

Genetic Factors in Aggression, including the MAOA gene.

Aggression can be explained by exploring biological processes such as genetics.

Genes consist of DNA strands, which are inherited containing the instructions for physical features and mechanisms of an organism. If research can show a link between genetic vulnerability and aggressive behaviour, we can begin to understand why some people behave this way.

Early psychologists investigating aggression believed the genetic cause of aggression could lie in the Y chromosome. They were particularly interested in examining individuals with a genotype of XYY. These individuals were often referred to as 'super males' as they possessed two male Y chromosomes.

Price et al (1966) studied violent males in hospitals for the criminally insane. They discovered that 28% of the patients had the extra Y chromosome, compared to less than 0.1% of the general population. This suggests there is a correlation between the extra Y chromosome and aggressive behaviour.

However, Theilgaard (1984) undertook research into men with the XYY genotype and found that XYY can cause an increase in height in individuals but not an increase in aggression.

Twin Studies

Family studies and twin studies allow psychologists to explore the genetic nature of behaviour.

As twins share genetic material it is likely that they have inherited similar characteristics. Monozygotic/ identical twins (MZ) share 100% of their DNA and dizygotic/ non-identical twins (DZ) only share 50%. This genetic similarity is measured using a concordance rate, therefore a high concordance rate indicates a stronger genetic link.

Raine (1993) found a concordance rate of 52% for monozygotic twins and delinquent behaviour.

In addition, Coccaro et al (1997) found that up to 50% of the variance in aggressive behaviour can be explained by genetics. There was a 50% concordance rate amongst MZ twins, and a 19% concordance rate for DZ twins for physical aggression.

In earlier research, McGuffin and Gottesman (1985) found an 87% concordance rate in MZ twins and a 72% in DZ twins.

However, none of the research studies show a concordance rate of 100%, which suggests the other external, environmental factors also contribute to aggressive behaviour.

MAOA Gene

With the advances in genetic testing, specific genes have been identified which have been shown to pass the aggression trait down through generations. One such gene is the MAOA gene, and one variant has been named the 'warrior gene'.

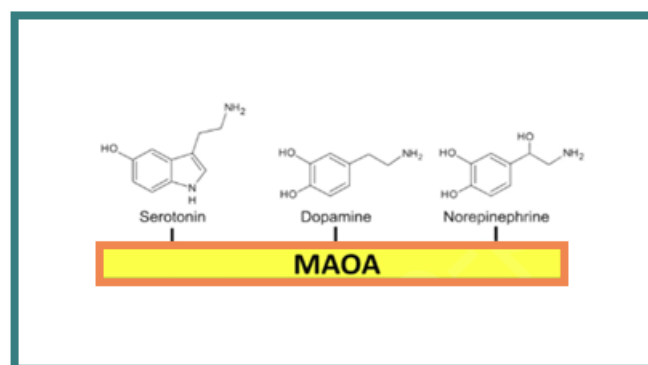
The MAOA gene is responsible for the production of the enzyme 'monoamine oxidase A'. This protein allows the metabolising of noradrenaline, serotonin and dopamine. A dysfunction in this gene can result in these neurotransmitters not being broken down appropriately in the body.

If adrenaline is not metabolised, we end up with too much adrenaline causing hypersensitivity in the fight or flight response. This means individuals may overreact to an external stimulus and perceive a threat where one does not exist.

Furthermore, if dopamine is not broken down, increased or excessive levels of dopamine are also linked to aggressive behaviour.

Serotonin has a calming influence in the brain, but low levels have been implicated in a reduction of control over impulsive behaviour.

Low levels of the enzyme caused by the MAOA gene (MAOA-L), means that the neurotransmitters dopamine and noradrenaline flood the brain, whilst serotonin levels are not regulated, resulting in aggressive behaviour.



Brunner et al (1993) found a link between a gene responsible for producing MAOA and aggression. They studied a Dutch family and found that many of its male members behaved in a particularly violent and aggressive manner, and a large proportion had been involved in serious crimes of violence including rape and arson. These men were found to have abnormally low levels of MAOA and a defect in this gene was later identified.

Stuart et al (2014) studied 97 men who had been involved in severe domestic abuse to their partners. They found the most violent men had the faulty MAOA gene. These men engaged in the highest level of physical and psychological aggression and inflicted the worst injuries on their partners.

However, not all men with the gene mutation show aggressive behaviour. Caspi et al (2002) found that environment also plays a part. They showed that males with low activity MAOA are more at risk of committing a violent crime if they have suffered abuse as a child. This shows the interaction between nature and nurture.

Genes are significant influences on aggressive behaviour, but they do not function in isolation.

Frazzetto et al (2007) found an association between higher levels of antisocial aggression and the MAOA-L gene variant in men, but this was only the case for those who had experienced significant trauma during the first 15 years of life.

Rhee and Waldman (2002) carried out a meta-analysis of antisocial behaviour in 51 twin and adoption studies. They found the genetic component of antisocial/ aggressive behaviour was 40% on the environmental contribution was 60%. This suggests there is an interactionist explanation.

It is hard to isolate the role of genes from environmental influences. Genes may only create a vulnerability to aggression, when combined with certain environmental influences. Therefore, adopting the genetic explanation of aggression on its own seems to be too reductionist.

