

We may now know how childhood adversity leaves its mark on the brain

Research in mice suggests that a newly identified brain pathway may be the reason childhood adversity increases the risk of mental health issues as an adult

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By **Grace Wade**



Childhood adversity can have long-lasting effects, which may be related to a newly identified brain pathway
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A newly identified brain pathway in mice could explain why experiencing **hardship early in life** leads to poorer mental health as an adult. If a similar pathway is found in human brains, it could be the target of future drug therapies.

During childhood, “poverty, immigration, neglect and abuse are all associated with an increased risk for mental health issues later in life, specifically **depression**, drug use and even **suicidal thoughts**”, says **Tallie Z. Baram** at the University of California, Irvine.

The precise mechanisms underlying this association are unknown, but it may be related to the fact that stress can cause connections between brain cells, known as synapses, to either strengthen or weaken as the brain develops. Baram and her colleagues looked at the brains of nine adult male mice, which had been engineered to make a stress-sensitive brain molecule glow when viewed under a microscope. This allowed the researchers to map pathways the molecule travelled to reach a brain region involved in pleasure and reward, called the nucleus accumbens.

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Their experiments revealed a new pathway connecting this region to another area of the brain related to fear and **anxiety** known as the basolateral amygdala.

“It made sense that because this [molecule] is stress sensitive, that maybe early-life adversity influences this pathway,” says Baram, who presented these findings at a meeting of the Society for Neuroscience in San Diego, California, in November.

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To confirm their suspicions, the researchers activated this pathway in adult male mice using **optogenetics**, a technique to turn cells on and off using light. This decreased the animals' interest in pleasurable activities, such as sex and eating sugary foods. “They almost looked depressed,” says Baram. “And this is exactly what we find in adult male mice that have been **exposed** to early-life adversity.”

Conversely, turning off the pathway in mice raised with limited bedding materials, which is meant to mimic early-life adversity, restored their interest in pleasurable activities. On average, the mice ate about 30 per cent more sugary food and displayed greater enthusiasm for sex than before. “They became normal. It was actually incredibly striking,” says Baram.

Together, these findings suggest a [potential mechanism](#) for the long-term mental health consequences of childhood adversity. However, because they only studied male mice, future experiments are needed to determine how this pathway affects females, says Baram.

It would also be useful to assess how this pathway relates to [dopamine](#), a chemical that induces feelings of pleasure and reward, says [Sora Shin](#) at Virginia Tech. “That might help validate not only the function of this pathway, but the neurochemical mechanism of it,” she says.

If these findings translate to humans, they could make treatments for [depression](#) and other mental health conditions related to early-life adversity more effective, Shin says.

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