

THE ROLE GENETIC INFORMATION PLAYS IN THE CRIMINAL JUSTICE SYSTEM

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I. INTRODUCTION

"[W]e used to think that our fate was in the stars. Now we know, in large measure, our fate is in our genes."¹

Consider a world where an analysis of your genetic material at birth creates a "genetic resume," which determines your station in life. What if, in this reality, the deoxyribonucleic acid ("DNA") within a drop of blood determines whether you will be incarcerated for crimes not yet committed or subjected to behavior modification? In this world, diseases are identified and cured before becoming symptomatic, and antisocial behavior is predicted and treated prior to resulting in violence. While this may seem like a fantastic science-fiction movie,² the science of it is not outside the realm of possibility. It is therefore imperative that the law develops to prevent such science from becoming a modern eugenics tool.³ Caution must also be taken, however, to ensure that the law does not prevent society from reaping the tremendous benefits promised by advances in genetics.

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1. Dan W. Brock & Allen E. Buchanan, *The Genetics of Behavior and Concepts of Free Will and Determinism*, in GENETICS AND CRIMINALITY 67 (Jeffrey R. Botkin et al. eds., 1999) (quoting James Watson, Nobel Prize Winner, developer of the Human Genome Project and co-discoverer of the double helix structure of DNA).

2. See, e.g., MINORITY REPORT (Twentieth Century Fox 2002); GATTACA (Columbia Pictures Corp. 1997).

3. Eugenics is the study of selective breeding to produce an advanced race. See Dee Marlo E. Chico, *Pharmacogenomics: A Brave New World in Designer Drugs*, 5 SCHOLAR 111, 120-21 (2002). The idea that heredity determines an individual's behaviors and status in society attracted many people who considered themselves to be "genetically elite." See *id.* at 127-28. Many countries, including the United States have at one time applied eugenics concepts in the form of mandatory sterilization laws enacted to "weed out the biologically inferior stock." *Id.* at 121 n.64 (quoting JEREMY RIFKIN, THE BIOTECH CENTURY: HARNESSING THE GENE AND REMAKING THE WORLD 122 (1998)). For example, between 1907 and 1931, thirty states passed sterilization laws (most of which have since

Currently, scientists are identifying genes that indicate characteristics such as antisocial behavior, aggression, and sexual orientation.⁴ Advances in genetic technology will open doors never before imagined. Doctors will diagnose diseases before a person becomes symptomatic⁵ and customize treatments to the patient's genetic makeup.⁶ Law enforcement officers will compile physical profiles of criminal suspects from DNA evidence left at a crime scene.⁷ And psychologists will use biology to explain certain behaviors.⁸

This Note explores the recent developments in genetic research and its applicability to criminal law. Part II provides a brief discussion and introduction to the science behind DNA and some applications for genetic research. Part III examines the current and more controversial uses of genetic information in law enforcement, and discusses the constitutional problems that have arisen by these uses. Part IV analyzes behavioral genetics and its potential application to several stages of the criminal justice process. While the use of behavioral genetics raises numerous ethical and constitutional considerations, the potential usefulness of the technology, especially in post-conviction stages as a rehabilitative tool, may help recondition a criminal justice system that is inundated with recidivism, resentment, and rancor.

II. BACKGROUND AND BIOLOGY

Human genetics, the study of inheritance and biological variation as it relates to health and disease, is a rapidly advancing field. It is the underlying genetic makeup of an organism that shapes its outward appearance and characteristics.⁹ This Part of the Note will first explain some basic biological

been overturned) for people considered feeble-minded or who had criminal tendencies. *Id.* at 128 n.112; See Deborah Hellman, *What Makes Genetic Discrimination Exceptional?*, 29 AM. J.L. & MED. 77, 106–07 (2003).

4. See Mark A. Rothstein, *The Impact of Behavioral Genetics and the Law and the Courts*, 83 JUDICATURE 116, 117 (1999).

5. “All diseases have a genetic component, whether inherited or resulting from the body’s response to environmental stresses like viruses or toxins.” Human Genome Project, U.S. Dep’t of Energy, Medicine and the New Genetics, at http://www.ornl.gov/sci/techresources/Human_Genome/medicine/medicine.shtml (last modified Oct. 19, 2004).

6. *Id.*; see, e.g., Chico, *supra* note 3, at 113 (“Pharmacogenomics uses the knowledge that ethnic variation plays a part in human drug responses, thereby creating the need for population-specific research to study this effect of genetic diversity on human responses to drugs and other chemical substances.”).

7. See, e.g., Lindsey A. Elkins, Note, *Five Foot Two With Eyes of Blue: Physical Profiling and the Prospect of a Genetics-Based Criminal Justice System*, 17 NOTRE DAME J.L. ETHICS & PUB. POL’Y 269 (2003) (discussing the pros and cons of physical genetic profiling in law enforcement).

8. See generally Diana H. Fishbein, *Introduction to 1 THE SCIENCE, TREATMENT, AND PREVENTION OF ANTISOCIAL BEHAVIORS: APPLICATION TO THE CRIMINAL JUSTICE SYSTEM* ch. 1 (Diana H. Fishbein ed., 2000).

9. The genotype is the actual genetic (DNA) sequence that spells out what the physical appearance of the organism will be. BENJAMIN LEWIN, GENES 51 (6th ed. 1997). The characteristics that are actually visible or measurable are called the phenotype. *Id.* In the absence of a test that shows the actual genetic sequence (genotype), the genotype can be inferred from the expression or existence of certain physical characteristics (phenotype). *Id.*

concepts and introduce the field of genetics, before discussing the creation of genetic profiles and the Human Genome Project.

A. Genetics 101

In order to understand where the field of genetic research is heading, it helps to look at its history. In 1865, an Austrian monk, Gregor Mendel, determined through his experiments with garden peas that certain characteristics are inherited as pairs of hereditary elements that we now call genes.¹⁰ Genetic study, however, did not flourish until the middle of the twentieth century when scientists identified the structure of DNA.¹¹

All living organisms are made up of cells, which are the fundamental working units of every living system.¹² Within each cell, DNA provides the needed instructions to direct all of the cell's activities.¹³ Nearly every human cell has a nucleus containing DNA, strands of which are coiled into a condensed double helix shape containing twenty-three pairs of chromosomes.¹⁴ DNA contains an estimated thirty to forty thousand genes that encode the information necessary for cell structure and function.¹⁵ Interestingly, the coding part of a strand of DNA makes up only approximately five percent of the total DNA strand; the rest is considered "junk DNA."¹⁶ Genes can affect behavior through how they encode the physical structure and the regulatory mechanisms of neurobiological systems.¹⁷

The DNA of all organisms contains the same chemical components; however, the differences between species are determined by the sequence of the DNA.¹⁸ This sequence spells out the instructions for the development and activity of the cells, thus creating a particular organism's unique traits.¹⁹

10. *Id.* at 54.

11. In 1962, James Watson, Francis Crick, and Maurice Wilkins jointly received the Nobel Prize for their discovery of the structure of DNA. Robert A. Curley, Jr. & Lisa M. Caperna, *The Brave New World Is Here: Privacy Issues and the Human Genome Project*, 70 DEF. COUNS. J. 22, 22-23 (2003). Because the Nobel Prize can only be awarded to the living, Rosalind Franklin, who had also made major contributions to the discovery of the structure of DNA, was not honored, as she had died prior to 1962. *Id.*

12. LEWIN, *supra* note 9, at 3.

13. *Id.*

14. ARTHUR C. GUYTON & JOHN E. HALL, *TEXTBOOK OF MEDICAL PHYSIOLOGY* 36 (9th ed. 1996).

15. *Id.* at 27-33.

16. "Junk DNA" are the portions of the DNA strand for which a purpose has not yet been identified; no known genes are included in this "junk DNA." See *Genzyme Agrees to Royalties on Noncoding DNA*, 23 BIOTECH. L. REP. 755, 755 (2004). But see W. Wayt Gibbs, *The Unseen Genome: Gems Among the Junk*, SCI. AM., Nov. 2003, at 46. (continuing research into "junk DNA" indicates that some of these sequences may contain useful genetic information).

17. David Goldman & Diana H. Fishbein, *Genetic Bases for Impulsive and Antisocial Behaviors—Can Their Course Be Altered?*, in 1 SCIENCE, TREATMENT, AND PREVENTION OF ANTISOCIAL BEHAVIORS, *supra* note 8, at 9-1, 9-4.

18. Genetically, humans and chimpanzees are over ninety-eight percent identical. David Wasserman, *Is There Value In Identifying Individual Genetic Predispositions to Violence?*, 32 J.L. MED. & ETHICS 24, 25 (2004). DNA is a nucleic acid,

The genome is the complete set of a particular organism's DNA, and the size of a genome varies widely depending on the organism.²⁰ Every cell in the human body, with the exception of mature red blood cells and sex cells, has a complete copy of the human genome²¹ arranged into twenty-three pairs of distinct chromosomes, which are physically separate molecules that range from a few thousand to tens of thousands of base pairs²² per chromosome.²³ Each chromosome contains many genes, which are specific sequences of base pairs that encode how to make specific proteins.²⁴ These proteins perform most of the functions necessary for life and create the physical cell structure.²⁵ It is the study of the function and activity of these proteins that illuminates the role that genes play in health and disease.²⁶

B. Creating Genetic Profiles

Each individual has a distinct genetic profile. Through DNA testing, scientists can use a sample of blood, saliva, skin tissue, urine, semen, or other tissue to develop a genetic profile.²⁷ There are several ways to construct DNA profiles that have been developed throughout the years. As technology advances, these techniques constantly change.

One important advancement was the Polymerase Chain Reaction ("PCR") technique. PCR greatly amplifies even minute amounts of DNA because it increases the amount of available DNA by duplicating it many times.²⁸ PCR can

meaning it is a chemically linked group of subunits called nucleotides. LEWIN, *supra* note 9, at 71–78. These nucleotides are made up one of four types of nitrogenous bases (adenine (A), guanine (G), cytosine (C), and thymine (T)), a pentose sugar and a phosphate group. *Id.* Depending on whether the nitrogenous base is an A, T, G or C determines what order the nucleotides line up along the strand of DNA. NAT'L RESEARCH COUNCIL, THE EVALUATION OF FORENSIC DNA EVIDENCE 61 (Norman Grossblatt ed., 1996). The pentose sugar and the phosphate group of all the nucleotides line up with each other to make the backbone of the double helix DNA strand. *Id.* The nitrogenous bases determine the actual sequence of the DNA because they only pair up in specific ways; A's only bond with T's, and G's only bond with C's. *Id.* These pairs are called base pairs. *Id.*; LEWIN, *supra* note 9, at 71–78.

19. LEWIN, *supra* note 9, at 71–78.

20. ANTHONY J.F. GRIFFITHS ET AL., AN INTRODUCTION TO GENETIC ANALYSIS, 494–96 (6th ed. 1998). The human genome has approximately three billion DNA base pairs, while a simple bacterium genome has approximately 600,000 DNA base pairs. *Id.*

21. NAT'L RESEARCH COUNCIL, note 18, at 12.

22. See *supra* text accompanying note 18.

23. NAT'L RESEARCH COUNCIL, *supra* note 18, at 13.

24. *Id.*

25. GRIFFITHS ET AL., *supra* note 20, at 9–11.

26. See Gerard Magill, *The Ethics Weave in Human Genomics, Embryonic Stem Cell Research, and Therapeutic Cloning: Promoting and Protecting Society's Interests*, 65 ALB. L. REV. 701, 708 (2002).

27. See Katherine L. Prevost O'Connor, *Eliminating the Rape-Kit Backlog: Bringing Necessary Changes to the Criminal Justice System*, 72 UMKC L. Rev. 193, 197 (2003).

28. NAT'L RESEARCH COUNCIL, *supra* note 18, at 21–25; Jasmine Samrad, Book Note, *DNA in the Courtroom: A Trial Watcher's Guide*, 10 HIGH TECH. L.J. 433, 439 (1995)

amplify DNA so that, even if only an extremely small amount of DNA were collected, it would still be sufficient to conduct genetic profiling tests.²⁹ As the science for creating genetic profiles advances, so, too, will our ability to get meaningful profiles from even the tiniest amount of DNA left behind at a crime scene.³⁰

Even though the techniques for genetic profiling continue to advance, the portions of DNA that are generally used to create a profile are those long strands of DNA that do not encode for anything, sometimes referred to as "junk DNA."³¹ This non-coding DNA has no known purpose, but a high mutation rate resulting in great variation among individuals.³² It is these differences that make "junk DNA" useful in constructing DNA profiles. Further, the use of junk or non-coding sequences means that while the obtained genetic profile can distinguish individuals, it does not reveal physical traits or genetic predisposition to diseases or conditions.³³

C. Human Genome Project

The last decade of genetic research has led to monumental developments in the understanding of human genetics, highlighted by the completion of the Human Genome Project ("HGP"). The HGP is an international research project aimed at determining the complete sequence of human DNA.³⁴ In April of 2003, the HGP announced that it had determined the DNA sequence of the entire human

(reviewing Howard C. Coleman & Eric D. Swenson, DNA IN THE COURTROOM: A TRIAL WATCHER'S GUIDE (1995)).

29. NAT'L RESEARCH COUNCIL, *supra* note 18, at 23.

30. The technology is improving such that technicians are able to retrieve DNA from very small amounts, like the back of a stamp or saliva left on a rape victim. Telephone Interview with Bruce Walsh, Full Professor and Associate Department Head of Ecology and Evolutionary Biology, University of Arizona, (Feb. 11, 2005) [hereinafter Walsh Interview]. There are even assertions that enough DNA has been found in the oil left behind in a fingerprint, but Professor Walsh has not yet seen the data. *Id.*

31. *See supra* note 16.

32. NAT'L RESEARCH COUNCIL, *supra* note 18, at 65. The ideal markers are ones that show little variation against broadly defined ethnic groups. Walsh Interview, *supra* note 30. If a gene that encodes for a specific protein was used, then in certain regions of the world, the marker would be present in a large portion of the population. *Id.* For example, if the marker for hemoglobin was used, then in certain regions of the world, like Malaysia, the disease marker for sickle cell anemia would be present in a large number of Malaysians, as having sickle cell anemia, prevents them from being affected by Malaria. *Id.* Therefore, the profile made from genes that encode for proteins would be very similar between groups of people from the same part of the world, as their genes have evolved so that they could survive in that part of the world. *Id.*

33. *See United States v. Kincade*, 379 F.3d. 813, 818 (9th Cir. 2004); NAT'L RESEARCH COUNCIL, *supra* note 18, at 58. Generally, the CODIS markers were designed to not be predictive of a disease, characteristic or ethnicity. Walsh Interview, *supra* note 30.

34. Human Genome Project, U.S. Dep't of Energy, Human Genome Project Information, at http://www.ornl.gov/sci/techresources/Human_Genome/home.shtml (last modified Oct. 27, 2004) (on file with Arizona Law Review).

genome.³⁵ However, scientists have yet to decode every gene in the human genome.³⁶ Additionally, genes interact with each other in complicated ways so that a particular characteristic, condition, or illness may result from the interplay of multiple genes and environmental factors, rather than from any one particular gene.³⁷ Furthermore, even though the basic sequence of the human genome has been completed, researchers still must correct inaccuracies identified in the sequence.³⁸ Nonetheless, having a complete blueprint of the human genome is one of the first steps in identifying particular genes that influence human characteristics, such as behavior.

III. CURRENT APPLICATIONS FOR CRIMINAL JUSTICE

The use of genetic information in the courtroom is not new. In fact, it plays an important role in the criminal justice system. Juries have decided cases based on forensic evidence for nearly two decades.³⁹ Every person has a unique DNA fingerprint, which is identical in nearly every cell of a person's body, making it one of the best methods for identifying and distinguishing among human beings.⁴⁰ Therefore, regardless of whether suspects leave behind skin cells, hair follicles, saliva, or blood, DNA can identify them.⁴¹ Because DNA differs only slightly from person to person, individual differences in the DNA make identification nearly certain.⁴²

However, as genetic advances allow for more information to be ascertained from DNA evidence, and as more tests become available to detect behavioral predispositions, genetic information may play an expanded role in the

35. Nat'l Human Genome Research Inst., All About the Human Genome Project, at <http://www.genome.gov/10001772> (last modified Jan. 2004) (on file with Arizona Law Review).

36. One of the difficulties in decoding human DNA and predicting the expression of various genes is that DNA is made up of three million base pairs that form approximately thirty-five to fifty thousand discrete genes, any one of which may encode several proteins. See Nat'l Human Genome Research Inst., The Human Genome Project Completion: Frequently Asked Questions, at <http://www.genome.gov/11006943> (last modified Sept. 2004) (on file with Arizona Law Review).

37. See Lori Andrews & Erin S. Zuiker, Lecture, *Ethical, Legal, and Social Issues in Genetic Testing for Complex Genetic Diseases*, 37 VAL. U. L. REV. 793, 821–22 (2003).

38. Curley & Caperna, *supra* note 11, at 26. A private company in Iceland, Decode Genetics, has identified mistakes in the sequencing of the human genome. *Id.* Iceland has a small population (278,000) and keeps careful genealogic records which can trace genetic diseases back ten generations. *Id.*

39. DNA was first used as evidence at a criminal trial in the United States in 1986. See Mark Hansen, *The Great Detective*, A.B.A. J., Apr. 2001, at 37, 40.

40. *Id.*

41. See Prevost O'Connor, *supra* note 27, at 197.

42. Hansen, *supra* note 39, at 41–42. For example, the Federal Bureau of Investigation ("FBI") laboratory tested the semen sample from Monica Lewinski's dress and estimated the odds of the DNA belonging to someone other than President Clinton as one in 7.87 trillion, which is more than the number of people who have ever lived. *Id.* at 42; see NAT'L RESEARCH COUNCIL, *supra* note 18, at 25–36 (discussing the statistical issues regarding genetic testing).

courtroom. This section focuses on the evidentiary issues involved with admitting genetic evidence in court, examines some of the newer more controversial uses of DNA, and discusses the constitutional issues that arise in this area. It is important to look at the current uses of DNA and the respective problems they raise because those same arguments will be made when prosecutors attempt to introduce genetic behavioral predictions into courtrooms.

A. Evidentiary Issues

In the area of criminal forensics, there are several applications for genetic information in the courtroom. In order for scientific evidence to be admitted in federal court, a judge generally conducts a *Daubert* hearing to determine whether the reasoning or methodology underlying the proffered evidence is scientifically valid.⁴³ The *Daubert* test is composed of four factors: whether the theory or techniques can or have been tested; the extent to which there has been peer review and publication of the theory or techniques; the known or potential error rate and the existence and maintenance of standards controlling the technique's operation; and the general acceptance of the methodology or technique in the scientific community.⁴⁴ In most courts, the admissibility of DNA evidence is now well accepted, leaving defendants to argue against only the legality of the collection and storage of the samples, rather than the validity of the tests.⁴⁵

As far as using DNA as an investigative tool, the issue of how to obtain a suspect's DNA still remains.⁴⁶ Currently there are three ways to get a DNA sample from a known suspect: voluntary submission;⁴⁷ DNA abandonment;⁴⁸ or a court order.⁴⁹ Getting a DNA sample by voluntary submission is the least problematic of the three. Although obtaining a DNA sample from a person's body is considered a search under the Fourth Amendment, an individual may consent to a search without implicating the Fourth Amendment.⁵⁰ DNA abandonment occurs when a

43. *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579 (1993).

44. *Id.* at 593–94; *see also* *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 149–50 (1999).

45. Warren R. Webster, Jr., *DNA Database Statutes & Privacy in the Information Age*, 10 HEALTH MATRIX 119, 124 (2000).

46. Symposium, *Criminal Law and DNA Science: Balancing Societal Interests and Civil Liberties*, 51 AM. U. L. REV. 401, 409 (2002).

47. *See* *Schneekloth v. Bustamonte*, 412 U.S. 218, 227 (1973) (“In situations where the police have some evidence of illicit activity, but lack probable cause to arrest or search, a search authorized by a valid consent may be the only means of obtaining important and reliable evidence.”); Edward J. Imwinkelried & D.H. Kaye, *DNA Typing: Emerging or Neglected Issues*, 76 WASH. L. REV. 413, 440–43 (2001).

48. *See* Imwinkelried & Kaye, *supra* note 47, at 436–37.

49. *See* *Bousman v. Iowa Dist. Court for Clinton County*, 630 N.W.2d 789, 796 (Iowa 2001) (stating that a court order for a DNA sample that was based on reasonable suspicion was not quashed); *see also* *In re Nontestimonial Identification Order Directed to R.H.*, 762 A.2d 1239, 1246 (Vt. 2001) (holding that order for DNA evidence based on reasonable suspicion upheld).

50. *See* *Schneekloth*, 412 U.S. at 227; Imwinkelried & Kaye, *supra* note 47, at 440–43.

person discards a personal item containing DNA.⁵¹ Abandonment is also usually not problematic as long as the evidence was truly abandoned, and not stolen or retrieved by an illegal search and seizure. Obtaining a court order is more difficult and usually implicates the Fourth Amendment's Search and Seizure Clause. Probable cause is generally necessary to obtain a search warrant to seize DNA, although some recent cases have held that reasonable suspicion is sufficient.⁵² Once a sample has been collected, there are issues of genetic profiling, privacy, storage, the following subsections address several of these concerns.

B. DNA Collection: Creating Genetic Profiles and Databanks

Currently, DNA databanks are one of the more useful tools available to law enforcement.⁵³ These databanks store genetic profiles created from samples of personal biological material like, blood, saliva and semen.⁵⁴ To date, all fifty states require that convicted sex offenders provide DNA samples for storage in criminal genetic databases.⁵⁵ These DNA samples allow law enforcement agencies to compare DNA evidence left at crime scenes to profiles already stored in a database, helping to identify unknown assailants.⁵⁶

The FBI runs a national DNA databank named the Combined DNA Index System ("CODIS").⁵⁷ CODIS includes a Convicted Offender Index that stores the

51. When a person leaves behind DNA on a drinking cup that he sets aside or throws away, which is then picked up by a perceptive officer, the prosecution can argue that the DNA was abandoned and thus no search occurred. See Imwinkelried & Kaye, *supra* note 47, at 436–37. In New York City, police used this tactic to acquire DNA from a suspected serial killer and rapist. Richard Willing, *As Police Rely More on DNA, States Take a Closer Look*, USA TODAY, June 6, 2000, at 1A.

52. See Bousman, 630 N.W.2d at 796. See also R.H., 762 A.2d at 1246.

53. See NAT'L RESEARCH COUNCIL, *supra* note 18, at 133–35.

54. See discussion *supra* Section II.B.

55. Jonathan Weems, *A Proposal for a Federal Genetic Privacy Act*, 24 J. LEGAL MED. 109, 120 (2003) ("[E]ach jurisdiction collects, stores, and maintains its own genetic samples."). In addition to the domestic DNA databanks, there are proposals to extend the usefulness of databanks into the international arena. For example, one possibility is the creation of a terrorism database. Symposium, *supra* note 46, at 406–07. This database would require that all people applying for entry into the United States, provide a DNA sample for identification purposes only. *Id.* This database would put together profiles of suspected terrorists from samples collected at terrorism training sites and compare them to the profiles of individuals entering the United States. *Id.*

56. See Weems, *supra* note 55, at 120.

57. Detailed information about CODIS is available on the FBI's website. See FBI Laboratory, FBI, CODIS: Combined DNA Index System, at <http://www.fbi.gov/hq/lab/codis/index1.htm> (last visited Feb. 17, 2005) [hereinafter CODIS]. To facilitate the collection of samples for the DNA databanks, Congress passed the Violent Crime Control and Law Enforcement Act in 1994, which authorized the FBI to collect DNA samples from certain convicted felons to establish CODIS. H.R. REP. NO. 106-900, pt. 1, at 8 (2000); FBI Laboratory, FBI, Mission Statement & Background, at <http://www.fbi.gov/hq/lab/codis/program.htm> (last visited Feb. 17, 2005) [hereinafter Mission Statement] (on file with Arizona Law Review). However, the government did not have the authority to collect DNA samples from federal prisoners until Congress enacted the DNA Analysis Backlog Elimination Act of 2000, Pub. L. No. 106-546, § 2, 114 Stat. 2726, 2726, providing for the

DNA profiles of people convicted of felony sex offenses as well as other violent crimes,⁵⁸ giving law enforcement agencies a powerful tool to identify repeat offenders and link together crime scenes.⁵⁹ CODIS also contains a Forensic Index, which compiles DNA profiles developed from evidence left at crime scenes.⁶⁰ Matches made in the Forensic Index can link crime scenes together and identify the possibility of a serial offender.⁶¹ Another feature of CODIS is its Population File, an anonymous database of DNA profiles of the general population that determines the statistical significance of a match.⁶² CODIS also includes a National DNA Index System (NDIS), which enables participating agencies to exchange and compare DNA profiles on a national level.⁶³ Currently, all fifty states, as well as Puerto Rico and the United States Army, participate in NDIS.⁶⁴

The following subsections discuss three constitutional issues that defendant's have raised regarding the collection and use of their DNA, including the Fourth Amendment right against unreasonable search and seizure, the Fourteenth Amendment right to equal protection, and the Fifth Amendment right against self-incrimination.

1. Fourth Amendment Issues with DNA Collection

Defendants have challenged the constitutionality of DNA collection as an unreasonable search and seizure under the Fourth Amendment.⁶⁵ The Supreme Court has deemed the involuntary taking of a biological sample a "search" under the Fourth Amendment;⁶⁶ therefore, the forced collection of DNA must fall within an exception that allows for the collection of DNA without the existence of probable cause or reasonable suspicion. One such exception is the "special needs

forced extraction of blood samples from federal parolees, probationers, and prisoners. 42 U.S.C. § 14135 (2004); *United States v. Kincade*, 345 F.3d 1095, 1097 (9th Cir. 2003), *reh'g en banc*, 379 F.3d 813 (9th Cir. 2004); *United States v. Reynard*, 220 F. Supp. 2d 1142, 1146 n.2 (S.D. Cal. 2002) (citing 146 CONG. REC. S11645-02, S11647 (Dec. 6, 2000)).

58. FBI Laboratory, FBI, National DNA Index System, at <http://www.fbi.gov/hq/lab/codis/national.htm> (last modified Dec. 2004) (on file with Arizona Law Review).

59. *See id.*

60. Stephen J. Niezgod, Jr. & Barry Brown, FBI, The FBI Laboratory's Combined DNA Index System Program, at <http://www.promega.com/geneticidproc/ussymp6proc/niezgod.htm> (last visited Feb. 17, 2005) (on file with Arizona Law Review).

61. *Id.*

62. *Id.*

63. CODIS, *supra* note 57.

64. FBI Laboratory, FBI, Participating States, at <http://www.fbi.gov/hq/lab/codis/partstates.htm> (last modified Feb. 2005) (on file with Arizona Law Review).

65. *See, e.g., United States v. Reynard*, 220 F. Supp. 2d 1142, 1165 (S.D. Cal. 2002).

66. *Skinner v. Ry. Labor Executives' Ass'n*, 489 U.S. 602, 618 (1989) ("[C]ollection and subsequent analysis of the requisite biological samples must be deemed Fourth Amendment searches . . .").

exception.”⁶⁷ This exception allows for a suspicionless search when designed to serve “special needs, beyond the normal need for law enforcement.”⁶⁸ Courts have utilized this exception in cases involving random drug screening in high schools and sobriety checkpoints.⁶⁹ Unsurprisingly, defendants have argued that a DNA sample collection for a government database does not come within the special needs exception.⁷⁰ In making this determination, courts must examine whether the purpose of the challenged search, in this case the collection of DNA, goes beyond the normal need for law enforcement.⁷¹

The government has made a number of arguments in favor of the special needs exception in cases involving DNA collection. First, the government has urged that the collection of DNA qualifies as such because the collection of samples and maintenance of a comprehensive DNA database is programmatic, meaning that Congress intended to create a more complete national database to “increase the accuracy of the criminal justice system.”⁷² Second, the government has also contended that DNA collection serves a compelling state interest in assuring that the correct criminal goes to jail and in reducing recidivism because offenders know their DNA is in the system.⁷³ Third, the government has argued that there is a societal interest in assuring that parolees comply with the

67. See, e.g., *United States v. Kimler*, 335 F.3d 1132, 1146 (10th Cir. 2003) (holding the collection of DNA for the DNA Act to be a reasonable search and seizure under the special needs exception to the Fourth Amendment’s warrant requirement).

68. *Ferguson v. Charleston*, 532 U.S. 67, 74 n.7 (2001).

69. The “special needs exception” applies to drug and alcohol testing programs for railroad employees who are involved in train accidents. *Skinner*, 489 U.S. at 621–33. It also has been found to apply to random drug testing of student athletes. *Vernonia Sch. Dist. 47J v. Acton*, 515 U.S. 646, 664–65 (1995). It also applies to sobriety checkpoints used to remove drunk drivers from the road. *Mich. Dep’t of State Police v. Sitz*, 496 U.S. 444, 451–55 (1990). But see *Indianapolis v. Edmond*, 531 U.S. 32, 48 (2000) (holding that special needs exception does not apply to a highway checkpoint with the primary purpose of discovering illegal narcotics).

70. See, e.g., *Reynard*, 220 F. Supp. 2d at 1168–69. The Court found that the special needs exception applied to people subject to the DNA Act because it found:

[F]our other factors indicate that searches of qualifying individuals under the DNA Act fall within the ‘special needs’ exception. First, supervised releasees possess a diminished expectation of privacy. . . . Second, the DNA Act authorizes a search—i.e., a single blood draw—that is minimally intrusive. . . . Third, in accordance with the legislative history discussed above, the Court finds that Congress authorized DNA fingerprinting under the DNA Act to promote the public’s legitimate interest in a more accurate criminal justice system. Fourth, the Court finds that contribution of DNA to CODIS, pursuant to the DNA Act, is reasonably related to the accomplishment of this legitimate congressional goal.

Id.

71. *Id.* at 1169.

72. *Id.* at 1167.

73. See *Roe v. Marcotte*, 193 F.3d 72, 79–80 (2d Cir. 1999) (concluding that Connecticut’s DNA collection program advanced the government’s significant interests in reducing recidivism and assisting law enforcement officials to solve and deter past and future crimes).

requirements of their release.⁷⁴ Finally, the government has asserted that incarcerated criminals and those on probation have diminished privacy rights and that collection of a DNA sample constitutes a minimal intrusion.⁷⁵

Most courts that have addressed this issue, including the United States Supreme Court,⁷⁶ have characterized the collection of a DNA sample from a prisoner or probationer as a search and seizure,⁷⁷ but that the collection is reasonable in relation to the compelling state interests of reducing recidivism and insuring accuracy, in light of the reduced privacy expectation of the prisoners and probationers, and the minimal bodily intrusion.⁷⁸ When balanced with the enormous societal interests in establishing and maintaining offender databases, the infringed rights of convicted felons seem minimal in comparison.

2. Equal Protection Issues for DNA Collection

Equal protection issues may arise when the state collects DNA samples only from those arrested or convicted of certain crimes. According to the Fourteenth Amendment, "[n]o State shall . . . deny to any person within its jurisdiction the equal protection of the laws."⁷⁹ When analyzing a statute to see if it violates equal protection guarantees, the general rule is that a statute is presumed to be valid if the classification drawn by the legislation is rationally related to a legitimate state interest.⁸⁰ As inmates have not been deemed a protected class⁸¹ for

74. United States v. Kincade, 379 F.3d 813, 838 (9th Cir. 2004).

75. *Id.* at 837–38 (citing *Rise v. Oregon*, 59 F.3d 1556, 1560 (9th Cir. 1995)) (stating that a person convicted for a predicate felony under the DNA Act "lost any legitimate expectation of privacy in the identifying information derived from blood sampling").

76. *Schmerber v. California*, 384 U.S. 757, 761 (1966).

77. See Milton Hirsch & David O. Markus, *Fourth Amendment Forum: Involuntary Blood Testing*; United States v. Kincade, CHAMPION, Mar. 2004, at 40.

78. The Tenth and Second Circuits have ruled that although inmates have a reasonable expectation of privacy against collection of DNA samples, the "special needs" exception to the warrant requirement is satisfied by DNA collection statutes. United States v. Kimler, 335 F.3d 1132, 1146 (10th Cir. 2003), *cert. denied*, 540 U.S. 1083 (mem.); *Marcotte*, 193 F.3d at 78–82. The Fourth, Fifth, and Ninth Circuits maintain that inmates do not have a reasonable expectation of privacy against DNA collections similar to those described in the DNA Act. *Kincade*, 379 F.3d at 839 (holding that a requirement that federal offenders who were on parole, probation, or supervised release submit to compulsory DNA profiling, in the absence of individualized suspicion that they had committed additional crimes, was reasonable and did not violate the Fourth Amendment); *Velasquez v. Woods*, 329 F.3d 420, 421 (5th Cir. 2003) (per curiam) (finding a similar Texas DNA collection program constitutional); *Jones v. Murray*, 962 F.2d 302, 306–07 (4th Cir. 1992) ("While we do not accept even this small level of intrusion for free persons without Fourth Amendment constraint . . . the same protections do not hold true for those lawfully confined to the custody of the state. As with fingerprinting, therefore, we find that the Fourth Amendment does not require an additional finding of individualized suspicion before blood can be taken from incarcerated felons for the purpose of identifying them.").

79. U.S. CONST. amend. XIV, § 1.

80. *City of Cleburn, Texas v. Cleburn Living Ctr.*, 473 U.S. 432, 440 (1985).

81. *Johnson v. Daly*, 339 F.3d 582, 585–86 (7th Cir. 2003) ("Legislation that does not burden a suspect class or affect fundamental rights satisfies the equal-protection

equal protection analysis, a level of scrutiny higher than rational basis is not required.⁸² In order to prove that facially neutral statutes, like DNA collection acts, violate equal protection guarantees, a challenger must demonstrate a racially discriminatory purpose behind the statute.⁸³

Defendants can argue that a discriminatory purpose can be inferred based on the arrest and conviction rates that vary greatly between the sexes and among different races.⁸⁴ In some predominately black neighborhoods, up to ninety percent of adult males have been arrested.⁸⁵ Nationally, a black person is five times more likely to be arrested than a white person.⁸⁶ Therefore, if DNA is collected from arrestees, or even just felons, that are convicted of certain crimes, then a black person is more likely than a white person to be identified from DNA left at future crime scenes.⁸⁷ While this disparity shows a clear discriminatory impact on black males, as they will more often be subjected to DNA profiling, it does not show discriminatory purpose.

requirement if the legislature could think the rule rationally related to any legitimate goal of government. Prisoners are not a suspect class”).

82. Under the Equal Protection Clause of the Fourteenth Amendment, the Supreme Court has declared that classifications based on race, alienage and national origin are subject to strict scrutiny. *Graham v. Richardson*, 403 U.S. 365, 371–72 (1971) (“[T]he Court’s decisions have established that classifications based on alienage, like those based on nationality or race, are inherently suspect and subject to close judicial scrutiny.”). Classifications based on gender and non-marital children are also still protected but are subject to intermediate scrutiny. *United States v. Virginia*, 518 U.S. 515, 532–33 (1996) (“[F]or cases of official classification based on gender: Focusing on the differential treatment or denial of opportunity for which relief is sought, the reviewing court must determine whether the proffered justification is ‘exceedingly persuasive.’”). Finally, governmental classifications that do not target suspect groups or classes or fundamental interests, such as sexual orientation or age, are subject only to the rational basis review, meaning the legislation is presumed to be valid if the statute is rationally related to a legitimate state interest. *Romer v. Evans*, 517 U.S. 620, 631–36 (1996) (using rational basis review for an amendment to the Colorado State Constitution, which prohibited discrimination based on sexual orientation); *Gregory v. Ashcroft*, 501 U.S. 452, 470 (1991) (“This Court has said repeatedly that age is not a suspect classification under the Equal Protection Clause.”).

83. *United States v. Holton*, 116 F.3d 1536, 1548 (D.C. Cir. 1997) (citing *Washington v. Davis*, 426 U.S. 229, 239 (1976)).

84. A man has an 11.3% chance of going to jail in his lifetime whereas a woman has only a 1.8% chance. Bureau of Justice Statistics, U.S. Dep’t of Justice, Criminal Offenders Statistics, at <http://www.ojp.usdoj.gov/bjs/crimoff.htm> (last modified Dec. 28, 2004) (on file with Arizona Law Review). A black person has an 18.6% chance of going to prison in his lifetime versus a 3.4% chance for a white person. *Id.*

85. Symposium, *supra* note 46, at 412.

86. *Id.*

87. This argument is similar to the one routinely rejected by courts that the Federal Sentencing Guidelines violate the Equal Protection Clause as a result of the statistics showing that blacks are more often convicted of drug crimes involving crack cocaine, while whites are convicted at a higher rate for offenses involving powder cocaine, which exposes them to a less serious punishment. See, e.g., *Holton*, 116 F.3d at 1548–49; *United States v. Watson*, 953 F.2d 895, 897–98 (5th Cir. 1992).

Statistical evidence of disparate impact, without more, is not enough.⁸⁸ It is unlikely, however, that defendants will be able to prove discriminatory intent behind the legislation unless evidence of a discriminatory purpose is expressed either on the face of the statute or in legislative history. Therefore, as long as the DNA collection acts qualify a person for collection of their DNA based on a conviction or arrest for specific enumerated crimes, without distinction between offenders on the basis of race, the statute need only be rationally related to a legitimate state interest.⁸⁹ As discussed above, there are numerous compelling state interests for the collection of DNA for storage in a database—reducing recidivism, ensuring accuracy, solving past and future crimes, and ensuring compliance with

88. See *Holton*, 116 F.3d at 1548.

89. See *Johnson v. Quander*, No. Civ.A. 04-448(RBW), 2005 WL 670759 *10, (D.C. Cir. Mar. 21, 2005) (mem.). One possible means of ending the controversy regarding equal protection issues and racial disparity is to require that all newborn children in the United States and United States immigrants provide a DNA sample for a nationwide DNA databank, that is to be used for identification purposes only. By specifically using the CODIS loci for creating the profile, which were specifically chosen because they do not contain personal information, then the identification profiles would not look at the parts of DNA that have to do with race, physical characteristics, or tendency to develop a disease. See Walsh Interview *supra* note 30. Nationwide sampling of all people would end issues of potential discrimination in testing and is analogous to current fingerprinting of children. See Am. Football Coaches Ass'n, Child ID Program, at <http://www.afca.com/lev1.cfm/38> (last visited Feb. 24, 2005) (on file with Arizona Law Review). While fingerprinting children is not mandatory, the American Football Coaches Association (AFCA) National child identification Program has partnered with the FBI and local law enforcement with the goal of fingerprinting all sixty million children in the United States. *Id.* Additionally, four million new babies each year are already tested for medical genetic conditions, and that same DNA could be used to create an identification profile. See Ctrs. for Disease Control & Prevention, Dep't of Health & Human Servs., Newborn Screening, at http://www.cdc.gov/nceh/dls/newborn_screening.htm (last modified Feb. 2, 2005) (on file with Arizona Law Review). A nationwide DNA database for identification purposes would serve monumental societal interests beyond merely identifying suspects whose DNA matches evidence left behind at a crime scene such as identifying victims of murder or catastrophe, identifying the remains of soldiers recovered from battle, establishing paternity or other familial relationships, and increasing the overall population database, which increases the accuracy of the data. See Human Genome Project, U.S. Dep't of Energy, DNA Forensics, at <http://www.ornl.gov/sci/techresources/HumanGenome/elsi/forensics.shtml> (last modified Sept. 16, 2004) (on file with Arizona Law Review); see also Forensic Mathematics, World Trade Center Disaster Identification, at <http://dna-view.com/wtc.htm> (last visited Feb. 17, 2005) (on file with Arizona Law Review); Weems, *supra* note 55, at 119–20 (discussing how in 1991, the Department of Defense opened the largest DNA database in the world, in which all active duty and reserve military personnel were required to give DNA samples for the purpose of identifying casualties of war); Human Genome Project, *supra*; Niezgodna & Brown, *supra* note 60 (discussing the more samples included in the database increases the probability of a match). Nevertheless, without massive changes to existing genetic policy that would accommodate a nationwide identification database, it is unlikely that the DNA collection of newborns, or the entire nation, would occur by any means other than a voluntary basis.

conditional release requirements.⁹⁰ Clearly, the compulsory collection of DNA is rationally related to these compelling state interests.

3. Fifth Amendment Implications

The collection of DNA may also implicate the defendant's Fifth Amendment right against compelled self-incrimination.⁹¹ To implicate the Fifth Amendment, the incrimination must be a communication of a testimonial nature.⁹² Therefore, depending on what the DNA tells us—race, sex, or medical conditions—it will affect whether the genetic information is testimonial in nature or merely physical evidence. Generally, physical evidence is not testimonial in nature, so the protection hinges on whether DNA is considered physical evidence or a communication.⁹³ Because DNA evidence tends to identify someone rather than reveal something about their behavioral tendencies, DNA has not been treated as testimonial in nature.⁹⁴ It follows that an identification made by DNA left at a crime scene should be treated as physical evidence and not testimonial. However, as science improves and technicians are able to discern more than mere identity from a DNA sample, a re-evaluation of the testimonial nature versus the identification purpose of DNA will be necessary, and the answer will hinge on exactly what the DNA tells us. If the testing tends to communicate behavioral characteristics, then a Fifth Amendment infringement is more likely.

C. The Use of "John Doe" or DNA Warrants

States have begun to use genetic information in law enforcement by issuing "John Doe" or DNA warrants. These warrants are based on an unknown individual's unique genetic profile, and are used to toll a statute of limitations.⁹⁵ For example, the Wisconsin Court of Appeals recently upheld a trial court's decision that a complaint and arrest warrant, which identified the suspect not by his name but by his DNA profile, was proper.⁹⁶ This section analyzes the application of these DNA warrants and identifies potential constitutional and statutory infringements.

90. See *supra* Section III.B.1.

91. U.S. CONST. amend. V. ("No person shall be . . . compelled in any criminal case to be a witness against himself . . .").

92. *Schmerber v. California*, 384 U.S. 757, 761 (1966) (holding that the compelled production of physical evidence did not constitute "evidence of a testimonial or communicative nature" and therefore was not prohibited by the Fifth Amendment); *Holt v. United States*, 218 U.S. 245, 253 (1910). *But see* *Rochin v. California*, 342 U.S. 165, 209–10 (1952) (holding the involuntary pumping of a defendant's stomach resembled obtaining a confession by torture).

93. Veronica Valdivieso, Note, *DNA Warrants: A Panacea for Old, Cold Rape Cases?*, 90 GEO. L.J. 1009, 1042 (2002).

94. *Id.* at 1042–43.

95. "John Doe" is defined as "[a] fictitious name used in a legal proceeding to designate a person whose identity is unknown." BLACK'S LAW DICTIONARY 853 (8th ed. 2004).

96. *State v. Dabney*, 663 N.W.2d 366, 374–75 (Wis. Ct. App. 2003).

The case in Wisconsin arose out of the following facts. In 1994, an unknown male kidnapped and sexually assaulted a fifteen-year-old girl.⁹⁷ The state crime lab found seminal fluid DNA evidence and developed a genetic profile of the unknown suspect.⁹⁸ In December of 2000, the State charged John Doe #12 with kidnapping and sexual assault just days before the Wisconsin statute of limitations for sexual assault was to expire.⁹⁹ The DNA profile was included in the caption of the complaint, and a trial court found that probable cause existed to arrest John Doe #12.¹⁰⁰ In March of 2001, after matching the genetic profile to one in the database, the State filed an amended complaint substituting the defendant's name for John Doe #12.¹⁰¹

The defendant argued that the initial complaint and arrest warrant, identifying him only by his DNA profile, was insufficient to identify who was being charged in the complaint and should not have tolled the six-year statute of limitations.¹⁰² The Wisconsin statute governing identification requirements for arrest warrants states that the warrant shall "[s]tate the name of the person to be arrested, if known, or if not known, designate the person to be arrested by any description by which the person to be arrested can be identified with *reasonable certainty*."¹⁰³ The statute regarding the sufficiency of a complaint states that the complaint must set forth "a written statement of the essential facts constituting the offense charged."¹⁰⁴

The Wisconsin Court of Appeals upheld the validity of the arrest warrant and complaint because Wisconsin's case law provides that the name of a person is not necessary for a valid warrant or complaint.¹⁰⁵ A person need only be identified using the best description available.¹⁰⁶ The court held that a DNA profile is "arguably the most discrete, exclusive means of personal identification possible."¹⁰⁷ The court, however, did suggest that the inclusion of as many physical characteristics as available would be helpful for notice purposes, but that their absence would not defeat the validity of such a complaint or warrant.¹⁰⁸

The use of "John Doe" or DNA warrants prevents the statute of limitations in sexual assault cases from expiring.¹⁰⁹ A purpose behind a statute of limitations is to protect defendants from unfairly having to prepare a defense so long after the alleged crime that they are unable to obtain adequate evidence,

97. *Id.* at 369.

98. *Id.*

99. *Id.* at 369–70.

100. *Id.* at 369.

101. *Id.*

102. *Id.* at 369–71.

103. WIS. STAT. § 968.04(3)(a)(4) (2003) (emphasis added).

104. *Id.* § 968.01(2).

105. *Dabney*, 663 N.W.2d at 371.

106. *Id.* See also *Scheer v. Keown*, 29 Wis. 586, 586 (1872) (a woman accused of larceny was not identified by name—the court held that the best description available should have been stated in the warrant and complaint).

107. *Dabney*, 663 N.W.2d at 372.

108. *Id.*

109. See *id.*

raising due process concerns.¹¹⁰ After several years, it might be difficult to obtain witnesses or crime lab personnel to cross-examine.¹¹¹ These statutes seek to balance the competing policy interests of justice for the victim and due process for the accused by allowing valid claims while preventing stale ones.¹¹² In addition, DNA evidence may only identify defendants and may not be indicative of whether a crime was committed.¹¹³ For example, semen evidence may be present from both consensual and non-consensual sex.¹¹⁴ Therefore, to use a DNA warrant to toll a statute of limitations when the issue is more than mere identity but also consent, raises numerous fairness issues that the statute of limitations was designed to address.¹¹⁵

Defendants have also raised two constitutional claims for why “John Doe” warrants should not be allowed. First, the Fourth Amendment is usually implicated when a defendant claims that either the warrant failed to identify the defendant with the required degree of particularity¹¹⁶ or that the defendant had no notice that a prosecution was pending.¹¹⁷ Second, the Sixth Amendment is implicated because a defendant’s right to a speedy trial¹¹⁸ protects defendants from undue post accusation delay.

1. Fourth Amendment Arguments

Defendants’ Fourth Amendment argument that DNA warrants do not provide them with the required degree of particularity should fail. A DNA profile is a unique description of an individual and should be sufficient to meet the reasonable certainty requirement for describing a suspect in a warrant. Most states already allow warrants to identify an unknown suspect by an alias, a nickname, or

110. Elkins, *supra* note 7, at 280.

111. See, e.g., Andrew C. Bernasconi, Comment, *Beyond Fingerprinting: Indicting DNA Threatens Criminal Defendants’ Constitutional Rights*, 50 AM. U. L. REV. 979, 1018–19 (2001); Frank B. Ulmer, Note, *Using DNA Profiles to Obtain “John Doe” Arrest Warrants and Indictments and Statutory Rights*, 58 WASH. & LEE L. REV. 1585, 1613–14 (2001).

112. Tyler T. Ochoa & Andrew J. Wistrich, *The Puzzling Purposes of the Statutes of Limitation*, 28 PAC. L.J. 453, 454–55 (1997).

113. See Imwinkelried & Kaye, *supra* note 47, at 473; Jonathan W. Diehl, Note, *Drafting a Fair DNA Exception to the Statute of Limitations in Sexual Assault Cases*, 39 JURIMETRICS J. 431, 438 (1999) (considering a hypothetical rape suspect who passed by a crime scene prior to the crime and inadvertently left blood there, and then left prior to the crime being committed).

114. Imwinkelried & Kaye, *supra* note 47, at 473.

115. One way to alleviate this dilemma is to use the “John Doe” warrants only where the sole issue is the identity of the assailant, such as in violent forcible sexual assaults, sexual assaults by strangers, and sexual assault of a minor, as opposed to using DNA warrants in cases where consent is at issue.

116. U.S. CONST. amend. IV (“[N]o warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing . . . the persons or things to be seized.”). See, e.g., *Dabney*, 663 N.W.2d at 370–71.

117. See Ulmer, *supra* note 111, at 1610.

118. U.S. CONST. amend. VI (“In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial . . .”).

a physical description.¹¹⁹ Additionally, a complaint or warrant satisfies the sufficiency standard when the description of the suspect listed clearly demonstrates that "law enforcement authorities had probable cause to suspect a particular person of committing a crime."¹²⁰ Because a DNA profile is unique to only one individual, it should satisfy the particularity requirements for obtaining a warrant even better than a physical description could.

Countering the argument that the use of DNA or "John Doe" warrants does not provide a defendant with adequate notice of a pending prosecution is more difficult. The suspect's right to a fair trial may be prejudiced because the warrant did not identify the suspect by name, and therefore, the defendant was not put on notice of his or her pending prosecution. A person is likely to know his or her nickname or alias; but rarely will a suspect be able to identify himself by his genetic profile. If the defendant can show that he or she was prejudiced by the "John Doe" warrant, then he or she may have a good case against the constitutionality of such a warrant.¹²¹ Currently, as with many issues surrounding DNA, this issue is still undecided.¹²²

2. Sixth Amendment Arguments

Finally, the Sixth Amendment of the Constitution may provide another defense against the use of "John Doe" warrants. Specifically, the Sixth Amendment's speedy trial clause arguably prevents the use of such warrants to haul suspects into court years after a crime was originally committed.¹²³ The speedy trial clause begins to run at the start of the prosecution, which arguably is the issuance of a complaint, indictment, or warrant, even without an arrest.¹²⁴ Therefore, there is an argument that courts should have greater discretion in allowing "John Doe" warrants to toll the statute of limitations in sexual assault cases because the Sixth Amendment's speedy trial clause ultimately will provide relief for a defendant aggrieved by stale evidence and the inability to present a vigorous defense.¹²⁵

Allowing courts to use "John Doe" or DNA warrants to extend the statute of limitations in sexual assault cases would go far in alleviating the concern some victims feel that sexual assault is not taken seriously by the criminal justice system. It is already incredibly difficult to prosecute a sexual assault case, and

119. See Elkins, *supra* note 7, at 281. See also Powe v. City of Chicago, 664 F.2d 639, 645-47 (7th Cir. 1981).

120. See Powe, 664 F.2d at 646.

121. See Valdivieso, *supra* note 93, at 1043-44.

122. See Elkins, *supra* note 7, at 281-82.

123. Barker v. Wingo, 407 U.S. 514, 530 (1977) (articulating a balancing test that takes into account the length of the delay, the reason for the delay, whether the defendant asserted his Sixth Amendment right, and prejudice to the defendant).

124. United States v. Marion, 404 U.S. 307, 313 (1971) ("[T]he protection of the Amendment is activated only when a criminal prosecution has begun and extends only to those persons who have been 'accused' in the course of that prosecution.").

125. See Bernasconi, *supra* note 111, at 1016-18.

most rapists never spend a day in jail.¹²⁶ Giving the prosecution one more weapon to use might help to bring the rape conviction rate up from fifty-eight percent.¹²⁷

Currently, DNA warrants have been used in several states, including New York, Pennsylvania, California, Florida, and Wisconsin.¹²⁸ Ultimately, all jurisdictions will have to decide whether the use of DNA warrants comports with their individual state constitutions, and the issue has yet to be decided by the United States Supreme Court in regard to the United States Constitution.

IV. MOVING TOWARD THE USE OF BEHAVIORAL GENETICS IN THE COURTROOM

In the last century, there has been a growing appreciation for the role that genes play not only in the development of certain physical characteristics and diseases, but also in human behavior. Many human diseases, characteristics, and traits have been linked to genetics, including homosexuality, aggressiveness, and shyness,¹²⁹ as well as diseases like Huntington's disease, cancers, sickle cell anemia, and cystic fibrosis.¹³⁰ An understanding of the role that genetics plays in affecting behavior may help answer the age-old question: why do we do the things we do?¹³¹ The following section summarizes the current state of studies concerning behavioral genetics and what impact these studies may have in the courtroom. Specifically, Section IV.A. addresses how behavior is influenced by genetics. Section IV.B. discusses four stages of the criminal process where the use of genetic information could play a role, which are: before a crime is committed, during trial as a defense, during sentencing as a mitigating factor, and finally post-conviction as a rehabilitative tool. While genetics could play a role at each of these

126. Factoring in unreported rape cases, fifteen out of sixteen rapists will walk free, without ever spending one day in jail. Rape, Abuse & Incest Nat'l Network, RAINN Statistics, at <http://www.rainn.org/statistics.html> (last visited Feb. 17, 2005) (on file with Arizona Law Review).

127. See *id.* (stating that, when rapes are prosecuted, they result in a felony conviction rate of fifty-eight percent). Of course, to alleviate this issue altogether, states could extend or repeal the statute of limitations in sexual assault cases. Ulmer, *supra* note 111, at 1621. Since a sexual assault can be just as devastating as murder, which has no statute of limitations, this would put sexual assault on the same footing as other "heinous" crimes, a place in which some victims' advocates feel sexual assault belongs. States would also need to decide which cases to allow this to apply to, such as cases where the only issue is identity, sexual assaults of minors and violent sexual assaults. See *supra* text accompanying notes 114–15. It will be up to the legislatures to balance the competing policy interests of victims' rights and the problems associated with prosecuting stale cases.

128. See Meredith A. Bieber, *Meeting the Statute or Beating It: Using "John Doe" Indictments Based on DNA to Meet the Statute of Limitations*, 150 U. PA. L. REV. 1079, 1079 n.1 (2002).

129. Rhoda J. Yen, *Tourette's Syndrome: A Case Example for Mandatory Genetic Regulation of Behavioral Disorders*, 27 LAW & PSYCHOL. REV. 29, 30 (2003).

130. Curley & Caperna, *supra* note 11, at 25.

131. Thinkers ranging from Plato to Martin Luther to David Hume have all tried to understand the complexities of human behavior and the process by which an individual undertakes to act. See Richard C. Boldt, *The Construction of Responsibility in the Criminal Law*, 140 U. PA. L. REV. 2245, 2254 (1992).

stages, there are constitutional hurdles and other challenges that need to be addressed. Behavioral genetic information should not be used at every stage because of the problems that it causes. Nonetheless, behavioral genetic information should play a role in the post-conviction and therapeutic stages of the criminal process.

A. The Role Genes Play in Human Behavior

At some point in the near future, science may advance to the point where anti-social behavior can be predicted with some degree of accuracy. Because genetics plays only a role in human behavior rather than controlling it completely, many other factors will have to be considered in order to predict a person's likelihood of exhibiting anti-social behavior.¹³² A genetic predisposition for aggression will only make a person more likely to commit an act of aggression.¹³³ Researchers have theorized that analyzing elements, including genetic factors like serotonin deficits, presence of Attention Deficit Hyperactivity Disorder (ADHD),¹³⁴ as well as biological factors like organic defects caused by drug use during pregnancy, and factors such as environmental and social conditions, like economic level, marital status of parents, and neighborhood can all be used to predict violence. It is important to realize, however, that this prediction would only be a calculation of the *probability* for violence, not an absolute indicator.

Recent studies have concluded that all human behavior has a genetic component.¹³⁵ Behavioral characteristics that are influenced by genes are inherited in polygenic fashion, meaning a number of genes are involved in the expression of a single characteristic.¹³⁶ While there are few, if any, specific behaviors attributable to a single gene,¹³⁷ a person's underlying biology can provide a predisposition to behave according to a pattern.¹³⁸ What follows is a brief discussion of how genes can affect behavior and current studies that shed light on the role genes play in behavior.

Genes can affect behavior in a number of ways. They can affect the physiological structure and the regulatory mechanisms of biological systems, like the brain and neural pathways.¹³⁹ They also provide the code that tells the body how to make the chemicals that control most of the body's functions, including brain function.¹⁴⁰ Some of these chemicals are neurotransmitters,¹⁴¹ enzymes,¹⁴²

132. Mary Coombs, *A Brave New Crime-Free World?*, in GENETICS AND CRIMINALITY, *supra* note 1, at 227, 231-35 (Jeffrey R. Botkin et al., eds., 1999).

133. *Id.*

134. Studies have shown that Attention Deficit Hyperactivity Disorder (ADHD) is prevalent in prisons. Dwaine McCallon, *Diagnosing and Treating ADHD in a Men's Prison*, in 1 SCIENCE, TREATMENT, AND PREVENTION OF ANTISOCIAL BEHAVIORS, *supra* note 8, at 17-1, 17-3. While "most persons with ADHD do not end up in prison, prisons house a significant proportion of those with ADD and ADHD." *Id.*

135. Fishbein, *supra* note 8, at 1-8.

136. McCallon, *supra* note 134, at 17-10.

137. Fishbein, *supra* note 8, at 1-8.

138. *Id.*

139. Goldman & Fishbein, *supra* note 17, at 9-4.

140. *Id.*

hormones,¹⁴³ and receptors.¹⁴⁴ The levels of these chemicals in the body affect human behavior.¹⁴⁵

Studies of twins have shown the importance of genetics, rather than solely environment, in influencing human behavior.¹⁴⁶ A person's genetic make-up, therefore, may help to predict his or her vulnerabilities to anti-social behavior that, when coupled with environment, may indicate the likelihood of exhibiting such behavior.¹⁴⁷ These studies may lead to techniques for predicting such vulnerabilities or for helping psychologists customize treatment to an individual's genetically influenced social problems.

Several studies have linked specific genetically triggered chemicals, such as serotonin, dopamine, and monoamine oxidase (MAO) to human behavior. Lowered serotonin levels in the brain have been linked to impulsive, aggressive, and violent behavior.¹⁴⁸ Serotonin levels may also affect a person's tendencies towards alcoholism and suicide, giving those characteristics a possible genetic component.¹⁴⁹ Additionally, postmortem studies of the brain have detected

141. Neurotransmitters are chemicals in the brain that transmit messages between cells in the brain, enabling the neural circuits. *Id.* The synthesis, metabolism, and receptor functions of neurotransmitters are essential in performing most brain functions like sleep cycles, mood, behavior, emotion, cognition, and motor movement. *Id.*

142. Enzymes are proteins that degrade and metabolize other chemicals in the body. Genes encode for the structure, location, and level of expression of enzymes, which are primarily responsible for the synthesis and metabolism of neurotransmitters. Thus, genetic variances in the levels, functions, structure, or expression of enzymes can lead to behavioral differences. *Id.*

143. Hormones are chemicals that are released throughout the body and that elicit responses from other cells and greatly influence behavior. Examples are estrogen, progesterone, testosterone, and adrenaline. Hormones affect the sexual differentiation of the brain and determine whether a person will develop male or female characteristics. *Id.*

144. Receptors are proteins that are usually on the surface of the cell that bind to particular neurotransmitters and hormones, which activates a change in the ion concentration in a cell. The number of receptor sites and their functionality determines the sufficiency of neurochemical activity, which are influential in human behavior. *Id.* at 9-4 to 9-5.

145. Mental disorders are often characterized as "chemical imbalances" in the brain. See OhioHealth, Chemical Imbalance at <http://www.ohiohealth.com/health/reference/reference/32E0D468-E6AF-9BC6-BE2041CD811966D3.htm> (last modified Apr. 30, 2004) (on file with Arizona Law Review).

146. See, e.g., David E. Comings, Encyclopedia of Life Scis., *Behaviour Genetics—Human* (Nature Publ'g Group 2003), available at www.els.net (describing studies showing that the genetic component in many personality disorders, like paranoid, antisocial, borderline and obsessive-compulsive disorders, as well as clinical disorders like depression, bi-polar and manic depressive disorders, and attention deficit hyperactivity disorder, have a genetic component ranging between thirty to seventy percent) (on file with Arizona Law Review).

147. Fishbein, *supra* note 8, at 1-8.

148. Goldman & Fishbein, *supra* note 17, at 9-9 to 9-11.

149. *Id.* Studies have also revealed that "serotonin modulates alcohol consumption including excessive drinking," which is a common factor in many criminal acts. *Id.*

serotonin deficits in people who committed violent¹⁵⁰ suicide as contrasted to people who committed nonviolent¹⁵¹ suicide.¹⁵²

Another chemical linked to aggressive behavior, including psychosis and violent behavior is dopamine.¹⁵³ Many genes are involved in the production of dopamine, and genetic defects in dopamine metabolism have been linked to behaviors including drug abuse, Tourette's Syndrome, post-traumatic stress disorder, and obsessive-compulsive disorder.¹⁵⁴

For nearly twenty years, there has been an acknowledged link between MAO and certain types of criminality, especially those that involve psychopathy, aggression, and violent behavior.¹⁵⁵ MAO A and MAO B are two enzymes that metabolize dopamine, serotonin, and other chemicals.¹⁵⁶ Consequently, low levels of MAO affect the balance of these neurotransmitters, which in turn can affect behavior.¹⁵⁷ Unfortunately, the relationship between MAO metabolic abnormalities is complex, and studies of families with genetic MAO abnormalities have been improperly applied to many families that have a prevalence of impulsivity and aggression, when a number of other factors could also have played a role.¹⁵⁸ A correlation has been found between many of these chemicals and enzymes and the prevalence of anti-social human behavior, however, more research still needs to be done.

While many additional studies link genetic components to human behavior, in reality human behavior is highly complex and influenced by many different things, like environment and individual choice, and completion of the research involving the interaction of genes with other influences is still many years

150. Examples of violent suicides include those committed by knives and guns. *Id.*

151. Examples of non-violent suicides include those committed by pills and gas. *Id.*

152. Other studies, have shown that impulsive and violent persons who have very low concentration levels of a by-product of serotonin were almost all alcoholics and over half had a history of suicide attempts. *Id.* (discussing a study of a group of genetically related Finns who exhibited extreme anti-social behavior).

153. *Id.* at 9-8.

154. *Id.*

155. *Id.* at 9-11.

156. David E. Comings, *The Role of Genetics in ADHD and Conduct Disorder—Relevance to the Treatment of Recidivistic Antisocial Behavior*, in 1 SCIENCE, TREATMENT, AND PREVENTION OF ANTISOCIAL BEHAVIORS, *supra* note 8, 16-1, 16-11.

157. *Id.* at 16-11.

158. One study of a Dutch family that spanned four generations found several males to be affected with a behavioral syndrome that included borderline retardation and impulsive and aggressive behavior. Goldman & Fishbein, *supra* note 17, at 9-12 (citing H.G. Brunner et. al., *X Linked Borderline Mental Retardation with Prominent Behavioral Disturbance*, AM. J. HUM. GENETICS, 52, 1032-39 (1993)). These males also had a history of unprovoked aggressive outbursts and difficulty forming relationships. *Id.* A genetic analysis revealed that the males in this family who were affected with the behavioral disorders had a defective MAO-A gene, which is on the X chromosome, deactivating the MAO-A enzyme, leading to the neurochemical, and behavioral disorders. *Id.*

away.¹⁵⁹ However, the possibility of being able to identify individuals with a predisposition for violent or antisocial behavior raises interesting moral and ethical questions about the use of behavioral genetic tests in criminal proceedings and for court ordered mandatory treatment.¹⁶⁰ For example, can people be forced to undergo treatment and therapy for a behavioral characteristic that has not yet manifested? Can a genetic test showing a predilection for violence be used as evidence of motive, or alternatively, as a defense? Can a person's genetic profile, indicating a predilection for violence, in conjunction with other evidence, one day be used to establish probable cause to obtain a search or arrest warrant?

B. Behavioral Genetics in the Courtroom

Genetic research as it relates to individual behavior is beginning to make its way into the courtroom. In both civil and criminal law, the standard for determining the lawfulness of an individual's conduct is to compare it with the behavior of a reasonable person.¹⁶¹ What happens when a genetics expert testifies regarding a person's innate capabilities of committing an offense? Philosopher Dan Brock asked, "If a person's genetic structure is . . . completely beyond the individual's control, can an individual justifiably be held responsible for the resultant behavior?"¹⁶² A philosophy such as this could completely do away with traditional concepts of criminal responsibility, allowing for gradations of culpability, a situation neither science nor the legal system is ready to accept. But this does not preclude the fact that there is still a place for behavioral genetic in our justice system, one that does not offend too deeply the notions of civil liberty or violate the Constitution.

There are four stages of the criminal justice process where genetic information could play a role: before trial (as a predictor of future anti-social behavior); during the trial phase; during sentencing; and finally, during post-conviction rehabilitation. While many people are terrified of the possibility of DNA playing a role in the justice system, ignoring the role that genetics plays in human behavior would prevent improvement to the current criminal justice system. There is a place for genetic information in our justice system, especially as an effective intervention in the post-conviction stages of criminal punishment and rehabilitation.

1. Before Trial: Prediction of Criminal Behavior Before Its Appearance

Using behavioral genetic information poses insurmountable problems at the before conviction stage. Defendants will object to behavioral DNA used at this

159. See Comings, *supra* note 156, at 16-12 to 16-17.

160. See generally Coombs, *supra* note 132.

161. The reasonable person standard is an objective standard that is the personification of a community's ideal of reasonable behavior. See RESTATEMENT (SECOND) OF TORTS § 283 cmt. c (1997). See, e.g., Angela Baker, *Employment Law—The "Reasonable Woman" Standard Under Ellison v. Brady: Implications for Assessing the Severity of Sexual Harassment and the Adequacy of Employer Response*, 17 J. CORP. L. 691, 706 (1992).

162. Dan W. Brock, *The Human Genome Project and Human Identity*, 29 HOU. L. REV. 7, 16 (1992).

stage for a host of reasons: Fourth Amendment concerns, invasion of privacy, and general societal policy beliefs of the criminal justice system. Groups such as the America Civil Liberties Union (ACLU) have already raised both civil liberty and privacy concerns about the government's access to information that could tell it whether a person has a predilection for a certain genetic disease, condition, or behavior.¹⁶³

The Fourth Amendment concerns question how the government can even gain access to a person's DNA, and how a court could use that information. As discussed above, collecting DNA constitutes a search and seizure,¹⁶⁴ but courts have deemed it justifiable because of society's compelling interest. It is impossible to imagine that a court would uphold a governmental decision to arrest people or force them into rehabilitation programs based on behavioral evidence that they are more likely to commit a crime. Punishing a person for the mere probability that he or she will commit a crime does not strike the appropriate balance between insuring public safety and insuring personal freedom. It is highly unlikely that genetic testing will ever be used to predict and prevent criminal behavior without corroborating evidence. Doing so would go against traditional concepts of the criminal justice system.¹⁶⁵ Detaining a person and subjecting him to rehabilitation before he has even committed a crime would punish him for the mere probability that he might commit a crime. While some would argue that statutes allowing for the commitment of repeat sexual offenders as a public safety issue, even after they have served their punishment,¹⁶⁶ are already one step toward punishing people for their genetic predilections, it is not the same as locking up sexual offenders for their mental illness. In such cases, the sex offenders have already committed a crime, and while they have served their time, they may have established a pattern or have a very high likelihood of recidivism.

Behavioral genetics does not determine who will commit a crime, only that a person has a predilection or increased likelihood of exhibiting anti-social behavior when combined with multiple other factors like environment and upbringing. Further, there are serious privacy concerns in letting the government have that much access to such personal information—information that could possibly expose multiple genetically linked medical and psychological

163. In 2000, the ACLU advised legislatures to beware the dangers of genetic databases, fearing misuse of the genetic information. ACLU, *DNA Databases Hold More Dangers Than Meet the Eye*, ACLU Says, (Mar. 23, 2000), <http://www.aclu.org/Privacy/Privacy.cfm?ID=7886&c=129> (on file with Arizona Law Review). The ACLU has also weighed in on fears that the genetic samples taken will be used for more than establishing mere identity and can be used to predict some 4,000 genetic conditions. Laura W. Murphy, Am. Civil Liberties Union, *ACLU Letter to the House Judiciary Committee Expressing Concerns About HR 3214, the Advancing Justice Through DNA Technology Act of 2003* (Oct. 8, 2003), at <http://www.aclu.org/Privacy/Privacy.cfm?ID=14002&c=129> (on file with Arizona Law Review).

164. See *supra* text accompanying notes 65–71.

165. It would be analogous to punishing people for their thoughts, although even less tangible as the “thought” they are punishing for is merely a heightened possibility that they may exhibit antisocial behavior. See Rachel F. Moran, *Law and Emotion, Love and Hate*, 11 J. CONTEMP. LEGAL ISSUES 747, 769–70 (2001).

166. See, e.g., WASH. REV. CODE § 71.09.010 (2005).

conditions.¹⁶⁷ While being able to prevent crime before it happens is a worthwhile cause, it is wrong to punish people before they have committed a crime. The societal interest in preventing harm to citizens is great, but the cost to our civil liberty and privacy is too high. Therefore, the criminal justice system should never be allowed to use genetic information at this stage of the criminal process.

2. During Trial: DNA as a Defense to Criminal Behavior

Genetic information may also be useful during the actual trial. Legal ethics require defense attorneys to be zealous advocates for their clients.¹⁶⁸ Courts usually permit even speculative arguments based on scientific innovations under the auspices of zealous advocacy. Such arguments are especially appealing in criminal cases in which they can be used to argue that the defendant was compelled to commit a crime because of uncontrollable genetic influences.¹⁶⁹ The general rule is that a defendant must have acted voluntarily to be convicted of a criminal act.¹⁷⁰ If the act was involuntary, then the defendant cannot have exercised free will.¹⁷¹ Thus, in certain cases in which a genetic condition is argued to have been the *cause* of an illegal action, the defendant may have an affirmative defense.

An example of a possible genetic defense is illustrated by the controversy surrounding the XYY Syndrome.¹⁷² Early studies found that there were a

167. Many people are already wary of the government having too much access to their personal information, and genetic information is the most personal information there is, as it can indicate whether a person has a certain medical condition or behavioral characteristic. Currently, there are only a few federal laws that regulate the use of genetic information. *See generally* The Health Insurance Portability and Accountability Act of 1996 ("HIPAA"), Pub. L. No. 104-191, § 101, 110 Stat. 1936, 1139–55 (1996) (codified as amended at 29 U.S.C. §§ 1181–87).

168. The Model Rules of Professional Conduct provide that a lawyer is duty bound to make any lawful argument in support of a client's position, regardless of whether it will ultimately prevail, so long as the argument is not frivolous and in criminal cases even frivolous arguments are permitted. MODEL RULES OF PROF'L CONDUCT R. 3.1 cmt. 1 (2002).

169. *See, e.g.,* Mass. Mut. Life Ins. Co. v. Woodall, 304 F. Supp. 2d 1364, 1377, n.7, (S.D. Ga. 2003). The "Twinkie Defense" was used in the trial of Dan White, a former San Francisco supervisor charged with murdering Mayor George Moscone and Supervisor Harvey Milk in 1978. Forensic Psychiatrist Dr. Martin Blinder, an assistant clinical professor at the University of San Francisco Medical School, testified that the junk food eaten by White could have affected his decision to shoot the victims. White was convicted of mere manslaughter and the California legislature amended their penal code to limit a defense attorney's ability to make such arguments. *Id.* *See also* Richard Lowell Nygaard, *The Ten Commandments of Behavioral Genetic Data and Criminology*, JUDGES' J., Summer 1997, at 59, 60 (comparing defenses based on behavioral genetics to the "Twinkie Defense.").

170. JOSHUA DRESSLER, CASES AND MATERIALS ON CRIMINAL LAW 123 (3d ed. 2003); *see also* MODEL PENAL CODE § 2.01(1) (1985).

171. DRESSLER, *supra* note 170, at 123.

172. Most women are born with two X chromosomes (XX), while most men are born with an X and a Y chromosome (XY). GRIFFITHS ET AL., *supra* note 20, at 70. Some individuals, however, are born with chromosomal abnormalities at the twenty-third (sex) chromosome, and they have an extra sex chromosome. One of these abnormalities is the

disproportionately high number of males with an extra Y chromosome in maximum-security prisons.¹⁷³ While there is some evidence of a correlation between violent behavior and the frequency of XYY chromosomes, courts in general have been reluctant to accept this genetic excuse.¹⁷⁴ Given the inconsistencies in studies that attempt to prove a correlation between violence and an extra Y chromosome,¹⁷⁵ the reason most courts give for not accepting the XYY defense is that it is not based on proven and accepted research.¹⁷⁶

However, as has been explained in the sections above, a genetic condition might increase the odds that a person will succumb to criminal behavior, but it is rarely the genetic defect alone that *causes* an individual to act. Rather, it is the genetic predisposition combined with other factors that affect a defendant's behavior.¹⁷⁷ Because it can rarely be proven that genes caused a criminal to act, it seems infeasible to allow a genetic predisposition for violent behavior to substitute for the assumption of free will and therefore constitute a complete genetic-based affirmative defense.

Additionally, because there are causation issues regarding the role genes play in a criminal behavior, there are several evidentiary problems associated with using behavioral genetic studies as scientific evidence in court. Were a defendant to introduce a genetic condition as a defense, he or she would be required to prove a relationship between the criminal offense and the genetic impairment.¹⁷⁸ Given the current state of genetic research,¹⁷⁹ however, it is highly unlikely that genetic studies would meet admissibility requirements under the Federal Rules of Evidence.¹⁸⁰ Even if genetic studies and expert testimony were admitted, it would

"super male" or XYY abnormality. See WAYNE R. LAFAYE, *SUBSTANTIVE CRIMINAL LAW* § 9.3 (2d ed. 2003). See also Rebecca Dresser, *Criminal Responsibility and the "Genetics Defense"*, in *GENETICS AND CRIMINALITY*, *supra* note 1, at 163, 167–68.

173. Matthew Jones, Note, *Overcoming the Myth of Free Will in Criminal Law: The True Impact of the Genetic Revolution*, 52 DUKE L.J. 1031, 1039–40 (2003) (citing Herman A. Witkin et al., *Criminality in XYY and XXY Men*, 193 SCI. 547, 547–55 (1976)).

174. This defense has been tried in several jurisdictions. See, e.g., *State v. Roberts*, 544 P.2d 754, 759 (Wash. Ct. App. 1976) ("In the absence of sound medical support of the XYY defense, the trial court did not abuse its discretion in denying defendant's motion for a continuance."); *People v. Yukl*, 372 N.Y.S.2d 313, 320 (Sup. Ct. 1975) ("[T]he genetic imbalance theory of crime causation has not been satisfactorily established and accepted in either the scientific or legal communities so as to warrant its admission in criminal trials.").

175. See LAFAYE, *supra* note 172.

176. *Roberts*, 544 P.2d at 759; *Yukl*, 372 N.Y.S.2d at 319.

177. See discussion *supra* Section IV.A (regarding variables that affect human behavior).

178. See Maureen P. Coffey, Note, *The Genetic Defense: Excuse or Explanation?*, 35 WM. & MARY L. REV. 353, 394–95 (1993).

179. Currently, few of the studies in behavioral genetics have been widely replicated and they are still limited in number. See Dorothy Nelkin, *After Daubert: The Relevance and Reliability of Genetic Information*, 15 CARDOZO L. REV. 2119, 2123 (1994).

180. See discussion *supra* Section III.A. (regarding evidentiary problems with using genetic information during trial). See also *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 589 (holding that the adoption of the Federal Rules of Evidence supercedes the *Frye* test for admissibility of scientific evidence).

still be nearly impossible to prove the existence of a direct causal relationship between genetic abnormalities and criminal acts, as the studies tend to indicate only that there is an association between a particular genetic mutation and criminal tendencies.¹⁸¹ Evidence of mere association is not legally sufficient to excuse completely a defendant of a violent crime.¹⁸²

Nevertheless, genes do influence human behavior, which undermines the American criminal justice system's reliance on the theory of free will. As a result, the criminal justice system should begin to take into consideration the biological causes of conduct rather than just the psychological decision-making process.¹⁸³ This may entail a system that weighs all factors affecting behavior, with graduated levels of accountability based on the sum of all such factors.¹⁸⁴ With the extensive advances that genetic research has made and promises to make in identifying genes that influence behavior, courts in the future may have to reevaluate genetic defenses.

3. Post-Trial: DNA as a Mitigating Factor at Sentencing

Genetic information may also play a role during the sentencing phase. While there is little case law on this issue, some defendants have already attempted to raise genetic conditions as a mitigating factor during a sentencing hearing.¹⁸⁵ Even if genes do not cause people to commit crimes, it does not necessarily follow that the actor had complete free will.¹⁸⁶ Therefore, genetic predispositions to criminal behavior could possibly play a legitimate role during the sentencing stage. A person's genetic make-up influences behavior, but it does not cause behavior. Because of this link between genetic makeup and behavior, a defendant's genetics might serve as a mitigating factor for criminal behavior.¹⁸⁷ There is a need for

181. See generally Mary Crossley, *The "Genetics Defense:" Hurdles and Pressures*, in GENETICS AND CRIMINALITY, *supra* note 1, at 174.

182. *Id.* (describing numerous hurdles to overcome when using genetic information as a defense).

183. Steven I. Friedland, *The Criminal Law Implications of the Human Genome Project: Reimagining a Genetically Oriented Criminal Justice System*, 86 KY. L.J. 303, 329 (1998).

184. See Richard Lowell Nygaard, *Freewill, Determinism, Penology, and the Human Genome: Where's a New Leibniz When We Really Need Him?*, 3 U. CHI. L. SCH. ROUNDTABLE 417, 433-34 (1996) (arguing that a criminal law system based on the idea of free will perseveres yet goes against common sense and that the current criminal justice system will need to undergo drastic changes to respond to criminal behavior).

185. See *Baker v. State Bar of Cal.*, 781 P.2d 1344, 1345 (Cal. 1990) (allowing evidence of defendant attorney's genetic predisposition to alcoholism to mitigate his punishment in disbarment proceeding).

186. Courts and commentators have acknowledged the role of free will in American criminal justice. Free will theory asserts that human behavior is the result of individual choices made by an autonomous actor as a result of a given situation, who thus can be held partially responsible for his or her choices. See Boldt, *supra* note 131, at 2247-55 (stating that criminal law creates a society based on the idea of free will).

187. Genetic disorders that create neuro-physiological conditions that make it more difficult to control behavior and resist impulses may show reduced capacity sufficient

flexibility in the assumption of free will, which supports a downward departure for impairments of a genetic origin. Further, precedent indicates that judges may be more willing to accept genetic evidence at the sentencing stage that does not meet the standards for admissibility during trial.¹⁸⁸

Federal sentencing policy also seems to support a mitigating role for genetic disorders.¹⁸⁹ The Federal Sentencing Guidelines ("Guidelines") authorize punishment mitigation for offenders suffering from a "reduced mental capacity" under the diminished capacity departure.¹⁹⁰ One can argue that reducing sentences for offenders who are predisposed to commit violent crimes would be similar to rewarding the offenders who are most likely to repeatedly commit acts of violence, which is contrary to what such offenders deserve as a punishment. While, incarceration of genetically predisposed violent offenders may keep the general public safer while the offenders are behind bars, it does not eliminate the inherent problem. In fact, extended prison sentences can exacerbate the perpetual cycle of violence as it is well known that there is a violence problem within prisons, and because environment also plays a role in triggering a genetic disposition for violence, the highly stressful and hostile environment of most prisons could seriously hinder a prisoner's ability to learn to control his behavior.

Currently, the Guidelines do not specifically address genetic impairments under the diminished capacity departure, and as such, many judges may be reluctant to categorize a genetic predisposition as a "mental impairment." However, sentencing is a stage of the criminal justice system where the use of genetic information could play a beneficial role in improving the application of justice. Supplementing the current Guidelines to reduce sentences for violent offenders, who successfully demonstrate a genetic predisposition for violence, would serve the broad principle of justice that punishment of a crime be proportional to one's blameworthiness.¹⁹¹ Justice is not served by imposing similar

for mitigation at sentencing. See discussion *supra* Section IV.A (discussing the role that various genetic disorders play in human behavior).

188. *Hendricks v. Calderon*, 864 F. Supp. 929 (N.D. Cal. 1994). In this capital case, the trial court excluded genetic evidence at both the trial and at sentencing. *Id.* The appeals court held it was reasonable for the trial court to have excluded the genetic evidence at trial but withholding the potential mitigating evidence of a genetic disorder at sentencing was unreasonable and prejudicial. *Id.* see also *Baker*, 781 P.2d at 1351 n.6 (allowing evidence of defendant attorney's genetic predisposition for alcoholism to mitigate his punishment in disbarment proceedings).

189. U.S. SENTENCING GUIDELINES MANUAL § 5K2.13 (1998).

190. The Sentencing Commission has interpreted "reduced mental capacity" to include volitional impairments, which are conditions that affect the ability of an individual to control behavior, despite knowing that it is wrong. See *id.* § 5K2.13 cmt. n.1.

191. See Jarod K. Hofack, *Justice or Vengeance: How Young Is Too Young for a Child to Be Tried and Punished as an Adult?*, 34 TEX. TECH L. REV. 159, 176 (2002) (describing the framework for an Eighth Amendment inquiry into cruel and unusual punishment); Denis W. Keyes & William J. Edwards, *Mental Retardation and the Death Penalty: Current Status of Exemption Legislation*, 21 MENTAL & PHYSICAL DISABILITY L. REP. 687, 687 (1997) ("[S]tates may execute only those persons whose culpability and moral blameworthiness are proportional to the punishment.").

sentences for similar crimes when the offenders have dissimilar capacities for self-control.¹⁹²

4. *Post-Conviction: Genetics as a Rehabilitative and Therapeutic Agent*

The final stage of the criminal justice and perhaps the most beneficial stage where genetic information could play a role involves post-conviction rehabilitation. There is great potential to improve behavioral disorders through an understanding of the underlying social and biological mechanisms involved in criminality, which will help to develop humane policies with better preventative effects. For example, many crimes are committed by people who are intoxicated.¹⁹³ These crimes can be reduced through therapy that regulates serotonin, thus reducing alcoholism and other aggressive behavior associated with excessive drinking.¹⁹⁴

Genetic testing within prison populations could also seriously improve the chance of rehabilitative success.¹⁹⁵ For example, studies have shown that ADHD is prevalent in prisons.¹⁹⁶ Genes identified as contributing to ADHD implicate dysfunction within neurotransmitter systems, which are suitable to both medical and social interventions like drug treatments, training programs, and cognitive skills development.¹⁹⁷ For individuals identified as having genetic dysfunctions that are indicators of criminal behavior, incarceration with other prisoners could just lead to them developing new criminal skills instead of coping skills.¹⁹⁸ Once identified, inmates with genetic dysfunctions can receive

192. See Friedland, *supra* note 183, at 328 (arguing that since the scope and nature of criminal responsibility is socially ordered it can therefore be disordered by those within the system); Seth A. Travis, Comment, *Guiding the Sentencing Court's Discretion: A Proposed Definition of the Phrase "Non-Violent Offense" Under United States Sentencing Guideline § 5K2.13*, 86 J. CRIM. L. & CRIMINOLOGY 530, 547 (1996) ("Under the deterrent theory, legal sanctions are less effective with people who suffer from diminished mental capacity, because sanctions will not deter someone whose actions are beyond his self-control. Thus, under both theories those with diminished mental capacity deserve less severe punishment.").

193. Among the 5.3 million convicted offenders under the jurisdiction of corrections agencies in 1996, about thirty-six percent, or nearly two million, were estimated to have been drinking at the time of the offense. Among violent offenders, forty-one percent of probationers, forty-one percent of those in local jails, thirty-eight percent of those in State prisons, and twenty percent of those in federal prisons were estimated to have been drinking when they committed the crime. See Bureau of Justice Statistics, *supra* note 84.

194. Goldman & Fishbein, *supra* note 17, at 9-10. See also David B. Wexler, *Inducing Therapeutic Compliance Through the Criminal Law*, in *ESSAYS IN THERAPEUTIC JURISPRUDENCE* 187, 188 (David B. Wexler & Bruce J. Winick eds., 1991) (discussing a study of fifty-eight violent offenders and impulsive fire-setters who were followed for three years after release from prison, during which time thirteen recidivated. Based on a study of fluid samples before release one could classify 84.2% of the subjects as persons who would or would not recidivate indicated by low serotonin levels).

195. McCallon, *supra* note 134, at ch. 17.

196. *Id.* at 17-3; see *supra* note 134.

197. McCallon, *supra* note 134, at 17-11.

198. See John Braithwaite, *A Future Where Punishment Is Marginalized: Realistic or Utopian?*, 46 UCLA L. REV. 1727, 1738 (1999) ("Prisons are schools for crime;

prescription drugs to correct chemical imbalances in the brain, and they can enroll in social programs like anger management¹⁹⁹ and social responding²⁰⁰ to help them deal with impulsivity and aggression problems. There is hope that successful treatment and medication could greatly reduce the risk of recidivism.²⁰¹

A crucial aspect of these programs is that they must be voluntary. There are two reasons for this requirement. First, such a requirement would alleviate the Fourth Amendment issues raised by impermissible bodily searches, from forcible DNA extractions and other privacy concerns.²⁰² Second, allowing the inmate to choose to enter the program on his or her own free will is itself one of the recovery steps.²⁰³

Court programs that specifically address genetic conditions can be analogized to the "problem solving courts" that are developing in response to the emerging legal theory of "Therapeutic Jurisprudence."²⁰⁴ During the past fifteen years a number of these problem solving courts have emerged and are attempting to break the cycle of recidivism by intervening in the life of criminal offenders by addressing their underlying problems, such as mental illness, poverty, substance abuse, or the lack of a home, job, or education.²⁰⁵ Depending on the program, these courts sometimes admit offenders into their programs in lieu of prison or sometimes as a condition of release.²⁰⁶

offenders learn new skills for the illegitimate labor market in prison and become more deeply enmeshed in criminal subcultures."); Joshua T. Rose, Note, *Innocence Lost: The Detrimental Effect of Automatic Waiver Statutes on Juvenile Justice*, 41 BRANDEIS L.J. 977, 987 (2003). ("[I]ncarcerating juveniles in adult prisons, surrounded by polished, career criminals, is certain to mold and develop the juvenile offender's criminal skills and attitude.").

199. Uncontrolled rage and anger contribute greatly to arrests and incarceration of people with behavioral disorders like ADHD. Anger management training helps a person to recognize the consequences of anger and rage, consequences like incarceration. Wendy Richardson, *Criminal Behavior Fueled by Attention Deficit Hyperactivity Disorder and Addiction*, in SCIENCE, TREATMENT, AND PREVENTION OF ANTISOCIAL BEHAVIORS, *supra* note 8, at 18-1, 18-11 to 18-12.

200. Social responding involves helping people diagnosed with conditions, like ADHD, understand and initiate appropriate responses to social situations. *Id.* at 18-11.

201. *See generally id.*

202. *See discussion supra* Section III.A.

203. *See* David B. Wexler & Bruce J. Winick, *Therapeutic Jurisprudence as a New Research Tool*, in ESSAYS IN THERAPEUTIC JURISPRUDENCE, *supra* note 194, at 303, 306-07.

204. *See generally* JUDGING IN A THERAPEUTIC KEY: THERAPEUTIC JURISPRUDENCE AND THE COURTS, (Bruce J. Winick & David B. Wexler. eds., 2003).

205. *Introduction to* JUDGING IN A THERAPEUTIC KEY, *supra* note 204, at 3.

206. *See, e.g., id.* at 4 ("Offenders accepting diversion to drug treatment court or pleading guilty and agreeing to participate in drug treatment court as a condition of probation agreed to remain drug-free, to participate in a prescribed course of drug treatment, to submit to periodic drug testing to monitor their compliance with the treatment plan, and to report periodically to court for judicial supervision of their progress.").

Among these problem solving courts, the drug courts have been particularly successful.²⁰⁷ The drug court treatment plans are tailored to the needs of an individual offender, and could include, among other things, participating in group therapy, substance abuse treatment, job training, completing a GED program, or referral to a residential treatment center.²⁰⁸ Completion of the program keeps a participant out of prison, or shortens a prison sentence and prepares him or her for emersion into daily life.²⁰⁹ Specialized courts that help a person deal with genetic conditions are a natural fit. There is no reason why a specialized genetic court could not be established that tailors a rehabilitative program specific to a person's genetic behavioral condition and includes treatments such as, anger management and impulse control, social response training, substance abuse treatment, and the necessary medication.

While the existence of a specialized genetic treatment program appears to have few drawbacks, there may be some concern that once a predisposition has been identified through genetic testing necessary to identify people appropriate for the programs, then convicted criminals will have ready-made defenses for future offenses. Therefore, to have a therapeutic effect, it may be necessary to place extra responsibility on the genetic offenders, once they are identified, to ensure that they cannot use the results of the testing as a perpetual defense.²¹⁰ For example, once a predisposition has been identified and an offender has been placed in a genetic court, in lieu of prison or for a reduced sentence, the individual cannot use that predisposition as a defense in subsequent prosecutions; it is allowed only once. Alternatively, another possible basis of liability for a person who commits a crime after being made aware of a predisposition for that criminal behavior is liability for failure to avoid a known dangerous condition.²¹¹

Currently, there are legal doctrines that attribute criminal liability to persons who commit an "involuntary" dangerous act by failing to take reasonable precautions to prevent such acts from occurring.²¹² These precedents suggest a possible system in which criminal defendants who have actual knowledge of their predisposition for antisocial behavior could be found culpable for failing to take reasonable precautions to avoid harming others.²¹³ Further, if state legislatures

207. Gloria Hayes, *Breaking the Cycle of Addiction: Officials Seek to Spread the Word on Drug Treatment Courts*, in JUDGING IN A THERAPEUTIC KEY, *supra* note 204, at 21.

208. See, e.g., *id.* at 23 (describing a Philadelphia drug court program).

209. See *id.* (describing a program requiring a participant to remain drug-free during the course of the program, failure to do so resulted in termination from the program, and the offender would then serve time for the crime for which they were initially arrested).

210. See Wexler & Winick, *supra* note 203, at 189-98 (discussing using the doctrine of reckless endangerment for offenders who engage in conduct which knowingly places others in danger of death or serious bodily injury in cases where a person was aware of the dangers of alcohol consumption, aware of the dangers of not following serotonergic medication, aware of their resulting behavior; yet, who nonetheless fail to follow a reasonable therapeutic and preventative course).

211. Dresser, *supra* note 172, at 169.

212. *Id.* at 166 (discussing the defense most commonly used with intoxicated defendants who argued that they lacked the requisite intent, control or awareness to be held responsible for their criminal acts); see also *People v. Decina*, 138 N.E.2d 799 (N.Y. 1956).

213. Dresser, *supra* note 172, at 170.

enacted statutes providing for the genetic testing of inmates as a condition for entrance into specialized courts or rehabilitative programs, provisions could impose criminal liability for failure to take reasonable precautions against known risks. This would alleviate the fear that by paying for genetic testing to customize treatment plans for inmates based on their behavioral predispositions, the state would be paying to provide violent offenders with a defense for their future actions.

V. CONCLUSION

While there is promise in behavioral genetics research, it is unlikely that science will ever uncover one particular gene for criminal behavior. Geneticist David Cummings stated that “[m]y feeling is there is certainly no ‘gene’ for criminal behavior. There are [only] genes which predispose people to an increased frequency of impulsive-compulsive behaviors and that put them at greater risk of being involved in criminal behavior.”²¹⁴ Science will continue to study and identify correlations between biology and behavior—correlations that will force the criminal justice system to reevaluate its theory of punishment based on actions caused by free will.²¹⁵ Optimistically, as the understanding of the role genetics plays in behavior increases, the criminal justice system should respond more therapeutically and less punitively.²¹⁶

Thus far, the criminal justice system has largely ignored the role that a person’s biological makeup, when combined with sociologic factors, plays in the criminal tendencies and recidivism rates of offenders.²¹⁷ Additionally, improved genetics information will likely, and should, affect the assumptions upon which our criminal justice system is based—assumptions related to both culpability and treatment. While there are stages during the criminal process where it would be inappropriate to rely on genetic information, as a predictor of future violence, an understanding of the underlying social and biological mechanisms involved in criminality will ultimately help to develop humane policies with a better preventative effect, especially in the areas of sentencing and rehabilitation. It is for these reasons that policy makers need to begin taking affirmative steps toward incorporating some of this biological knowledge into the justice system. Our fate may yet be in our genes.

214. Jones, *supra* note 173, at 1041 (citing Natalie Angier, *Disputed Meeting to Ask if Crime Has Genetic Roots*, N.Y. TIMES, Sept. 19, 1995, at C1).

215. Free will theory assumes that individuals have the inherent ability to “choose or ‘choose not’ when confronted with specific environmental stimuli,” and thus with this choice a person can be held individually responsible for his choices and actions. *Id.* at 1034.

216. Incarceration has been shown to be largely ineffective at reducing recidivism rates, decreasing victimization and improving public safety. Goldman & Fishbein, *supra* note 17, at 9-14 to 9-15.

217. See generally Fishbein, *supra* note 8, at 1-3 to 1-4.

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