BIOLOGICAL FACTORS ASSOCIATED WITH AGGRESSION AND VIOLENT BEHAVIOR: A COMPARATIVE ANALYSIS OF SCIENTIFIC, SOCIETAL, AND LEGAL DIMENSIONS

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PART I: INTRODUCTION

Overview

One of the most frequently discussed issues in the scientific community dealing with human behavior is the issue of nature versus nurture. Most researchers would agree a combination of biology and environment contributes to human behavior and cannot be separated one from the other.

However, the purpose of this paper is not to explore how biology and environment interact with each other, but to examine specific biological factors that may be leading contributors to criminally aggressive and violent human behavior and how society does or will react to these behaviors scientifically, socially, and legally.

Of course, this is not to suggest that environment should be disregarded, but rather the focus of this paper is on biological implications of behavior opposed to environmental implications of behavior.

In the year 2000, approximately 49% of inmates were violent offenders. On December 31, 2001, 1,962,220 prisoners were held in Federal or State prisons or in local jails, which signifies almost an annual 3.6% increase since yearend 1995. On December 31, 2000, 1,313,000 of the prisoners were male, which was a 1.2% increase. The women prison population decreased by 0.2% from December 31, 2000 to December 31, 2001.[1]

The United States is one of the top industrialized nations in the world and is close to having the most incarcerated criminals compared to other industrialized nations. Interestingly enough, there has been a decline in violent crimes from 1992 to 2001 by 25.7%, which contradicts what the United States society believes or has viewed through

[1] Office of Justice Programs - Bureau of Justice Statistics, *Prison Statistics*, U.S. DEPT. JUST., Summary Findings (2002), *at* www.ojp.usdoj.gov/bjs/prisons.htm.

the media or heard from their politicians.[2] Crime rates have been declining since 1993 but the United States maintains an increasingly substantial prison population in 2001[3] and the numbers continue to rise. If a portion of the prison population was found to be suffering from biological disorders, these individuals could be treated and rehabilitated opposed to incapacitation by incarceration; thus, decreasing the prison population and the possible cost to the taxpayers.

Part I, the introduction of this paper, describes the current practices of our judicial system and gives you a taste of some controversial issues surrounding biological factors associated with aggression and violent behaviors. Part II is the scientific analysis, which discusses biological factors associated with aggression and violent behaviors, treatment options, along with scientific policy implications. Biological factors such as heart rate, biochemicals, brain chemistry, and seizure disorders are just a few of the causes that have been identified as grounds for certain violent behaviors. Violence, according to the Black's Law Dictionary, is "physical force unlawfully exercised with the intent to harm."[4] Violent crimes are mainly characterized as offenses of murder, forcible rape, robbery, and aggravated assault.

Part III is the social analysis, which examines some environmental factors affecting biology, DNA profiling policies, gender issues, physician patient interactions, and social policy implications. Part IV explores legal issues from a historical standpoint and historical policy implications, legal issues of right to privacy, informed consent, genetic discrimination, and legal policy implications. Finally, Part V gives the

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[2] *Uniform Crime Reports: Table 1*, FED. BUREAU OF INVESTIGATION (2000), *at* www.fbi.gov.
[3] David Ho, *U.S. Prison Population Rising: Incarceration Rate May Top Russia as Highest in World*, THE ASSOCIATED PRESS, (2000).
[4] BLACK'S LAW DICTIONARY 1564 (7th ed. 1999).

conclusion of this paper. This section is "food for thought", which suggests possible avenues the human race may appraise in order to become a more civilized society.

Current Justice Practices

The American judicial system assumes that an individual's "free will" is the reason behind offenses committed and the individual is legally responsible for such behavior. Our justice system tends to focus on punishing the offenders while paying almost no attention to the social and physical science advancements that may explain why such behaviors may occur in U.S. society.[5] What we learn about offenders through scientific and social measures will help us understand why individuals engage in aggressive or violent behavior. This will give scientists the ability to treat offenders, which can reduce or prevent future aggressive and violent acts.[6]

Scientifically, it may be valuable to isolate genetic factors from environmental factors so the justice system will know whom to punish, whom to treat, and the methods to be used in treating the offenders.[7] A system using genetic screening and manipulation would revolve around the biological implications of criminal acts, which would move away from the strict psychological system, currently used by the justice system.[8] There is no significant showing that biology is the cause for criminal behavior, but studies do support a correlation between biology and crime.[9] Therefore, biological implications

[5] Richard Lowell Nygaard, *Freewill, Determinism, Penology, and the Human Genome: Where's A New Lebniz When We Really Need Him?*, 3 U. CHI. L. SCH. ROUNDTABLE 417, 422 (1996).
[6] Id. at 421.
[7] Id.
[8] Steven I. Friedland, *The Criminal Law Implications of the Human Genome Project: Reimagining A Genetically Oriented Criminal Justice System*, 86 KY. L.J. 303, 330 (1997-1998).
[9] *Id*.

should be considered as mitigating factors[10] when criminals are put through the justice system.

Controversial Issues

There are many controversial issues dealing with biological factors associated with criminal-type behaviors. First, it is sensible to discuss biological determinism and how it has set root in our society. Biological determinism began gaining ground after Darwin's theory of evolution was theorized in *The Origin of Species* in 1859. Societies began forming social programs revolving around eugenics wanting to encourage the reproduction of the upper class while eliminating the "unfit" social classes.[11] Many researchers have used Darwin's theory to support certain race- or class-based theories. These theories have either directly or inadvertently supported discrimination against certain classes and/or races as well as eugenics programs to eliminate the inferior elements from a particular race to create a biologically superior race. This only touches on a few issues that have led to many controversies in the scientific, social, and legal communities, which will now be discussed.

Biological implications of violent behavior have always been controversial as far as the public is concerned. Issues such as characteristics of violent offenders, eugenics programs that would eliminate "inferior" races, and the idea of using genetics to identify and treat violent offenders have led a significant number of researchers to believe that biology would be used as a tool for discrimination. Genetic manipulations may mean unpredictable mutations, which could alter human nature. However, on a more positive

[10] *Id*. at 335.
[11] Dorothy Porter, *Biological Determinism, Evolutionary Fundamentalism and the Rise of the Genoist Society*, 42 CRITICAL QUARTERLY 67, 70 (2000).

note, genetic manipulation could enhance and improve the quality of life by eliminating hereditary diseases.[12]

One of the earliest recorded controversial issues dealing with biological implications of violent behavior was in the 1870's in reference to a biological determinism theory developed by a criminologist by the name of Cesare Lombroso. Unlike most criminologists, Lombroso did not subscribe to the idea of "free will" in criminality. "Free will" is an idea, which describes an individual's propensity to commit crime according to his or her own free will. Instead, Lombroso developed a more positivistic approach where he believed there were other factors, such as biology and environment that needed to be studied to determine causes of criminality.[13]

Lombroso had been influenced by Charles Darwin's idea of natural selection. Lombroso took the idea of the atavistic creature, which is a primitive man, from Darwin's theory of evolution. This creature was said to be an evolutionary "throwback" in the modern world of human development. According to Lombroso, these primitive individuals who were insane, savages, and criminals often shared common physical characteristics. Some of these characteristics were abundant black and frizzled hair, sparse beards, skin that was often brown, slanted eyes, small skulls, over-developed jaws, retreating foreheads, and big ears.[14]

The problem with Lombroso's theory was that it was not a very scientific approach.[15] Lombroso only studied 200 criminals that were already locked up in prisons. He did not venture out into society to measure the criminal group against a control group

[12] FRIEDLAND, *supra* note 8, at 315-316.
[13] MARVIN E. WOLFGANG, PIONEERS IN CRIMINOLOGY 234 (Hermann Mannheim ed., Patterson Smith Publishing Corporation 2d ed. 1972) (1960).
[14] *Id.* at 247-248.
[15] *Id*. at 261-262.

of other individuals in the community that may have shared similar characteristics but were not themselves criminals.[16] Lombroso's theory was ultimately refuted. However, Lombroso has been identified as being the "father of criminology"[17] for his efforts to look at factors other than "free will" that may be main determinants for criminality.

A subsequent controversial issue was Adolf Hitler's race purification programs. These programs have always been classic examples of the controversial nature of biological policies that address undesirable traits in human genetics. In the 1920's, Hitler took the view that if resources were spent on individuals that were physically, mentally, or criminally degenerative than it would breed an inferior race.[18] Subsequently, a eugenics movement that would employ Darwinian principles of natural selection dealing with the survival of the fittest was implemented to see that the German race would be the ultimate survivor.

This eugenics movement summoned a biomedical science called race hygiene that would put a halt to the proliferation of mentally and physically handicapped individuals and criminals that Hitler and his scientists viewed as being the ultimate end of entire races.[19] Hitler wanted his Aryan race, a race of physically and mentally superior individuals, to inherit the world; thus, strict eugenics policies were implemented.[20] As we all know, these policies perpetuated not only the torture and deaths of many criminal individuals and the mentally and physically handicapped, but also medical experimentations on these individuals and the Jewish people in hopes of achieving an

[16] *Id*. at 244.
[17] *Id*. at 232.
[18] Roland Blaich, *Health Reform and Race Hygiene: Adventists and the Biomedical Vision of the Third Reich*, 65 CHURCH HIST. 425, 426-427 (1996).
[19] *Id*. at 426.
[20] *Id*. at 427.

Aryan race. It was after World War II that the idea of biological determinism was met with disfavor after the murderous potential of the Nazi party was realized to be such a threat to the human race.[21]

An additional example that illustrates the controversial issue of biological implications of violent behavior can be found in our present day society just within the last few years. In 1992, the University of Maryland had a criminology conference addressing the issue of genetic factors that may be related to crime. A group of social scientists led by Dr. Peter Breggin, who was the director of the Center for the Study of Psychiatry in Bethesda, Maryland at that time, scuttled the conference because the Human Genome Project was going to provide the University with $78,000 to have a topic of genetic factors in crime. Dr. Breggin stated, "The primary problems that afflict human beings are not due to bodies or brains, they are due to the environment. Redefining social problems as public health problems is exactly what was done in Nazi Germany."[22]

The point Dr. Breggin and his colleagues attempted to make by protesting the idea of genetics linked to criminality was to avoid discrimination and a eugenics-type program, which is understandable. However, it is a scientist's responsibility to be objective and to look at all angles of social problems so that informed decisions can be made in regards to such issues of criminality, aggression, and violence. The following sections of this paper will discuss the scientific, social, and legal dimensions of biological factors associated with aggression and violent behavior and possible policy implications of these dimensions.

[21] PORTER, *supra* note 11, at 72.
[22] Anastasia Toufexis & Hannah Bloch, *Seeking the Roots of Violence*, 141 TIME 1993 at 52.

PART II: SCIENTIFIC ANALYSIS

Biological Factors of Aggression and Violence

There are many different biological functions that have been linked to aggressive and violent behavior. This is not to say that environment does not play a significant role in these behaviors, but there are studies to suggest that the biology of some disorders may be a more significant factor than environment. This section will discuss a few of the biological issues connected to aggressive and violent behaviors and how they may be treated or prevented from occurring.

Heart Rate:

Heart rate has shown to be a well-established biological correlate of crime concerning aggression.[23] Boys from the third to sixth grades were subjects of a study looking at reduced heart rate levels in association with aggression. This study found there was a significant main effect between the heart rates of aggressive children compared to nonaggressive children. The aggressive boys' heart rates were significantly lower than the nonaggressive boys' in five out of six heart rate readings.[24]

Sampling from a birth cohort of 400 London males was studied over a period of twenty-four years, from the ages of eight to thirty-two. Heart rate was measured on the sample when the males were eighteen years old. The findings support that a low resting heart rate was significantly associated with convictions for violence. It was strongly related to only two risk factors, which were unstable job record at the age of eighteen and playing team games at the age of sixteen. The unstable job may be related to the employers have difficulty with the aggressive behavior of the subject males or the male

[23] L. ELLIS & A. WALSH, CRIMINOLOGY: A GLOBAL PERSPECTIVE 301 (Allyn & Bacon 2000) (2000).
[24] T. PITTS BICE, BIOSOCIAL BASES OF VIOLENCE 319 (A. Raine, P. A. Brennan, D. P. Farrington & S. A. Mednick ed., Plenum Press 1997) (1997).

subjects quitting their jobs due to issues with temper. Team sports may have been due to the aggressive nature of sports that were played, suggesting that aggressive individuals were attracted to these team sports.[25] What is clear is that a low resting heart rate does seem to support aggressive and/or violent behavior in male subjects.

Hormones:

Sex hormones have shown a probable correlation with crime[26], but they are not fully understood as far as their interaction with other biochemicals in the body that may or may not correspond to deviant and criminal behavior. In females, deviant or criminal behavior is most probable during the hormonal flux of the premenstrual period (PMS). In a Paris study, it was discovered that well over half the women reported they had committed their offense(s) during the seven days of PMS.[27] In another study on PMS, the findings suggested that women were consistently more aggressive on average than women with few or no symptoms of PMS.[28]

In males, testosterone has been the central focus for aggressive behavior studies. The relationship between testosterone and criminality has shown significant results in both men and women.[29] However, testosterone does not seem to work alone. Cortisol has been suggested to have a link with testosterone. Cortisol is a stress hormone that tends to be released by the adrenal glands during the fight or flight situations.[30] In a study looking at 113 late-adolescent male offenders that were incarcerated, testosterone

[25] D. P. FARRINGTON, BIOLSOCIAL BASES OF VIOLENCE 103 (A. Raine, P. A. Brennan, D. P. Farrington & S. A. Mednick ed., Plenum Press 1997) (1997).
[26] ELLIS, *supra* note 23, at 302.
[27] *Id*. at 275.
[28] *Id*. at 276.
[29] *Id*. at 284.
[30] *Id*. at 286.

concentrations with cortisol as a moderator have been associated with violent behavior. The testosterone-violence relationship was strongest when cortisol levels were low.[31]

Other Biochemicals:

Another biochemical that has an established relationship to criminal behavior is monoamine oxidase (MAO).[32] There are two forms of MAO, which are "MAO A" and "MAO B". Both MAO's are neurotransmitter enzymes – MAO A catabolizes serotonin and norepinephrine, whereas MAO B catabolizes the neuromodualtor phenylethylamine.[33] The MAO enzymes are studied in relation to psychiatric diseases. Low platelet MAO B has been associated with diseases, such as bipolar disorder, suicidal behavior, and alcoholism.[34] MAO A has been researched and is being implicated in the control of aggressive behavior in human beings.[35] Some studies have suggested that a high level of monoamine neurotransmitters in the central nervous system may be a factor that causes aggressive behavior. When a MAO A enzyme is introduced through drug therapies, the enzyme breaks down the monoamine neurotransmitter; thus, reducing aggressive tendencies.[36]

The neurotransmitter, serotonin, has also been a well-established correlate for crime.[37] Serotonin is a neurotransmitter and a hormone found naturally in the blood and brain or can be produced synthetically. Serotonin constricts the blood vessels and

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[31] J. M. Dabbs, G. J. Jurkovic & R. L. Frady, *Salivary Testosterone and Cortisol Among Late Adolescent Male Offenders*, 19 J. ABNORMAL CHILD. PSYCHOL. 469, 475 (1991).
[32] ELLIS, *supra* note 23, at 302.
[33] J.C. Shih & R. F. Thompson, *Monoamine Oxidase in Neuropsychiatry and Behavior*, 65 AM. J. HUMAN GENETICS 593, 593 (1999).
[34] *Id*.
[35] *Id*.
[36] *Id*. at 595.
[37] ELLIS, *supra* note 23, at 302.

contracts smooth muscle tissue.[38] Low levels of whole blood serotonin in males have been significantly associated with violent behavior. Women were excluded from this particular study for the reason they were not significantly more violent than men.[39] It is also important to look at alcohol abuse when examining the effects of neurotransmitters, such as serotonin. Alcoholism is associated with differences in neurotransmitter levels.[40]

Glucose, which is a sugar used to create energy in the body, is another biochemical that has been studied to show the difference in how the brain uptakes glucose in violent offenders compared to nonviolent offenders.[41] Offenders that have committed murder who are without a clear psychosocial deprivation could be characterized by lower prefrontal glucose metabolism compared with that of control levels.[42] This means that the brain has a lower uptake of glucose in murders than nonviolent individuals.[43] Murderers without deprivation showed a 4.7% reduction in lateral and medial glucose metabolism compared to controls, and had significantly lower medial glucose metabolism compared to the deprived murderers.[44] Murderers were found to have weaker activity in the left hemisphere of the brain, which is the area of the brain dealing with rational behavior, compared to the increased right hemisphere, which deals with emotions.[45] This suggests that some violent offenders' brains use glucose

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[38] WEBSTER'S NEW WORLD DICTIONARY 1310 (4th ed. 1999).
[39] T. MOFFIT, A. CASPI, P. FAWCETT, G. L. BRAMMER, M. RALEIGH, A. YUWILER & P. SILVA, BIOSOCIAL BASES OF VIOLENCE 231 (A. Raine, P. A. Brennan, D. P. Farrington & S. A. Mednick ed., Plenum Press 1997) (1997).
[40] GEORGE B. VOLD, THOMAS J. BERNARD & JEFREY B. SNIPES, THEORETICAL CRIMINOLOGY 76 (Oxford University Press 4th ed. 1998) (1998).
[41] *Brain Damage Linked To Violent Crime*, 13 BROWN U. CHILD & ADOLESCENT BEHAV. LETTER 4, 4 (1997).
[42] A. Raine, D. Phil, J. Stoddard, S. Bihrle & M. Buschsbaum, *Prefrontal Glucose Deficits In Murderers Lacking Psychosocial Deprivation*, 11 NEUROPSYCHIATRY, NEUROPSYHOLOGY, AND, BEHAV. NEUROLOGY 1, 5 (1998).
[43] BROWN U. CHILD. & ADOLESCENT BEHAV. LETTER, *supra* note 41, at 4.
[44] RAINE, *supra* note 42, at 5.
[45] BROWN U. CHILD. & ADOLESCENT BEHAV. LETTER, *supra* note 41, at 4.

differently than nonviolent offenders. This could be valuable information if science is able to help treat violent offenders' brains to uptake glucose like nonviolent offenders' brains.

The Brain:

The cerebral cortex has been the main portion of the brain studied when looking at violence and aggression. The cerebral cortex is the outer portion of the brain, which is divided into two hemispheres consisting of four lobes: frontal, parietal, temporal, and occipital lobes. Because the frontal and temporal lobes deal with goal-directed behavior, impulses, and emotions; they are the areas of the brain that are most studied when looking at aggression and violence.[46]

Dysfunction with the prefrontal cortex along with reduced prefrontal gray matter volume has been significantly associated with psychopathic behavior and antisocial personality disorders. Reduced prefrontal and increased subcortical brain functioning was positively associated with predatory murderers. Predatory murderers have prefrontal activity levels similar to affective (non-predatory) criminals, but they differ with excessive subcortical findings, which were statistically significant with a large effect size being obtained.[47]

Seizure disorders, such as epilepsy may not in itself be a link to aggressive or violent behavior, but a dysfunctional temporal lobe may be responsible for the seizures as well as behavioral and emotional disorders that may cause violent behaviors in some

[46] VOLD, *supra* note 40, at 79.
[47] A. Raine, J. R. Meloy, S. Bihrle, J. Stoddard, L. LaCasse & M. Buschsbaum, *Reduced Prefrontal and Increased Subcortical Brain Functioning Assessed Using Positron Emission Topography In Predatory and Affective Murderes*, 16 BEHAV. SCI. & L. 319, 330 (1998).

individuals.[48] Another type of seizure disorder that has not been completely understood and needs more research is limbic seizures. The limbic system of the human brain is the area that deals with emotion and some memory functions. It is responsible for aggressive behavior and is held in check by the frontal lobe of the brain. Limbic seizures have been characterized as an individual with a feeling of puzzlement or strange hallucinations, nausea, racing heart, and incontinence.[49] The individuals will go into a primitive mode with killer instincts, yet these incidents are unplanned with no motive.[50] Once the limbic seizure is over, the killer has almost total recall of the killing, but does not try to hide the incident – in fact, they feel such remorse and regret that they tend to turn themselves into custody or attempt sucide.[51]

The case studies that have exhibited this type of behavior have shown to be physically healthy, working, middle-class men from intact families with average education. These individuals are also said to be loners that may have had head injuries either at birth or sometime in their lives, but were nonaggressive in the past as well. Alcohol may also be a factor in this type of behavior. The case studies that could not be interrupted during their seizure had little to moderate alcohol consumption where they fatally attacked one individual and within minutes they fatally attacked a second individual. The case studies that did not have any alcohol could be interrupted before they fatally wounded any individuals. Researchers suggest these individuals go through three seizure-like phases of symptoms: aura, the feeling of strangeness or hallucinations;

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[48] FRANK A. ELLIOT, HANDBOOK OF PSYCHOL. APPROACHES WITH VIOLENT OFFENDERS: CONTEMPORARY STRATEGIES AND ISSUES 422 (Vincent B. VanHasselt & Michel Hersen ed., Kluwer Academic/Plenum Publishers 1999) (1999).
[49] Philip LoPiccolo & Polly Becker, *Something Snapped*, 99 TECHNOLOGY REVIEW 52, 53 (1996).
[50] Anneliese A. Pontius, *Homicides With Partial Limbic Seizures: Is Chemical Seizure Kindling the Culprit?*, 45 INT'L J. OFFENDER THERAPY & COMP. CRIMINOLOGY 515, 516 (2001).
[51] LOPICCOLO, *supra* note 49, at 53.

ictus phase, the phase where the individual acts out of character with an autonomic arousal; and the third post-ictal phase, where the individual displays inefficient or "stupid" acts.[52]

Limbic seizures are different from other types of seizures, such as partial seizures. During a partial seizure, the individual's consciousness may be seriously impaired along with volitional control to the point that the individual would not actually be coordinated enough to hurt anyone.[53] During a limbic seizure, the individual still has volitional control and is said to go on somewhat of an "automatic pilot", where their core consciousness in not impaired during the seizure.[54] A possibility is that during the limbic seizure there is a disruption between the frontal lobe of the brain, which keeps the limbic system in check, and the limbic system, which contains memories and emotions. Once this is disrupted, the individual goes into a primitive and aggressive mode where they are unable to control their actions.[55] This type of seizure disorder has been used as a mitigating factor in the court systems. This mitigating factor will be discussed in the legal section.

Treating Biological Disorders

There are ways in which to treat biological disorders. Pharmaceuticals are most likely to be used to treat aggressive and violent behaviors. Drugs have been used to manipulate the neurotransmitters of the body, which are normally genetically determined. Drugs have been used to manage serotonin levels with lithium carbonate, reserpine for norepinephrine and various antipsychotic drugs for dopamine levels in the body to reduce

[52] PONTIUS, *supra* note 50, at 519.
[53] *Id*. at 518.
[54] *Id*.
[55] *Id*. at 520.

antisocial behavior. These drugs have had mixed results, but the medications along with changes in diet may influence the neurotransmitter levels.[56]

Looking at more controversial treatments, there has been much talk about the Human Genome Project and its implications for screening genetic disorders and possibly eliminating those disorders through gene therapy. In order to understand gene therapies, it is necessary to understand what is a gene. A gene controls the behavior of an organism.[57] Genes transmit and determine hereditary characteristics.[58] Genes form the genome, which is one complete haploid set of chromosomes of an organism.[59] Deoxyribonucleic acid (DNA) forms the basic material in the chromosomes of the cell nucleus, which contains the genetic code and transmits the hereditary pattern.[60] This is a very complex biological organization that is affected internally and externally; meaning environment plays as important a role in how genes are activated as biology. This buttresses the idea that neither environment nor biology occurs in a vacuum but are related and should be researched in conjunction with each other.

The hope for the Human Genome Project was that biology itself would locate certain abnormal genes that may cause disease and using gene therapy in those situations to eliminate the disease.[61] How the disease comes about is a bit more complicated. Some individuals that show genetic markers for certain diseases may not ever develop the disease. Certain environmental factors, such as pollution or diet may trigger such

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[56] VOLD, *supra* note 40, at 77.
[57] Allison Morse, *Searching For the Holy Grail: The Human Genome Project and Its Implications*, 13 J.L. & HEALTH 219, 228 (1999).
[58] WEBSTERS'S, *supra* note 38, at 590.
[59] *Id*. at 592.
[60] *Id*. at 421.
[61] MORSE, *supra* note 57, at 234.

diseases.[62] Gene therapy is the replacing of defective genes in living cells through medical treatment.[63] Some of the techniques used in gene therapy are gene insertion, gene modification, and gene surgery. Gene insertion is where healthy genes are inserted into cells with the defective genes; gene modification is where a defective gene or gene sequence in DNA is modified to re-code the genetic material; gene surgery is where the defective gene is replaced by a healthy one.[64] Gene therapy has been used to manipulate the genetics of animals, such as pigs, in order to make for possible organ donors.[65] Genetically manipulated organs may help reduce the possibility of transplant rejection by creating genetic suppressors.[66]

A genetic screening process can be implemented to determine the possibilities of individuals developing hereditary diseases;[67] thus, candidates for gene therapy. Some areas that genetic screening may take place are prenatal screening and workplace exams.[68] Prenatal testing would find genetic defects during an amniocentesis examination performed during the fourteenth and sixteenth weeks of a women's pregnancy.[69] Workplace screening may show an individuals propensity to be susceptible to occupational hazards or illnesses.[70] This, of course, opens the doors to possible genetic discrimination, which will be discussed later in the legal section.

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[62] *Id*. at 235-236.
[63] David Suzuki & Peter Knudtson, *Genethics: The Clash Between the New Genetics and Human Values*, 183 (1989).
[64] *Id*. at 184-185.
[65] FRIEDLAND, s*upra* note 8, at 315.
[66] *Id*. at 316.
[67] SUZUKI, *supra* note 63, at 162.
[68] *Id*.
[69] *Id*. at 166.
[70] Virginia Lapham and Chahira Kozma, *Genetic Discrimination: Perspectives of Consumers*, 274 SCI. 621, 623 (1996).

It is possible that if the genetic disorder were initially taken care of biologically through gene therapy, the environmental factors that would normally trigger a disease's development would be diminished. However, there are still other less socially favorable methods to deal with genetic disorders.

Abortion is such an option that is discussed when a genetic disorder is found present in a fetus after a DNA test is done. Doctors have the ability to test for genetic disorders and will provide that information to the parents in an objective, scientific perspective. It will be up to the parents' ethical beliefs to decide whether or not to bring their fetus to term.[71]

Society's culture defines what is normal and abnormal as far as desirable traits in the human population. The problem being that parents will make their decisions based on these social norms. So not only will certain genetic diseases be treated or eliminated in the fetus, but so could certain behaviors society deem undesirable, such as homosexuality.[72] Another policy, sterilization, affects individuals who already possess these undesirable traits, such as mental retardation, to prevent those individuals from having offspring. There are already states, namely North Carolina, that have subscribed to eugenic-type programs, which encourage the sterilization of the mentally handicapped.[73] The issue society will have to address in these ventures is that abortion or gene therapies along these lines will have extreme ethical implications and will also affect the genetic diversity of the human population, which can have unforeseen affects.[74] This is the area of science that really needs to look at the past and how Hitler and the

[71] MORSE, *supra* note 57, at 243.
[72] *Id*. at 246-247.
[73] *Id*. at 248.
[74] *Id*. at 249.

Third Reich implemented eugenics policies eliminating criminals and the physically and mentally handicapped to create an Aryan race.

Scientific Policy Implications

One of the main policy concerns and the most controversial issues dealing with biology, is if certain biological circumstances are the causal factors of violent and aggressive behaviors, is society justified in punishing criminals that are unable to control their own behavior?[75] Another policy concern is if science has the ability to identify defective genes and treat those genes, perhaps, funding for social programs could be weakened.[76] It would no longer be necessary to fund educational programs for the poor and minorities if science is able to control intelligence, strength, and possibly morality.[77] As a result, the government would switch from funding social programs to funding scientific programs that develop the use of genetics to eliminate the defects of society's citizens.

Other policy concerns are related to more capitalistic avenues where businesses may exploit the use of genetic engineering for financial gain.[78] Consumers would be allowed to use genetic manipulation concerning their bodies by altering their genetic make-up or that of their offspring.[79] To combat these concerns, international law dealing with human rights and intellectual property law[80] would need to be implemented to avoid

[75] Mark Hansen, *Finding the Root Causes*, 83 JUL A.B.A J. 20, 20 (1997).
[76] MORSE, *supra* note 57, at 238.
[77] *Id*. at 239.
[78] Stephen P. Marks, *Tying Prometheus Down: The International Law of Human Genetic Manipulation*, 3 CHI. J. INT'L L. 115, 118 (2002).
[79] *Id*. at 119.
[80] *Id*. at 135.

the eugenics movement similar to what the Nazi party implemented in attempts to produce the Aryan race and preserve the ethics of genetic engineering.[81]

PART III: SOCIAL ANALYSIS

Environment Affecting Biology

It is irresponsible to believe that environment and biology can be separated and behavior is solely determined by environmental factors. This would suggest everyone is born equal in mind and body, which is not true. Our society would like to believe that their environment could shape individuals. Although to a certain extent, biology plays a significant role in the physical and behavioral aspects of human development. Intelligence and character are, for the most part, inherited[82] – to suggest otherwise would put an undue burden on schools and parents by placing unfair guilt upon them for a child's failures.[83] Society should seek out every avenue of human development (environmentally and biologically) so that programs can be instituted to encourage diversity without discrimination. Treating individuals who suffer from violent behaviors is prudent so they can lead productive lives in society and to protect the rest of society from such negative behaviors.

Environmental factors, such as an individual's socioeconomic status, influences of parents, peer groups, culture, and education, just to name a few, do have a significant impact on aggressive and violent behavior. Unfortunately, the scope of this paper cannot explore all of the avenues of environment for the mere reason that environmental factors affecting aggressive and violent behavior would be a paper in itself; thus, the focus of this

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[81] *Id*. at 119.
[82] Nicholas Wade, *In Nature vs. Nurture, a Voice for Nature*, N.Y. TIMES, (2002), at http://www.nytimes.com/2002/09/17/science/social/17PINK.html.
[83] *Id*.

section is not to look at those environmental factors so much as to look at environment's direct link to biological processes that can result in aggressive and violent behaviors. Environmental influences such as drug and alcohol abuse, diet and toxins, head injuries, and pregnancy or birth complications[84] can affect a person's aggressive or violent behavior.

Alcohol in small doses seems to bring about people's malevolent tendencies; whereas, alcohol in high doses tends to make people pass out.[85] There is no clear indication why alcohol has an impact on aggressive behavior. However, some studies suggest that the release of inhibitions or an increase in the productive capabilities of the endocrine system may be the reason for the aggressive tendencies.[86]

Individuals who indulge in drug abuse who already have tendencies for violent behavior seem to be the ones who display such aggressive behavior. Chronic use of opiates, amphetamines, PCP, and LSD has been shown to intensify violent behavior in individuals who are already prone to such behavior. Withdrawal from these drugs after chronic use may also lead to violent behavior.[87]

Research studies looking at diet are still not clear on how nutrition affects behavior. Sugar and cholesterol have been studied to see their relationship with antisocial behavior. Sugar has been linked to hyperactivity in children and excessive sugar intake in habitually violent offenders has been shown.[88] Cholesterol is also linked to violent behavior, but much more research will need to be done before any conclusive results can be found.

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[84] VOLD, *supra* note 40, at 83.
[85] *Id*. at 84.
[86] *Id*.
[87] *Id*.
[88] *Id*. at 85.

Exposure to toxins, such as lead, has been shown to increase the possibilities of learning disabilities and hyperactive attention deficit disorder in children and may increase the chances of aggressive or violent behaviors.[89] In areas where lead has been released into the environment, there is a higher violent crime rates than in areas without such pollutants. Toxic waste sites that give off high levels of pollutants most generally tend to be in poor and minority areas[90], which may suggest the tendency for these areas to have higher crime rates.

Head injuries are another factor that has been linked to violent and aggressive behavior among individuals when these injuries involved the loss of consciousness.[91] Our justice system deals with these types of environmental factors that affect our biology everyday. How the system uses these instances of environment affecting biology as mitigating factors in the justice system still seems to lean towards the "free will" aspect of committing crime. This mentality will have to be changed so these environmental factors affecting biology may be treated; leading to a possible decrease in aggressive, violent, and criminal behavior.

DNA Profiling Policies

With the advent of genetic testing, the criminal justice system has taken advantage of DNA testing to determine an individual's guilt or innocence. A select amount of countries around the world have called for DNA databases to collect the genetic information of their citizens to be used as a crime-fighting tool. DNA testing has typically been used in sexual assault cases, but is gaining ground in other areas of criminal activities. There are many ethical and legal implications dealing with DNA

[89] *Id*. at 84.
[90] HANSEN, *supra* note 75, at 21.
[91] VOLD, *supra* note 40, at 84.

testing in the criminal justice system. This section of the paper will not deal with the legal implication of DNA testing, as much as it will deal with the social policies that are being implemented for collecting and using DNA testing to find criminals and to exonerate the innocent. Issues such as right to privacy, Fourth Amendment issues of search and seizure, Fifth Amendment issues of self-incrimination, and genetic discrimination will be discussed in the legal section that follows the social implications.

In most jurisdictions, "samples of blood, saliva, or other tissue or fluid is collected from a convicted offender, a fraction is taken for analysis, and the remainder is preserved and stored."[92] A small portion of the genetic information in the subsample is analyzed and then stored in the local and state databases.[93] The National DNA Index System (NDIS) uploads that information into the national system.[94] The combined local, state, and national system share the genetic information through CODIS (Combined DNA Index System).[95] Thus, once police are investigating a crime scene and find some genetic material, they can analyze the information and, possibly, get a match through CODIS.[96]

The key problem with DNA testing is that most of the biological evidence collected at a crime scene is lost, destroyed, or contaminated.[97] Legislation has now been implemented that requires all government agencies (state crime laboratories, circuit courts, law enforcement agencies, and district attorney's offices) that have actual or constructive custody of any biological material collected in the investigation of a crime must, with a few exceptions, preserve the biological material until every person in

[92] D.H. Kaye, *Bioethical Objections To DNA Databases For Law Enforcement: Questions and Answers*, 31 SETON HALL L. REV. 936, 937 (2001).
[93] *Id*.
[94] *Id*. at 938.
[95] *Id*.
[96] *Id*.
[97] Keith A. Findley, *New Laws Reflect the Power and Potential of DNA*, 75-MAY WIS. LAW. 20, 22 (2002).

custody as a result of criminal conviction, juvenile adjudication, or insanity commitment has reached his or her discharge date.[98] Therefore, any individual that is in actual imprisonment, on probation, parole, extended supervision, actual or constructive custody pursuant to a juvenile dispositional order, and supervision of a person committed as a sexually violent offender is considered in custody; thus, all biological evidence would need to be preserved for those individuals.[99]

Once the individual is discharged from custody, the government is free to destroy the evidence.[100] The government may destroy the evidence if a person is still in custody only after the government has given notice to all persons still in custody and their attorneys.[101] If the individuals in custody or their attorneys do not file a motion to preserve the evidence within 90 days, the government is free to destroy the evidence.[102]

The future for crime fighting will become more efficient once police investigators are trained in collecting and preserving biological data. There is one tool being developed that will allow investigators to collect and analyze DNA at a crime scene, which is a credit-card-size device that is placed into a briefcase-size reader that will analyze the DNA evidence and match that evidence to possible suspects.[103] The suspects' names will come from the NDIS, which was developed by the FBI after Congress passed legislation in 1994 pushing every state to collect DNA samples from violent offenders.[104] Once the DNA sample is matched to possible suspects, law

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[98] *Id*.
[99] *Id*.
[100] *Id*. at 23.
[101] *Id*.
[102] *Id*.
[103] Gunjan Sinha, *DNA Detectives*, INT'L REV. LAW, COMPUTERS & TECH., Mar. 2001, at 74.
[104] 61 C.F.R. § 37495-02 (1996).

enforcement will attempt to locate those suspects for questioning and for a possible arrest.

However, since DNA identification is prone to error due to human mistake, the database search should only be the beginning.[105] The police investigators should follow up with the possible matches, question the suspects, attempt to obtain another sample from the suspect so that the individual being investigated is confirmed or excluded[106] as the individual who's genetic information was found at the crime scene. This type of identification device could make a defense attorney's job increasingly difficult if there is a positive DNA match with the client.

The United States first began using DNA for identification purposes in 1991 during Operation Desert Storm.[107] The DNA identification system was used to identify the remains of servicemen so that no servicemen would have to be buried in an unmarked grave.[108] Originally, convicted offenders were the only individuals who had their DNA samples placed into the DNA databanks[109], but there is a push for that to include more individuals[110] and possibly the entire population. Since January 2001, over 210,000 criminal DNA profiles have been entered into NDIS[111] and more are added everyday.

The United States is not the only country that has been collecting DNA samples of their citizens and putting that information into a national DNA database. Great

[105] KAYE, *supra* note 92, at 940.
[106] *Id*.
[107] *Id*. at 921.
[108] Aaron P. Stevens, *Arresting Crime: Expanding the Scope of DNA Databases in American*, Mar. 2001, at 921.
[109] *Id*. at 923.
[110] Id. at 927.
[111] Id. at 922.

Britain, Canada, Australia, Iceland, Sweden, and Estonia[112] have already implemented DNA databases of their own. More European countries seem to be following that trend.

Great Britain's database began in 1995 and contains over 940,000 profiles of citizens in that country.[113] The British database had exonerated over 51,000 suspects by June of 2000 of a possible 75,000 suspects in the crimes committed.[114] Canada tests all individuals that are suspected of a violent crime[115], which does not necessarily mean that these individuals have been arrested.

Australia has used genetic screening on newborns since the 1970's to test for genetic disorders and have archived these genetic specimens, which are now inadvertently becoming DNA databanks.[116] This means that Australia holds DNA specimens of all young people born in that country[117], which can be used for crime fighting purposes in the future.

South Africa hopes to have a DNA criminal intelligence database in with Britain, the United States, and other European countries.[118] With the DNA criminal intelligence database, South Africa hopes to use it as a crime-fighting tool to protect its citizens.[119]

Iceland's DNA database is a bit more controversial than the other countries because it was initiated by a private company called deCODE Genetics.[120] Through Icelandic legislation, the company could gain access of medical records of all Icelandic

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[112] Michael Hagmann, *U.K. Plans Major Medical DNA Database*, SCI., Sept. 2000, at 1184.
[113] STEVENS, *supra* note 108, at 927.
[114] *Id*.
[115] *Id*. at 929.
[116] Margaret Boyes, Whose DNA? *Genetic surveillance, ownership of information and newborn screening*, NEW GENETICS & SOC'Y, Dec. 1999, at 146.
[117] *Id*. at 150.
[118] *DNA Profiling – No Place To Hide*, S. AFRICAN J. SCI., Apr. 1998, at 175.
[119] *Id*.
[120] HAGMANN, *supra* note 112, at 1184.

citizens who did not opt out of the program.[121] This, of course, brings up issues of monopolizing confidential information that a patient may want to remain confidential.[122]

There are cultures that oppose keeping DNA samples for databank uses. In New Zealand, blood specimens are regarded as body parts, which have traditional significance in that country[123]; thus, it is uncertain if the samples should be returned to the person they were taken from, given to the parents, or if they belong to the state or laboratories.[124] In any event, it seems that most of the world is trying to take advantage of genetic technology to better protect their citizens by making sure the guilty are caught and the innocent are set free.

Gender Issues

Gender is another biological issue that has often been met with disparate treatment in the justice system. Historically, courts have had different ideas of handling women in the justice system compared to males. Issues dealing with children, where the women is the only individual able to become pregnant and give birth to a child, have come up against the court and is a good example of where the court may force a women to submit to certain medical interventions on behalf of the unborn child.[125]

Consequently, a natural father is not required to donate bone marrow for the benefit of the child just because he is the natural father.[126] This type of disparity between males and females does not stop at issues dealing with children in the justice system; they also deal with issues of violent behavior and criminality.

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[121] *Id*.
[122] *Id*.
[123] BOYES, *supra* note 116, at 152.
[124] *Id*. at 150.
[125] Dorothy E. Roberts, *Biology, Justice, and Women's Fate*, 3 U. CHI. L. SCH. ROUNDTABLE 465, 469 (1996).
[126] *Id*.

The sex differences of murder offenders in the 2001 Federal Bureau of Investigation Uniform Crime Reports show that 65.4% were male, 7.0% were female, and 27.6% were unknown.[127] Men are shown to be four times more likely to commit violent acts compared to women.[128] The difference between men and women dealing with violent behavior is the strongest predictors for violent behavior in men were environmental factors, such as lead poisoning, low language achievement and frequent household moves.[129] Women with neurological problems were shown to be the strongest predictors associated with violent behavior.[130]

Some of the factors of violence that have been linked to females are homosexuality, alcohol abuse, psychiatric disturbances, neurological abnormalities, problems with impulse control, severe maternal loss, parental punishment, neurological disorders among relatives, and poor medial histories. The difference between male and female career criminals shows that females commit substantially less violent crime than men, violent females begin and peak earlier than men, females are less likely to repeat their violent offenses, and females are far more likely to desist from further violence.[131]

The justice system may have to take into consideration various biological factors that affect the genders as mitigating factors prior to sentencing so that proper treatment can be sought and applied to the individuals in need of such treatment.

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[127] FED. BUREAU OF INVESTIGATION, *supra* note 2, at Table 1.
[128] Mark Hansen, *Finding the Root Causes*, 83-JUL. A.B.A J. 20, 21 (1997).
[129] *Id*.
[130] *Id*.
[131] Deborah W. Denno, *Gender, Crime, and the Criminal Law Defenses*, 85 J. CRIM. L. & CRIMINOLOGY 80, 89 (1994).

Physician-Patient Interaction

Ironically, it seems a physician's role in society gets more complicated with new technologies that are mainly developed by physicians, to make life easier for everyone else. The new technologies seem to revolve around genetics and the confidentiality that surrounds this genetic information between the physician and their patient. Every new doctor has to take the Hippocratic Oath as a rite of passage into the medical profession.[132] "The Oath states in part: 'Whatever, in connection with my professional practice, or not in connection with it, I see or hear, in the life of men, which ought not be spoken of abroad, I will not divulge, as reckoning that all such should be kept secret.'"[133] If a doctor fails to disclose information to his patient or fails to keep the patient's medical information confidential, then a patient will most likely not trust the physician and will be reluctant to seek advice or treatment.[134]

Does the physician have a duty to warn parents that their unborn children have genetic dispositions to certain diseases or possible adverse behaviors, such as violence? Does the physician have a responsibility to hand over genetic information on individuals who may be violent offenders to law enforcement officials?

The first of these questions deal with the physician's fiduciary duty to the patient and a third party individual, such as a parent or a parent's child. With new developments and discoveries in genetics, the physician may have an ongoing duty to disclose certain possible genetic defects of an unborn child to the parent(s). Society places an enormous

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[132] Michelle R. King, *Physician Duty To Warn A Patient's Offspring of Hereditary Genetic Defects: Balancing the Patient's Right To Confidentiality Against the Family Member's Right To Know – Can or Should Tarasoff Apply*, 4 QUINNIPIAC HEALTH L.J. 1, 5 (2000).
[133] *Id*.
[134] *Id*.

burden on parents to have healthy children[135]; otherwise, those children may become a burden upon the parents or the state. It is a physician's duty to notify the women who are at risk for certain fetal conditions by the use of alpha-fetoprotein (AFP) screening, which has actually become an accepted test for all pregnant women as a national standard of care.[136] If an abnormality is found, the burden is placed on the parent to decide whether to bring the fetus to term or to terminate the birth.[137]

With the Human Genome Project and other genetic research projects coming into play, other genetic abnormalities may be discovered[138], such as a propensity for violent behavior discovered in the fetal stages of development. These tests may become a routine clinical practice that would screen for hundreds of genetic disorders the parent will ultimately have to decide whether to carry to term or not. Physicians have been sued by parents for not offering them the AFP screening test.[139]

In *Reed v. Campagnolo*, the court recognized a cause of action for a wrongful birth when a child was born with Down's syndrome and the physician had not informed the parents of the AFP screening test.[140] Therefore, physicians have added duties and pressures to use every available method of testing to ensure that parents have healthy children if those tests have been deemed a nationally recognized standard of care.[141] The implication is if physicians suggest genetic abnormalities or undesired traits, such as violent behaviors, to the parents, the parents may wholeheartedly abort their child. This,

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[135] Lois Shepherd, *Protecting Parents' Freedom To Have Children With Genetic Differences*, 1995 U. ILL. L. REV. 761, 775 (1995).
[136] *Id*.
[137] *Id*. at 778.
[138] *Id*. at 776.
[139] *Id*.
[140] Reed v. Campagnolo, 630 A.2d 1145, 1150 (Md. 1993).
[141] SHEPHERD, *supra* note 135, at 776.

of course, suggests many ethical dilemmas physicians will have to face or are facing now dealing with the genetic testing of fetuses.

Physicians also have been put in an ethical bind regarding physician-patient confidentiality. Physicians are the professional individuals that are involved in genetic testing as clinicians, laboratory directors, and researchers.[142] If the physicians are not the direct person involved in the testing then they are usually the specialists acting as supervisors of the DNA laboratories.[143] The main goals of genetic databases for physicians have been for research purposes that would ultimately benefit the health and welfare of patients, patients' relatives, and society as a whole.[144]

With law enforcement agencies and the courts getting involved with the use of DNA testing to establish guilt or innocence or to exonerate, there has been concern in the medical community about breaching physician-patient confidentiality. Since physicians have developed genetic databases for the use of research, using them for law enforcement purposes goes outside of the intent for which the databases were created.[145] Law enforcement would not only have access to the DNA profiles for identification purposes, but would also have access to sensitive health information on the particular individual being investigated. Law enforcement would also gain genetic information on their relatives' family medical history (DNA contains information about every close relative), which would not be necessary for legal proceedings in the court room.[146]

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[142] Samuel C. Seiden & Karine Morin, *The Physician As Gatekeeper To the Use Of Genetic Information In the Criminal Justice System*, 30 J.L. MED. & ETHICHS 88, 89 (2002).
[143] *Id*.
[144] *Id*.
[145] *Id*. at 90.
[146] *Id*.

The American Medical Association (AMA) has set out guidelines to protect physicians in dealing with physician-patient confidentiality. The AMA states:

> Law enforcement agencies requesting private medical information should be given access to such information only through a court order. This court order for disclosure should be granted only if the law enforcement entity has shown, by clear and convincing evidence, that the information sought is necessary to a legitimate law enforcement inquiry; that the needs of the law enforcement authority cannot be satisfied by non-identifiable health information or by any other information; and that the law enforcement need for the information outweighs the privacy interest of the individual to whom the information pertains. These records should be subject to stringent security measures…[147]When breaches of confidentiality are compelled by concerns for public health and safety, those breaches must be as narrow in scope and content as possible, must contain the least identifiable and sensitive information possible, and must be disclosed to the fewest possible to achieve the necessary end.[148]

This means that physicians are allowed to hand over confidential, genetic information to law enforcement if the individual is a threat to themselves or to society or if there is a legitimate warrant or court order for that genetic information.[149]

There are many legal concerns for breaking confidentiality, such as right to privacy concerns and informed consent concerns. How can a patient give a doctor consent if the doctor himself does not know all of the possibilities for which the patient's genetic sample could be used? If the patient did not give the doctor consent to use their genetic information, is the physician liable? These questions will be discussed in the legal section of this paper.

Social Policy Implications

Environmental impacts on behavior will always be a central issue involved in punishing or treating individuals convicted of crimes in our society. Court systems

[147] Council on Ethical and Judicial Affairs, A.M.A, "Op. 5.05, Confidentiality," in Council on Ethical and Judicial Affairs, Code of Medical Ethics: Current Opinions with Annotations. (CHI., 2000), at 53.
[148] House of Delegates of the A.M.A., H-315.983, Patient Privacy and Confidentiality (CHI. 1999).
[149] SEIDEN, *supra* note 142, at 90.

should not simply put blinders on and decide that all individuals commit crime due to their own "free will". Courts must also look at alternative causes for aggressive or violent behaviors such diet and toxins, head injuries, and pregnancy or birth complications[150] that may cause individuals to be aggressive or violent.

Society will also have to deal with the use of genetic testing being used as a crime-fighting tool. Police will likely be able to show up at a crime scene, collect some genetic samples left behind and match those samples to an individual that has their DNA profile in a DNA database. How far the public allows this to go will depend on what leniency they give the politicians in making laws that cover DNA databases and the samples taken from offenders, possible suspects, or the entire population.

Physicians will also have many ethical dilemmas in facing society's wishes. The public may form mistrust in the medical community if they feel the doctor will hand over their genetic information to law enforcement for prosecution purposes after going to that physician for help.[151] Any person who may or may not be guilty of a crime would be very hesitant to let a doctor take any type of samples or do any type of tests on them. All of these issues have many legal implications, which will now be discussed.

PART IV: LEGAL ANALYSIS

Legal History

The United States along with all other countries in the world have had to deal with a variety of issues on how to handle criminals, the insane, the aggressive, and handicapped individuals. These individuals seem to be viewed as a drain on the economy and the well-being of the other, more "physically fit" citizens of those countries.

[150] VOLD, *supra* note 40, at 83.
[151] SEIDEN, *supra* note 142, at 90.

In 1968, there were twenty-seven states with laws that advocated the sterilization of criminal offenders in the United States.[152] These sterilization laws have been attacked on a number of constitutional grounds, but most have been held valid and within the police power of the state.[153] If an individual was incarcerated as a habitual criminal, moral degenerate, sexual pervert, or insane, the superintendent of the state's penal institution would recommend in a report, after getting the consent of the legal guardian or next of kin or after a trial resulting in court affirmance of the board's findings, the individual be sterilized. This way, those individuals could not produce offspring that would have the same offending potential as the criminal parent.[154] The court emphasized that:

> "procreation of defective and feeble-minded children with criminal tendencies patently disadvantages the race, that such reproduction 'turns adversary' and thwarts the ultimate end and purpose of reproduction that the race may ensure its own perpetuation, and that such progeny may be prevented in the interests of the higher general welfare."[155]

Now, with the discovery of DNA in 1953 by James Watson and Francis Crick[156], there has been much research and study dealing with the complexities of the double helix structure and how it affects human beings, which has been reaching into the justice system. This suggests the justice system will have to consider biological factors that are associated with aggressive or violent offenders.

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[152] 21 AM. JUR. PROOF OF FACTS 255, Sexual Sterilization §§ 19, 23.
[153] Jeffrey F. Ghent, J.D., *Validity of Statutes Authorizing Asexualization or Sterilization of Criminals or Mental Defectives*, 53 A.L.R. 3d 960, § 1 (1973).
[154] *Id*. at § 3.
[155] *Id*.
[156] Hugh Miller, III, *DNA Blueprints, Personhood, and Genetic Privacy*, 8 HEALTH MATRIX 179, 182 (1998).

The United States first started allowing DNA evidence in 1988 in a Florida case - *Andrews v. State*.[157] The federal government first admitted DNA fingerprint evidence in *United States v. Yee*.[158] The executive, judicial, and congressional branches have been scrambling to pass laws dealing with the emergence of DNA testing as a crime-fighting tool[159] ever since. Wisconsin has emerged as the leading state in dealing with the new technology for crime fighters. Wisconsin has passed legislation, Wis. Stat. §§ 939.74(2d)(a) and 971.23(9)(a) (2001-2002), requiring the preservation of biological evidence after conviction; providing access to that biological evidence for post conviction DNA testing that might prove innocence; and relax the statute of limitation in sexual assault cases in which the state has developed a DNA profile of the perpetrator.[160]

The new Wisconsin law defines a DNA profile as "an individual's patterned chemical structure of genetic information identified by analyzing biological material that contains the individual's deoxyribonucleic acid."[161] The importance of this DNA profile is shown in the examples of individuals that have been exonerated from their convictions. There have been more than 100 DNA exonerations in the last decade[162], which is a significant number of innocent people being convicted since it is the court's responsibility to make sure that the innocent go free and the guilty are punished.

Right to Privacy

"The ability to collect and analyze DNA samples is a break-through for medical science and law enforcement, but it also presents a threat to the American notions of

[157] Andrews v. State, 533 So.2d 851, 851 (Fla. App. 5 Dist. 1988).
[158] United States v. Yee, 129 F.R.D. 629, 631 (N.D. Ohio 1990).
[159] FINDLEY, *supra* note 97, at 21.
[160] *Id*. at 21-22.
[161] *Id*. at 22.
[162] *Id*.

autonomy and the right to privacy."[163] There are four traditional components to an individual's right to privacy, which are intrusion upon the plaintiff's seclusion or solitude; public disclosure of embarrassing private facts about the plaintiff; publicity that places the plaintiff in a false light in the public eye; and appropriation, for defendant's advantage, of plaintiff's name or likeness.[164] The use of DNA information in a given context can conceivably implicate all of these components of the right to privacy.[165] It was 1890 in a law review article written by Samuel Warren and Louis Brandeis that a person's legally protected privacy interests were first identified.[166] Subsequently, the Supreme Court recognized a constitutional basis for the "common law right to privacy as an aspect of the right to liberty guaranteed by the Due Process Clause of the Fifth and Fourteenth Amendments."[167]

Most states have dealt with the issue of DNA databanks by including privacy provisions in statutes that impose sanction for proscribed acts concerning DNA samples and DNA information.[168] In *Shaffer v. Saffle*, a state prisoner brought a pro se § 1983 action, claiming the state of Oklahoma's statute requiring him to provide a DNA sample that was to be added to the DNA Offender database violated his federal constitutional rights.[169] The prisoner alleged that his rights against unreasonable searches and seizures (4th Amendment) and self-incrimination (5th Amendment) had been violated.[170] The court held that "while obtaining DNA samples implicates Fourth Amendment concerns, it

[163] Warren R. Webster, Jr., *DNA Database Statutes & Privacy In the Information Age*, 10 HEALTH MATRIX 119, 119 (2000).
[164] MILLER, *supra* note 156, at 185.
[165] *Id*.
[166] *Id*.
[167] *Id*. at 186-187.
[168] WEBSTER, *supra* note 163, at 120-121.
[169] Shaffer v. Saffle, 148 F.3d 1180, 1180 (10th Cir. 1998).
[170] *Id*.

is reasonable in light of an inmate's diminished privacy rights, the minimal intrusion involved, and the legitimate government interest in using DNA to investigate and prosecute crimes."[171] The court rejected the Fifth Amendment claim because "DNA samples are not testimonial in nature."[172]

There is federal protection of the genetic information in the DNA databanks by criminal penalties if such information is used against an individual not convicted of a crime. Some states have similar protections, but most states do not have laws that apply to DNA, specifically, and are "designed to prevent inappropriate diversions of samples banked for official use."[173] For this reason, it is important that the federal and state governments have laws dealing with the establishment and use of DNA databanks to ensure the right to privacy.

Informed Consent

The Supreme Court has recognized the right to informed consent, but has not fully explained or defined the parameters of informed consent clearly.[174] Informed consent was born out of the right to privacy in that an individual has "the right to informational privacy, the right to bodily integrity, and the right to informed decision making."[175] One of the first Supreme Court cases dealing with the right to bodily integrity was*Jacobson v. Massachusetts* where the Court recognized there is a "sphere within which the individual

[171] *Id*. at 1181.
[172] *Id*.
[173] Paul A. Lombardo, *Genetic Confidentiality: What's the Big Secret?*, 3 U.CHI. L. SCH. ROUNDTABLE 589, 598 (1996).
[174] Elizabeth B. Cooper, *Testing For Genetic Traits: The Need For A New Legal Doctrine of Informed Consent*, 58 MD. L. REV. 346, 370 (1999).
[175] *Id*.

may assert the supremacy of his own will and rightfully dispute the authority of any human government . . . to interfere with the exercise of that will."[176]

There is much debate and skepticism that the Informed Consent Doctrine even works. "In an often-quoted 1982 article in the New England Journal of Medicine, University of Chicago physician and bioethicist Marc Siegler declared that confidentiality in the medial setting was no longer a viable concept."[177] Most patients will bring a claim of negligence for "lack of informed consent" for failure to provide adequate disclosure of risks and benefits that are involved in medical procedures.[178] This, in turn, affects the patient's trust towards their doctor, which can lead to a failure of the patient telling their doctor what the doctor may need to know in order to treat them properly.[179]

The type of informed consent a physician must give his/her patient depends on the patient.[180] This kind of consent may depend on a reasonable physician standard, which may change over time:

> A "reasonable physician" standard determines the nature and scope of information that must be disclosed to a patient solely from the perspective of the physician, and which generally has fallen out of favor, is particularly inadequate to meet the needs of those who may be disenfranchised from the health care system.[181]

Genetic testing is a major concern with informed consent since it is a technology that is developing rapidly. Governmental agencies are attempting to keep up with the technology by creating legislation that addresses the subject.

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[176] Jacobson v. Commonwealth of Massachusetts, 25 S. Ct. 358, 362 (U.S. 1905).
[177] LOMBARDO, *supra* note 173, at 593.
[178] COOPER, *supra* note 174, at 381.
[179] *Id*. at 383.
[180] *Id*. at 385.
[181] *Id*. at 389.

There are suggestions for statutes that would reflect essential elements needed to give a patient the informed consent they would need to make appropriate decisions. To start, there would be a "requirement that no genetic testing shall occur without the signed and dated informed consent of the person to be tested."[182] Next, "the consent form itself should be designed to ensure that the patient is given sufficient information so that her or his consent or refusal to consent is informed."[183]

Those individuals who are unable to consent, such as the disabled or incapacitated, especially need the law to protect them in medical interventions.[184] The Council of Europe's Convention on Human Rights and Biomedicine addresses the use of such persons in medial interventions.[185] If this convention is ratified, it will "establish the first international, minimum, legal standard for consent to medical treatment and research."[186] The Convention will ensure the basic protection of human rights and dignity in the states that have ratified the Convention along with the signatories that signed the Convention.[187] This will protect all individuals who are unable to consent in all areas within the territory of the Council.[188] Hence, informed consent will remain a significant factor so that individuals, whether criminal or not, will know the possibilities they face if they submit a genetic sample for medical purposes.

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[182] *Id*. at 405.
[183] *Id*.
[184] Marc Ernest Trigilio, *The Convention On Human Rights and Biomedicine: Allowing Medical Treatment and Research Without Consent On Persons Unable To Give Informed Consent*, 22 SUFFOLK TRANSNAT'L L. REV. 641, 642 (1999).
[185] *Id*. at 642-643.
[186] *Id*. at 660.
[187] *Id*.
[188] *Id*. at 661.

Genetic Discrimination

"Genetic Discrimination has been defined as the 'denial of rights, privileges or opportunities on the basis of information obtained from genetically-based diagnostic and prognostic tests.'"[189] There is a huge fear in society about an individual's genetic information being put on file in a database that is accessible to insurance companies, employers, and law enforcement agencies. This information could be used to deny those individuals insurance, employment, or single them out by law enforcement agencies as a possible offender because of their genetic makeup, respectively. With the possibility of genetic engineering being done prenatally for health and social reasons[190], society will need to face the idea of a genetically "inferior" class being labeled. This would stigmatize certain individuals in society and increase the likelihood of discrimination against those individuals by the rest of society.

Individuals are fearful insurance companies will get a hold of their genetic information and use it against them by increasing premium rates or denying coverage to someone who is deemed "high risk".[191] Individuals fear if there are not regulatory schemes in place that monitor insurance companies, such as genetic discrimination laws, genetic information will be obtained from doctors and hospitals.[192] In doing so, some of the public will not want to go to the doctor out of fear their genetic information could be used against them.[193] However, individuals seeking health or life insurance from insurance companies give these companies the permission to collect information on their

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[189] Teresa K. Baumann, *Proxy Consent and a National DNA Databank: An Unethical and Discriminatory Combination*, 86 IOWA L. REV. 667, 681 (2001).
[190] Sandra Anderson Garcia, Ph.D., J.D., *Sociocultural and Legal Implications of Creating and Sustaining Life Through Biomedical Technology*, 17 J. LEGAL MED. 469, 489 (1996).
[191] Jennifer S. Geetter, *Coding For Change: The Power of the Human Genome To Transform the American Health Insurance System*, 28 AM. J.L. & MED. 1, 3 (2002).
[192] *Id*. at 29.
[193] *Id*.

past and present health along with the individual's family medical history[194]; thus, it would not create a major change in policy for the insured or the insurer. Insurance companies could also argue that if they were prohibited from using genetic information on a potential policy holder, that individual may know of a genetic disorder they are prone to because of genetic tests and may take out a large amount of health and/or life insurance to cover the potential costs.[195] Hence, it will be up to state and federal government to legislate the concerns for both the public and the insurance companies.

In 1996, the federal government offered insurance regulations to guard against genetic discrimination. The 1996 Health Insurance Portability and Accountability Act (HIPAA), contains two provisions related to genetic information in insurance.[196] "Under HIPAA, insurers must offer coverage for preexisting conditions, but there is no cap on the premiums that the insurer might set."[197] However, "genetic information may not, itself, be considered a preexisting condition for purposes of health insurance coverage denial to members of group plans."[198] HIPAA also "prohibits self‡ insured plans and commercial insurance carriers from using genetic information, medical histories or other enumerated medical factors in underwriting."[199] Accordingly, this is a powerful step in preventing possible genetic discriminatory acts initiated by insurance companies.

Legal Policy Implications

The rush to create specific laws dealing with genetics may be problematic, to say the least. Llaws that protect medical privacy, in general, could be more appropriate

[194] Douglas H. Ginsburg, *Genetics and Privacy*, 4 TEX. REV. L & POL. 17, 22 (1999).
[195] Jon Beckwith & Joseph S. Alper, *Reconsidering Genetic Antidiscrimination Legislation*, 26 J.L. MED. & ETHICS 205, 207 (1998).
[196] 45 C.F.R. § 160 (2000).
[197] *Id*.
[198] *Id*.
[199] *Id*.

instead of laws protecting only a subset of medical information[200], such as DNA. This way, an individual's genetic identity is protected unless that person gives specific, written consent after being informed of purpose for which the information is being used. This will prevent the possible abuse of patients' genetic identities by insurance companies, employer, and/or law enforcement agencies.

The justice system also needs to look at other alternatives in dealing with genetics being associated with aggressive and violent behaviors. Of the biological factors discussed in the scientific section, the limbic seizure disorder has been one of the only mitigating factors discussed in the research on biological implications of aggressive and violent behaviors as a legal defense. The defense has been successful in all but one case since 1996 where it has been employed – at least in getting patients sent to maximum-security hospitals rather than to prison.[201] "Of the 25,000 homicides committed each year, about 10 percent are unexplained, irrational killings of complete strangers."[202] About one percent of the 25,000 homicides may be attributed to limbic seizure disorders.[203] This is a significant number of individuals that can be treated, opposed to being incarcerated.

PART V: CONCLUSION

Biological factors that are associated with any type of behavior are controversial subjects in all societies around the world. There are those who believe that man is acting as God when he or she manipulates humans, animals, and plant life with genetic engineering. However, there are many biological disorders, such as hereditary diseases

[200] Dorothy C. Wertz, Ph.D., *Society and the Not-So-New Genetics: What Are We Afraid Of? Some Future Predictions From A Social Scientist*, 13 J. CONTEMP. HEALTH L. & POL'Y 299, 311(1997).
[201] LOPICCOLO, *supra* note 49, at 61.
[202] *Id*. at 62.
[203] *Id*.

that can be eliminated by the use of genetic engineering, which would be in the best interest of the public good. If some of these disorders revolve around aggression and violent behavior, it would be best for the public good that these behaviors be treated with whatever means possible. This would allow the individual who has the propensity for these behavior disorders to lead a mentally healthy life, which would also protect the public.

Nonetheless, it is when science attempts to manipulate behavior manifestations, such as aggression and sexual orientation or physical features, such as eye color, hair color, and body type the lines become blurred between what is good for the public and what may be detrimental to the human population. Thus, objective science and sound social policy is needed to ensure a healthy and diverse human population.

Scientific technology has far advanced the use of DNA as a crime-fighting tool that will ultimately allow investigators to locate criminals more quickly and efficiently. However, this creates problems with constitutional rights of the people that the technology is designed to protect. Improper search and seizure (4^{th} Amendment) by forcing an individual to submit a DNA sample along with the issue of self-incrimination (5^{th} Amendment) where that sample put in a DNA database could be used against the individuals who submitted the sample are all key concerns. Yet, these same DNA technologies have been used to exonerate a significant number of individuals from the crimes for which they were suspected or had been convicted. This means the court systems will need to use some type of balancing test when they hand down their decisions.

The possibility of crime investigators forcing physicians to hand over genetic samples to law enforcement through a court order puts the physician-patient privilege in jeopardy and brings up serious concerns with informed consent. How would an individual be able to give their consent to a physician when the physician himself may not know what that individual's genetic sample might be used for? Why would an individual want to submit to physical testing by a physician where their genetic information could be used against them? These are all crucial concerns to an individual's right to privacy. If their genetic information is subject to anyone obtaining that information, then there is a risk of genetic discrimination by not only law enforcement, but also employers and insurance companies as well.

To finish, the courts and legislators are trying to keep up with the ever-changing scientific community, especially with the use of DNA and its implications in the justice system. Courts have supported prisoners submitting DNA samples because they are not too invasive and because it is for the better of the public good as a whole. After the terrorist attack on September 11, 2001, there has been much legislation passed that has relaxed the right to privacy. Issues such as using DNA profiling and wire tapping to apprehend possible terrorists have become very popular in the interest of national security, which is suppose to protect the public. It will be interesting to see how these technologies created by science will change the social structure and the constitutional rights of the citizens in the United States and the rights of citizens in other countries through international policies around the world, whether it be for better or for worse.