

Brain Scans Suggest Some Are Born With Violent Tendencies

April 13, 1998, p A3

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An engineer in his forties, described as friendly and outgoing by neighbors, flies into a rage in the midst of a family argument and brutally beats his wife and 13-month-old daughter to death with a champagne bottle he has just emptied.

A grocery store robber armed with a sawed-off shotgun, shoots an employee who happens to walk in unexpectedly.

A 21-year-old man, who has a "quick temper" but is well-liked by his neighbors, goes back to the auto parts store from which he'd been fired and kills, execution style, three of his former co-workers.

Sociologists, psychiatrists, criminologists and others have long struggled to understand what makes some people turn violent. Childhood abuse clearly can be a major factor in predisposing someone to violence as an adult. But researchers have wondered whether some people are born with the tendency. And a new study suggests some are.

In the first study of its kind, neuroscientists used the latest high-tech imaging technology literally to peer inside the minds of killers to try to determine whether their brains differ in some fundamental way.

"For a long time, we seemed to know that antisocial groups may be characterized by some kind of brain dysfunction. But the measure of brain dysfunction was indirect," said Andrian Raine, a clinical neuroscientist at the University of Southern California in Los Angeles who led the study. "This is the first, the largest, and the most comprehensive brain imaging study on seriously violent crime to date."

They found evidence that some people are born with brains that may make them prone to violence, perhaps because the part of their brains involved in creating a sense of "conscience" is dysfunctional, Raine said.

Raine and his colleagues identified 38 murderers, including the three described above, and reviewed court records, attorney interviews, medical and psychological records and newspaper articles to determine which had suffered trauma during their childhood, including physical or sexual abuse, severe neglect, extreme poverty, severe family conflict and parental divorce. Of the murderers, 12 had suffered significant abuse or deprivation. The remaining 26, including the three described above, experienced minimal abuse or none at all.

The researchers then used positron, emission tomography (PET), a technique that can measure activity of various parts of the brain, to compare those who had suffered trauma as children with those who had not, and with a group of people who had not committed any violent acts.

Compared with the subjects who had, suffered abuse and with nonviolent people, the 26 murderers, from comparatively benign backgrounds averaged 5.7 percent less activity in a part of the brain known as the medial prefrontal cortex. More significant, they showed an average of 14.2 percent less activity in a part of the medial prefrontal cortex known as the orbitofrontal cortex, on the right hemisphere. Head injuries or mental illness could not explain the differences.

The, medial prefrontal cortex, located just behind the forehead, has been shown in animal research to be involved in inhibiting the limbic system, a region located much deeper inside the brain that produces aggressive behavior. "The prefrontal frontal cortex is a bit like an emergency brake on a car. It's like the emergency brake on the deeper areas of the brain that are involved in aggressive feelings," Raine said.

Animal research also has shown that the right orbitofrontal cortex, which is just above the right eye, is involved in fear conditioning-the subconscious association between antisocial behavior and punishment that in humans is thought to be key to developing a sense of "conscience."

"When you train a dog, you punish it every time it does something wrong. That's how they learn to follow social rules," Raine said. "A conscience is really just a set of conditioned responses."

The deficit revealed in the study may leave individuals with "an emotionally blunted personality lacking in conscience development," Raine and his colleagues wrote in reporting their findings last week in the journal *Neuropsychiatry, Neuropsychology, and Behavioral Neurology*.

The research could help explain why some people who had not suffered traumatic childhoods still become violent. "People always suspect that, it was those with the adverse childhood experiences who were the ones with brain dysfunction. We found it was the ones with the benign home backgrounds who showed the dysfunction," Raine said in a telephone interview.

"Coming from a deprived background, the reasons for your violence may be the child sexual abuse or poverty or whatever," he said. But "if you are a violent offender, and you have a relatively normal home background, it's more likely that biological factors like brain dysfunction may be the best explanation for your violent behavior," he said.

"There are a lot of parents out there who, despite all of their best efforts, their children go off the rails and they commit violent offenses. And the parents feel desperately guilty and there's a lot of soul searching-"What did I do wrong?" he said. "The fact that there is an identifiable biological disposition suggests it's not how the child was raised. It's that they had a biological dysfunction, combined with a situation, that led to the violence."

Raine cautioned that human behavior is extremely complicated and tends to be influenced by a complex and often subtle interaction of social and biological factors.

“There are a lot of factors involved in crime. Brain function is just one of those,” he said. “But by understanding the brain function, we will be in a much better position to understand the complete causes of violent behavior.”

Other researchers praised Raine's study. “I think it's original work that's quite important,” said Jan Volavka, a professor of psychiatry at New York University.

But some said that while Raine's research is, interesting, they were highly skeptical that brain dysfunction alone could predispose someone to violence.

“By and large our findings suggest that neurologic impairment alone does not cause violence because most neurologically impaired People are not violent,” said Dorothy O. Lewis, who studies violence at New York University and Yale University. “It impairs judgment and increases emotionality and a tendency to lash out. But if you raise a child who has brain dysfunction in a reasonably supportive household, that person will learn to handle that volatility.”

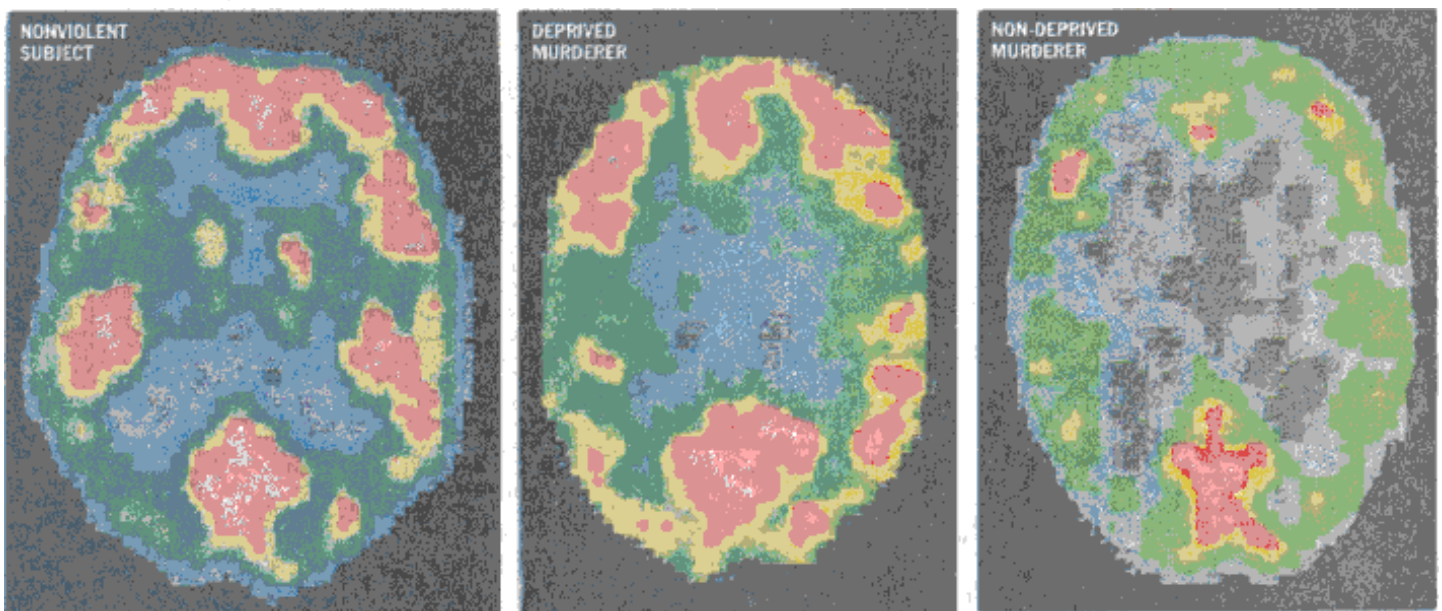


Photo Courtesy of University of Southern California

Scientists compared brains of murders who had a deprived or abusive childhood with killers who had relatively benign upbringings, and with brains of people who had not committed violent acts. Those from a comparatively non-deprived background appeared to have an abnormal lack of activity in front parts of the brain involved in impulse control. Red indicates highest activity.