



University of Colorado **Anschutz Medical Campus**

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Study Finds Link Between Brain Injury and Criminal Behavior

Study shows criminality is associated with damage to a key brain pathway involved in emotional control and judgment

AURORA, Colo. (June 2025) – A new study led by researchers at the [University of Colorado Anschutz Medical Campus](#), [Brigham and Women's Hospital](#) and [Harvard Medical School](#) has found that damage to a specific region of the brain may contribute to criminal or violent behavior.

The study “White matter disconnection in acquired criminality” was published recently in [Molecular Psychiatry](#).

The investigation analyzed brain scans from individuals who began committing crimes after sustaining brain injuries from strokes, tumors or traumatic brain injury. The study compared these 17 cases to brain scans from 706 individuals with other neurological symptoms such as memory loss or depression. The investigators found that injury to the region of the right uncinate fasciculus was the most commonly affected area in the brains of those people who developed criminal behavior. The same pattern held true among individuals who committed violent crimes.

“This part of the brain, the uncinate fasciculus, is a white matter pathway that serves as a cable connecting regions that govern emotion and decision-making,” said [Christopher M. Filley, MD](#), professor emeritus of neurology at the [University of Colorado School of Medicine](#) and one of the study’s co-authors. “When that connection is disrupted on the right side, a person’s ability to regulate emotions and make moral choices may be severely impaired.”

“While it is widely accepted that brain injury can lead to problems with memory or motor function, the role of the brain in guiding social behaviors like criminality is more controversial,” said [Isaiah Kletenik, MD](#), assistant professor of neurology at Harvard Medical School and lead author of the study. “It raises complex questions about culpability and free will.”

Kletenik said during his time in behavioral neurology training at the University of Colorado School of Medicine he had the unique opportunity to evaluate patients who began committing acts of violence with the onset of brain tumors or degenerative diseases.

“These clinical cases prompted my curiosity into the brain basis of moral decision-making and led me to learn new network-based neuroimaging techniques at the [Center for Brain Circuit Therapeutics at Brigham and Women’s Hospital](#) and Harvard Medical School,” said Kletenik.

To strengthen the findings, the researchers conducted a full connectome analysis, employing a detailed map of how brain regions are interconnected. They confirmed that the right uncinate fasciculus was the neural pathway with the most consistent link to criminal behavior.

“It wasn’t just any brain damage, it was damage in the location of this pathway,” said Filley. “Our finding suggests that this specific connection may play a unique role in regulating behavior.”

The uncinate fasciculus links brain regions involved in reward-based decision-making with those that process emotions. When that link is damaged, particularly on the right side, people may have difficulty controlling impulses, anticipating consequences or feeling empathy, all of which can contribute to harmful or criminal actions.

While not everyone with this type of brain injury becomes violent the study suggests that damage to this tract may play a role in new onset criminal behavior after injury.

“This work could have real-world implications for both medicine and the law,” said Filley. “Doctors may be able to better identify at-risk patients and offer effective early interventions. And courts might need to consider brain damage when evaluating criminal responsibility.”

Kletenik said that the findings raise important ethical questions.

“Should brain injury factor into how we judge criminal behavior? Causality in science is not defined in the same way as culpability in the eyes of the law. Still, our findings provide useful data that can help inform this discussion and contributes to our growing knowledge about how social behavior is mediated by the brain.” said Kletenik.

Experts from Vanderbilt University, University of California San Diego and Salk Institute, also collaborated on the study.

About the University of Colorado Anschutz Medical Campus

The University of Colorado Anschutz Medical Campus is a world-class medical destination at

the forefront of transformative science, medicine, education and patient care. The campus encompasses the University of Colorado health professional schools, more than 60 centers and institutes and two nationally ranked independent hospitals - UCHealth University of Colorado Hospital and Children's Hospital Colorado – which see more than two million adult and pediatric patient visits yearly. Innovative, interconnected and highly collaborative, the CU Anschutz Medical Campus delivers life-changing treatments, patient care and professional training and conducts world-renowned research fueled by \$910 million in annual research funding, including \$757 million in sponsored awards and \$153 million in philanthropic gifts.

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