

# Journal Club

## PSYCHOLOGY AND LAW

### NEURAL BASIS OF ANTISOCIAL BEHAVIOUR

The quick ascent of advanced neuroscientific methods over the past few decades has revolutionized many fields and opened doors to previously unexplored interdisciplinary areas of study. In their 2014 perspective piece, Andrea L. Glenn and Adrian Raine discussed one such advance that explores the neural underpinnings associated with criminal behaviour, also known as neurocriminology.

I came across this article early in my undergraduate career when I realized that I was fascinated by the neural underpinnings of antisocial behaviour. This article has served as a guiding point for me in many ways, shaping a path that currently finds me in a clinical and developmental psychology PhD programme studying childhood adversity, neuroscience and antisocial behaviour.

The search for biological explanations for criminal and antisocial behaviours was not a new endeavour in 2014, and Glenn and Raine provide a digestible overview of the various connections that have been made between biology and criminality. These biological factors include genetics, prenatal and perinatal influences, hormones, neurotransmitters, psychophysiology and, more recently, neuroimaging.

Glenn and Raine highlight neuroimaging tools that can provide additional perspective on brain function as it pertains to criminal behaviour. They broaden the picture of knowledge about the various

biological systems that might function differently in individuals with antisocial behaviour, while highlighting the gaps that must be filled. For example, the authors discuss the amygdala as a brain region that is commonly implicated in antisocial behaviour. Research has found correlations between reduced overall amygdala volume and antisocial behaviour; however, findings on amygdala activity are more mixed, with evidence that severe antisocial behaviour is associated with both reduced amygdala activity and with increased amygdala reactivity in response to emotional stimuli. These diverging patterns of activity largely map onto clinically recognized subtypes of antisocial behaviour, in that individuals with more proactive or calculated aggression might have a reduced amygdala response and that individuals with more reactive or impulsive aggression might have a hyperactive amygdala response.

Further complicating the interpretation of these findings is the fact that an individual's history of antisocial behaviour is rarely confined to either reactive or proactive aggression. For instance, consider an individual who becomes verbally hostile in response to criticism by a peer (reactive aggression) and who commits premeditated robbery to obtain necessary medication (proactive aggression). Literature delineating subtypes of antisocial behaviour



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tends to conceptualize them as one or the other, and therefore does not always map onto complex, real-world human behaviour.

The idea of using neuroimaging to enhance crime prediction and prevention holds much promise, but the lack of correspondence identified in Glenn and Raine's paper limits the applicability of neuroscience to courtroom settings. More work is needed to develop nuanced phenotypes of brain structure and function that more accurately reflect an individual's unique pattern of behaviour, dysfunction, life history, and the nature of criminal or antisocial acts.

Clinical neuroscience has a part to play in further defining subtypes that map onto heterogeneous behavioural and neural patterns and, in doing so, integrating biological markers of comorbidities, distinct aetiologies, life experiences (such as childhood maltreatment) and other factors. This level of specificity is required if neurocriminology is to be used to make individual-level predictions. If not, as Glenn and Raine caution, we run the risk of both violating personal freedoms and failing to prevent violence by making conclusions about an individual's propensity for aggression on the basis of incomplete science.

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**ORIGINAL ARTICLE** Glenn, A. L. & Raine, A. Neurocriminology: implications for the punishment, prediction and prevention of criminal behaviour. *Nat. Rev. Neurosci.* **15**, 54–63 (2014)

**RELATED ARTICLE** Hyde, L. W. et al. Early starting, aggressive, and/or callous-unemotional? Examining the overlap and predictive utility of antisocial behavior subtypes. *J. Abnorm. Psychol.* **124**, 329–342 (2015)