



Online Ethics Center
FOR ENGINEERING AND SCIENCE

The XYY Controversy

Ethics in the Science Classroom Case Study #5

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Year

2000

Description

This historical case study discusses how a paper published in 1961 that purported to link men with XYY chromosomes to being predisposed to violent and criminal behavior. The case discusses issues related to genetic screening and other applications of genetics and biotechnology research.

Abstract

This is one of six cases from Michael Pritchard and Theodore Golding's instructor guide, "[Ethics in the Science Classroom](#)."

Categories of Ethics/Values Issues Illustrated by This Case: Issues related to genetic screening and other applications of genetics and biotechnology research.

Body

1. Introduction

Efforts to make use of increasing knowledge about the genetic component of human development and behavior have been a frequent source of serious ethical controversies. Support among geneticists, other scientists and the educated public for the eugenics movement, which advocated efforts to improve the human race by controlling presumed heritable characteristics, resulted in such misguided governmental policies early in this century as the large-scale sterilization of "inferior" individuals. Legislation authorizing such forms of social engineering was met with increasing criticism from those who questioned the morality of such practices as well as those who doubted the validity of simplistic biologically determinist models of complex human social behavior.

The reaction to the extreme and horrific use of eugenics measures by the Nazis in their campaign to promote the superiority of a cleansed Aryan "race" resulted in a temporary hiatus in research and development in applied human genetics. By the 1960s, however, increasing understanding about the genetic causes of such specific conditions as Down's Syndrome and sickle cell anemia were again arousing support for efforts to seek genetic explanations - and perhaps improvements - for a wide range of human "deficiencies" from various sorts of socially deviant behavior to susceptibility to environmental hazards.

The explosive growth of facile genetic engineering technologies and, in particular, the potential applications of the information gained through the Human Genome Project is destined to greatly amplify both the quantity and the variety of ethical concerns related to attempts to screen, control, manipulate or modify people based on their genetic predispositions.

A frequent underlying theme in disputes over "progress" in applied human genetics is rooted in the nature-nurture controversy. Those who do research into the genetic factors related to complex human problems are seen by their opponents as diverting attention from and ultimately undermining attempts to ameliorate the socioeconomic conditions related to the problems. In the view of these opponents, genetic differences are likely to be less important than social inequalities in determining most human behavior. Furthermore, they argue that the end result of a biological determinist perspective is discrimination against, rather than help for, those who are deemed inferior or defective.

The XYY controversy offers a case study that dramatically illustrates many of the ethical issues that arise when efforts are made to explore the social implications of

human genetic differences.

2. Background

In 1961, a paper was published in the medical journal *Lancet* reporting the first man to be discovered with an extra Y chromosome in his cells, in addition to the normal male complement of one X and one Y. Within the next few years research reports appeared that purported to show that XYY males were predisposed to violent and criminal behavior. This claim was widely publicized in the news media. By the mid-1960s XYY was being referred to as the *criminal chromosome*. In 1968 lawyers in at least two cases succeeded in persuading juries that their clients were less culpable for their crimes because they were XYY males. If this was not sufficient to persuade the public that XYY individuals were potentially dangerous social misfits, the erroneous report that a vicious serial killer of eight student nurses in Chicago was an XYY male surely had that result.

As is often the case for sensationalized, premature publicity about unproven scientific findings, the subsequent research that debunked the connection between the XYY karyotype and any demonstrable link to anti-social behavior received very little publicity. Thus the myth persisted that males with an extra Y chromosome were likely to manifest excessive violence and other undesirable social traits. This fallacious association even made its way into biology textbooks.

Several research projects underway during the 1960s were aimed at examining the actual prevalence of the XYY karyotype in the general population and attempting to explore whether there were any phenotypic consequences, including predisposition to any form of abnormal social behavior. One such study was carried out by Harvard child psychiatrist Stanley Walzer and Harvard Medical School geneticist Park Gerald. By 1968 they were screening all newborn males at Boston Hospital for Women and following up by studying the development of those with abnormal karyotypes like XYY or XXY. The research was funded by a grant from the Centers for Studies of Crime and Delinquency of the National Institute for Mental Health.

3. The Case

In 1974 the Walzer and Gerald research project became the subject of sharp criticism orchestrated by a study group from the organization Science for the People and led by Harvard microbiology professor Jonathan Beckwith and MIT molecular biology professor Jonathan King. Their criticism was based on claims that the research seriously stigmatized those infants found to be XYY, that efforts to obtain informed consent were flawed, that the research served no potentially useful purpose for either the subjects or society as a whole, that the research design could not produce any valid scientific conclusions, and that the only possible consequences of the work would be to undermine appropriate efforts to deal with social problems.

After failing in their attempt to have the research stopped by appealing to Harvard's internal institutional review boards, the Science for the People Group went to the press and successfully enlisted the help of other organizations concerned about the welfare of children. This tactic ultimately achieved their goal of getting Walzer and Gerald (as well as other researchers) to stop screening newborns for XYY. The victory was won at the expense of alienating many biomedical researchers who objected to the tactic of using public pressure to stop a research project.

4. Readings

To prepare yourself to consider the issues raised by this case you should read the following documents:

- "The XYY Controversy: Researching Violence and Genetics," a Special Supplement to the *Hastings Center Report*, August 1980.
- "Behavioral Implications of the XYY Genotype," by Ernest B. Cook, *Science*, 179, pp 139-150, January 12, 1973.
- "Patients' Rights: Harvard Is Sight of Battle Over X and Y Chromosomes," by Barbara Culliton, *Science*, 186, pp 715-717, November 22, 1974.
- "XYY: Harvard Researcher Under Fire Stops Newborn Screening," by Barbara J. Culliton, *Science*, 188, pp 1284-1285, June 27, 1975.
- Part III of *The Code of Codes*, edited by Daniel J. Kevles and Leroy Hood (Harvard University Press, Cambridge, 1992) contains several essays that discuss many of issues concerning ethical, legal and social implications of human genetics research and technology.
- An excellent discussion of issues related specifically to genetic screening of workers is "Genetic Testing in the Workplace" by Paul Billings and Jon Beckwith, *Trends in Genetics*, 8, pp. 198-202, June 1992.

5. The Issues

Significant ethical questions raised by this case:

- How should the principle of informed consent be interpreted when the subject of a research project is newborn infants?
- What possible outcomes would justify a research project that will have the inevitable outcome of stigmatizing the subjects in a way that may result in serious restrictions on their personal freedom?
- Is it an inappropriate intrusion for a researcher to offer *anticipatory guidance* to subjects of a research study where no scientific basis exists for expecting the need for this help?
- Is it possible to design an ethical, valid research project aimed at establishing a genetic component for the predisposition to some socially unacceptable behavior?

- Is it ethical to ban or refuse to use public monies to support certain types of research because of their potential social consequences, even if the research may have scientific merit?
- Is it ethical for scientists (or anyone else) to organize public opposition, with the help of the press, to halt a research project that has won the approval of the public funding agency and all of the review procedures within the institutions where it is being carried out?
- To what extent should the principle of academic freedom be invoked to protect researchers from the scrutiny of the public?
- Under what circumstances is it ethical to deny human subjects of research projects information about the results of that research?
- To what extent should the public be represented on institutional review boards set up to approve research that may have serious social or political consequences?
- Should there be any limits to the genetic information that a pregnant women can use in deciding whether to interrupt a pregnancy.

Additional ethical questions related to applications of genetic research results not covered by this case study:

- What are the ethical issues related to such concerns as rights of privacy, pregnancy counseling, public education, equal access and public welfare that are raised by existing or proposed screening programs for debilitating or fatal diseases resulting from genetic defects, such as Down's syndrome, cystic fibrosis, Huntington's disease and Tay-Sach's disease?
- What are the ethical implications of using genetic screening in the workplace to exclude candidates from eligibility for jobs?
- Is it ethically permissible to use genetic susceptibility to various diseases as a basis for determining eligibility for health care coverage?
- Is the use of genetic information to increase the social categories to which people can be assigned likely to lead to various forms of discrimination, and to what has been referred to as a *genetic underclass*?
- Can the potential invasions of privacy that may result from the increased use of genetic screening in forensics be avoided?

Resource Type

Case Study / Scenario

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Ethics in the Science Classroom

Topics

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