

Biological Risk Factors for Involvement in Crime

This brief provides an introductory discussion of three sets of biological risk factors for involvement in crime: genetics; neuro-transmitters; and neuro-biology. These factors should be understood as representative of the kind of issues addressed in biological research about the causes of crime.

The factors discussed in this brief contribute to criminal behaviour in complex ways, and the mechanisms by which this happens are not always clear.

This brief concludes by noting other socio-biological factors where the evidence base regarding their relationship to offending is still emerging.

Genetics

There is ongoing debate about the role of genetics in human behaviour, although research does suggest that some inherited characteristics may contribute to anti-social or criminal behaviour. In particular, there is some evidence that suggests a genetic connection with chronic offending and, in particular, property crime. In contrast, there is relatively little evidence about a genetic connection with violent crime.

There is also a relatively limited but growing body of evidence about the risk and protective factors associated with particular genes. For example, a genotype that confers a low level of the enzyme monoamine oxidase may predispose an individual to violent or anti-social behaviour. This correlation, however, only exists where an individual with that gene has been exposed to abuse as a child.

There is evidence for a genetic influence on criminal behaviour but this influence is complex because of the interaction of inherited characteristics and environment.

Dysfunction in the neuro-transmitters used by the brain is associated with some kinds of criminal behaviour.

Neuro-transmitters

Hormones are chemicals used by the body to communicate between cells. Serotonin, norepinephrine and dopamine are the three hormones that have been the focus of research about the links between hormones and criminal behaviour. Overall, there appears to be a strong relationship between low levels of serotonin and anti-social behaviour, a moderate relationship for norepinephrine, and no effect for dopamine. Numerous studies have found links between low serotonin activity and childhood conduct disorders, antisocial personality disorders and criminal behaviour, particularly crimes involving impulsivity.

Damage to the structure and function of the brain can be associated with antisocial or criminal behaviour.

Neuro-biology

Neuro-biology focuses on the structure and function of the brain. Improvements in the technology for examining the brain in action (for example, functional magnetic resonance imaging) have provided new information on the functioning of the brain.

There is increasing evidence that neurological damage is an important mediating mechanism which leads to offending. Of particular significance in this area is evidence that suggests that damage to the prefrontal cortex, through head injury, birth complications, disease or environmental toxin (such as alcohol or other drugs), is linked to antisocial behaviour. Pre-frontal damage is thought to limit the ability to control impulsive, aggressive feelings, encouraging risk-taking, rule-breaking, emotional and aggressive outbursts, as well as resulting in poor reasoning ability, loss of intellectual flexibility and problem-solving skills, leading to failure in school.

Risks to the developing brain arise even before birth, in the form of agents which may damage the foetus, in particular, cigarettes, alcohol and other drugs. The early years of a child's life are also crucial for brain development and negative experiences during this period, such as prolonged maltreatment, physical abuse or neglect, can over-activate the stress response system, causing neurological deficits that predispose an individual to criminality.

Evidence suggests that mental health can have both direct and indirect links to criminality.

Mental health

Mental health sits at the intersection of biological (such as genetics and neurology) and social factors (such as post-traumatic stress disorder, resulting from trauma or abuse). Evidence suggests that mental health can have both direct and indirect links to criminality. Research from the Dunedin Multidisciplinary Health and Development Study concluded that, in the age group committing most violent incidents, individuals with mental disorders account for a considerable amount of violence in the community. In terms of indirect links to criminality, maternal mental health problems are associated with negative outcomes for children, including emotional and behavioural problems.

Other socio-biological factors

Evidence about causal relationship between many biological risk factors and criminal behaviour continues to grow.

There are a number of other socio-biological factors that may influence an individual's risk of involvement in criminal offending, but where the evidence is insufficient to be conclusive.

Factors such as low intelligence, poor diet, impulsivity and hyperactivity, hormones such as testosterone and cortisol, and environmental pollutants may all affect a person's biological propensity for criminal or antisocial behaviour. Emerging evidence about the correlates of these and related factors is helping to build a better picture of the biological basis for human behaviour.

Further reading:

Arseneault, Louise et. al. (2000) Mental Disorders and Violence in a Total Birth Cohort Results From the Dunedin Study. *Archives of General Psychiatry* 57 <http://archpsyc.ama-assn.org/cgi/reprint/57/10/979>

Ellis, Lee (2005) A Theory Explaining Biological Correlates of Criminality. *European Journal of Criminology* 2 (3):287-351

Stewart, A, Dennison Susan and Waterson, E (2002) *Pathways from Child Maltreatment to Juvenile Offending*. Australian Institute of Criminology <http://www.aic.gov.au/publications/tandi/ti241.pdf>