**Discuss genetic factors involved in aggressive behaviour.**

Aggression often runs in families, indicating that a particular gene inherited in our DNA may be responsible for aggressive behaviour by creating a predisposition to engage in aggressive behaviour. Research by Coccaro compared concordance rates for aggressive behaviour in 182 monozygotic identical twins and 118 dizygotic non-identical twins. They found that 50% of variance in aggressive behaviour could be attributed to genetics, since MZ twins, who share 100% of the same genes, had much higher concordance rates than DZ twins, who only share 50% of the same genes.

Hutchings and Mednick (1973) also found evidence supporting the genetic explanation using an adoption study. In a study of over 14000 adoptions, they found a significant proportion of adopted boys with criminal convictions had biological parents convicted of violent crimes, seeming to support a genetic explanation. However, there are a number of methodological problems with this study which question its validity. Firstly, the study was undertaken in one country alone, therefore the results cannot easily be generalised to all cultures. Secondly, it is possible that the correlation in aggression between biological parent and adoptee is due to environmental influences of deprivation, depending on the age at which the child was adopted. Therefore these particular findings are not necessarily strong evidence in support of the genetic explanation.

However, Miles and Carey (1997) conducted a meta-analysis of 24 twin and adoption studies, and found that genetics can explain approximately 50% of the variation in aggressive behaviour, increasing support for a genetic explanation. Furthermore, the method of assessing aggression within these studies played a significant role in findings. A genetic component was found to be even higher when studies using a self-report technique for reporting aggression were removed, and studies using a method where others reported on the aggression only were used.

Research has indicated that aggressive people have an X chromosome defective gene which is responsible for producing the protein MAOA. These people therefore have low levels of MAOA. The MAOA protein is responsible for regulating serotonin, and therefore people with this defective MAOA gene also have low levels of serotonin. Low levels of serotonin are associated with impulsive and aggressive behaviour. Brunner found that all male members of the same Dutch family had criminal convictions, and also low levels of MAOA. This suggests that low levels of MAOA are responsible for increased aggressive behaviour and that this aggressive tendency is hereditary.

However, in a study of 500 male children, Caspi found that boys who had been subject to abuse, and had low level MAOA producing gene, were significantly more likely to display antisocial behaviour in adulthood however there was no difference in antisocial behaviour of low and high MAOA boys that had not been abused. Clearly therefore there exists a complex interaction between MAOA genetic predisposition and environment that determines aggressive behaviour.

Furthermore, if aggression was fully determined by genetic factors then we would expect the concordance rate for MZ twins in experiments to be 100%, as they share 100% of their DNA. Since this is not the case, it suggests that by reducing the explanation down to basic elements of genes, and enzymes associated with those genes, the genetic explanation is incomplete. Factors such as social learning should also be taken into consideration in order to explain all the variation in aggressive behaviour found in twins studies. Aggression may be better explained by a process of gene environment interaction incorporating the influence of both sets of factors, such as the diathesis-stress model.

The genetic explanation can also be considered highly deterministic, as it implies that all those who inherit the gene will go on to be more aggressive and more likely to commit crime, and that they have no control over these behaviours. This ignores the role of free will to choose whether or not to engage in aggressive behaviour based on what we know to be morally right and wrong. This has implications for the justice system, as it questions whether those with the gene who have a greater tendency to be aggressive should be held responsible for their actions, or whether they do have free will to override this biological predisposition and make their own choices about their behaviour. If specific genes can be identified then this suggests that early intervention is possible to identify those with a tendency to be aggressive and prevent them from engaging in violent crimes. However this raises the question about whether or not, if gene testing was available, it would be ethical to identify those individuals and how confident we are in the current evidence.