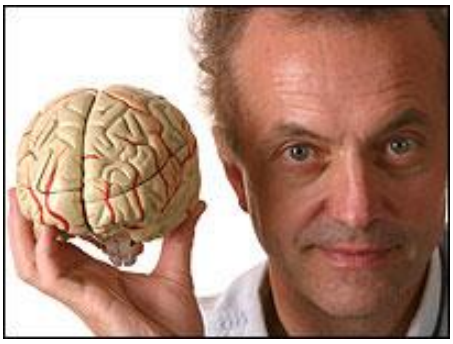
'Biological key' to unlocking crime



By Professor Adrian Raine
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Connections between crime and biological make-up are increasingly becoming a hot topic for discussion. Two personal and opposing accounts argue the case for and against. Professor Adrian Raine sets out his views below.

Until recently it was thought that the causes of crime lay just in social factors like poverty and unemployment. Yet repeat offending criminal behaviour is a clinical disorder, with brain impairments playing a key role. New research is now showing that genetic and biological factors play an equal, if not greater, role than social factors in crime causation. Within this new field of biocriminology, brain imaging findings are revealing dramatic new insights into the criminal mind. There are now 71 brain imaging studies showing that murderers, psychopaths, and individuals with aggressive, antisocial personalities have poorer functioning in the prefrontal cortex - that part of the brain involved in regulating and controlling emotion and behaviour. More dramatically, we now know that the brains of criminals are physically different from non-criminals, showing an 11% reduction in the volume of grey matter (neurons) in the prefrontal cortex.

'Bad brains'

Violent offenders just do not have the emergency brakes to stop their runaway aggressive behaviour. Literally speaking, bad brains lead to bad behaviour. Dramatic advances are also being made in the areas of molecular and behaviour genetics. Over 100 twin and adoption studies have convincingly shown that genetic processes account for 50% of antisocial and criminal behaviour. Of the remaining half that is environmental, biology accounts for part of this. For example, physical child abuse can cause brain damage that in turn results in antisocial, aggressive behaviour. Genetic processes are also at play in shaping aggressive behaviour in children. There is exciting new evidence that an abnormality in one specific gene (monoamine oxidase A), when combined with child abuse, predisposes to violent offending in adulthood. In a similar fashion, birth complications, when combined with maternal rejection in the first year of life, results in higher violence at age 34.

Breakthroughs

The biological and genetic findings are now incontrovertible; the evidence is too strong to ignore. These new breakthroughs have important implications for crime prevention. One of the reasons why we have repeatedly failed to stop crime is because we have systematically ignored the biological and genetic contributions to crime causation. We instead need to focus efforts on new interventions that will improve brain structure and function. New research has just shown that childhood malnutrition is linked to poor brain functioning (low IQ) and conduct disorder in early adulthood. Giving three-year-olds better nutrition (and more physical exercise) for just two years results in better brain functioning (EEG) at age 11, and a 35% reduction in crime 20 years later at age 23. Prisoners given fish oil (rich in omega-3, a long-chain fatty acid that is critical for brain structure and function) show reduced aggressive and antisocial behaviour. Low physiological arousal (e.g. low sweat and heart rates) is a well-replicated risk factor for crime and violence, but stimulants (drugs which increase arousal) are effective in reducing aggressive and antisocial behaviour in children.

Future

Where will this new biological approach take us? If we really want to stop crime, the best investment society can make is to intervene very early on. Better prenatal and perinatal health care, better nutrition early in life, and medication for severely aggressive children can be implemented right now. The next decade will reveal new discoveries regarding specific genes that cause violent behaviour, and these findings could result in new drugs to correct the neurotransmitter brain abnormalities that cause violence. In 50 years time, will we be conducting reparative brain surgery on prisoners to correct the faulty neural circuits that give rise to violence? Rocket science perhaps - but there is an uncanny habit for today's science fiction to become tomorrow's reality.

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Violence 'not detectable' by brain imaging

By Professor Steven Rose
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Connections between crime and biological make-up are increasingly becoming a hot topic for discussion. Two personal and opposing accounts argue the case for and against. Professor Steven Rose sets out his views below.

There is a revealing moment in the IF TV drama in which the "lecturer" addressing his class of bored students shows a picture of the Jarrow hunger march in the 1930s. If poverty is the cause of violence, he asks, why was there relatively little of it then, but so much more today? He concludes the cause must be located in the brain and in the genes. It is true that there has been an increase in violent crime since the 1960s, and an even greater increase, fostered by the tabloid press and the government, in the fear of crime. However, what any alert student would quickly have pointed out to the lecturer is as there cannot have been time since the 1930s for genetic change to occur, as it requires hundreds of generations. Since our brains remain the same now as they were then, the genetic argument cannot be right either.
And of course as a child gets half its genes from its father and half from its mother, the message in the programme of "like father like son" is a crass genetic error. If Liam has ADHD (if that were a sensible diagnosis, which many child psychologists would doubt), and if ADHD were a genetic condition (for which there is no strong evidence), then it would be as likely to be inherited from his mother as his father.

External factors

If there is more violent crime today we have to look for other reasons than inside peoples' brains. Guns and drugs other than alcohol and nicotine are more available, there is a growing gap between rich and poor, and life in sink estates, perhaps especially for young men, offers little hope. But despite all this, one might argue that maybe there is something different about the brains or the genes of someone prepared to be violent, and that a genetic test or a brain imaging, as in the programme, might reveal it. This is only true up to a point.

There is some evidence that children with a particular genetic mutation, if brought up in an abusive environment, are more likely to be violent or abusive in turn when they become adult. But the crucial factor is the interaction between gene (which is rare) and environment (which is common), so if we want to do something about it we should try to prevent any child, with or without any particular gene, from being abused.

'Beware'

There is also some evidence that some people diagnosed as psychopathic may show particular brain abnormalities. But many people so diagnosed do not show such abnormalities, and many people who are behaviourally not violent do show them. So the predictive power of such a brain scan is pretty much zero. Furthermore of course, people are violent for many different reasons, almost none of which are detectable by brain imaging. I doubt if you would be able to explain the reasons why they have been responsible for some 100,000 deaths in Iraq by doing brain scans on Tony Blair or George W Bush, to take an extreme example. Nor would the violence of someone addicted to crack cocaine and desperate for a fix be attributable to some genetic or neural predisposition.

The truth is that neuroscience and genetics can say little about the causes or the treatment of violence in our society and cannot offer cheap fixes. Beware forensic psychologists who say anything different, however glib they may sound. They are selling snake oil.

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