The Legal Implications of Behavior Genetics Research

By Zachary L. Stewart

Abstract

Behavioral genetics research has attempted to link behavior and personality to genes since at least 1965. This link, and the idea that human behavior may be wholly or in part predetermined, suggests that we may not have free will. One underpinning of many legal systems is the assumption that free will exists: a criminal makes the choice to commit a crime and is punished for making that choice. If behavior is predetermined, though, the idea of punishment appears immoral – we cannot punish people for things they have no control over. Lawyers occasionally take advantage of this idea and present behavioral genetics research in court in an effort to provide mitigating factors and reduce the punishment of their clients. I have reviewed three genetic traits that have been used in court: XYY syndrome, the MAOA gene, and Huntington’s disease. Generally, these types of defenses are not successful, and it appears unlikely that behavioral genetics will have a significant impact on the legal system in the near future.

The general population, having been raised on a diet of unrealistic television shows of detectives, criminals, and lawyers, and high profile, sensationalistic crimes and trials, may think of solving crimes using DNA when asked about genetics’ impact on the legal system. But genetics research has the potential to have a more important and far-reaching impact, particularly as further research is done. Research on the roles genes play in the development of behavior, particularly criminal and antisocial behavior, threatens to challenge some of the fundamental theoretical and philosophical underpinnings of the United States’ legal system. Yet, despite the appearance of a serious challenge to the legal system, the practical aspects of using behavioral genetics in court, the difficulties of determining the genetic basis of complex behavioral traits, and the paucity of successful genetics-based defenses show that such a challenge appears more threatening than it really is. Nonetheless, genetics defenses may become important in the future and the issues behavioral genetics research raises about crime and punishment are important to discuss and debate.

“The broadest and most approachable idea that is threatened by behavioral genetics research is that of free will, a tenet of legal systems – whether formally acknowledged or not – for as long as modern legal systems have existed. The idea of free will is that every person has control over his or her actions. This is the assumption that underlies criminal punishment – the criminal chooses to commit the crime and is punished for making that choice. In the United States, at least, a well-known exception to this assumption is the insanity plea, which occurs when the defense attempts to prove that the criminal was insane at the time of the crime and so did not realize that the crime was wrong or lacked control over him or herself. The insanity defense is notoriously difficult to successfully deploy, possibly because of the skepticism of jurors, who
view the evidence presented by psychiatrists as ‘soft’ science that has an indefinite, imprecise answer.\(^1\) It is estimated that one percent of felony cases in the United States seek an insanity verdict, and that one quarter of those cases receive one,\(^2\) meaning that 0.25% of felony cases end with an insanity acquittal. Behavioral genetics research threatens the assumption of free will by suggesting that some people are genetically predisposed to act antisocially and allowing attorneys to advance the defense that their clients committed crimes but could not be reasonably expected to control themselves because of the physiological impact of their genomes.

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This challenge to free will, the idea that genetic influences may not allow people to act of their own volition, is called determinism, and comes in two flavors: hard determinism and soft determinism. Jonathan Glover, an English ethicist, nicely frames hard determinism as resembling Newtonian physics in that people can only do one thing, which is prescribed by their particular mix of environment and genes.\(^3\) If scientists knew everything about someone, then hard determinism says that they would be able to predict exactly what that person will do in the future given a particular situation. This philosophy does not accept the existence of free will, and under hard determinism a criminal is guilty of the act but not psychologically guilty because he or she could not have done anything but commit the crime. According to hard determinists, the criminal who hits someone in the head is no more morally responsible that an apple is for falling from a tree, plummeting towards the Earth, and hitting Isaac Newton on the head. What would the world look like if hard determinism were true, one must wonder? It would look exactly as it does now – this implication of hard determinism is highly ironic, and it shows that it does not matter if hard determinism is true, but it does matter if we believe it is. Soft determinists, on the other hand, argue that our actions may be strongly affected by genetics, but that we still retain some control and, given sufficient self discipline, can make decisions. In this manner, soft determinism retains an aspect of morality so the criminal can still be condemned for not resisting psychological pressures and the urge to commit a crime. Soft determinism's retention of morality makes it a practical and hopeful stance. Determinism is among the issues raised by behavioral genetics research, and though it does not appear that the determinist debate will be resolved soon, if it is eventually reasoned that hard determinism is accurate there will be serious implications for the legal system.

In court, the guilt of the defendant can be separated into two distinct aspects: *actus reus*, or guilty act, and *mens rea*, or guilty mind.\(^4\) Genetics, particularly DNA ‘fingerprinting,’ is already used to establish or disprove the former, but the impact of genetics on the latter – an ethically complex issue – is what this essay is concerned with. Occasionally genetic evidence is used in the first part of the trial in an effort to obtain an insanity verdict, but this is uncommon and behavioral genetics research is almost always introduced in the penalty phase of the trial, after the criminal has been found guilty.

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of the crime. In the penalty phase, the evidence is used by the defense in an attempt to show the judge or jury that there are mitigating factors at work – namely, that their client was either the victim of an overwhelming psychological urge to commit the crime or that their client did not know that the action was wrong at the time. The object of such a defense is to show the absence of a *mens rea*, which can then be transformed into either an acquittal or a lesser sentence, such as life in prison rather than death, a shorter term in prison, or a move to a less secure prison or even a psychiatric institution. When behavioral genetics evidence is used, the object is a lesser sentence, not an acquittal.6

“What are we to do with criminals who commit violent crimes but who do not deserve to go to jail because they could not resist the impulse to commit the crime?”

The moral guilt of criminals rather than the physical guilt of criminals is the field in which behavioral genetics research is usually used, in an odd marriage of science and philosophy. If judges and jurors are convinced by such defenses, then an ethical dilemma arises: what are we to do with criminals who commit violent crimes but who do not deserve to go to jail because they could not resist the impulse to commit the crime? This is where theoretical matters meet practical ones, and where we must examine why society punishes criminals. One reason is to set an example and deter other potential criminals; another is to offset the crime, in a retributive ‘eye for an eye’ approach; and a third is to prevent the criminal from committing further crimes via incapacitation.7 If we punish people to deter others, then we ought to let the genetically impaired criminal go – incarcerating someone because he or she is blind, for instance, will not dissuade other people from going blind. But this is in essence a shifting of the punishment from the criminal to society; because the criminal – who cannot control him or herself – may commit additional crimes, and may even not struggle against such impulses anymore because of the lack of consequences for his or her actions. If we adopt the second approach – retribution – then we are freeing society from the burden of living with a criminal who may commit future crimes and fulfilling our need for revenge, but we also betray our sense of morality and infringe on the rights of the criminal who could not control him or herself. The third reason, incapacitation, would lead to the incarceration of the criminal. It lifts the burden of living with people who cannot control their criminal tendencies from society, but still leaves us on the immoral end of the spectrum. But if we follow moral standards and let the criminals live freely then we are – again – punishing society. There is a diametric opposition here between the rights of people who cannot control themselves and the rights of others to live in a safe and peaceful society. Eric Parens, a researcher who investigates the impact of technological and scientific innovations on society, frames the quandary well: “How can we simultaneously accept the respect in which our behaviors are not freely chosen, and also insist that, as members of communities, we must act as if they were?”8 This is, as Parens dryly notes, a difficult question.

A balance of idealism and pragmatism in determining punishments is necessary. Balanced

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solutions might include incarceration in institutions like mental hospitals or requirements that the criminal undergo therapy or take a drug to counteract the effects of his or her genes. It is vital that the public discuss the redefinition of consequences for criminals in light of behavioral genetics research and debate the proper balance of morally appropriate consequences and the public good.

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Some of the earliest genetics-based defenses involved the XYY chromosome syndrome, in which a male has a duplicate Y chromosome. This was observed in 1965 to be associated with lower levels of intelligence and greater height, and it was implicitly suggested that aggressive behavior was also associated with the syndrome.9 The data were gathered from prisoners, and, partly because of this, the XYY studies were criticized for having poor methodology and have now been discredited.10 Nonetheless, lawyers have used, or tried to use, the syndrome in court at least five times in the United States, beginning in 1969, but never successfully.11 In some cases, the defense was not allowed to present the evidence to the jury because there was insufficient proof that the XYY syndrome either caused “a physiological capacity or impulsion”12 – meaning that the defendant had not proved that he had no free will – or because there was insufficient proof that the defendant was incapable of understanding the concepts of right and wrong. In short, attorneys were not able to prove the absence of a mens rea. In other cases, the genetic evidence was found to not meet standards for scientific evidence. But in the case of Regina v. Hannell, a murder trial in Australia, the XYY syndrome of the murderer was introduced and the murderer was found to be insane, though it is unclear how much of an impact the XYY syndrome had on the verdict.13 Additionally, in a French case, a man who strangled a prostitute was given a reduced sentence based on his XYY syndrome.14

These results bring to light the court’s important role in determining what evidence is scientific enough to use. The French case in particular is disturbing given that the link between XYY syndrome and aggression was subsequently discredited, but the trial cannot be re-held, and the guilty man is not being punished as he would have been otherwise. It is clearly vital that courts exercise lively skepticism with regard to defenses based on behavioral genetics, which is at best a murky field. In large part judges – whose job it is to determine the admissibility of evidence – seem to be filling this role well, as shown by the ruled inadmissibility of XXY syndrome in four of the five United States cases. This skepticism continues today – a survey of judges found that only seventeen of ninety-two state judges and two out of thirteen federal judges would “compel tests for [a genetic] condition leading to bouts of rage.”15 Such weeding-out appears to be even more necessary now because of the increasing complexity of the studies performed, which could make genetics-based defenses incomprehensible to jurors, who are usually not trained in genetics or science. The public may be well disposed to accept less-than-certain behavioral genetics findings given the abundance of exaggerated news articles about the finding of a gene that causes this or that trait, and the

11 Denno, “Legal Implications.”
12 Dresser, “Criminal Responsibility.”
13 Denno, “Legal Implications.”
14 Ibid.
perception that genetics is a ‘hard’ science that has definite answers, unlike psychology, for instance.\textsuperscript{16} It is all too easy to imagine jurors being bamboozled by findings that they can barely understand, let alone critically examine. Judges – who are often not scientifically trained – may also have these weaknesses, and the job ultimately falls back onto the scientific community. Scientists can help solve this problem by publishing criticism of others’ work, working to provide the legal community with understandable and accurate information, and considering behavioral genetics research in context. Wensley and King, two bioethicists, advocate that behavioral genetics studies be “reported [not] in isolation, but presented alongside other environmental, cultural, and socio-economic influences that may also contribute to the studied behavior.”\textsuperscript{17} The use of XYY syndrome in court shows that judicial defenses against misreported and misinterpreted information are vital, particularly given the increasing complexity of genetics studies.

Perhaps the most well-known examples of behavioral genetics in the legal system involved the monoamine oxidase type A (MAOA) gene, which was first detected as being a possible cause of antisocial behavior in 1993 by a team led by H. G. Brunner.\textsuperscript{18} Some males in a single Dutch family exhibited a constellation of connected characteristics, including mild mental retardation and aggressive behavior, but the females and other males in the family were normal, suggesting a genetic trait carried on the X chromosome. The aggressive behaviors included attempted murder and arson, as well as sexual abuse and attempted rape of females of the family. Affected males were found to have a defect in the MAOA gene, and the media quickly reported that the aggression gene had been found, despite protestations from Brunner himself that this was untrue.\textsuperscript{19} The study examined only the afflicted Dutch family, and neither had controls, “nor was an epidemiological study done to determine whether people with that genetic mutation in the general population have aggressive tendencies.”\textsuperscript{20} Nonetheless, defense attorneys rushed to have their violent clients tested, a testament to the fact that attorneys are obligated to get their clients off in any way possible.\textsuperscript{21}

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The most prominent case involving the MAOA gene was that of Stephan A. Mobley, who murdered the manager of a Georgia Domino’s Pizza restaurant, a man who was – as Mobley later said – pleading for his life.\textsuperscript{22} Mobley had a history of serious crime, had been diagnosed with antisocial personality disorder, and came from a family with a long history of very aggressive and violent males and females.\textsuperscript{23} Mobley’s attorney requested in 1994 that Mobley be tested for MAOA deficiency, as well as other neurological disorders. The judge denied this request on the grounds that Mobley did not exhibit...
any mental retardation, which was one of the most characteristic features of the affected Dutch males – Mobley actually appeared to be quite intelligent. Furthermore, Carey and Gottesman, who work at the intersection at psychology and genetics, point out that Mobley’s family history shows that the MAOA gene could not be affecting Mobley in the same way as the Dutch males because their trait was X-linked, while Mobley clearly inherited his aggression from his father’s side of the family, from which he would have received a Y chromosome. Mobley was found guilty, sentenced to death, and executed by lethal injection in 2005.

Since 1993 no person outside of the Dutch family has been found to have this precise defect, which suggests that this exact point mutation is unique and therefore not widely applicable in court. It would be incorrect to say that the link between MAOA and aggression has been discredited, not only because the researchers who discovered the link indicated that it could not be generalized to the general population, but also because variance in MAOA expression has been linked to variance in aggression. Unlike with the Dutch family, where the mutation seemed to be a sort of on and off switch, Caspi et al. and Brunner found merely a statistical correlation between MAOA expression and aggression, suggesting that rather than being the single ‘aggression gene,’ it is probable that MAOA is one of many genetic and environmental factors. This revised version of the MAOA-aggression link has been used successfully in court: Abdelmalek Bayout, a murderer, received a reduced sentence from an Italian court because of his particular variant of the MAOA gene, despite the fact that 30% of ‘Caucasian’ men carry this variant. Presentation of the prevalence of this genetic trait in the general population may have affected the trial by putting the defendant’s claim in context, and this may help in many situations in which behavioral genetics is introduced in court. Like the XYY syndrome defenses, the defenses of Mobley and Bayout show that a healthy dose of skepticism is necessary when using behavioral genetic research in court and emphasize the importance of basic scientific training and advising for judges who have to evaluate behavioral genetics in court.

Huntington’s disease occasionally appears as part of behavioral genetics-based defenses. Huntington’s is an inherited disorder of the nervous system that becomes symptomatic sometime after adolescence and gets progressively worse over time. Sufferers are characterized by reduced mental function and an inability to control their physical movements, and can experience uncontrollable emotions – depression, impulsiveness, and irritability – as well as episodes of violence. The gene for Huntington’s disease has been tracked down and a test with 100% accuracy is available. Surprisingly, Huntington’s disease has been successfully used as a mitigating factor in court, for instance in the case of State of Georgia v. Glenda Sue Caldwell. Caldwell shot and killed her son and attempted to kill her daughter, without an apparent reason. At her trial she claimed that she had intended to kill both her children and herself because of her fear of developing Huntington’s and getting divorced, and thus was insane. Psychiatrists and her daughter testified that she was sane and Caldwell was initially sentenced to life in prison. But

25 Carey and Gottesman, “Genes and Antisocial Behavior.”
26 Anjana Ahuja, “The Get Out of Jail Early Gene: The sentence of on killer in Italy has been reduced as he possesses a ‘violent gene’,” The Times (London; 17 Nov. 2009): 32-33.
27 Carey and Gottesman, “Genes and Antisocial Behavior.”
29 Ahuja, “Get Out of Jail Early.”
30 Summer, “Use of Human Genetics Research.”
32 Summer, “Use of Human Genetics Research.”
in prison she showed signs of Huntington’s and the presence of the Huntington’s gene was confirmed. Summer claims that Caldwell, during the retrial, was found to have been symptomatic at the time of the murder, and that on this basis she was freed, but Andrews contests that Caldwell was found to be sane at the time of the murder and stresses of the verdict of insanity that “such a verdict stretches credulity.” Andrews, “Predicting and Punishing,” 126. Several other interesting instances of Huntington’s defenses are covered by Andrews, but they apply the disease in ways that are not relevant to this paper. Yet all the cases have in common the justification of crimes by using Huntington’s disease, and this use has the side effect of stigmatizing all Huntington’s sufferers, regardless of whether they are violent. Such stigmatization is a serious problem with using genetics as a legal defense. Huntington’s in particular – unlike XYY syndrome and the MAOA gene – is apparent without genetic testing, and has symptoms besides violence. Indeed, in the popular eye, Huntington’s disease is not particularly connected to violence. But such defenses could change this, with the result that people with the disease have to live with the consequences of a serious social stigma. Andrews, “Predicting and Punishing,” 126.

These three examples, together with the complexity of determining the many factors that interact to produce personality and social tendencies, suggest that it will be some time before genetic defenses are used with consistent success in court, if ever. This may lead to the idea that the ethical issues involved, such as those involving punishment, can be ignored or considered in a purely theoretical environment. Yet although no single genetic trait has been definitively shown to be an overwhelming contributor to aggression or criminal tendencies (except for, unhelpfully, the Y chromosome) there is no doubt that antisocial behavior is at least in part inherited. For example, Caspi et al. show that while MAOA activity is correlated to aggression, it does not determine aggression by itself. Caspi et al. also point out that “although maltreatment increases the risk of later criminality by about 50%, most maltreated children do not become delinquents or adult criminals.” Caspi et al., “Cycle of Violence.” ibid., 851.

The impact of behavioral genetics research on the legal system has so far been examined only as a tool for the defense. This is how behavioral genetics is being used today, but as our understanding of the formation of complex psychological traits develops, and if genetic evidence becomes more accepted in courtrooms, there may be other consequences, many of which are rather frightening. One possible consequence is that behavioral genetics may eventually become a tool of the prosecutor as well as the defender, and juries may be convinced that the defendant must have committed the crime because he or she was predisposed to commit it and was in a situation where the commission of the crime is predicted by genetic and environmental factors. The blood curdling case of Ward Weaver III and his father Ward Weaver Jr. appears to be an excellent case for exactly this sort of prosecution. Both men killed several people and both buried at least one body each under concrete pads in their backyards, among an alarming number of additional shared traits. Prosecutors might have argued that Weaver III was likely to be guilty because both his environment

54 Ibid.
55 Caspi et al., “Cycle of Violence.”
56 Ibid., 851.
57 Robert Lee Hotz and John Johnson, “Murdera Family Affair: When detectives investigated Ward Weaver, they were reminded of the case that put Weaver’s dad on death row. Could genes be to blame?” The Gazette (Montreal, Quebec, 5 July 2003).
and genetics predisposed him to commit exactly this type of crime. Other ominous possibilities include the preemptive gathering of people predisposed to criminal behavior in concentration camps or institutions, or the screening of fetuses for ‘criminal genes’ before birth and termination of fetuses that exhibit such genes – in short, predictions of criminal behavior, not actual criminal behavior, may suffice for action to be taken.

The prosecution could also use behavioral genetics, by pointing out the permanency of behavior implied by behavioral genetics to argue that the criminal should be incarcerated for longer than he or she otherwise would be in order to prevent him or her from being a danger to the public. This writer is not familiar with cases in which prison sentences have been lengthened by such evidence, but this could conceivably happen: one risk of the insanity defense is that the criminal, if deemed insane, might be permanently sent to a mental institution rather than temporarily sent to jail. Interestingly, this scenario has been quantitatively tested in a survey in which state trial court judges were presented with different variations of a scenario modeled after Stephen A. Mobley’s crime.\(^{38}\) In some versions, the prosecution presented the genetic evidence to argue that the defendant was liable to re-offend and so should be jailed for longer, while in others the defense argued that the genetics provided a mitigating factor. Some versions did not have genetic evidence presented by either side, but all versions included testimony from a psychiatrist. Alarmingly, the judges’ sentences varied from one to forty-one years for the same physical crime (the sample responses in the supplementary material do not inspire confidence in the impartiality of the judicial system). When genetics-based evidence was not presented, 29.7% of judges listed mitigating factors; when it was presented, 47.8% did. The average sentence when genetic information was not presented was 13.93 years compared to 12.83 years when the information was presented. This is not an overwhelming difference, but it is significant. The absence of any well-known cases in which the prosecution presented genetic evidence (opposed to the several in which the defense did) suggests that behavioral genetics research is not seen by prosecutors as a useful tool, at least not yet. The study also shows that behavioral genetic evidence has an effect in court, though it’s not a dramatic one – less than half of the judges listed genetics as a mitigating factor even when it was presented. Like any one gene’s influence on behavior, genetic evidence is just one of many factors in the courtroom.

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Behavioral genetics is a field subject to much misinterpretation and blind excitement, particularly in the media, where it seems that every day the gene for something or other is discovered. Such media coverage emphasizes the impact that genes have on behavior, at the expense of environmental impacts, and thus encourages views like determinism. Determinism, particularly hard determinism’s elimination of free will, is a potent idea which appears to undermine the foundation of the legal system of the United States. But the danger posed to the legal system by determinism is actually not considerable: behavioral traits like antisocial behavior or aggression are difficult even to objectively define, let alone track to specific genes, and success in court using genetic defenses is almost unknown. The genes that have been implicated affect behavior, but do not determine it. But even unsuccessful genetics defenses may contribute to a stigmatization of certain groups, like people who suffer from Huntington’s. And although behavioral genetics is not poised to have a significant impact on the legal system in the short term, in the long term research may impact our understanding of free will.

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and moral responsibility. In light of this possibility, it may be beneficial to begin discussing existing ideas about crime and punishment now. Morally suitable punishments must be balanced with the basic role of the law to provide a safe society and individuals’ right to live peacefully and without fear. Achieving such a balance will require much debate and collective introspection.

Behavioral genetics research will almost certainly have an impact on society beyond the legal system, but that impact may be different from what is expected in discussions about determinism. (Parenco discusses these issues well). It is interesting to note that Stephan Mobley’s family is almost uniformly aggressive, but several of his relatives – including his father, Steve Mobley, from whom Stephen A. Mobley inherited his aggression – are spectacularly successful in business and lead peaceful lives at home, suggesting that these relatives are aggressive, but that they use this tendency in a productive way. Similarly, partisanship has been associated with a specific gene, but the gene has no bearing on which party the partisan belongs to – this appears to be determined by the environment. These are rather hopeful conclusions because they emphasize the vital interaction of genetics and the environment and raise the possibility that given similar genes, the environment can make the difference between a murderer like Stephen A. Mobley and a multimillionaire like Steve Mobley, his father. The results of behavioral genetics research may be far from deterministic expectations in that they may not point at genetically predetermined behaviors, but at environmentally influenced ones, and suggest that the socioeconomic system, not the legal system, is in need of reformation. Behavioral genetics offers – among other things – an abdication of moral responsibility: Sarah Boseley, an English journalist, speculates that “Americans, weary with liberal quests for social and economic causes of spiralling crime, are intrigued by the simple notion that some people are born to be bad.” This is a disturbing possibility; a reversal of responsibility back onto society and a realization that science may not solve all of society’s ills will not be easy to come to terms with, but it must be achieved.

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39 Denno, “Legal Implications.” Denno notes that Steve Mobley is “A good person and kind man. Worked hard and was a good father and family man. Now a multimillionaire” (family tree facing p. 252).
