

New evidence on the biological basis of highly impulsive and aggressive behaviors

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Physical and chemical changes in the brain during development can potentially play a role in some delinquent and deviant behaviors, according to research released today. Studies looking at the underlying mechanisms that influence our ability to exercise self-control were presented at Neuroscience 2013, the annual meeting of the Society for Neuroscience and the world's largest source of emerging news about brain science and health.

Understanding the impact of changes in specific prefrontal regions during [brain development](#) could lead to new treatments and earlier interventions for disorders in which impulsivity plays a key factor. The research may have implications for understanding and dealing with aggressive and troublesome behaviors.

Today's new findings show that:

- The absence of serotonin receptors during early development leads to highly aggressive and [impulsive behaviors](#) in mice. Impulsivity, but not aggression, returns to normal levels by reintroducing the receptors (Katherine Nautiyal, PhD, abstract 754.07, see attached summary).
- Adolescents react more impulsively to danger than adults or children, and the [prefrontal cortex](#) works harder to exert control over impulsive responses to threatening cues (Kristina Caudle, PhD, abstract 852.14, see attached summary).

Other recent findings discussed show that:

- Weak control of the brain's prefrontal cortex (which monitors personality, decision-making, and self-restraint) over regions associated with reward and motivation could explain the lack of self-control experienced by anti-social individuals (Joshua Buckholtz, PhD, presentation 194.01, see attached speaker summary).
- Criminal defendants increasingly use [brain science](#) to explain their actions, pointing to brain scans and the scientific literature for evidence that brain impairments affect behavior. This is impacting how the legal system assigns responsibility and punishment for criminal wrongdoing in the United States (Nita Farahany, JD, PhD, presentation 301, see attached speaker summary).

"Our deeper understanding of the origins of delinquent behavior can be a double-edged sword," said press conference moderator BJ Casey, PhD, of Weill Cornell Medical College, an expert in attention, behavior, and related brain disorders. "While we're making tremendous gains in [neuroscience](#) that should lead to improved treatments, our biological insights also have implications for criminal cases and the judicial process that we need to understand."

Provided by Society for Neuroscience

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