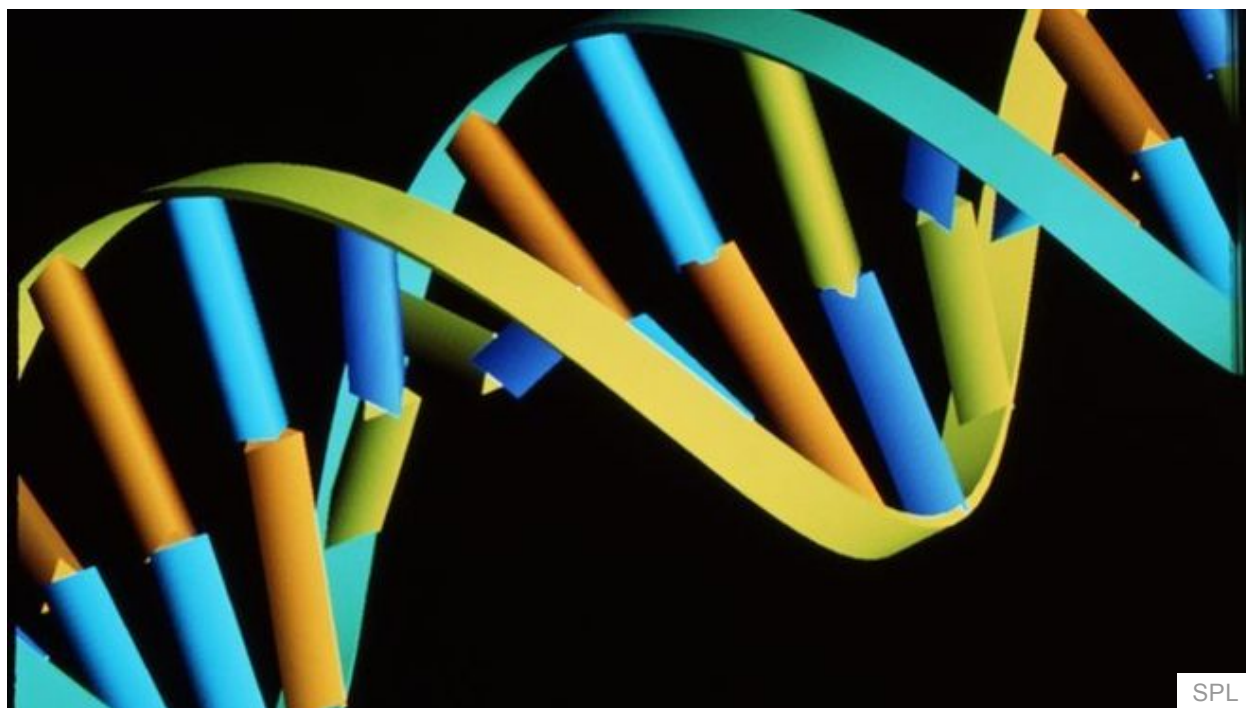


## Science & Environment

### Two genes linked with violent crime

By Melissa Hogenboom  
Science reporter, BBC News

28 October 2014



**A genetic analysis of almost 900 offenders in Finland has revealed two genes associated with violent crime.**

Those with the genes were 13 times more likely to have a history of repeated violent behaviour.

The authors of the study, published in the journal **Molecular Psychiatry**, said at least 5-10% of all violent crime in Finland could be attributed to individuals with these genotypes.

But they stressed the genes could not be used to screen criminals.

Many more genes may be involved in violent behaviour and environmental factors are also known to have a fundamental role.

Even if an individual has a "high-risk combination" of these genes the majority will never commit a crime, the lead author of the work Jari Tiihonen of the Karolinska Institutet in Sweden said.

"Committing a severe, violent crime is extremely rare in the general population. So even though the relative risk would be increased, the absolute risk is very low," he told the BBC.

The study, which involved analysis of almost 900 criminals, is the first to have looked at the genetic make-up of so many violent criminals in this way.

## Warrior gene

Each criminal was given a profile based on their offences, categorising them into violent or non-violent. The association between genes and previous behaviour was strongest for the 78 who fitted the "extremely violent offender" profile.

This group had committed a total of 1,154 murders, manslaughters, attempted homicides or batteries. A replication group of 114 criminals had all committed at least one murder.

These all carried a low-activity version of the MAOA gene, which previous research has dubbed the "warrior gene" because of its link to aggressive behaviour.

## Crime genes

- The two genes associated with violent repeat offenders were the MAOA gene and a variant of cadherin 13 (CDH13)
- The MAOA gene codes for the enzyme monoamine oxidase A, which is important for controlling the amount of dopamine and serotonin in the brain
- CDH13 has previously been associated with substance abuse and ADHD
- Those classified as non-violent offenders did not have this genetic profile

A deficiency of the enzyme this controls could result in "dopamine hyperactivity" especially when an individual drinks alcohol or takes drugs such as amphetamines, said Prof Tiihonen. The majority of all individuals who commit severe violent crime in Finland do so under the influence of alcohol or drugs.

## Free will

For now, a person's genetic information should not have any influence on conviction outcomes in criminal courts, Prof Tiihonen added.

"There are many things which can contribute to a person's mental capacity. The only thing that matters is the mental capacity of the individual to understand the consequences of what he or she is doing and whether or not the individual can control his or her own behaviour."

Christopher Ferguson of Stetson University in the US state of Florida agreed. He said it must be remembered that there was not "one or even two genes that by themselves code for violence or crime".

"To some extent we're all products of genetics and the environment but I don't think that robs us of free will or understanding right and wrong."

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Despite this view, echoed by many other scientists, there have been several instances of defence lawyers using genetic information to reduce sentences.

In 2009, a court in Italy **reduced the sentence** of a criminal with genes linked to bad behaviour. In a **similar case** in the US a murderer's genetic profile was highlighted as a contributing factor for his crime.

Commenting on the latest study, Dr Ferguson said it added to our understanding of the factors involved in violent crime.

"Studies like this really document that a large percentage of our behaviour in terms of violence or aggression is influenced by our biology - our genes - and our brain anatomy.

"It's important to conceptualise crime and violence, where it comes from, even if we would not want to radically change the criminal justice system."

Brett Haberstick from the University of Colorado, Boulder in the US, said the work illustrates that "finding genes for criminal behaviour is going to be difficult", despite a long tradition of biological work in the area of criminology.

He said it would be important for others with similar data to replicate the study.

"It is worthwhile to look for biological contributions to criminal or antisocial behaviour as their impact on individuals, communities and society in general is sizeable. What I think, however, is that it is vital that environmental influences are considered as well," he told BBC News.

Jan Schnupp at the University of Oxford was critical of the work. He commented that up to half the population could have one of the genes involved.

"To call these alleles 'genes for violence' would therefore be a massive exaggeration. In combination with many other factors these genes may make it a little harder for you to control violent urges, but they most emphatically do not predetermine you for a life of crime."

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