

UNIT 7: BLAME IT ON YOUR GENES

TEACHERS' NOTES UNIT 7

OBJECTIVES

To encourage students to critically appraise what they read about genes and genetics in the media.

To explore aspects of the 'nature v. nurture' debate and the degree to which genes might be responsible for influencing human behaviour

SUGGESTED AGE RANGE

14-16 year olds

CURRICULUM LINKS

For use in PSE, Media/Social Studies, English, Moral Education, Science etc

SUMMARY OF CONTENT

Thirty years ago, research into a possible link between an extra Y chromosome and increased aggression in men triggered considerable public debate about the degree to which human behaviour is genetically determined. Students are given a newspaper article about XYY males and violence and go on to explore how knowledge and beliefs about genetics can be influenced by the media. The final activity focuses on aspects of the 'nature v. nurture' debate and the degree to which genes might be responsible for influencing human behaviour

TEACHERS PLEASE NOTE

You may like to read the Notes for Teachers on the Activity Sheets on pages 78—79 before the lesson. It is important to be aware of the fact that some students in the class may themselves have a genetic condition, or be a carrier, or have relative who is affected. Sensitivity is required to avoid putting such students under stress.

MATERIALS NEEDED

One copy of Activity Sheets IA, IB, 2A and 2B per group of three students.

WHAT YOU DO

Ask students to work in groups of three. Explain that they are going to read a newspaper article about XYY males and violence and answer questions in their groups based on what they have read. Before you hand out the article, see if students can answer the following questions:

- A biological female (♀) can be described as XX because of the sex chromosomes she has inherited (an X from her mother and an X from her father). What sex chromosomes does a biological male (♂) inherit? (Answer: an X chromosome from his mother and a Y chromosome from his father, making him XY.)
- So what does the phrase 'XYY male' suggest to you? (Answer: a male with an extra Y chromosome in each body cell.)

Talk students through the following background information:

Why study XYY males?

In the 1960s, studies of men in 'institutions for the mentally subnormal' revealed that a significant proportion of these men had an extra X chromosome (XXY). But studies of men with severe learning difficulties who were also 'hard to manage', violent or had criminal tendencies revealed a significant proportion of men with an extra X and an extra Y chromosome (XXYY).

Researchers began to wonder if an extra Y chromosome predisposed its carriers to unusually aggressive behaviour. After all, the statistics seemed to suggest that a man who was XXY would have severe learning difficulties, but that a man who was XXYY would have severe learning difficulties and be violent. Dr. Patricia Jacobs, a respected British geneticist, reasoned that if this were the case, she might expect to find an increased frequency of XYY males amongst those 'of a violent nature'.

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Her research findings were published on December 25th 1965 in the prestigious journal Nature. But very few members of the public read Nature. Most of our information about genetics comes from other sources such as newspapers, TV and magazines.

Give each group a copy of Activity Sheet 1A and read through the article together or in groups. Then hand out Activity Sheet 1B and set a time limit for the activities.

Come back together as a whole class and go through the activities with students. [You may find the Notes for Teachers on Activity Sheets 1A and 1B helpful.]

Hand out copies of Activity Sheets 2A and 2B. Give students time to work through the sheets in their groups before coming back together as a whole class for discussion and feedback. [You may find the Notes for Teachers on Activity Sheets 2A and 2B helpful.]

ACTIVITY SHEETS 2A AND 2B

The debate about the degree to which human behaviour can be attributed to nature (i.e. genes) or nurture (i.e. environmental factors) looks set to continue well into the next century.

At present, there is some agreement that the existence of a single gene for specific behaviours (such as intelligence, aggression, sexual orientation etc.) is very unlikely. It is more likely that genetic factors influence aspects of human behaviour/ psychology but not in a deterministic or directly causal way. For example, while research may indicate that particular genes appear to indicate impulsivity in humans, those genes alone do not determine behaviour. Environmental factors (e.g. education, family expectations, wealth, social class, diet etc.) also influence how a person behaves in a given situation. So a person with genes which appear to predispose towards impulsivity might become an opportunistic thief, a high-flying business entrepreneur, a free-wheeling backpacker, or none of these.

- The idea that all human behaviour is genetically determined is unrealistic and undermines any sense of personal responsibility or free will. It might also lead to the creation of a subclass of people denied basic services and discriminated against on the basis of the genes they inherited at birth.
- Increased use of genetic information linked to human behaviour/psychology could have implications for all of us. When discussing the pictures in Activity Sheet 2B with students, it is important to emphasise that you are asking them to explore four imaginary future scenarios.
- Education. If genetic intelligence scores were used as a basis for identifying gifted children, where would this leave low-scoring children? Given that education affects the attainment and expectations of all children to a greater or lesser degree, would children with a high genetic intelligence deserve more or fewer resources than other children?
- Employment. Jobs might be awarded on the basis of “genetic suitability”. What might this mean for people whose genetic profile showed that they were at risk of developing an inherited disorder?

CRIMINAL JUSTICE AND THE LAW

If criminal behaviour were genetically determined, courts would have to decide whether offenders should be punished (because they have broken the law) or helped (because they have defective genes). Do students think that our social environment (i.e. our family background, whether we are socially/ educationally disadvantaged, poor or rich) has any bearing on criminal behaviour? What role does free will play?

Family life. Children with observable genetic predispositions could be groomed for particular roles. Acquired talents might be ignored and children prevented from making free choices about their future.

Twin studies are extensively used in genetic research. Identical twins share 100% of their genes, compared with an average 50% shared by non-identical twins, so comparisons of data from both groups allows researchers to estimate the degree to which variation is due to genetic rather than environmental factors.

ACTIVITY SHEETS FOR STUDENTS UNIT 7

BLAME IT ON YOUR GENES



ACTIVITY SHEET 1A: DOES AN EXTRA Y CHROMOSOME MAKE MEN MORE VIOLENT?

by our Social Affairs Correspondent

Research published today suggests a link between an extra Y chromosome and violence in men.

Embryos which contain two X chromosomes (one from the mother and one from the father) develop into females, while those containing an X and a Y chromosome develop into males. Researchers doing routine blood tests on nearly 200 men in Carstairs, a high-security mental hospital in the UK, have discovered seven men with an extra copy of the Y chromosome in each of their body cells (XYY rather than XY).

No-one knows how many XYY males there are in the population as a whole, but researchers suggest that the seven (3.5%) found in Carstairs is an unusually high figure — maybe even 20 times higher than expected.

XYY males do not necessarily look any different from normal males, although XYY males at Carstairs appear to share some characteristics — they are unusually tall (i.e. more than 1.8m/6 ft), and tend to have low intelligence and low fertility.

Researchers say it is too early to link the presence of an extra Y chromosome with aggressive behaviour. But women (who have no Y chromosome) tend to be less aggressive than men. So is violence in the genes? Is there a gene on the male sex chromosome which makes XYY men doubly likely to commit violent crime?

Wendy Taggart, a 22 year old picture researcher from Glasgow, admits that the research findings worry her a bit. 'I do not like the idea of judging people by their genes', she said, 'but I would think twice now if I met a man who was very tall and a bit slow. I mean, who knows, he could be one of them.'

Sonny Obote, a 19 year old computer technician working in Cardiff, thought that people were jumping to the wrong conclusions. 'There could be thousands of XYY men leading perfectly ordinary lives out there who've never been involved in crime. It's stupid to say the two are linked.'

ACTIVITY SHEETS FOR STUDENTS UNIT 7

ACTIVITY SHEET 1B

Read through the newspaper article you have been given. Then go through the statements below putting a tick in the box which is right for your group:

BE PREPARED TO SAY WHY YOU THINK THE STATEMENT IS:

STATEMENTS: TRUE FALSE DON'T KNOW/ CAN'T AGREE

- If a man has an extra Y chromosome, he will become a violent criminal.
- Embryos with two X chromosomes develop into females.
- Mentally ill people who commit violent crime need to be locked away in high security mental hospitals like Carstairs.
- Embryos which contain an X and a Y chromosome develop into males.
- A person who has one X and two Y chromosomes is biologically male.
- An extra Y chromosome in men can be detected by a blood test.
- Seven men out of 200 (i.e. 3.5%) with an extra Y chromosome is an unusually high figure.
- There are lots of men in the general population who are XYY and have never committed a crime.
- Tall men of low intelligence and low fertility are likely to be XYY.
- Women are less aggressive than men.
- A screening programme to detect which males are XYY would help prevent crime.
- Society needs to be protected from XYY males.
- Newspaper articles linking XYY males with crime discriminate unfairly against men born with an extra Y chromosome.
- You shouldn't believe everything you read in the newspapers.

ACTIVITY SHEET QUESTIONS FOR DISCUSSION

Which of the following (if any) did you use to help you decide which of the statements on Activity Sheet 1B were true and which were false:

- Scientific evidence
- Other things you have read/seen /heard in the media
- Your own attitudes and values
- Personal experience
- A combination of these?

ACTIVITY SHEETS FOR STUDENTS UNIT 7

Read the following and put a circle round any which are true for you (you can circle as many as you wish):

Now that I have read a newspaper article about XYY males, if I found out that a father/ brother/ male friend of mine was XYY..

- It would make no difference
- I would worry for them
- I would worry for me
- I would worry for the general public
- I would not want other people to know
- I would keep a close eye on their behaviour
- other (please add your own)

Do you:

A) understand B) believe everything you read/see/hear in the media about recent developments in human genetics?

If not, why not?

ACTIVITY SHEETS FOR STUDENTS UNIT 7

ACTIVITY SHEET 2A

The newspaper article about XYY males is based on research which took place in 1965. More than 30 years later, the debate about the degree to which human behaviour is determined by genes continues..



I believe that genes are important, but our environment (how we are brought up, the food we eat, the “help and support we get) also has an effect on human behaviour. It's nurture not nature which counts!

“I believe that intelligence, violent behaviour, a willingness to take risks, sporting and musical talent, and happiness are all determined by genes. Nature makes us who we are!”



QUESTIONS FOR DISCUSSION

• Knowing more about how genes work might change the way people think about some aspects of human behaviour. Use the pictures on **Activity Sheet 2B** to help you think about some of the possible consequences of this.

Would you like what is happening in the pictures to happen to you/in your lifetime? Why/why not?

Do you think it is:

a) sensible

b) scientifically accurate

to link genes and behaviour in this way?

Why do you think twins are studied by researchers who want to understand whether human behaviour is caused by genes, by environmental influences, or by a combination of the two? (Think about the twins' DNA...)

ACTIVITY SHEETS FOR STUDENTS UNIT 7

ACTIVITY SHEET 2B - THE GENETIC FUTURE?



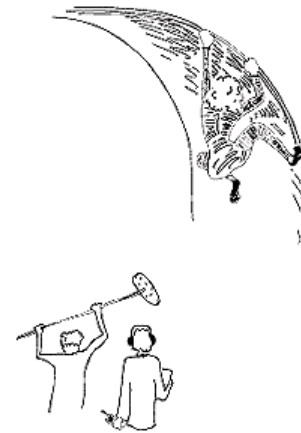
EDUCATION

I really enjoy teaching our genetic high-fliers. Sian Taylor is doing brilliantly, you know. I'm sure we did the right thing moving her into a special class alongside other students with high genetic intelligence scores.'



CRIMINAL JUSTICE

'I want to stop but I can't. I get drunk and then I get into fights and things. But I don't deserve to go to prison. Fighting is in my genes, you see — my old man was the same.'



EMPLOYMENT

As soon as I saw that risk-taking gene on her genetic profile, I just knew we had to employ her. And I was right. She's the best stuntwoman we've ever had'.



FAMILY LIFE

'The man who analysed Zak's genes when he was born told us Zak could be a great athlete if he worked hard at it, so I reckon we should pay for extra coaching for at least another year.'

'But not for Marcia?'

'No, I don't think so. She doesn't appear to have any special genetic potential.'