitability of the brain cells," says medical student Laura Senst, lead author of the study. "This reaction was not evident in their male counterparts."

This led the team to believe that only young [female mice](#), and not males, interpret social isolation as a type of stress. If this were true, it would

mean that males should experience [physical stress](#) in a similar way to the isolated females through activities such as swimming.

After both sexes of mice experienced a 20-minute swim, the researchers indeed discovered that the activity elicited the same reaction in males as that seen in the females that had been isolated and also swam. This suggests both sexes have the same sensitivity towards physical stress.

"By showing that males and females react differently to some types of stress but not others, our study highlights the importance of considering carefully the sex of animals when investigating how stress affects the brain," says Research Associate Dinara Baimoukhametova, co-lead author of the paper.

"Our findings also raise the interesting question of whether social and environmental changes during the crucial preadolescent stage of development could have long-term consequences for how males and females respond to stressful events later in life."

More information: Laura Senst et al, Sexually dimorphic neuronal responses to social isolation, *eLife* (2016). [DOI: 10.7554/eLife.18726](https://doi.org/10.7554/eLife.18726)

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