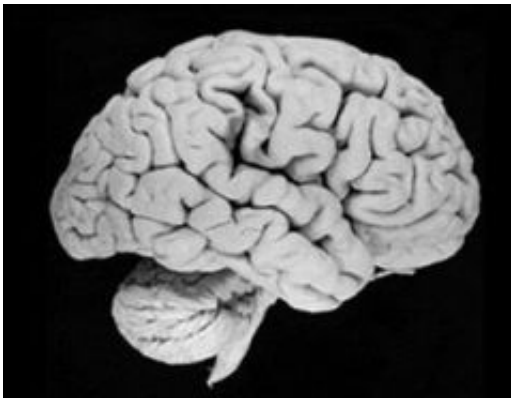


# Psychopaths' brains show differences in structure and function

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Modern human brain. Credit: Univ. of Wisconsin-Madison Brain Collection.

Images of prisoners' brains show important differences between those who are diagnosed as psychopaths and those who aren't, according to a new study led by University of Wisconsin-Madison researchers.

The results could help explain the callous and impulsive anti-social behavior exhibited by some psychopaths.

The study showed that psychopaths have reduced connections between the ventromedial prefrontal cortex (vmPFC), the part of the brain responsible for sentiments such as empathy and guilt, and the amygdala, which mediates fear and anxiety. Two types of [brain images](#) were collected. Diffusion tensor images (DTI) showed reduced structural

integrity in the [white matter](#) fibers connecting the two areas, while a second type of image that maps [brain activity](#), a functional [magnetic resonance image](#) (fMRI), showed less coordinated activity between the vmPFC and the [amygdala](#).

"This is the first study to show both structural and functional differences in the brains of people diagnosed with psychopathy," says Michael Koenigs, assistant professor of psychiatry in the University of Wisconsin School of Medicine and Public Health. "Those two structures in the brain, which are believed to regulate emotion and social behavior, seem to not be communicating as they should."

The study, which took place in a medium-security prison in Wisconsin, is a unique collaborative between three laboratories,

UW-Madison [psychology Professor](#) Joseph Newman has had a long term interest in studying and diagnosing those with psychopathy and has worked extensively in the Wisconsin corrections system. Dr. Kent Kiehl, of the University of New Mexico and the MIND Research Network, has a mobile [MRI scanner](#) that he brought to the prison and used to scan the prisoners' brains. Koenigs and his graduate student, Julian Motzkin, led the analysis of the brain scans.

The study compared the brains of 20 prisoners with a diagnosis of psychopathy with the brains of 20 other prisoners who committed similar crimes but were not diagnosed with psychopathy.

"The combination of structural and functional abnormalities provides compelling evidence that the dysfunction observed in this crucial social-emotional circuitry is a stable characteristic of our psychopathic offenders," Newman says. "I am optimistic that our ongoing collaborative work will shed more light on the source of this dysfunction and strategies for treating the problem."

Newman notes that none of this work would be possible without the extraordinary support provided by the Wisconsin Department of Corrections, which he called "the silent partner in this research." He says the DOC has demonstrated an unprecedented commitment to supporting research designed to facilitate the differential diagnosis and treatment of prisoners.

The study, published in the most recent *Journal of Neuroscience*, builds on earlier work by Newman and Koenigs that showed that psychopaths' decision-making mirrors that of patients with known damage to their [ventromedial prefrontal cortex](#) (vmPFC). This bolsters evidence that problems in that part of the brain are connected to the disorder.

"The decision-making study showed indirectly what this study shows directly – that there is a specific brain abnormality associated with criminal [psychopathy](#)," Koenigs adds.

Provided by University of Wisconsin-Madison

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