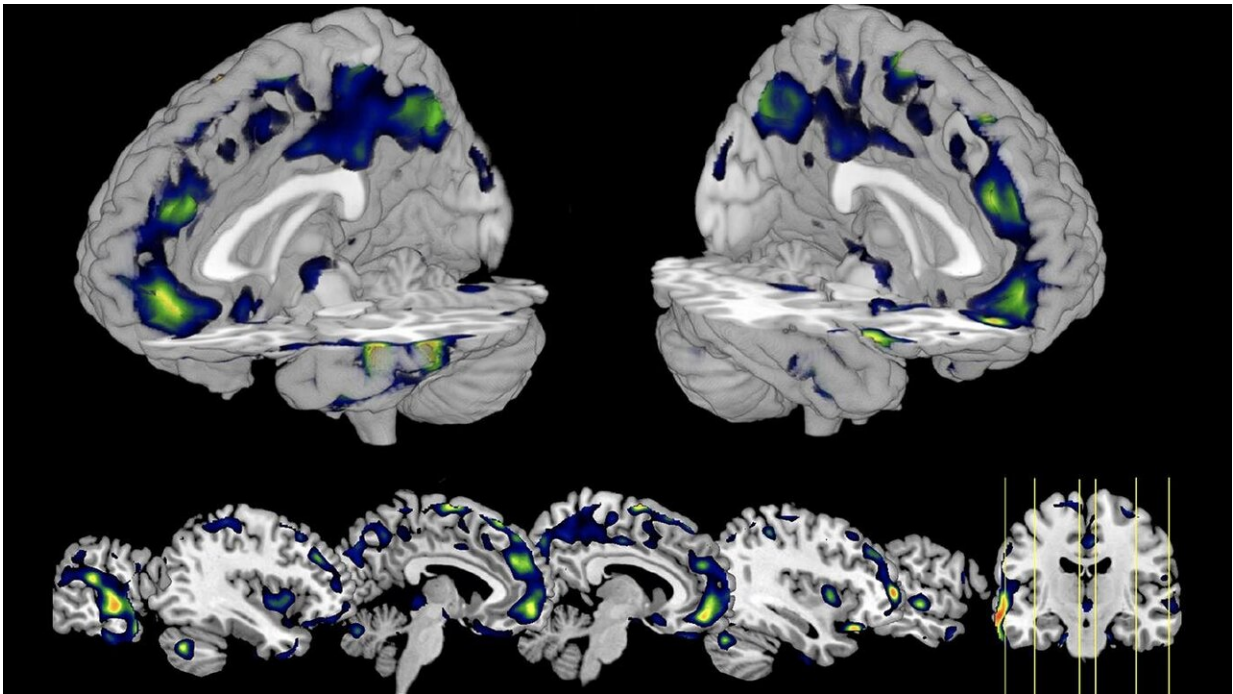


# Brain scans of incarcerated men reveal reduced gray matter in homicide offenders

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The colored sections in this figure highlight brain regions in murderers that exhibit reduced gray matter compared to other violent offenders. The data comes from a study of more than 800 incarcerated men. Credit: Sajous-Turner et al.

The brains of murderers look different from those of people convicted of other crimes—differences that could be linked to how they process empathy and morality.

Examining [brain scans](#) of more than 800 incarcerated men, new research co-authored by a leading University of Chicago neuroscientist found that individuals who had committed or attempted homicide had reduced [gray matter](#) when compared to those involved in other offenses. Those reductions were especially apparent in regions of the brain associated with emotional processing, behavioral control and social cognition.

"More gray matter means more cells, neurons and glia," said Jean Decety, the Irving B. Harris Distinguished Service Professor in Psychology and Psychiatry at UChicago, noting differences in the orbitofrontal cortex and anterior temporal lobes of the brain. "That's what you need to make computations, to process information—whether it's emotional information that you use to feel empathy for someone else, or information that you use to control your behavior, to suppress your tendencies to react."

A pioneering scholar in the cognitive neuroscience of moral reasoning and social decision-making, Decety's research has focused both on psychopathy and on childhood moral development. The innovative study is a result of his longtime collaboration with University of New Mexico neuroscientist Kent Kiehl, who helps direct the nonprofit Mind Research Network.

"This work represents more than 10 years of data collection across eight prisons in two states," Kiehl said. "We are fortunate to present the world's largest sample of its kind and the results are quite remarkable."

Published in the journal *Brain Imaging and Behavior*, the new study relied on structural MRI scans of the brains of men incarcerated in New Mexico and Wisconsin, which the researchers had obtained through previous studies.

Participants were divided into three groups: 203 individuals who were

convicted of or self-reported a homicide or homicide attempt; 475 individuals who had committed aggravated battery/assault, armed robbery or other violent crimes; and 130 individuals involved in non-violent or minimally violent crimes.

Researchers excluded from the homicide group those who had been convicted as accomplices, as well as those whose criminal files or court records indicated a strong possibility of accidental death.

Although previous neuroimaging studies also have examined brains of murderers, this is the first research that uses such a large sample and that controls for factors like psychosis—excluding individuals who suffered brain injuries or psychiatric disorders such as schizophrenia.

In addition to Decety and Kiehl, other researchers on the study include first author Ashly Sajous-Turner, a University of New Mexico post-baccalaureate scholar; and Michael Koenigs of the University of Wisconsin.

However, the scholars note that they do not have enough evidence to draw a [causal relationship](#) between reduced gray matter and homicide. Ongoing research by Kiehl and Decety is following up a large sample of ultra high-risk boys—now in their mid-20s—to determine if the [brain](#) regions identified in this sample are predictive of future homicidal behavior. This work, the scholars feel, would help determine whether or not the results are causal.

**More information:** Ashly Sajous-Turner et al. Aberrant brain gray matter in murderers, *Brain Imaging and Behavior* (2019). [DOI: 10.1007/s11682-019-00155-y](https://doi.org/10.1007/s11682-019-00155-y)

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