

Developments in the last several years have sparked renewed interest in the ethics of research involving humans. Issues relating to the global extent of research and its guiding principles are of particular importance to researchers, health officials, and individual ethics committees who want a deeper and more encompassing inquiry regarding the foundation and evolution of human research. This department of *CQ* launches a long overdue effort to explore these wider issues. Readers are invited to submit papers to Charles MacKay, 5011 Worthington Drive, Bethesda, MD, 20816, USA. E-mail: mackaycharles@yahoo.com.

Attitudes of Future Lawyers and Psychologists to the Use of Genetic Testing for Criminal Behavior

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In a democratic society, adults are viewed as moral agents who are responsible for their acts. A crime is a violation of a widely agreed upon set of rules by an individual presumed to understand that he is committing the offence. In the long run, new insights provided by molecular genetics could influence society to adopt a disease model for some types of crime. Claims that a genetic condition is the underlying cause of an individual's criminal act have already appeared (albeit rarely) in the courts.¹ In their article on medical ethics in the 21st century, M. Parker and T. Hope² predict that "criminal responsibility will . . . come to be seen as a thing of the past. . . . The age of Prisons will be looked back upon with horror in much of the same way that we now look back to the workhouse.

Funding was provided by a research fund of the faculty of medicine, University of Geneva. I thank Prof. T.W. Harding and Prof. C.-N. Robert for their support.

The treatment of 'criminals' will therefore become a medical issue, and the ethical issues, issues of medical ethics" (p. 5).

Until recently, evidence for the genetic influence on criminal behavior has been poor and controversial.³ However, a recent, often-cited study points to the influence of a particular genotype on aggressive behavior. This study⁴ showed that a certain form of a gene that breaks down neurotransmitters makes men more likely to be violent, but only if they were maltreated as children. Eighty-five percent of cohort males having a low-activity MAOA genotype who were severely maltreated developed some form of antisocial behavior.⁵ According to E. Stokstad,⁶ legal implications of this study are less clear because experts do not think that "judges will buy it." Some criminologists remain skeptical, citing earlier claims to have identified a biological basis of criminality that later were not confirmed.⁷

In autumn 2002, the Nuffield Council on Bioethics published its report on "Genetics and Human Behaviour."⁸ In its chapter 14, the report considers "the status of biological explanations of behaviour in the context of criminal law and the possible impact of behavioural genetics on the legal system." The working party that wrote the report concluded that "research in behavioural genetics does not pose a fundamental challenge to our notions of responsibility as they are applied in the legal context . . . at least for the foreseeable future. If progress in behavioural genetics were to be such that close and clearly identifiable association between particular genetic variants and particular forms of antisocial acts were to be demonstrated, there would be a case for a re-examination of the legal implication" (articles 14.24, 14.25). It concluded also that predictive use of genetic information may be "used only if the aim is to benefit the individual, and in doing so, to benefit society also . . . prediction of behaviour with a view to detaining an individual who has not committed a crime is not justified, whether such predictions are based on information about genetic or non-genetic influences on behaviour" (art. 14.44). In contrast, with regard to sentencing of convicted offenders, the report concludes that it "would be unwise to assume that genetics will not be able to assist in determining degrees of blame, even if the 'all-or-nothing' question of responsibility is not affected by genetic factors themselves" (p. xxxi) . . . the justice system should be open to new insights from disciplines that it has not necessarily considered in the past" (p. xxxii). The "criminal law should be receptive to whatever valid . . . evidence is available. . . . Credible evidence of influence and a robust test for the genetic factor in question would be essential: the weight to be accorded to such infor-

mation would be determined by the judge" (art. 14.34).

Concerning prenatal selection, the working party expressed its opinion that "the use of selective termination following PND [prenatal diagnosis] to abort a foetus merely on the basis of information about behavioural traits in the normal range is morally unacceptable" (p. 152). It also recommended that preimplantation genetic diagnosis "should not be extended to include behavioural traits in the normal range such as intelligence, sexual orientation and personality traits" (art. 13.78).

We are not aware of any other study concerning the Nuffield Council report on genetics and human behavior. The aim of our study was to explore the attitudes of law and psychology students, taking part in a course on criminology, toward genetic testing for a disposition to violent and antisocial behavior and the use of these tests by the criminal system. We chose this group of students because they represent, first, a group of educated young adults interested in criminology, and second a group of future lawyers, judges, and psychologists who will be faced by the issue of making use or not making use of genetic knowledge. To determine a possible need for more general education of interested members of the public about the subject, it is important to know about attitudes of young educated adults, which they have most probably gained from their education, the media, and perhaps other more personal sources. On the other hand, we were interested in knowing whether the recommendations of the Nuffield Council are in tune with the views of these students who will, as future professionals, act or not act according to the cited recommendations. Our hypothesis was that the years of study, the field of studies (law versus psychology), cul-

tural background, and religion might influence students' attitudes as has been established for other ethical issues.⁹

Participants and Methods

We developed a standardized questionnaire (see the Appendix) about attitudes to genetic testing for behavioral traits, including violent and antisocial behavior, based on the Nuffield Council report,¹⁰ citations of the chairman of the council's working party in a press report,¹¹ which have been approved by N. Perrin (Public liaison Officer, Nuffield Council, personal communication 2002), and other studies about students' and the public's attitudes toward genetic testing for behavioral traits.¹² The questionnaire was pretested among a group of bioethicists, former law students, and individuals with university education in the field outside genetics, in order to test for comprehension of the questions and ethical validity. Several corrections were made to remove ambiguities.

At the first session of the criminology course at the University of Geneva (law school, winter semester 2002/2003), before any teaching had taken place, the 91 students present in the auditorium filled out the anonymous questionnaire. They were informed that the research was conducted by an independent researcher from the medical faculty with the aim to find out about the students' attitudes on some ethical issues. Besides the questions, we asked students about their age, sex, field of studies, study year, mother tongue, religion, and frequency of participating in religious activities.¹³ The answers to the questions were coded on a five-point Likert scale ranging from 5 (completely agree) to 1 (completely disagree).

All statistical analyses were performed with the personal computer version of the Statistical Package for the Social Sciences (SPSS). Compari-

sons between the scores (responses to the questions) of dichotomic groups (e.g., psychology students vs. law students or Catholic students vs. non-Catholic students) used the Student's *t*-test for independent variables. For other simple comparisons we used chi-square and two-tailed *t*-tests where appropriate.

Results

Eighty-seven of the 91 participants (96%) returned completed questionnaires. Sixty-two (71.3%) were law students, 21 (24.1%) were psychology students, and 4 (4.5%) students were from other faculties, mostly educational sciences. Overall, 70% of students were women, 30% men. The mean age of students was 23.5 years. Most of them were second to fourth year students, a few students being more advanced (minimum 2, maximum 10, mean 3.2). The mother tongue of 80% was French, of 5% German, of 6% Italian, of 6% Spanish, and of 3% other languages. Twenty-three percent of students were without religious affiliation, 46% Catholic, 19% Protestant 7% Jewish, 4% Orthodox, and 1% Moslem. The 64 students with a religious affiliation attended religious activities from 0 to 52 times per year (mean: 6.7 ± 13.85). No significant differences existed between law and psychology students with regard to sex, age, study year, mother tongue, the writing of a comment, attendance of religious activities, and religious affiliation, except Catholic religion. Forty-one percent of law students versus 67% of psychology students ($p = 0.4$) were Catholic.

The answers to the questions are shown in Table 1. No significant differences were found between the answers of psychology and law students and between older and younger students. The 23 students who were in their fourth year or more advanced

Table 1. Students' Answers to Questions 1–10b (1–6. Ranged from Highest to Lowest Disagreement)

	Completely agree	Partially agree	No opinion	Partially disagree	Totally disagree	Total disag. ^a	Mean ^b [SD]	Mode
3. It would be justified to take preventive measures including deprivation of freedom in regard to individuals who carry genes predisposing to aggressive or antisocial behaviour.	1 (1.1%)	5 (5.7)	3 (3.4%)	15 (17.2%)	63 (72.4%)	89.6	1.5 [0.9]	1
5. A criminal's genetic disposition toward antisocial or violent behaviour could be as valid a factor for judges as psychiatric reports or the diagnosis of a personality disorder.	3 (3.4%)	15 (17.2%)	4 (4.6%)	24 (27.6%)	41 (47.1%)	74.7	2.0 [1.2]	1
2. It is important to develop tests permitting to know whether a person carries a gene causing a predisposition to criminal behaviour in order to give individuals who desire children the possibility to know whether they risk transmitting such a gene.	3 (3.4%)	20 (23.0%)	2 (2.3%)	21 (24.1%)	41 (47.1%)	71.2	2.1 [1.3]	1
1. Society should do everything possible to diminish the frequency of genes predisposing to criminal behaviour.	6 (7%)	20 (23.3%)	4 (4.7%)	23 (26.7%)	33 (38.4%)	65.1	2.3 [1.4]	1
4. In the future research on genetic factors of criminal behaviour will contribute significantly to public safety.	4 (4.6%)	17 (19.5%)	7 (8.0%)	28 (32.2%)	31 (32.2%)	64.4	2.3 [1.3]	1
6. The genetic disposition toward antisocial or aggressive behaviour should be relevant for the decision between medical treatment (psychotherapy or psychiatric treatment) and imprisonment.	8 (9.2%)	24 (27.6%)	2 (2.3%)	19 (22.1%)	33 (38.4%)	60.5	2.5 [1.5]	1
7. It is not fair to a child to bring it into the world:								
(a) if it is at great risk of suffering from a serious genetic disorder.	16 (18.6%)	37 (43.0%)	2 (2.3%)	16 (18.6%)	15 (17.4%)	36.0	3.3 [1.4]	4
(b) if it has a genetic disposition to criminal behaviour.	2 (2.3%)	10 (11.5%)	4 (4.6%)	29 (33.3%)	42 (48.3%)	81.6	1.9 [1.1]	1

8. In an era of prenatal diagnosis it is socially irresponsible knowingly to bring an infant into the world:								
(a) which is at great risk of suffering from a serious genetic disorder.	15 (17.2%)	26 (29.9%)	3 (3.4%)	21 (24.1%)	22 (25.3%)	49.4	2.9 [1.5]	4
(b) which has a genetic disposition to criminal behaviour.	2 (2.3)	12 (13.8%)	2 (2.3%)	31 (35.6%)	40 (46.0%)	81.6	1.9 [1.1]	1
9. Confidential prenatal testing should be available to all individuals who want to know this information for: ^c								
(1) Aggression (tendency toward violent behaviour)	5 (5.7%)	28 32.2%	5 (5.7%)	20 (23.0%)	29 (33.3%)	56.3	2.5 [1.4]	1
(2) Antisocial behaviour	4 (4.6%)	15 (17.2%)	4 (4.6%)	26 (29.9%)	38 (43.7%)	73.6	2.1 [1.3]	1
(3) Alcoholism	6 (6.9%)	23 (26.4%)	4 (4.6%)	23 (26.4%)	31 (35.6%)	62.0	2.4 [1.4]	1
10. Such genetic tests about "aggression" (1)								
(a) should be proposed to all adults of the age to have children who have in their family a relative convicted for violence against a human being.	3 (3.4%)	17 (19.5%)	3 (3.4%)	31 (35.6%)	33 (37.9%)	73.5	2.1 [1.2]	1
(b) should be proposed to all adults of the age to have children who have in their family a person convicted for a particularly violent crime (murder, attempted murder, etc.).	6 (6.9%)	24 (27.6%)	2 (2.3%)	25 (28.7%)	30 (34.5%)	63.2	2.4 [1.4]	1

^aTotal percentage of students who disagreed.

^bMean of Likert scale from 5 = *totally agree* to 1 = *totally disagree*.

^cAssume that a specific gene has been identified which determines a disposition of an individual to a particular behaviour and that a precise test has been developed to test for the particular disposition.

agreed significantly more often than less advanced students with question 5 (mean 2.6 vs. 1.8, $p = 0.2$), question 9-2 (mean 2.6 vs. 1.8, $p = 0.46$), and question 9-3 (mean 2.9 vs. 2.2, $p = 0.06$). Female students agreed significantly more often than male students with question 3 (mean 1.6 vs. 1.2, $p = 0.02$), question 7a (mean 3.5 vs. 2.7, $p = 0.02$), question 8a (mean 3.1 vs. 2.4, $p = 0.048$), question 8b (mean 2.1 vs. 1.4, $p = 0.002$), and (less significantly) question 7b (mean 2.0 vs. 1.6, $p = 0.07$). Catholic students agreed significantly less often than non-Catholic students with question 8a (mean 2.6 vs. 3.2, $p = 0.05$). Protestant students agreed more often with question 7a than non-Protestant students (mean 3.9 vs. 3.2, $p = 0.03$). The most important differences were found between students who indicated French as their mother tongue and students with other languages as mother tongue (from now on referred to as "foreign" students, although of course in Switzerland, German speaking and Italian speaking may mean coming from another part of Switzerland). Foreign students agreed less often than native French speakers with all 15 questions, differences being significant for question 2 (mean 2.3 vs. 1.4, $p = 0.001$), question 3 (mean 1.6 vs. 1.1, $p < 0.001$), question 7a (mean 3.5 vs. 2.4, $p = 0.005$), and question 8a (mean 3.2 vs. 1.8, $p < 0.001$).

A reliability analysis obtained a Cronbach's alpha coefficient of 0.9 for the 15 questions. A factor analysis (principal component analysis) showed a main component that explains 42% of variance. In the component matrix, most questions obtain a value of at least 0.6. The exceptions are questions 7a and 8a, with lower values (0.3). When comparing the sum of the scores of all 15 questions, significant differences were found between native French speakers and foreign students

(mean 35.8 vs. 29.0, $p = 0.04$) and between students who wrote comments and those who did not write any comment (mean 30.0 vs. 36.0 of the maximum 45 score, $p = 0.04$). Foreign students and students who wrote comments had lower agreement with the statements.

Overall, one-third of students wrote a comment at the bottom of the questionnaire. Apart from some comments (identification number of questionnaire in brackets) indicating that the questions were interesting, complicated, and difficult to answer because "the issue is delicate," (28) and some other comments explaining that answering the questions is of no use to the student, the comments brought about the issues shown in Table 2.

Discussion

Genetic Testing for Criminal Behavior

Most law and psychology students at the University of Geneva who are interested in criminology have critical attitudes toward genetic testing for criminal behavior. The majority of them, independent of whether they studied law or psychology, disagreed with the use of genetic testing for aggressive or anti-social behavior in different circumstances. The greatest opposition was that concerning preventive measures, including deprivation of freedom, in regard to individuals with a genetic disposition to criminal behavior (question 3). The attitudes of 90% of students were in accordance with the recommendations of the Nuffield Council: "We don't think the case is made out yet for preventive detention or anything of that kind. That would be horrifying science fiction stuff, he [B. Hepple, chairman of the council's working party] said."¹⁴

Overall, students' attitudes were more generally against the use of all testing and less differentiated than the

recommendations of the Nuffield Council report.¹⁵ This report concludes that genetics might be able to assist in determining degrees of blame (p. xxxi) and recommends that “the criminal justice system should be open to new insights from disciplines that it has not yet considered in the past” (p. xxxii). In a recent press report, M. Holden¹⁶ has written: “A criminal’s genetic disposition toward anti-social behaviour, such as violence or aggression, should be as valid a factor for judges as psychiatric reports or personality disorders, Britain’s Nuffield Council on Bioethics said.” The information that we have obtained from the Nuffield Council by e-mail is that “should” is to be replaced by “could” in order to accurately describe the Council’s opinion. Of law and psychology students from our sample, 74.2% did not agree with this statement, and only a minority agreed (17.2% partially, and 3.4% completely; “could”-version, question 5). “If you found that someone had a genetic make-up of this kind together with certain environmental factors, you might find probation plus anger treatment or therapy more appropriate than sending them to prison,” Professor Bob Hepple, chairman of the council’s working party, told Reuters.¹⁷ Again, most students from our sample (60.5%), but less than concerning the previously cited question 5, disagreed that “genetic disposition toward antisocial or aggressive behaviour should be relevant for the decision between medical treatment (psychotherapy or psychiatric treatment) and imprisonment” (question 6).

The reason most students reported such a consistent opposition to genetic testing for criminal behavior was apparently their conviction that nurture is more important than nature in causing criminal behavior (see comments, Table 2). Most students did not think that the evidence of reliable genetic

influence on different kinds of behavior is sufficient nor that it will ever be sufficient. This conviction can also explain why most students (64.4%) did not believe that, in the future, research on genetic factors of criminal behavior will have significant contributions, for example, to public safety (question 4).

As shown in the comments, students who wrote them shared the Nuffield Council’s opinion against genetic determinism, implying the possibility to “correct” the genetic predisposition through environmental influences. “If you are aggressive you can go and have anger management courses. You can restrain your genetic predisposition or channel it in certain ways, he [B. Hepple] said.”¹⁸ To a lesser degree, students’ attitudes seemed to have been influenced by the idea that criminal behavior is not a behavior that can be characterized in itself but is caused by societal norms that vary over time. If aggressive or antisocial behavior only depends on the particular definition of different societies, the use of genetic testing would be complicated because in one particular type of society a defined predisposition would lead to criminal behavior, but in another society the same gene would, by definition, lead to noncriminal behavior.

On the other hand, it is also important to see that an important minority (one-fourth to one-third of students) were constantly at least partially in favor of the use of genetic testing for antisocial or violent behavior in the context of the criminal justice system, the most important exception being the use of preventive measures for genetic reasons (only 6.8% of students in favor).

Students’ Attitudes to Prenatal Testing for Serious Genetic Disease versus Predisposition to Criminal Behavior

One of the most striking results of the study is the clear difference between

Table 2. Students' Comments (Identification Number of Questionnaire in Parentheses)

a. The influence of nurture is more important than the influence of nature	<p>I do believe neither in god nor in a genetic predisposition to criminal behaviour. Minority report is a bad movie (2)</p> <p>I think that criminal behaviour does not result from a genetic but from a familial or social or cultural problem (87).</p> <p>I do not think that a gene predisposing to criminality is the explanation of criminal behaviour. A person with a predisposition to alcoholism will not always develop it. It depends on the circumstances. (44)</p> <p>I am sceptical on the subject. I do not think that all criminals have a genetic predisposition. For me, the "acquired" aspect has more importance than the "inborn". A criminal might have suffered from childhood traumatism which have driven him to commit a crime, without being the carrier of a particular gene. A gene carrier might due to education and personnel experiences be protected from committing a crime. I do not believe in this theory of genes. (61)</p> <p>It seems to me totally illusory to search for one gene supposed to be responsible of aggressive or antisocial behaviour or (which is still worse) of alcoholism. Human beings need to be studied in their context as this is where behaviour takes place and is constructed, not only in the genes. (66)</p> <p>I do not believe in the presence of a "gene of criminals" (73).</p>
b. Both nature and nurture influence, but nurture can be changed	<p>If a gene would be found, it would only determine a predisposition to behaviour and therefore it is rather society, which should change. (3)</p> <p>Should one not rather blame society itself and its pernicious influences than the genes of individuals? (24)</p> <p>I do not believe in genetics as only factor, but in multiplication of factors, containing particularly educational and environmental factors. (67)</p>
c. Genetic determinism is not compatible with the values of our society such as autodeterminism and respect for diversity of individuals	<p>Every individual has the right to autodetermination. A reduction of behaviour to genetic predispositions is not compatible with this idea. Better is to educate the individuals by inculcating values and permitting individuals to evolve. (4)</p> <p>Argumenting with genetic predispositions will create races of people according to what corresponds to the "perfect individual" of a certain era. Predisposition to aggressiveness will not necessarily express itself as violent behaviour, but as talent in sports or creativity. It is more important to help people control their aggressiveness or other nondesirable behaviour. (6)</p> <p>One should not get caught up in genetic selection and try to determinate which will be a child's future. (23)</p> <p>I think that one cannot control everything, society is not perfect, one cannot forbid that parents have children, because even with a predisposition, the risk is not 100%, there is still hope. (59)</p> <p>The progress of science must serve humanity; it is not humanity, which should serve science as guinea pig. It is for me aberrant to wish to transform science into a pre-science allegedly capable of creating the "ideal human being". Attention to the risks of "dérive". (83)</p>

- d. Genetic determinism is dangerous
 - If in the future all behaviour was explained by genetics, this would be dangerous and frightening. I find this out of its place and not at all realistic. (9)
 - I think it is dangerous to believe that a single gene could be responsible of a criminal or other behaviour. (13)
 - Crime has a social function. It would be dangerous to reduce criminality to zero. Better is to keep it at a normal frequency, which should be a small percentage. (17)
 - It seems to me that the "dérives" of the "génie génétique" have to be more feared than the unwanted actions of some individuals. (35)
 - It is not particularly for religious reasons that I do not entirely agree with the use of genes. I am rather convinced that once one begins to use genes one will loose control and the results will be undesirable. (72)

 - e. Belief in genetic determinism will act as a self-fulfilling prophecy
 - Concerning questions 9 and 10, I think that knowing about an individual's predisposition will only increase the risk of the individual to develop the predisposition. (73)

 - f. In favour of some form of prevention
 - Violent behaviour should be prevented. It depends on the incidence whether psychological measures or other types of prevention should be used. (1)
-

students' attitudes on the "fairness" of bringing into the world a child at great risk of suffering from a serious genetic disorder (61.6% thought this would be "unfair") and bringing into the world a child with a genetic predisposition to criminal behavior (only 13.8% thought this would be "unfair").

Critical voices have warned that the availability of genetic tests not only for diseases but also for undesirable characteristics will create a pressure on women to request testing.¹⁹ If prenatal testing and selective abortion are judged not to be acceptable,²⁰ selection by preimplantation diagnosis could perhaps be justified.²¹ This pressure is indirect through the idea of "responsible parenthood," which means that parents should take steps to have children who are as healthy as possible.²² The view that a responsible parent needs to do prenatal testing is in general motivated by two reasons. The first is the wish to avoid harming a child. This idea, which underlies also the wrongful birth claim, is contradictory in itself, because avoiding harm to an affected child by not selecting it or by terminating the pregnancy means avoiding its life altogether. In general, parents rather compare the life of an unborn affected child with the life of a future nonaffected child than, concerning the same unborn child, compare no life with an affected life. The second reason could be the feeling that having an affected child would be socially unfair, because the child would be a burden to society or to other siblings (and also to the parents). The idea of "unfairness" to the child is accepted by a greater percentage (61.6%; question 7a) of our sample of young educated adults in the case of serious disease than by Western geneticists, physicians, and patients. In an international study, less than 40% of geneticists in the United States, Canada, the United Kingdom, Switzerland,

and Germany, 52% of U.S. primary care physicians and 46% of U.S. patients agreed to the same question ("it is not fair to a child to bring it into the world if it is at great risk of suffering from a serious genetic disorder").²³ Fewer students from our sample, but still almost half of them (47.1%) found it "socially irresponsible" knowingly to bring into the world in this era of prenatal diagnosis an infant with a serious genetic disorder (question 8a).

A great majority of students (81.6%) did not agree with the idea that responsible parenthood requires prenatal testing for undesirable behavior such as aggression, alcoholism, or criminal behavior in general (questions 7b and 8b). The reasons for these critical attitudes toward prenatal testing for criminal behavior were apparently the same as for such testing in the context of the criminal justice system: the lack of belief (a) that such behavior is sufficiently genetically determined, and (b) that, if existing, the part of genetic determinism could be measured by gene tests.

The Nuffield Council's report identified "the start of a trend towards selection on other [than clinical] grounds"²⁴ (p. 150). Most students from our sample were opposed to the idea of reproductive freedom concerning genetic testing for criminal behavior. Seventy-five percent disagreed that it is important to develop "presymptomatic" tests "in order to give individuals who desire children the possibility to know whether they risk transmitting a gene predisposing to criminal behaviour" (question 2). The belief (b, see paragraph above) that precise gene tests are not possible in this field apparently influenced attitudes less than the belief in (a), the preponderance of nurture: If asked to imagine the existence of such a precise test (questions 9-1 to 9-3), the majority of students thought that confidential prenatal testing should *not* be available to individuals who

want this information concerning a predisposition to antisocial behavior (74%), alcoholism (62%), and aggression (56%). Another possible reason for the disagreement of the students could have been the feeling that prenatal testing and selective abortion are not adequate for predisposition to undesirable behavior. However, as shown by the answers to question 2, this cannot have been the major reason against testing, because even presymptomatic testing of *adults* who desire the tests has not been found acceptable by three-quarters of the students. Attitudes of students from our sample were more critical toward prenatal testing for a predisposition to the mentioned types of behavior than were two groups of undergraduate students at the University of Michigan.²⁵ Among these young North American students of childbearing age, almost 70% agreed that prenatal testing for alcoholism, and about 63% that prenatal testing for violent behavior should be made available at least in some circumstances to individuals who desire it. The students from this USA study cited as a reason for the endorsement of prenatal genetic testing the possibility for the individual to take preventive measures against the undesired behavior. Students from our study clearly thought that possible negative consequences of testing to the child (e.g., fulfilling prophecy, stigma; see Table 2) outweigh the autonomy rights of parents in this area.

Hepple resumes the opinion of The Nuffield Council's working party in the following way: "If you allow it [prenatal testing] for abnormal conditions such as chronic diseases, it doesn't follow that you have to allow it for what we regard as the normal make-up of mankind."²⁶ The Nuffield Council's report does not clearly state whether particularly violent behavior (murder, attempted murder, etc.) would be considered as the normal make-up of man-

kind or rather as a form of psychiatric pathology ("There seems to be a consensus in clinical genetics and in public opinion against use of PGD or PND in order to select babies on the basis of non-clinical characteristics."²⁷). Antisocial and violent behavior are part of personality disorders and could be considered as a disease. Surveys in the literature show that respondents were more likely to endorse prenatal testing for phenotypes that they felt to be indicative of pathology.²⁸

Eugenic Ideas with Regard to Criminal Behavior

Eugenic practices in the 20th century have aimed at among others things decreasing aggression and antisocial behavior in society by decreasing the birth rate of the "feeble minded" and "morally incompetent."²⁹ Among the means used to obtain this goal were involuntary sterilization, incarceration, and elimination. At present, the use of coercion as a means is condemned in Western countries, but it is less clear (1) how precisely to define eugenics.³⁰ Partly, but not completely, dependent on these problems of definition, it is also less clear (2) where exactly to draw the line between eugenics as an intervention on behalf of public health, and clinical genetics as a service for individuals and families,³¹ and (3) whether eugenics should be considered wrong in its very inception.³² The Nuffield Council's working party acknowledges the possibility "that contemporary understanding of the heritability of . . . behavioural characteristics . . . could provide a scientific foundation for a programme of positive or negative eugenics, were there to be the political will or power to construct and implement such a policy"³³ (p. 22). It does not give any definite answer, but encourages historical and philosophical studies of eugenic practices

“so that it may be clearly understood what was, and what was not, unacceptable about the past”³⁴ (art. 2.20, p. 22).

Students’ agreement with eugenic ideas might be concluded from several questions. Some 34.5% of students agreed that if precise gene tests for aggression existed, such tests “should be proposed to all adults of an age to have children who have in their family a person convicted for a particularly violent crime (murder, trial of murder, etc.)” (question 10b); a lesser percentage (23%) agreed with the proposal of tests if the relative in question had been convicted more generally for “violence against a human being” (question 10a). More important, 30% of students agreed that “society should do everything possible to diminish the frequency of genes predisposing to criminal behaviour” (question 1). This statement not only has a clear eugenic goal, it also does not exclude the use of coercive means. Seventy-one percent of the students from our sample disagreed with the idea of reproductive autonomy in the form of a positive right to select children according to a predisposition to criminal behavior (question 2). Such acceptance of a limitation of reproductive autonomy might be the first step on a slippery slope to other types of coercion, including eugenic coercion. According to Wertz,³⁵ “in an increasingly autonomy-oriented climate, it may be impossible to draw firm lines against such selection. Use of law to prevent such selection is the worst possible alternative, because it opens the door to other restrictions on people’s decisions about reproduction.” However, reliability and factor analysis of our study shows that most students who agreed with questions 10b and 1 disagreed with question 2; that is, contrary to Wertz fears, acceptance and not restriction of selection goes together with acceptance of eugenic ideas.

A General Attitude toward Genetic Testing for Criminal Behavior

We found a main component that influenced the answers to the 15 questions. This component seems to be a general belief in the influence of genes on behavior and leads to a general agreement with genetic testing about socially undesired behavior such as antisocial behavior, violence, or alcoholism. Part of this component, although of less importance, was also the agreement that socially responsible parents who want to be fair to their child would do prenatal testing for serious genetic disease. Students seemed to be of two types: either they disagreed with all statements about genetic testing (the majority) or they agreed to some extent to the use of genetic testing for antisocial or violent behavior in the context of the criminal justice system as well as to prenatal testing (a sizable minority of one-fourth to one-third of students). This tendency to generalization for or against testing could be due to several factors. First, a lack of more detailed information could have led to a general, most often critical, position nourished by fears of abuse of genetic tests and adverse effects on society (see Table 2). As reflected by many critical comments to the Nuffield Council report from official organizations and the public,³⁶ this is the prevalent position in Western society. Second, the opposite general positions could reflect the different “schools” of thinking, as to whether behavior is determined more by nature or nurture (see Table 2).

Factors Influencing Attitudes

The critical attitudes do not seem to be the result of particular university education in law or psychology. Contrary to our hypothesis, whether students belonged to one or the other

“school” apparently was not related to the type of studies (psychology vs. law). Only in 3 (questions 5, 9-2, 9-3) of the 15 questions was higher agreement associated with advanced study year. The fact that more advanced students’ attitudes were closer to the opinion of the Nuffield Council’s working party concerning question 5 could be due to the fact that these students had more detailed knowledge on the role of psychiatric reports in the courts. Interestingly, in all three questions, advanced students’ attitudes were more in favor of testing than less advanced students’ attitudes. A prudent conclusion would be that both types of university education (law or psychology) might contribute to a more differentiated, less generally critical, attitude toward behavioral genetics.

Our hypothesis that cultural origin and religion would be associated with different attitudes was confirmed. “Foreign” students (i.e., those whose mother tongue was not French) showed significantly more critical attitudes toward testing than did native French speakers. Cultural differences are known to influence ethical attitudes.³⁷ Foreign students from our sample were mostly German, Italian, and Spanish speakers. The history of Nazi eugenics is known to have shaped attitudes in Germany, with some probable influence on other German-speaking countries, toward more critical attitudes to presymptomatic and prenatal testing.³⁸ Foreign students could also be more aware of society’s tendency toward stigmatization due to nationality, race, or differences in behavior and therefore anticipate negative consequences of a belief in genetic differences of behavior.

Female students were more often in favor of statements 7a and 8a affirming that prenatal testing for serious genetic diseases would be fair to the future child and socially responsible.

This seems to indicate that potential mothers are more sensible to the pressures resulting from the idea of responsible parenthood. Possible reasons could be that women are particularly concerned about having a healthy child and feel personally guilty of transmitting a genetic disease to a future child. Women might also be more concerned about social responsibility in general³⁹ (question 8a), as seem to be Protestant students, confirming thereby a typical image of the Protestant religion as particularly concerned by social problems and tolerant toward prenatal testing and abortion. On the contrary, Catholic students were more often than other students against the idea that prenatal testing for serious genetic diseases would be socially responsible behavior (8a). The disagreement with this statement could be explained by the disagreement of Catholic students with abortion. If abortion is considered morally wrong, then not accepting prenatal testing and the possibility of selective abortion would not be “socially irresponsible.”

Strengths and Weaknesses of the Study

Strengths of our study are the high participation rate and the good reliability of the different parts of the questionnaire. Our study has also several weaknesses. First, all questions have been formulated in the same direction (in favor of testing). We can therefore not completely exclude that the high interitem reliability as well as differences found between students generally in favor and students generally against testing are in part due to a psychological tendency of some to rather agree, and of others to rather disagree. The different percentages found concerning different questions show, however, that many students gave differentiated answers according to the content of the questions.

A second weakness might be that some of the significant associations we found between sociodemographic characteristics and responses might be due to chance alone. However, because the differences we found are consistent and confirm typical differences toward ethical issues found in other studies speaks against the influence of chance.

Third, a problem of all questionnaire studies using hypothetical questions is that the reported attitudes might not be representative of attitudes that future judges, lawyers, or psychologist will show in a real situation.

Last, another weakness concerns the limited generalizability of our study. Our sample was composed of students interested in the course about criminology taught at the University of Geneva. Not all of these students will intervene later in the field of criminology. The personality of the two teachers (a university professor in criminal law and another in legal medicine) might have attracted a particular type of student—for example, students who agreed with the general opinion of the teachers known from previous courses. The course has been attended by mostly women. Their attitudes might not be representative of judges or psychologists who will later intervene in the field of criminology, the majority of whom will not be female. On the other hand, we were interested in comparing the attitudes of students interested in criminology with the recommendations of the Nuffield Council. Less important than the exact majorities in favor or against particular statements is the fact that we found groups of students who hold opposite opinions, as well as a general component distinguishing students generally against and students generally in favor of testing. This finding is important independent of the generalizability of our sample.

Conclusion

More detailed education of the interested public and in particular of present and future professionals intervening in the criminal justice system is needed in order to ensure a more differentiated view about the justified use of genetic testing for violent or antisocial behavior in different areas of the justice system, as well as about the usefulness of more research on genetics and human behavior.

However, given the limited scientific evidence for the time being, it is difficult to imagine teaching in this area that is entirely ethically neutral.

Notes

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23. See note 12, Wertz 1998.
24. See note 8, Nuffield Council 2002.
25. See note 12, Milner et al. 1998.
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27. See note 8, Nuffield Council 2002:151.
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APPENDIX

Annexe: Anonymous questionnaire

Please indicate (tick):

Your age: years

Your gender: m. f.

Type of studies: law
 psychology
 educational sciences
 other:.....

Your mother tongue ?
 French
 Other (describe)

Your study year:year

Thank your for answering the following questions (please tick):

	Completely agree	Partially agree	No opinion	Partially disagree	Totally disagree
1. Society should do everything possible to diminish the frequency of genes predisposing to criminal behaviour.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. It is important to develop tests permitting to know whether a person carries a gene causing a predisposition to criminal behaviour in order to give individuals who desire children the possibility to know whether they risk transmitting such a gene.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. It would be justified to take preventive measures including deprivation of freedom in regard to individuals who carry genes predisposing to aggressive or antisocial behaviour.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. In the future research on genetic factors of criminal behaviour will contribute significantly to public safety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. A criminal's genetic disposition toward antisocial or violent behaviour could be as valid a factor for judges as psychiatric reports or the diagnosis of a personality disorder.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. The genetic disposition toward antisocial or aggressive behaviour should be relevant for the decision between medical treatment (psychotherapy or psychiatric treatment) and imprisonment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. It is not fair to a child to bring it into the world :					
a) if it is at great risk of suffering from a serious genetic disorder..	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) if it has a genetic disposition to criminal behaviour.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. In an era of prenatal diagnosis it is socially irresponsible knowingly to bring an infant into the world:					
a) which is at great risk of suffering from a serious genetic disorder.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) which has a genetic disposition to criminal behaviour.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

