



Digital Commons@

Loyola Marymount University
LMU Loyola Law School

Loyola of Los Angeles Law Review

Volume 25

Number 4 *Symposium—One Hundred Twenty-Five Years of the Reconstruction Amendments: Recognizing the Twenty-Fifth Anniversary of the Loyola of Los Angeles Law Review*

Article 14

6-1-1992

The XYY Supermale and the Criminal Justice System: A Square Peg in a Round Hole

Susan Horan

Follow this and additional works at: <https://digitalcommons.lmu.edu/llr>



Part of the [Law Commons](#)

Recommended Citation

Susan Horan, *The XYY Supermale and the Criminal Justice System: A Square Peg in a Round Hole*, 25 Loy. L.A. L. Rev. 1343 (1992).

Available at: <https://digitalcommons.lmu.edu/llr/vol25/iss4/14>

This Notes and Comments is brought to you for free and open access by the Law Reviews at Digital Commons @ Loyola Marymount University and Loyola Law School. It has been accepted for inclusion in Loyola of Los Angeles Law Review by an authorized administrator of Digital Commons@Loyola Marymount University and Loyola Law School. For more information, please contact digitalcommons@lmu.edu.

THE XYY SUPERMALE AND THE CRIMINAL JUSTICE SYSTEM: A SQUARE PEG IN A ROUND HOLE

I. INTRODUCTION

In 1911 Cesare Lombroso, an Italian criminologist, published his book *Crime: Its Causes and Remedies*¹ in which he associated the "criminal type" with certain physical characteristics. According to Lombroso a typical "criminal" profile included individuals with a low slanting forehead, long ear lobes (or none at all), a large jaw with no chin, heavy ridges above the eye socket, and either excessive body hair or an abnormally small amount of body hair.² This view was but one proffered by early biological determinists—people who believed not that such physical characteristics caused crime, but rather that such characteristics identified the born criminal.³ Under this theory, an individual who possessed certain physical characteristics could not be expected to refrain from crime unless the circumstances of his or her life were exceptionally favorable.⁴

While modern thought generally rejects this theory, the belief that criminality may be at least in part, genetically predetermined or influenced by biological characteristics, has been resurrected by a new awareness and sensitivity in the fields of medicine, psychiatry and psychology.⁵ Today the legal profession is advancing defenses to criminal conduct based on biological determinants such as postpartum depression and psychosis,⁶ premenstrual syndrome⁷ and genetic determinants such as XYY syndrome.⁸

The American criminal law system is founded on the assumption that all individuals are equally able to perceive what is "right" and to act freely in accordance with that perception.⁹ The system is also founded on

1. CESARE LOMBROSO, *CRIME: ITS CAUSES AND REMEDIES* (1911).

2. *Id.* at xviii-xxx.

3. *Id.* at xii. Biological determinists believed that the causes of human conduct were to be found in the physiological and mental characteristics of an individual. *Id.* Additionally, they believed that human criminal conduct was the result of a number of factors including climate, seasons, geology, race, hair color and religion. *Id.* at 2-23.

4. *Id.* at xxxii.

5. See *infra* notes 231-33 and accompanying text.

6. See *infra* notes 231-32 and accompanying text.

7. See *infra* note 231 and accompanying text.

8. See *infra* note 63 and accompanying text.

9. See generally PETER W. LOW ET AL., *CRIMINAL LAW: CASES AND MATERIALS* 1-28 (2d ed. 1986) (describing basis of criminal law system and rationale underlying punishment).

the assumption that the threat of punishment will effectively deter most individuals from committing criminal acts, and that sufficient detention in a penal institution can rehabilitate one who has committed a crime and prepare him or her for reentry into society.¹⁰

This Comment will explore the possibility that individuals exist who cannot be as easily "plugged" into the current system of American jurisprudence as can others. This Comment will primarily focus on males who have an extra Y sex chromosome (XYY individuals),¹¹ the possibility of inherent antisocial behavior in such individuals¹² and the inability of the present criminal law system to dispense equal justice to them.¹³

This Comment will discuss the nature of the XYY syndrome and its reported characteristics,¹⁴ possible theories of defense for the XYY individual accused of a crime¹⁵ and other uses related to an XYY syndrome defense including a recommendation for its use in sentencing.¹⁶ Finally, this Comment will address the potential danger of XYY identification used not as a shield to protect criminal defendants, but rather misused as a sword against them.¹⁷

II. GENETIC MAKE-UP OF THE XYY MALE

A. *Genetics, a Basic Science; Its Beginnings*

All life forms share a complex interdependency of physiological parts to yield a homeostatic whole,¹⁸ but none to our knowledge shares man's ability to reflect.¹⁹ This ability enables man to say: Who am I? Why am I here? Where did I come from? What makes me unique? What will happen to me after I die? The answers to such questions have been and continue to be the basis of philosophical, theological and scientific investigation.²⁰ Many phases of these questions remain unanswered. However, the biological source of being for any living thing is now known; that source is deoxyribonucleic acid, or DNA.²¹ DNA determines heredity—the biological transmission of traits from one generation

10. *Id.* (describing purposes of punishment).

11. See *infra* notes 49-97 and accompanying text.

12. See *infra* notes 55-62 and accompanying text.

13. See *infra* notes 98-225 and accompanying text.

14. See *infra* notes 49-97 and accompanying text.

15. See *infra* notes 98-225 and accompanying text.

16. See *infra* notes 226-61 and accompanying text.

17. See *infra* note 262 and accompanying text.

18. PHILIP HANDLER, BIOLOGY AND THE FUTURE OF MAN 474 (1970).

19. *Id.*

20. See *id.* at 163-65.

21. *Id.* at 7.

to another.²² The field within the science of biology that studies heredity is called genetics, and behavior genetics bridges the sciences of psychology and biology by studying the transmission of structures and traits that specifically give rise to behavior.²³

Genetics as a basic science had its beginnings in the work of Gregor Mendel.²⁴ Mendel was an Augustinian monk who, between 1857 and 1865, conducted a series of experiments on peas grown in the monastery garden.²⁵ Mendel's basic premise was that "offspring inherit relatively discrete, independent traits which never mix nor modify each other"²⁶ and "as a corollary of this segregation principle he observed that the various traits are inherited relatively independently of each other."²⁷ Mendel's work, however, was not publicly recognized by the scientific community until 1900 when the principles he proposed were rediscovered independently by DeVries, Correns and Tschermak.²⁸

A second important scientific influence on the answers to questions regarding man's origin is found in the science of evolution.²⁹ The most significant event in this area of science was Charles Darwin's *The Origin of Species*,³⁰ where Darwin stated in the introduction that it would be quite conceivable for a naturalist to

come to the conclusion that species had not been independently created, but had descended, like varieties, from other species. Nevertheless, such a conclusion, even if well founded, would be unsatisfactory, until it could be shown how the innumerable species inhabiting this world have been modified so as to acquire that perfection of structure and coadaptation which justly excites our admiration.³¹

Historically, a third event of importance was the method discovered in 1871 by Friedrich Miescher allowing separation of cytoplasm³² from

22. *Id.*

23. SPENCER A. RATHUS, *PSYCHOLOGY* 90 (3d ed. 1987).

24. MONROE W. STRICKBERGER, *GENETICS* 114 (2d ed. 1976).

25. *Id.*

26. Willard Gaylin, *The Frankenstein Myth Becomes a Reality—We Have the Awful Knowledge to Make Exact Copies of Human Beings*, N.Y. TIMES, Mar. 6, 1972 (Magazine), at 2.

27. *Id.*

28. LESLIE CLARENCE DUNN, *A SHORT HISTORY OF GENETICS* 3-5 (1965).

29. Evolution is defined as "a process of continuous change from a lower, simpler, or worse condition to a higher, more complex, or better state: progressive development." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 789 (1976).

30. CHARLES DARWIN, *THE ORIGIN OF SPECIES* (1958).

31. *Id.* at 28.

32. Cytoplasm is the "protoplasm of a cell other than that of the nucleus." BLAKISTON'S GOULD MEDICAL DICTIONARY 354 (4th ed. 1979) [hereinafter BLAKISTON'S].

the nuclei³³ of a cell.³⁴ Miescher then extracted from the nuclei an acidic material with an unusually high phosphorous content.³⁵ Miescher called this material nuclein and described it as unique and incomparable with any other known material.³⁶ Innumerable facts about the properties of nuclein, the chemical composition of the factors and influences leading to coadaptation³⁷ were discovered, published and studied by the scientific communities of the world.³⁸ Finally, in 1953 the search ended at Cambridge University when James D. Watson and Francis Crick proposed a "double helix"—as in electromagnet coil—structure for DNA.³⁹ DNA is the material responsible for Mendel's factors, Miescher's nuclein, Darwin's evolution of species and the complex differentiation among all living organisms.⁴⁰

B. *The Structure of DNA*

DNA is the basic building block of heredity regulating the development of traits such as hair and eye color, blood type and gender.⁴¹ Segments of DNA molecules comprise individual genes which form rod-shaped genetic structures found in a cell's nuclei called chromosomes.⁴² The normal human cell contains forty-six chromosomes which are organized into twenty-three pairs.⁴³ This pairing occurs when twenty-three chromosomes from each parent combine during fertilization of the fe-

33. A nuclei or nucleus is the "differentiated central protoplasm of a cell; its trophic center." *Id.* at 926.

34. A cell is a "highly integrated, constantly changing system that is the structural and functional unit of the living organism, and that has the ability to assimilate, grow, reproduce, and respond to stimuli." *Id.* at 241.

35. N.A. TILEY, *DISCOVERING DNA* 37 (1983).

36. *Id.*

37. Coadaptation is the "correlated variation in two mutually dependent organs." BLAKISTON'S, *supra* note 32, at 289.

38. TILEY, *supra* note 35, at 37-41.

39. *Id.* at 60-63.

40. See RATHUS, *supra* note 23, at 90-92.

DNA takes the form of a double spiral, or helix, that is similar in appearance to a twisting ladder. In all living things, from one-celled animals to fish to people, the sides of the 'ladder' consist of alternating segments of phosphate (P) and simple sugar (S). The rungs of the ladder are always attached to the sugars and consist of one of two pairs of bases, either adenine with thymine (A with T), or cytosine with guanine (C with G). The *sequence* of the rungs is the genetic code that will cause the unfolding organism to grow arms or wings, skin or scales . . .

and is identical in every cell of the organism unless mutations occur through radiation or other environmental influences. *Id.* (emphasis added).

41. *Id.* at 90.

42. *Id.*

43. *Id.*

male ovum by the male sperm.⁴⁴ The twenty-third pair of chromosomes determines the gender of the human fetus.⁴⁵ All humans receive one X chromosome—named for its shape—from the mother, and either an X or a Y chromosome—also named for its shape—from the father.⁴⁶ If an X chromosome is received from the father, the fetus develops into a female.⁴⁷ If, on the other hand, a Y chromosome is received from the father, the fetus develops into a male.⁴⁸ Therefore, the genetic make-up of the twenty-third pair of sex chromosomes in a normal human female is XX, and in a normal human male is XY.

C. Genetic Make-up and Characteristics of XYY Syndrome

Due to causes as yet unknown, approximately one out of every 1000 newborn males will have a genetic make-up consisting of an extra Y sex chromosome.⁴⁹ The XYY sex chromosome complement was first reported in 1961⁵⁰ in a phenotypically normal male⁵¹ who was karyotyped⁵² because he fathered a child with Down's syndrome.⁵³ Between 1961 and 1965, the genotype was reported about twenty-five times in males with various physical abnormalities, or in males karyotyped because they were related to patients with other chromosome abnormalities.⁵⁴

In 1965 there was a meteoric rise of interest in the genotype following a report that a high frequency of XYY males was identified in a Scottish institution (Carstairs) for dangerous criminals, even though the actual incidence and prevalence of this genotype in the noninstitutionalized general population were not yet known.⁵⁵ This report detected eight

44. *Id.* at 93.

45. *Id.*

46. *Id.*

47. *Id.*

48. *Id.*

49. Alice Theilgaard, *A Psychological Study of the Personalities of XYY and XXY Men*, 69 ACTA PSYCHIATRICA SCANDINAVICA SUPPLEMENTUM 1, 11 (1984).

50. A.A. Sandberg et al., *An Human XYY Male*, 2 THE LANCET 488, 488 (1961).

51. Phenotype refers to the sum total of one's traits at a given point in time, as inherited from one's parents and influenced by environmental factors. RATHUS, *supra* note 23, at 91. This includes the interrelationship of nature (heredity) and nurture (environment) in the development of various behavior patterns. *Id.*

52. Karyotype refers to the process that determines the "total of characteristics, including number, form, and size, of chromosomes and their grouping in a cell nucleus" known as the karyotype. BLAKISTON'S, *supra* note 32, at 720.

53. Stanley Walzer et al., *The XYY Genotype*, 29 ANN. REV. MED. 563, 563 (1978).

54. *Id.*

55. Patricia A. Jacobs et al., *Aggressive Behavior, Mental Sub-normality and the XYY Male*, 208 NATURE 1351, 1351 (1965).

XYY individuals among the 197 males tested—an incidence of 3.5%.⁵⁶ Subsequent examination of these eight XYY individuals revealed no physical abnormalities except a tendency to be taller than the other patients.⁵⁷

Assessments of the behavioral characteristics of these individuals, on the other hand, showed that although none of them suffered from a true psychosis, each suffered from a severe, indeterminately caused personality disorder.⁵⁸ They were “unstable and immature, unable to conduct adequate personal relationships, showing a tendency to abscond from institutions and committing apparently motiveless crimes, mostly against property.”⁵⁹ A similar study, conducted concurrently by another research group, produced consistent findings.⁶⁰ Again, a high percentage of XYY individuals was found among antisocial or criminal types as compared to a low incidence discovered among mentally diseased and normal individuals.⁶¹

In addition to these studies newspapers around the world began reporting the lurid crimes of a few men with an extra Y chromosome.⁶² The XYY syndrome was first offered as evidence in the Paris murder trial of Daniel Hugon.⁶³ Hugon's attorneys revealed that his sex chromosome structure was XYY rather than the normal XY and argued that this anomaly caused his violent behavior.⁶⁴ Speculation then began to grow in this country that Richard Speck, convicted killer of eight nurses in Chicago, was also an XYY and that this fact might affect his pending

56. *Id.* at 1352.

57. W.H. Price et al., *Criminal Patients with XYY Sex-Chromosome Complement*, 1 THE LANCET 565, 565 (1966).

58. W.H. Price & P.B. Whatmore, *Behavior Disorders and Pattern of Crime Among XYY Males Identified at a Maximum Security Hospital*, 1 BRIT. MED. J. 533, 536 (1967).

59. *Of Chromosomes and Crime*, TIME, May 3, 1968, at 41 (statement of Dr. William Price, Western General Hospital, Edinburgh, Scot.).

60. M.D. Casey et al., *YY Chromosomes and Antisocial Behaviour*, 2 THE LANCET 859, 860 (1966). This second study disclosed 12 XYYs among 50 institutionalized, mentally deficient criminals, four XYYs among 50 mentally diseased men, two XYYs among 24 prisoners, but found no XYYs in a group of 30 individuals screened in an institution for the mentally diseased, and none in a group of 30 normal individuals. *Id.*

61. *Id.*

62. Alice Theilgaard, *Aggression and the XYY Personality*, 6 INT'L J.L. PSYCHIATRY 413, 413 (1983).

63. *Genetic Plea Gets Slayer 7-Year Term*, WASH. POST, Oct. 15, 1968, at A13.

64. Hugon's lawyers initially raised the issue of the XYY chromosome abnormality by contending that Hugon was incompetent to stand trial because of the genetic defect. The court appointed a panel of experts to determine his competency. *Of Chromosomes and Crime*, *supra* note 59, at 41. Although Hugon was later tried and convicted, he received a diminished sentence of seven years. *Genetic Plea Gets Slayer 7-Year Term*, *supra* note 63, at A13.

appeal.⁶⁵ Speck's prominence catapulted the XYY syndrome into a storm of controversy⁶⁶ which exploded with the acquittal by reason of insanity of an XYY defendant, Lawrence Edward Hannel, in Melbourne, Australia.⁶⁷

Over the last two decades considerable efforts have been made to further refine XYY studies and the effects of the syndrome on behavior. The early studies are now considered to be significantly biased.⁶⁸ Much of the information for these studies was obtained through screenings of populations selected *because* they demonstrated a particular personality trait or physical characteristic.⁶⁹ The studies undertaken to search for the XYY condition were characterized by efforts to identify XYY individuals in various specific sub-populations.⁷⁰ Mental hospitals, mental-penal institutions and prisons were selected for screening, and not surprisingly, the studies found that an extra Y chromosome predisposes the individual to aggressive and antisocial behavior and is associated with mental retardation.⁷¹ Several other studies⁷² found a relatively high fre-

65. Richard D. Lyons, *Ultimate Speck Appeal May Cite a Genetic Defect*, N.Y. TIMES, Apr. 22, 1968, at 43. After the appeal of Speck's conviction had been denied, his attorney announced that Speck's chromosome structure was normal. See *Getty Tells Speck Case Plea Basis: 10 Issues Are Raised Regarding Trial*, CHI. TRIB., Nov. 26, 1968, at A16.

66. See, e.g., *Born Bad?*, NEWSWEEK, May 6, 1968, at 87; Richard D. Lyons, *Chromosome Test for Flaws Costly*, N.Y. TIMES, Apr. 23, 1968, at 27, 46; *Of Chromosomes and Crime*, *supra* note 59, at 41. The XYY syndrome was the center of controversy at an August 1968 course on medical genetics and at an October 1968 meeting of the American Society of Human Genetics. Jane E. Brody, *Rate of Crime-Linked Genetic Flaw is Revised*, N.Y. TIMES, Aug. 7, 1968, at 34.

67. See generally Robert W. Stock, *The XYY and the Criminal*, N.Y. TIMES, Oct. 20, 1968, § 6, at 30 (describing trial and acquittal of XYY defendant). The initial reports of the case—that Hannel was acquitted because he was an XYY—were invalid. Examination of the trial transcript later revealed that Hannel's chromosome constitution was only mentioned once and was not a basis for his acquittal. *Chromosome Precedent in Trials is Disputed*, WASH. POST, Feb. 3, 1969, at A10.

Other attempts to use XYY defect as evidence bearing on criminal responsibility exist. See *Chromosome Test Asked For Accused Slayer of 2*, WASH. POST, Oct. 23, 1968, at B6 (Prince George's County, Md.; defense successful in having court pay for chromosome test); *Extra Chromosomes Ruled Immaterial*, WASH. POST, Mar. 8, 1969, at A4 (Los Angeles, Cal.; court rejected XYY as basis for insanity defense); *Murder Suspect Pleads Imbalance of Chromosomes*, N.Y. TIMES, Oct. 18, 1968, at 18 (New York City; attempt to gain immunity from prosecution); Peter Osnos, *Extra-Chromosome Plea Fails, Youth Convicted*, WASH. POST, Feb. 6, 1969, at E1 (Prince George's County, Md.; trial court disallowed evidence of XYY genotype).

68. Walzer et al., *supra* note 53, at 564.

69. *Id.*

70. Theilgaard, *supra* note 49, at 10.

71. *Id.*

72. See, e.g., Casey et al., *supra* note 60, at 859-60; Hans Forssman & Gunnar Hambert, *Incidence of Klinefelter's Syndrome Among Mental Patients*, 1 THE LANCET 1327, 1327

quency of the XYY condition among patients in maximum security hospitals⁷³ and a significant excess of XYY males in mental-penal institutions for mentally disturbed men accused or convicted of crime.⁷⁴ Statistics, however, interpreting studies revealing XYY traits of excessive tallness, intellectual impairment and antisocial behavior were hampered by a number of factors, including small sample size, selection for tall stature and heterogeneity of the institutions surveyed.⁷⁵

Additionally, early studies did not incorporate a figure reflecting the incidence of XYY among newborn males because conclusive information was not yet available.⁷⁶ Estimates at the time ranged from one in 300⁷⁷ to one in 1500.⁷⁸ If the incidence in the general population were one in 300, the early institutional studies reporting one XYY in thirty-three would indicate ten times the number of XYYs in institutions than in the general population.⁷⁹ The incidence of XYY in the general population today, however, is believed to be one in 1000.⁸⁰ This figure, when compared to the same institutional studies, indicates more than thirty times the number of XYYs in institutions than in the general population. This is a much more alarming figure than the first, and tends to lend credence to the theory of a causal link between the XYY defect and criminal behavior.

With today's consensus as to the incidence of XYY in the general population,⁸¹ recent studies have attempted to eliminate past sampling biases to provide a more accurate picture of the XYY male.⁸² Such studies still appear to indicate that the incidence of XYYs in penal institutions for adult and juvenile offenders is disproportionately high

(1963); N. Maclean et al., *A Survey of Sex-Chromosome Abnormalities Among 4514 Mental Defectives*, 1 THE LANCET 293, 293-94 (1962).

73. Jacobs et al., *supra* note 55, at 1351.

74. Ernest B. Hook, *Behavioral Implications of the Human XYY Genotype*, 179 SCIENCE 139, 140-41 (1973).

75. Richard F. Daly & J. Preston Harley, *Frequency of XYY Males in Wisconsin State Correctional Institutions*, 18 CLINICAL GENETICS 116, 116 (1980).

76. See Theilgaard, *supra* note 49, at 6. Because early studies primarily focused on penal and mentally deficient populations, they revealed little data on the prevalence of the XYY defect in the general population. *Id.*

77. These estimates were derived from studies conducted in New Haven, Connecticut, Ontario, Canada and Scotland. See Victor Cohn, *Testing for 'Criminal Heredity' Is Urged by Three Geneticists*, WASH. POST, Aug. 7, 1968, at A2.

78. Jacobs et al., *supra* note 55, at 1352.

79. *Id.*

80. J. Schroder et al., *The Frequency of XYY and XXY Men Among Criminal Offenders*, 63 ACTA PSYCHIATRICA SCANDINAVICA 272, 272 (1981); Theilgaard, *supra* note 49, at 11.

81. See Schroder et al., *supra* note 80, at 272; Theilgaard, *supra* note 49, at 11.

82. Daly & Harley, *supra* note 75, at 116-22.

compared to the XYY incidence in newborn males.⁸³ Furthermore, data indicates that males with an extra Y sex chromosome also have a higher rate of criminal convictions than XY individuals.⁸⁴

Additionally, this data suggests that men with an extra sex chromosome may be more likely to commit sexual crimes than other criminal offenders.⁸⁵ The clinical features common to both groups are tall stature and low or "low normal" intelligence.⁸⁶ Because tallness does not seem to predispose individuals to criminal behavior,⁸⁷ it appears the intelligence defect and accompanying abnormal features of the central nervous system are the most likely causes of the XYY's tendency to commit crimes.⁸⁸

XYY syndrome does not always produce a low or "low normal" intelligence.⁸⁹ However, the majority of studies, including those con-

83. Karyotyping 3011 males at five Wisconsin state correctional institutions revealed occurrence of XYY complement to be five times that for newborn males. Approximately the same rate was found among 2556 males in the three penal institutions for adults. The frequency of XYY for juvenile offenders was about 10 times that for newborn males. Data contradicts the notion that a high rate for XYY among adult males in penal settings may be due to a disproportionately large number of tall men in prisons. See Daly & Harley, *supra* note 75, at 116.

84. Schroder et al., *supra* note 80, at 275. The XXY karyotype identifies a sex chromatin-positive male resulting in a chromosome abnormality known as Klinefelter's syndrome. In 1960 a new sex chromosome variant of the Klinefelter's syndrome—the XXYY karyotype—was reported. Studies revealed an interesting genetic contrast between the XYY, XXY and XXYY groups. Many more XXYY individuals (XXY individuals with an extra Y chromosome) were found among antisocial, mentally deficient groups than among less aggressive, extremely mentally retarded individuals in the general population. These findings, which implied a relationship between an extra Y chromosome and antisocial behavior, prodded the curiosity of several medical researchers and prompted research into the XYY abnormality. See Forssman & Hambert, *supra* note 72, at 1327; S. Muldal & C.H. Ockey, *The "Double Male": A New Chromosome Constitution in Klinefelter's Syndrome*, 2 THE LANCET 492, 492-93 (1960).

85. See Schroder et al., *supra* note 80, at 275.

86. *Id.*

87. The studies addressed in this Comment did not draw conclusions suggesting tall stature was indicative of criminal predisposition. This is not to say, however, that more recent studies would support this supposition. In fact, one study noted that because a tendency to greater height in the XYY individual has been recognized in almost all population studies, size alone may be considered a possible significant factor in criminal conduct. "Personality patterns developing in children as a reaction to large height or 'channeling' by social forces of tall individuals (who may appear more threatening), conceivably could account for the observed frequencies of institutionalization." See Hook, *supra* note 74, at 144.

88. *Id.* at 145; see Herman A. Witkin et al., *Criminality in XYY and XXY Men*, 193 SCIENCE 547, 547-55 (1976).

89. W. Zublin, *Chromosomale Aberrationen Und Psyche*, 140 BIBLIOTHECA PSYCHIATRICA ET NEUROLOGICA 1, 69-71 (1969).

ducted within various correctional institutions,⁹⁰ found significantly higher intelligence levels in the normal controls than in the XYY subjects. Also, studies of several noninstitutionalized XYY subjects show low levels of intellectual functioning according to the 1958 Wechsler IQ norms.⁹¹ XYY individuals who appear to have normal IQs nonetheless suffer from developmental problems including learning, speech and attention disorders, and exhibit tendencies towards social isolation.⁹²

It appears, therefore, that in each incidence of XYY syndrome, one can only present a worst-case or best-case scenario for predicting potential antisocial behavior leading to criminal conduct.⁹³ Taken together, however, available data does suggest that an XYY individual runs an increased risk of appearing in a mental-penal setting.⁹⁴ Furthermore, it appears that those XYY individuals who are institutionalized suffer from a severe degree of "personality disorder."⁹⁵

Their personalities show extreme instability and irresponsibility, and in their criminal behaviour these men do not appear to have considered any but the most immediate consequences of their actions. They have few constructive aims for the future and the plans they make are generally unrealistic. In their emotional responses they show very little depth of affection for others and their capacity for understanding is more limited than would be expected from their level of intelligence. They display an impaired awareness of their environment, which appears, at least partly, to account for their inability to respond

90. See, e.g., A.W. Griffiths, *Prisoners of XYY Constitution: Psychological Aspects*, 119 BRIT. J. PSYCHIATRY 193, 194 (1971).

91. See D.B. Hier et al., *Learning Disorders and Sex Chromosome Aberrations*, 24 J. MENTAL DEFICIENCY RES. 17, 18 (1980) (study revealed 20 out of 89 subjects to be mentally retarded).

92. See Hier et al., *supra* note 91, at 20; see also Arthur Robinson et al., *Summary of Clinical Findings in Children and Young Adults with Sex Chromosome Anomalies*, 26 BIRTH DEFECTS: ORIGINAL ARTICLE SERIES 225, 227 (1991).

93. See *supra* notes 49-50, 53-58, 60, 72-75, 90-92 and accompanying text. All studies cited agree that XYY syndrome appears to have *some* effect on an individual. However, *what* effect and to *what degree* the effect is present are matters still in dispute. At worst, an XYY individual will be extremely retarded with an abnormally low IQ, completely unable to cope with stressful situations, antisocial and unduly aggressive with a propensity to violent outbursts. At best, an XYY individual will be of normal intelligence, quite capable of coping with the demands of life and society *especially* if his environment has been tailored to meet his special needs of stability and support. See Robinson et al., *supra* note 92, at 227-28. Most XYY individuals will probably fall somewhere between the two extremes, possessing a combination of worst-case or best-case characteristics in varying degrees. See Theilgaard, *supra* note 49, at 16-21.

94. See Hook, *supra* note 74, at 147.

95. See Price & Whatmore, *supra* note 58, at 534.

appropriately to the ordinary requirements of life. Their greatest difficulty in social adjustment, however, arises from emotional instability, combined with an incapacity to tolerate the mildest frustration.⁹⁶

Thus, even though it appears that the consensus of studies supports a definite association between the XYY genotype and the presence of XYY individuals in mental-penal settings, the nature and extent of this association has yet to be determined.⁹⁷

III. THE LEGAL DOCTRINES: USE OF XYY SYNDROME IN A CRIMINAL DEFENSE

If, due to some immutable, biological characteristic beyond an individual's ability to control, one is predisposed to antisocial or criminal behavior, can one be held morally and legally accountable for that behavior? This Comment will now address this issue and its applications and limitations within the criminal justice system.

A. *The Basic Tenet of Criminal Culpability*

The requirement that the government prove the mental state for the crime charged reflects a fundamental tenet of criminal law: criminal liability must be based on the moral culpability of the defendant.⁹⁸ If a person did not have the mental state necessary for the crime charged, he or she is simply not guilty of the crime, any more than if he or she had not committed the act.⁹⁹ This requirement of a guilty mind has existed for centuries.¹⁰⁰ Under the Model Penal Code¹⁰¹ a defendant must act

96. *Id.*

97. See Hook, *supra* note 74, at 147.

98. The old phrase "actus reus non facit reum nisi mens sit rea" translates into "the act is not guilty unless the mind is guilty." See Low et al., *supra* note 9, at 193.

99. *Id.* A few criminal statutes, however, dispense entirely with a state of mind requirement—or at least with the state of mind requirement regarding the major element of the offense. These are the so-called "strict liability" crimes. *United States v. Balint*, 258 U.S. 250 (1922) (such crimes include failure to pay taxes due and selling unsafe food). Because these offenses require no intent, even an accidental violation of the statute is a crime. Accordingly, the accused's "good faith" or "innocent mistake" will not prevent conviction—a person is "strictly liable" for the crime upon commission of the prohibited act. For example, it traditionally has been held that the crime of statutory rape does not require an awareness of the female's age. Thus, no intent or traditional mens rea need exist before the accused is found criminally liable. See *State v. Superior Court*, 454 P.2d 982 (Ariz. 1969).

100. Low et al., *supra* note 9, at 194; see Francis Bowes Sayre, *Mens Rea*, 45 HARV. L. REV. 974, 974 (1932).

101. The Model Penal Code consists of statutes proposed by the National Conference of Commissioners of Uniform State Laws for adoption by state legislatures. BLACK'S LAW DIC-

with purpose¹⁰² or knowledge¹⁰³ before he or she can be guilty of a criminal act. Further, Model Penal Code section 4.02(1) states: "Evidence that the defendant suffered from a mental disease or defect is admissible whenever it is relevant to prove that the defendant did or did not have a state of mind which is an element of the offense."¹⁰⁴ This section permits the introduction of evidence that reflects the defendant's mental state at the time of the commission of the crime.¹⁰⁵ Therefore, if there is a reasonable doubt that the defendant did not have the required mental state, he or she is not guilty of the crime charged.¹⁰⁶

B. *XYY and the Insanity Defenses*

The insanity defense originally was created to recognize that some individuals were not morally blameworthy and therefore were not criminally responsible for their actions because they did not understand the moral significance of their acts.¹⁰⁷ A defendant is entitled to an acquittal if, at the time of the crime, he or she was so impaired by mental illness or retardation as to be "insane" within the meaning of the law.¹⁰⁸ The con-

TIONARY 1003 (6th ed. 1990). "Frequently, the state adopting the model act will modify it to some extent to meet its own needs or may adopt only a portion of such." *Id.*

102. Section 2.02(2)(a) of the Model Penal Code provides:

A person acts purposely with respect to a material element of an offense when:

- (i) if the element involves the nature of his conduct or a result thereof, it is his conscious object to engage in conduct of that nature or to cause such a result; and
- (ii) if the element involves the attendant circumstances, he is aware of the existence of such circumstances or he believes or hopes that they exist.

MODEL PENAL CODE § 2.02(2)(a) (Proposed Official Draft 1962).

103. Section 2.02(2)(b) of the Model Penal Code provides:

A person acts knowingly with respect to a material element of an offense when:

- (i) if the element involves the nature of his conduct or the attendant circumstances, he is aware that his conduct is of that nature or that such circumstances exist; and
- (ii) if the element involves a result of his conduct, he is aware that it is practically certain that his conduct will cause such a result.

Id. § 2.02(2)(b).

104. *Id.* § 4.02(1); *see also id.* § 2.02 (defendant generally must act with required mental state to be guilty of offense).

105. *Id.* § 4.02.

106. *See id.*

107. *See generally* MICHAEL S. MOORE, LAW & PSYCHIATRY: RETHINKING THE RELATIONSHIP 233-43 (1984) (describing rationale underlying insanity defense).

108. Although the XYY anomaly is a physical, genetic defect it will be admissible in an insanity defense if it is shown that it can cause mental disturbance. *See* 2 HARRY CLAY UNDERHILL, CRIMINAL EVIDENCE § 455, at 1139, 1141 (Philip F. Herrick ed., 5th ed. 1956) (noting physical infirmities or diseases may lead to mental disturbances); HENRY WEIHOFEN, MENTAL DISORDER AS A CRIMINAL DEFENSE 321 (1954) (noting bodily injuries or diseases such as epilepsy and syphilis may lead to mental disturbances). The acceptability of the defect will probably experience a development in the courts similar to that experienced by epilepsy when it was offered to prove mental condition. When defense counsel were first attempting to

ditions giving rise to insanity include mental illness or disease,¹⁰⁹ mental retardation¹¹⁰ and intoxication.¹¹¹ While not all impairments give rise to this defense,¹¹² all the various formulations of the insanity test require some type of mental impairment which created a certain effect on the defendant's mental condition at the time of the crime.¹¹³

1. M'Naghten rule

The M'Naghten rule¹¹⁴ was established in 1843 and recognizes only cognitive disabilities: a defendant is insane if at the time of the crime he or she did not know the nature and quality of the action *or* did not know that what he or she was doing was wrong due to "such a defect of reason, from disease of the mind."¹¹⁵ The M'Naghten rule forms the basis for what is known today as the cognitive prong of the insanity defense.¹¹⁶ Because of this test's wide acceptance, the potential use of the XYY syndrome as a defense will depend largely on whether the defendant satisfies

offer evidence to show that their clients were suffering from epilepsy, courts insisted, as a condition precedent to the admissibility of this evidence, that an expert show a link between the malady and mental disturbance. *See, e.g.,* *Walsh v. People*, 88 N.Y. 458, 467-68 (1882). Later, when medical science progressed to the point where it was commonly accepted that epilepsy could have a serious effect on the defendant's mentality, courts took judicial notice of this fact and merely required testimony showing that the defendant suffered from the malady. *E.g., State v. Wright*, 84 N.W. 541, 542 (Iowa 1900).

109. Traditional mental illness such as psychosis, a severe form of mental disorder or disease, can be a basis for an insanity defense. This has been codified in modern statutory provisions providing for a defense based on a "mental disease." *See, e.g.,* ALA. CODE § 13A-3-1 (1975) (providing defense based on mental disease); ARK. CODE ANN. § 5-2-312 (Michie 1987) (same); MODEL PENAL CODE § 4.01(1) (Proposed Official Draft 1962) (same).

110. Mental retardation or "feble-mindedness" can also render the defendant legally insane. *State v. Johnson*, 290 N.W. 159 (Wis. 1940). This result is also codified in many modern statutes as a defense based on a "mental defect." *See, e.g.,* ALA. CODE § 13A-3-1 (1975) (providing defense based on mental defect); ARK. CODE ANN. § 5-2-312 (Michie 1987) (same); ME. REV. STAT. ANN. tit. 17A, § 39 (West 1964) (same); MODEL PENAL CODE § 4.01 (Proposed Official Draft 1962) (same).

111. *Burrows v. State*, 297 P. 1029 (Ariz. 1931) (holding involuntary intoxication produced required effect on defendant's mind), *overruled in part on other grounds by State v. Hernandez*, 320 P.2d 467 (Ariz. 1958).

112. An insanity defense cannot be based upon "an abnormality manifested only by repeated criminal or otherwise antisocial conduct" such as that exhibited by so-called psychopaths. *See, e.g.,* ALA. CODE § 13A-3-1 (1975) (prohibiting insanity defense based on repeated criminal or otherwise antisocial conduct); ARK. CODE ANN. § 5-2-312 (Michie 1987) (same); MODEL PENAL CODE § 4.01(2) (Proposed Official Draft 1962) (same).

113. *See WEIHOFEN, supra* note 108, at 321.

114. M'Naghten's Case, 8 Eng. Rep. 718 (H.L. 1843).

115. *Id.* at 719.

116. The basic issue that divides jurisdictions is whether the legal standard for insanity should be limited to the defendant's thinking or reasoning abilities—cognitive impairment—or include the defendant's inability to control his or her actions—volitional impairment—as well. *See infra* note 143.

M'Naghten's cognitive aspect by lacking culpable knowledge,¹¹⁷ and whether XYY syndrome is a mental disease.¹¹⁸

The cognitive aspect of the M'Naghten test, however, is more crucial than the mental disease aspect. In the latter, even though courts rarely give a precise definition of "disease of the mind,"¹¹⁹ a jury will conclude that a defendant's inability to comprehend the nature, quality or wrongfulness of an act results from a disease of the mind.¹²⁰ Under this mental disease aspect, therefore, evidence will only be admissible if it demonstrates the defendant's mental condition.¹²¹ If the XYY defendant is driven toward aggressive responses,¹²² he may have difficulty in controlling his behavior. The XYY syndrome may indicate a mental abnormality,¹²³ and as such may be evidence of the defendant's mental state and be admissible to show suffering from a "disease of the mind."¹²⁴

The cognitive aspect of the M'Naghten test pertaining to the defendant's "knowledge," however, presents a difficult problem. Unless medical research can establish a relationship between XYY syndrome and the defendant's cognitive abilities, the XYY syndrome would not in itself be evidence from which a jury could conclude that the accused did not know the nature and quality of the act, or did not know that the act was wrong, as the M'Naghten test requires.¹²⁵ When an XYY defendant's disabilities include mental retardation,¹²⁶ cognitive powers may be so impaired that he truly lacks the requisite "knowledge."¹²⁷ When that is the

117. See *supra* notes 98, 114-15 and accompanying text.

118. See *supra* notes 114-15 and accompanying text.

119. ABRAHAM S. GOLDSTEIN, *THE INSANITY DEFENSE* 47 (1967) (noting schizophrenia, paranoia and other mental abnormalities have qualified as "diseases"). *Id.*

120. Richard H. Kuh, *The Insanity Defense—An Effort to Combine Law and Reason*, 110 U. PA. L. REV. 771, 785 (1962); Henry Weihofen, *The Definition of Mental Illness*, 21 OHIO ST. L.J. 1, 12 (1960).

121. M'Naghten has been criticized because this exclusion of most relevant medical evidence results in an all or nothing rule. Bernard L. Diamond, *Criminal Responsibility of the Mentally Ill*, 14 STAN. L. REV. 59, 74-76 (1961). This restriction, however, has been loosened by some courts that do not require evidence to be material to the M'Naghten test. *State v. Carlson*, 93 N.W.2d 354, 361 (Wis. 1958) (holding medical evidence admissible if it helps show defendant was subject to compulsion or irresistible impulse).

122. *Jacobs et al.*, *supra* note 55, at 1352.

123. *Id.*

124. See WEIHOFEN, *supra* note 108, at 321 (bodily injuries or diseases, such as blows to head, injuries to spine, epilepsy, syphilis, etc., may lead to mental disturbances and are admissible when relevant to show defendant's mental condition).

125. M'Naghten's Case, 8 Eng. Rep. 718 (H.L. 1843).

126. One study found that 20 of 89 subjects were mentally retarded. *Hier et al.*, *supra* note 91, at 18.

127. Some courts insist upon a restrictive, scholastic definition of "knowledge." *State v. Andrews*, 357 P.2d 739, 748 (Kan. 1960) (stating defendant must understand nature of criminal acts), *cert. denied*, 368 U.S. 868 (1961). Other states have changed the wording so that

case, however, the retardation itself may be sufficient evidence to convince the jury the defendant did not have the requisite knowledge.¹²⁸ Therefore, unless some relationship is found between XXX syndrome and a person's cognitive abilities, the XXX syndrome will probably fail as a defense under a M'Naghten test analysis.

2. Loss of control tests

Because some people's impairments affect only their ability to exercise control over their conduct and not their cognitive abilities, the M'Naghten test provides them with no defense.¹²⁹ As a result, people who have not acted in a morally reprehensible manner are improperly convicted of criminal offenses. This phenomenon has opened the M'Naghten test to considerable criticism.¹³⁰ To remedy this, some formulations of the insanity test now permit acquittal if the defendant shows sufficient cognitive impairment—as required under the M'Naghten test—or volitional impairment sufficient to result in the inability to control behavior.¹³¹

A key difference between the cognitive prong and the volitional prong lies in a person's ability to distinguish between reality and fantasy. For example, if a person is psychotic¹³² and suffering from delusions¹³³

"understand," "appreciate," "comprehend" or other words of cognition are the key to the test. *E.g.*, *Chase v. State*, 369 P.2d 997, 1001-02 (Alaska 1962) (stating defendant must have capacity to understand or realize), *overruled by* *Fields v. State*, 487 P.2d 831 (Alaska 1971) and by *Schade v. State*, 512 P.2d 907 (Alaska 1973); *State v. Iverson*, 289 P.2d 603, 606 (Idaho 1955) (stating defendant must have capacity to appreciate; to know and understand), *overruled by* *State v. White*, 456 P.2d 797 (Idaho 1969). In other states "knowledge" has been left for the members of the jury to interpret. *Hall v. State*, 83 So. 513, 520 (Fla. 1919).

128. MODEL PENAL CODE § 4.01 (Proposed Official Draft 1962).

129. *See supra* notes 114-15 and accompanying text.

130. Such an approach under the M'Naghten test would be applauded by those members of society who believe in obtaining the highest possible rate of convictions. On the other hand, this means that a driver who suffers an epileptic seizure while operating an automobile and, as a result, strikes and kills a pedestrian in a crosswalk, could be convicted of a criminal offense. In such a case, the victim's death did not result from a morally reprehensible act. Rather, the death resulted from a physical condition which rendered the driver incapable of controlling his or her actions. *See supra* note 108 and accompanying text.

131. Such tests include the irresistible impulse test where an insane impulse controlled the defendant's will causing the commission of the crime. This test was first applied in *Parsons v. State*, 2 So. 854, 866-67 (Ala. 1887). Under another test, a defendant who lacked substantial capacity to conform his or her conduct to the requirements of the law may be acquitted. MODEL PENAL CODE § 4.01(1) (Proposed Official Draft 1962).

132. "Psychotic" refers to an individual who suffers from psychosis, meaning a "profound disorganization of mind . . . that results from an individual's inability to tolerate the demands of his social environment." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 1833 (1976).

133. A delusion is "a false belief, especially as a persistent psychotic symptom." *Id.* at 598.

or hallucinations,¹³⁴ he or she may have no concept of the real world, including societal perceptions of right and wrong.¹³⁵ In this mental condition, he or she would have no conscious appreciation of the wrongfulness of the act and would be legally insane under the cognitive aspect.¹³⁶ A person who accurately perceives that a given behavior is antisocial and wrong, however, would not be considered insane under a cognitive analysis¹³⁷—but if he or she could not refrain from the behavior even though he or she understood it was wrong, the person would lack volitional control and be considered insane in some jurisdictions.¹³⁸

This test of responsibility is universally called the “irresistible impulse” test,¹³⁹ which provides that a defendant is entitled to acquittal on insanity grounds if his or her commission of the crime was caused by an “insane impulse” that controlled the defendant’s will.¹⁴⁰ It is not necessary that the defendant’s action be sudden, but only that a mental disease caused the lack of control.¹⁴¹ If the XYY defendant is unable to cope with stressful situations and has great difficulty resisting aggressiveness in his actions, the defect could be responsible for the XYY’s inability to control his behavior.¹⁴² The control test requirements, however, express

134. A hallucination is “a sensory experience of something that has no basis in reality outside the mind.” *Id.* at 1023.

135. One psychiatrist observed:

The M’Naghten rule addresses itself to the defendant’s *knowledge* of the wrongfulness of his act. Individuals suffering from affective disorders may possess mere surface knowledge or cognition of the wrongfulness of their act, but such knowledge may lack any depth or understanding of the import of the conduct in question. A shortcoming of the M’Naghten formulation is that it authorizes a finding of responsibility in such individuals, whose knowledge of wrongfulness is a largely detached or abstract awareness, which fails to penetrate to the affective level.

Robert Lloyd Goldstein, *The Psychiatrist’s Guide to Right and Wrong: Part III: Postpartum Depression and the “Appreciation” of Wrongfulness*, 17 BULL. AM. ACAD. PSYCHIATRY & L. 121, 127 (1989).

136. *Id.*

137. An example of a person insane under a volitional standard would be a defendant who killed a number of people, acknowledging in a note at the scene of each crime the wrongfulness of his or her conduct, but also indicating an inability to control the compulsion to act. See LUCY FREEMAN, “BEFORE I KILL MORE . . .” 245-54 (1955) (fictional exposition of killings committed by William Heirens).

138. *Id.*

139. *Parsons v. State*, 2 So. 854 (Ala. 1887).

140. *Id.* at 863.

141. *Castro v. People*, 346 P.2d 1020, 1027 (Colo. 1959) (holding “[A] person is held to be insane as far as the criminal laws are concerned when . . . he suffers such an impairment of mind as to render him incapable of choosing the right and refraining from doing the wrong.”); see WEIHOFEN, *supra* note 108, at 321 (discussing early development of control test); Edwin R. Keedy, *Irresistible Impulse as a Defense in the Criminal Law*, 100 U. PA. L. REV. 956, 957-60, 976-86 (1952).

142. For a study that dictates this conclusion, see Price & Whatmore, *supra* note 58, at 533-36.

in absolute terms that nothing less than a complete inability to control oneself will suffice to free the accused from responsibility.¹⁴³ Thus, unless medical evidence can demonstrate that an XYY individual finds it virtually impossible to control his behavior at the time the crime is committed, it is unlikely that the XYY defense alone would warrant acquittal of the individual under the irresistible impulse test.¹⁴⁴

In jurisdictions that employ the control tests, however, the burden of proof with respect to the issue of insanity will determine the significance of XYY syndrome as a successful defense.¹⁴⁵ In jurisdictions where the burden is on the defendant, a preponderance of evidence prov-

143. "[T]he irresistible impulse criterion presupposes a *complete* impairment of capacity for self control." MODEL PENAL CODE § 4.01 & cmt. 158 (Tent. Draft No. 4, 1955). The Model Penal Code insanity provision contains both cognitive and volitional prongs. Section 4.01(1) provides that a "person is not responsible for criminal conduct if at the time of such conduct as a result of mental disease or defect he lacks substantial capacity either to appreciate the criminality [wrongfulness] of his conduct *or* to conform his conduct to the requirements of law." *Id.* § 4.01(1) (Proposed Official Draft 1962) (emphasis added).

The volitional prong focuses on the defendant's power to control her- or himself. If the XYY defendant were unable to conform his conduct to the requirements of law, he could be found insane. Courts broadened the M'Naghten definition of insanity by adopting definitions of insanity based on the Model Penal Code. Recently, however, the volitional prong has been widely abolished, in part due to the public's reaction to John Hinckley's acquittal by reason of insanity in 1982. See LINCOLN CAPLAN, *THE INSANITY DEFENSE AND THE TRIAL OF JOHN W. HINCKLEY, JR.* (1984). John Hinckley attempted to assassinate former President Reagan on March 30, 1981, wounding him and three others. *Id.* at 8-9. Hinckley was indicted on thirteen counts. *Id.* at 98. He introduced evidence of volitional impairment which established his insanity under a Model Penal Code-based statutory provision. *Id.* at 97. Hinckley was found insane and acquitted of all thirteen counts on May 4, 1982. *Id.* at 99-100. The assassination attempt had been the object of great national attention since millions of people viewed videotaped footage shown repeatedly on television. The public reacted with disbelief and outrage to the Hinckley verdict, and as a result the volitional prong was eliminated from the federal insanity statute and numerous state statutes. *Id.* at 101-05. For a treatment of the abolition efforts, see generally R.D. Mackay, *Post-Hinckley Insanity in the U.S.A.*, 10 CRIM. L. REV. 88 (1988). By voter proposition, the California insanity statute now contains only a cognitive prong, as does the federal insanity statute. 18 U.S.C. § 17(a) (1988); CAL. PENAL CODE § 25(b) (West 1991).

144. See MODEL PENAL CODE § 4.01 (Proposed Official Draft 1962).

145. In all jurisdictions there is a rebuttable presumption that the accused is sane. See WEIHOFEN, *supra* note 108, at 214. The insanity issue is not raised unless the defendant presents some evidence tending to show he or she was insane at the time of the offense. Prior to the post-Hinckley acquittal changes, most jurisdictions provided that once a defendant raised the issue of insanity, the prosecution was required to prove beyond a reasonable doubt that the defendant was sane. WAYNE R. LAFAYE, *MODERN CRIMINAL LAW* 345 (1978). As part of the reform of insanity law following the Hinckley case, a trend has developed placing on the defendant the burden of proving insanity. *E.g.*, 18 U.S.C. § 17(b) (1988) (defendant must prove insanity by clear and convincing evidence); ALA. CODE § 13A-3-1 (1975) (defendant must prove insanity by preponderance of evidence); ARK. CODE ANN. § 5-2-312 (Michie 1987) (same); CAL. PENAL CODE § 25(b) (West 1991) (same); ME. REV. STAT. ANN. tit. 17A, § 39 (West 1964) (same).

ing that the criminal conduct was the result of a disease-related inability to control behavior will be necessary before the question of the defendant's sanity will be submitted to the jury.¹⁴⁶ Where the prosecution has the burden of proving sanity¹⁴⁷ and the defense is required to raise a reasonable doubt to rebut the presumption of sanity,¹⁴⁸ less evidence will be needed by the defense in order to shift the burden to the prosecution. If the presumption of sanity can be rebutted by "some evidence" only,¹⁴⁹ the XYY defect alone may be sufficient to shift the burden of proving sanity to the prosecution,¹⁵⁰ and some showing that the defendant was unable to control himself at the time of the crime may be enough to gain acquittal. If, however, according to the modern trend, the presumption of sanity can only be rebutted by a preponderance of evidence, the XYY defect alone may not be sufficient to shift the burden of proving sanity to the prosecution.¹⁵¹

3. Product tests

In support of arguments that standards for determining criminal liability should extend beyond the limits of the M'Naghten or control tests, over the years a few jurisdictions have adopted a rule stating that if a defendant suffers from a mental disease and his or her criminal act was a product of that disease, the defendant is exempt from criminal liability.

146. In California an XYY defendant will need to prove insanity by a preponderance of evidence in accordance with the post-Hinckley acquittal changes. CAL. PENAL CODE § 25(b) (West 1991).

147. The initial burden of rebutting the presumption of sanity remains with the defense. Additionally, in following the modern trend, most states and federal jurisdictions place the burden of proving insanity on the defendant by clear and convincing evidence or by a preponderance of evidence. *E.g.*, ALA. CODE § 13A-3-1 (1975) (defendant must prove insanity by preponderance of evidence); ARK. CODE ANN. § 5-2-312 (Michie 1987) (same); ME. REV. STAT. ANN. tit. 17A, § 39 (West 1964) (same); *see supra* note 145.

148. *See, e.g.*, *People v. Robinson*, 174 N.E.2d 820, 823 (Ill. 1961), *cert. denied*, 368 U.S. 995 (1962); *Fowler v. State*, 206 A.2d 802, 805-06 (Md. 1965) (quoting *O'Connor v. State*, 199 A.2d 807, 808 (Md. 1964)).

149. *See, e.g.*, *Carter v. United States*, 325 F.2d 697, 702 (5th Cir. 1963), *cert. denied*, 377 U.S. 946 (1964); *State v. Penry*, 368 P.2d 60, 62 (Kan. 1962).

150. *See supra* note 145.

151. *See supra* note 145.

ity.¹⁵² Under this "product" rule, or Durham rule,¹⁵³ XYY syndrome will only be useful if it can satisfy the definitions of "mental disease" and "product."¹⁵⁴

The Durham rule defines mental disease as "any abnormal condition of the mind which substantially affects mental or emotional processes and substantially impairs behavior controls."¹⁵⁵ If the presence of an extra Y chromosome predisposes an individual to serious personality abnormalities, it can be said an "abnormal condition of the mind" exists that affects the defendant's mental processes.¹⁵⁶ Similarly, if a primary symptom of XYY syndrome is an individual's inability to control his behavior, it "impairs behavior controls" in a substantial manner.¹⁵⁷ Evidence related to XYY syndrome will, therefore, be indicative of mental disease and clearly admissible under the Durham rule.

The "product of" wording of the Durham rule implies a but-for relationship between the disease and the criminal act,¹⁵⁸ meaning the act is a product of the disease if the accused would not have committed the act if he or she did not suffer from the disease.¹⁵⁹ This emphasis on the "product of" concept, however, has been nearly eliminated because the rule fails to give juries guidance in determining when a specific crime is the product of a defendant's impairment.¹⁶⁰ There is a presumption of sanity under the product test that can be rebutted by "some evidence" of mental disease.¹⁶¹ With such evidence having been produced, the burden

152. Although initially formulated by the State of New Hampshire in *State v. Pike*, 49 N.H. 399 (1870), this test was adopted by the Court of Appeals for the District of Columbia in the famous *Durham* case. *Durham v. United States*, 214 F.2d 862 (D.C. Cir. 1954), *overruled by* *United States v. Brawner*, 471 F.2d 969 (D.C. Cir. 1972). It was later abandoned in that jurisdiction in *United States v. Brawner*, 471 F.2d 969 (D.C. Cir. 1972). The *Brawner* court held that jurors should be told to acquit a defendant if they determine that "at the time of his unlawful conduct his mental or emotional processes or behavior controls were impaired to such an extent that he cannot justly be held responsible for his act." *Id.* at 1032.

153. *Durham*, 214 F.2d 862.

154. *Id.* at 875.

155. *McDonald v. United States*, 312 F.2d 847, 851 (D.C. Cir. 1962). The court in *Durham* intentionally did not define mental illness in order to allow the greatest leeway for psychiatric testimony. *Durham*, 214 F.2d at 875-76. The practical difficulties of allowing doctors to define mental disease in their own way, however, made it imperative for the court to formulate a standardized definition. *Blocker v. United States*, 274 F.2d 572 (D.C. Cir. 1959).

156. *McDonald*, 312 F.2d at 851; see Theilgaard, *supra* note 49, at 6-9 (discussing personality abnormalities of XYY individuals).

157. *McDonald*, 312 F.2d at 851; see Casey et al., *supra* note 60, at 860; Price & Whatmore, *supra* note 58, at 536.

158. *Campbell v. United States*, 307 F.2d 597, 601 (D.C. Cir. 1962).

159. *Id.*

160. *Washington v. United States*, 390 F.2d 444, 455-56 (D.C. Cir. 1968) (expert medical witness may not use term "product" when testifying under Durham rule).

161. See LAFAYE, *supra* note 145, at 345.

of proving sanity shifts to the prosecutor who must either disprove the existence of the disease or the causal connection between it and the criminal act.¹⁶² Because the prosecution must essentially disprove the existence of the mental disease before it can disprove beyond a reasonable doubt the causal link between it and the act, the prosecution will usually attempt to disprove only the former.¹⁶³ Further, because the lack of behavioral controls is stressed in the definition of "mental disease,"¹⁶⁴ a jury will likely conclude that if the accused suffered from a disease, it was the disease that caused the act. If it can satisfy the "mental disease" standards of the Durham rule, the XYY disorder will, therefore, satisfy the "product of" standards as well.¹⁶⁵

The XYY syndrome, thus, is potentially a very significant factor in an insanity defense under a product test. Evidence produced relating to the syndrome may very well be sufficient to rebut the presumption of sanity and make the accused's sanity a question for the jury.¹⁶⁶ Finally, even though the product test has been abandoned as the *sole* standard by those states that initially adopted it, the test's influence survives as an important aspect of the Model Penal Code.

4. Model Penal Code

Some jurisdictions do not adhere to any of the previously discussed tests; instead, they follow the standard of responsibility for criminal conduct as determined by the test initiated by the American Law Institute (ALI) in its Model Penal Code: "A person is not responsible for criminal conduct if at the time of such conduct as a result of mental disease or defect he lacks substantial capacity either to appreciate the criminality [wrongfulness] of his conduct or to conform his conduct to the requirements of law."¹⁶⁷ The important issues under the Code are whether the XYY abnormality is a mental disease or defect, and if so, whether the accused was either unable to appreciate the criminality of his conduct or was unable to conform his behavior to legal norms.¹⁶⁸ The Code, there-

162. *Frigillana v. United States*, 307 F.2d 665 (D.C. Cir. 1962).

163. David C. Acheson, *McDonald v. United States: The Durham Rule Redefined*, 51 GEO. L.J. 580, 584 (1963).

164. *McDonald v. United States*, 312 F.2d 847, 851 (D.C. Cir. 1962).

165. *Id.*; *Campbell v. United States*, 307 F.2d 597, 601 (D.C. Cir. 1962).

166. *See* LAFAVE, *supra* note 145, at 345.

167. MODEL PENAL CODE § 4.01(1) (Proposed Official Draft 1962); *see, e.g.*, ALA. CODE § 13A (1975); COLO. REV. STAT. § 18 (1986); IND. CODE ANN. § 35 (Burns 1985). Largely stimulated by the labors of the American Law Institute, there are a total of 36 states that have adopted new substantive criminal law codes based on the Model Penal Code. WAYNE R. LAFAVE & AUSTIN W. SCOTT, JR., CRIMINAL LAW § 1.1, at 4 (2d ed. 1986).

168. MODEL PENAL CODE § 4.01(1) (Proposed Official Draft 1962).

fore, appears to be a combination of the M'Naghten test,¹⁶⁹ the control test¹⁷⁰ and the Durham test.¹⁷¹ Consequently, the Code once again appears to provide both cognitive and volitional prongs¹⁷² to determine criminal culpability.

As with other tests defining standards of criminal responsibility, the XYY anomaly will be admissible under the Code to prove a mental disease because it is indicative of a mental abnormality.¹⁷³ The defect, as under M'Naghten, will be of little value in establishing a lack of cognitive powers.¹⁷⁴ The syndrome will be very significant, however, in establishing that the accused lacked substantial capacity to conform his behavior to legal norms.¹⁷⁵ If the XYY defendant finds it extremely difficult to control his behavior, this alone might be sufficient to sustain a defense where complete lack of control is not required.¹⁷⁶

As with the other insanity defenses, the burdens of proof under the Code are important.¹⁷⁷ If the accused bears the burden to prove insanity, the XYY syndrome may not be sufficient to raise a jury question if other evidence showing the accused was unable to conform his conduct regarding the criminal act is absent.¹⁷⁸ If on the other hand, the prosecution bears the burden of proving sanity, the defect by itself will rebut the presumption of sanity and sustain an insanity defense.¹⁷⁹ Therefore, under the Model Penal Code standard proposed by the ALI, the XYY syndrome in the former case could be a useful defense *only* if supplemented by a substantial amount of other evidence, whereas in the latter case the

169. This test refers to the defendant's capacity to appreciate criminality. M'Naghten's Case, 8 Eng. Rep. 718, 719 (H.L. 1843); see *supra* note 114 and accompanying text.

170. This test refers to the defendant's capacity to conform his or her conduct. Parsons v. State, 2 So. 854, 863 (Ala. 1887); see *supra* notes 139-40 and accompanying text.

171. This test refers to the defendant's conduct as a result of mental disease or defect. Durham v. United States, 214 F.2d 862 (D.C. Cir. 1954), *overruled by* United States v. Brawner, 471 F.2d 969 (D.C. Cir. 1972); see *supra* notes 152, 155 and accompanying text.

172. See *supra* note 143 and accompanying text.

173. See McDonald v. United States, 312 F.2d 847, 851 (D.C. Cir. 1962); Durham, 214 F.2d 862; Theilgaard, *supra* note 49, at 6-9 (discussing personality abnormalities of XYY individuals).

174. M'Naghten's Case, 8 Eng. Rep. 718 (H.L. 1843).

175. See MODEL PENAL CODE § 4.01(1) (Proposed Official Draft 1962).

176. The Comment to the Model Penal Code provides:

Nothing makes the inquiry into responsibility more unreal . . . than limitation of the issue to some ultimate extreme of total incapacity The law must recognize that when there is no black and white it must content itself with different shades of gray. The draft, accordingly, does not demand *complete* impairment of capacity. It asks instead for *substantial* impairment.

MODEL PENAL CODE § 4.01(2) & cmt. 158 (Tent. Draft No. 4, 1955).

177. See *supra* notes 145-51 and accompanying text.

178. See *supra* note 146 and accompanying text.

179. See *supra* note 149-50 and accompanying text.

XYX syndrome may, by itself, be sufficient to sustain an insanity defense.¹⁸⁰

C. *XYX and Diminished Capacity*

In some jurisdictions, evidence of mental illness that does not establish insanity may still be admissible to prove that the defendant did not have or could not have formed the specific intent necessary for the crime charged.¹⁸¹ This position is sometimes referred to as the "Wells-Gorshen" rule after two leading California Supreme Court decisions that adopted it.¹⁸² The doctrine is often called "diminished capacity," because it permits the use of evidence—usually psychiatric testimony—to establish that the defendant's capacity was so diminished that he or she could not have formed the requisite mens rea necessary to be guilty of the crime.¹⁸³

"Diminished capacity" is a somewhat confusing term,¹⁸⁴ the meaning of which is further complicated by recent efforts to abolish the defense in jurisdictions such as California.¹⁸⁵ Courts and commentators at times have used the term "diminished capacity" to refer to each of the following concepts.

First, evidence can be used to negate the mental state for the crime charged.¹⁸⁶ If an XYX defendant did not have the culpable mental state for the crime charged, then the defendant is not guilty.¹⁸⁷ The prosecution must prove the criminal mental element beyond a reasonable doubt and the defendant can continue to offer evidence to negate the mental

180. See *supra* notes 145-51 and accompanying text.

181. California is one such jurisdiction.

182. *People v. Gorshen*, 51 Cal. 2d 716, 336 P.2d 492 (1959); *People v. Wells*, 33 Cal. 2d 330, 202 P.2d 53, *cert. denied*, 338 U.S. 836 (1949).

183. For one to be guilty of a crime, there must exist an actus reus (a conscious and volitional act) and a mens rea (a criminal state of mind). There is no single state of mind that suffices for purposes of imposing criminal liability. Rather, the requisite state of mind may vary with the crime. *Regina v. Tolson*, 23 Q.B. 168, 172-73 (1889).

184. Contributing to the confusion about diminished capacity in the United States is the English homicide statute, which expressly provides for mitigation of an offense from murder to manslaughter as a result of "diminished responsibility." Homicide Act, 1957, 5 & 6 Eliz. II, ch. 11, § 2 (Eng.). A crime that would otherwise constitute murder is reduced to manslaughter if the defendant was "suffering from such abnormality of mind . . . as substantially impaired his mental responsibility for" the killing. *Id.*

185. See *infra* note 205 and accompanying text.

186. See *United States v. Pohlot*, 827 F.2d 889, 890, 895-903 (3d Cir. 1987) (defendant may introduce evidence of mental abnormality to negate mental state for crime charged; Congress did not prohibit this when it enacted federal insanity statute, 18 U.S.C. § 17, and sought to eliminate so-called diminished capacity defense), *cert. denied*, 484 U.S. 1011 (1988).

187. See *Low et al.*, *supra* note 9.

state.¹⁸⁸ This, however, is not a form of "diminished capacity" at all. Thus section 28(a) of the California Penal Code, which otherwise restricts the diminished capacity defense, explicitly provides that "[e]vidence of mental disease, mental defect, or mental disorder is admissible solely on the issue of whether or not the accused actually formed"¹⁸⁹ the mental state required for the crime charged.

Second, the defendant could use evidence of XYY syndrome to show that the defendant was less able to form, or lacked the ability to form, the mental state for the crime charged.¹⁹⁰ Arguably, this is simply one way of using a mental disorder as circumstantial evidence that the defendant did not actually form the mental state.¹⁹¹ If the ability of the defendant to form the mental state was impaired as a result of the XYY syndrome, the trier of fact for that reason may infer that the defendant did not form the mental state.¹⁹² Nevertheless, California by statute now restricts the use of evidence in this fashion.¹⁹³ California Penal Code section 25(a) provides that "evidence concerning an accused person's . . . mental illness, disease, or defect shall not be admissible to show or negate capacity to form the . . . mental state required for the commission of the crime charged."¹⁹⁴

Similarly, section 28(a) of the California Penal Code provides that "evidence of mental disease, mental defect, or mental disorder shall not be admitted to show or negate the capacity to form any mental state."¹⁹⁵ These restrictions on the use of otherwise relevant evidence may, there-

188. Arguably, such a defense may only apply to XYY individuals who are extremely mentally deficient and are completely unable to understand the nature and quality of the criminal act.

189. CAL. PENAL CODE § 28(a) (West 1991); *People v. McAlroy*, 230 Cal. App. 3d 782, 792, 271 Cal. Rptr. 335, 339-40 (1990) (Ziebarth, J., concurring); *People v. Saille*, 229 Cal. App. 3d 1376, 1382-87, 1388-89, 270 Cal. Rptr. 502, 505-08, 509-10 (1990), *aff'd*, 54 Cal. 3d 1103, 820 P.2d 588, 2 Cal. Rptr. 2d 364 (1991); *see also Pohlot*, 827 F.2d at 895-903 (defendant may introduce evidence of mental abnormality to negate mental state for crime charged).

190. *See* CAL. PENAL CODE § 28(a) (West 1991).

191. *See supra* notes 98, 189 and accompanying text.

192. *See supra* notes 98, 189 and accompanying text.

193. CAL. PENAL CODE § 25(a) (West 1991).

194. *Id.*

195. Cal. Penal Code section 28(a) provides that evidence of mental illness "shall not be admitted to show or negate the capacity to form any mental state," but "is admissible solely on the issue of whether or not the accused actually formed a required specific intent, premeditated, deliberated, or harbored malice aforethought, when a specific intent crime is charged." CAL. PENAL CODE § 28(a) (West 1991). Section 28(b) forecloses the defenses of diminished capacity, diminished responsibility or irresistible impulse as a matter of public policy. *Id.* § 28(b); *see People v. Saille*, 229 Cal. App. 3d 1376, 1388-89, 270 Cal. Rptr. 502, 509-10 (1990), *aff'd*, 54 Cal. 3d 1103, 820 P.2d 588, 2 Cal. Rptr. 2d 364 (1991); *People v. Molina*, 202 Cal. App. 3d 1168, 249 Cal. Rptr. 273 (1988).

fore, make it more difficult for a defendant who is suffering from a marginal mental disorder associated with the XYY syndrome to raise a reasonable doubt as to whether he had the mental state necessary for the crime charged.¹⁹⁶

Finally, in cases of murder, the California Supreme Court has developed an expanded interpretation of the requisite mental state in a series of controversial diminished capacity case histories. In *People v. Conley*¹⁹⁷ the court held that if the defendant, because of mental disease or defect, is "unable to comprehend his duty to govern his actions in accord with the duty imposed by law"¹⁹⁸ or did not act with an "awareness of the obligation to act within the general body of laws regulating society,"¹⁹⁹ then he did not act with malice aforethought.²⁰⁰ In *People v. Wolff*²⁰¹ the court held that "premeditation and deliberation" requires that the defendant "maturely and meaningfully reflect upon the gravity of his contemplated act"²⁰² in order to be guilty of first-degree murder. Under these cases, if the defendant did not have the mental state for murder as interpreted by the court, then the person was guilty of voluntary manslaughter.²⁰³ These cases have been criticized on the grounds that the definitions of mental states should be left to the legislature,²⁰⁴ that the expanded mental states made it easier for defendants to develop outlandish defenses based on claimed mental disabilities that did not

196. Arguably, the California statute may violate a defendant's Sixth Amendment right to introduce evidence that is favorable to his or her defense. See generally *Chambers v. Mississippi*, 410 U.S. 284, 299-303 (1973) (questioning defendant's inability to introduce crucial evidence barred by hearsay rule); *United States v. Pohlott*, 827 F.2d 889, 890, 900-01 (3d Cir. 1987) (barring evidence relevant to subjective mental state may be unconstitutional), *cert. denied*, 484 U.S. 1011 (1988); Frederic R. Krausz, *The Relevance of Innocence: Proposition 8 and the Diminished Capacity Defense*, 71 CAL. L. REV. 1197, 1202-04 (1983) (questioning constitutionality of California Penal Code § 25(a) abolishing diminished capacity defense).

197. 64 Cal. 2d 310, 411 P.2d 911, 49 Cal. Rptr. 815 (1966).

198. *Id.* at 322, 411 P.2d at 918, 49 Cal. Rptr. at 822.

199. *Id.*

200. See *People v. Poddar*, 10 Cal. 3d 750, 758, 518 P.2d 342, 348, 111 Cal. Rptr. 910, 916 (1974) ("The effect . . . which a diminished capacity bears on malice [aforethought] . . . is relevant to two questions: First, was the accused because of a diminished capacity unaware of a duty to act within the law? . . . Second, even assuming that the accused was aware of this duty to act within the law, was he, because of a diminished capacity, unable to act in accordance with that duty?"); *People v. Saille*, 229 Cal. App. 3d 1376, 1388-89, 270 Cal. Rptr. 502, 509-10 (1990) (voluntary intoxication not considered mitigating circumstance for reduced sentence), *aff'd*, 54 Cal. 3d 1103, 820 P.2d 588, 2 Cal. Rptr. 2d 364 (1991).

201. 61 Cal. 2d 795, 394 P.2d 959, 40 Cal. Rptr. 271 (1964).

202. *Id.* at 821, 394 P.2d at 975, 40 Cal. Rptr. at 287 (emphasis omitted).

203. *People v. Conley*, 64 Cal. 2d 310, 411 P.2d 911, 49 Cal. Rptr. 815 (1966); *Wolff*, 61 Cal. 2d 795, 394 P.2d 959, 40 Cal. Rptr. 271.

204. See PHILLIP E. JOHNSON, CRIMINAL LAW: CASES AND MATERIALS AND TEXT 344-45 (4th ed. 1990).

amount to insanity,²⁰⁵ and that the expanded mental states made it more difficult for the prosecution to obtain murder convictions.²⁰⁶

In the wake of such controversy, the California legislature by statute and the people of California by referendum acted to curtail this line of cases. First, the legislature amended the statutory definition of malice aforethought explicitly to reject the interpretation in *Conley*.²⁰⁷ Section 188 of the California Penal Code now reads that "[n]either an awareness of the obligation to act within the general body of laws regulating society nor acting despite such an awareness is included within the definition of malice."²⁰⁸ Second, the legislature amended the statutory definition of premeditation and deliberation explicitly to reject the interpretation of *Wolff*.²⁰⁹ Section 189 of the California Penal Code now reads that "[t]o prove the killing was 'deliberate and premeditated,' it shall not be necessary to prove the defendant maturely and meaningfully reflected upon the gravity of his or her act."²¹⁰ Third, as discussed above, the legislature in section 28(a), and the voters through the referendum now codified in section 25(a), excluded the use of mental disorders to negate the capacity to form the mental state for the crime charged.²¹¹ Finally, the legislature enacted section 29 of the California Penal Code, which limits the testimony by an expert witness in a homicide case.²¹² An expert testi-

205. See, e.g., *People v. White*, 117 Cal. App. 3d 270, 172 Cal. Rptr. 612 (1981). This case involved defendant Dan White, who shot San Francisco Mayor Moscone to death when the mayor refused to reappoint White as San Francisco Supervisor after White resigned the office. After reloading his gun, White then crossed the hall and shot to death Supervisor Harvey Milk, a leader of the gay community and a political opponent of White's. One psychiatrist called in White's defense testified that White's behavior resulted in part from his habit of eating excessive amounts of junk food high in sugar. White was convicted of voluntary manslaughter. The public reaction to this "Twinkie defense" culminated in the enactment of sections 25, 28 and 29 of the California Penal Code. See JOHNSON, *supra* note 204, at 344-45.

206. See JOHNSON, *supra* note 204, at 344-45.

207. Act of 1982, ch. 893, § 4, 1982 Cal. Stat. 3318 (codified at CAL. PENAL CODE § 188 (West 1991)); see *supra* notes 197-98 and accompanying text.

208. CAL. PENAL CODE § 188 (West 1991).

209. Act of 1982, ch. 404, § 7, 1982 Cal. Stat. 1593 (codified at CAL. PENAL CODE § 189 (West 1991)); see *supra* notes 201-02 and accompanying text.

210. CAL. PENAL CODE § 189 (West 1991); accord *People v. Bobo*, 221 Cal. App. 3d 1432, 1448-49, 1451-54, 271 Cal. Rptr. 277, 287, 290 (1990), review granted, 798 P.2d 1213, 274 Cal. Rptr. 370 (Cal. 1990).

211. Act of 1982, ch. 893, § 3, 1982 Cal. Stat. 3318 (codified at CAL. PENAL CODE § 28(a) (West 1991)); CAL. PENAL CODE § 25(a) (added by initiative measure, Proposition 9, approved June 8, 1982); see *supra* notes 193-95 and accompanying text.

212. Section 29 provides:

In the guilt phase of a criminal action, any expert testifying about a defendant's mental illness, mental disorder, or mental defect shall not testify as to whether the defendant had or did not have the required mental states, which include, but are not limited to, purpose, intent, knowledge, or malice aforethought, for the crimes

fyng about a defendant's mental illness, mental disorder or mental defect may not testify as to whether the defendant had or did not have the required mental states for the crime charged.²¹³ That question is left to the jury.²¹⁴ The expert may nevertheless testify as to the defendant's underlying mental condition.²¹⁵

The significance of these developments to an XYY defendant is two-fold. First, an expert, such as a psychiatrist, can still describe the symptoms, phases and causes of XYY syndrome, and can give an opinion as to whether the defendant was suffering effects of the syndrome when the crime was committed.²¹⁶ The evidence is still admissible to negate the mental state for the crime charged.²¹⁷ Second, the rule is generally applied only to specific intent crimes.²¹⁸ An XYY defendant who successfully asserts the syndrome in defense to a major specific intent crime, therefore, can generally be convicted of a lesser-included offense that requires only a general mens rea.²¹⁹

These points are illustrated by the recent California case of *People v.*

charged. The question as to whether the defendant had or did not have the required mental states shall be decided by the trier of fact.

CAL. PENAL CODE § 29 (West 1991).

213. *Id.*

214. *Id.*

215. *Id.*

216. *Id.*

217. CAL. PENAL CODE § 28(a) (West 1991).

218. *See, e.g., State v. Carlson*, 93 N.W.2d 354, 359 (Wis. 1958) (defendant's effort to rebut presumption that one intends natural and probable consequences of one's own actions failed to raise reasonable doubt in jurors' minds). The mens rea required for the various crimes traditionally falls into one of three categories. Two of these categories are general intent and specific intent. The former consists of the volitional doing of a prohibited act. Accordingly, general intent crimes require an *intent to commit the act* constituting the crime. *Id.* The defendant need not be aware that the law made the act criminal. Furthermore, one who voluntarily acts is presumed to have intended that act. *Id.* Thus, general intent need not be specifically proven, but it can be inferred from the fact that the defendant engaged in the proscribed act. *Id.*

Specific intent, on the other hand, requires an *intent to do some further act or cause some additional consequence* beyond the general intent necessary to complete the criminal act itself. *See, e.g., Sullateskee v. State*, 428 P.2d 736, 738 (Okla. Crim. App. 1967) (prosecution failed to prove independent fact of defendant's intent to sell intoxicating beverages without license). Specific intent crimes tend to consist of activity in preparation for the commission of a more serious offense. *Id.* Examples of such crimes include burglary, rape, kidnapping and larceny. Finally, unlike general intent, specific intent *cannot* be inferred from the commission of the act of the crime. Rather, definite proof of the specific intent is required. *Id.*

219. *See, e.g., People v. Noah*, 5 Cal. 3d 469, 477-79, 487 P.2d 1009, 1014, 96 Cal. Rptr. 441, 466-67 (1971) (holding error to refuse to instruct jury on lesser-included offense of simple assault and assault with deadly weapon where substantial evidence of diminished capacity was introduced). *But see* MODEL PENAL CODE § 4.02(1) (Proposed Official Draft 1962) (evidence of mental illness admissible whenever relevant to whether defendant had state of mind required for offense).

Molina,²²⁰ which analyzed the relationship between negating the required mental state and mitigating a homicide offense from a higher to a lower level in light of recent efforts to restrict the diminished capacity defense in California. At trial, the jury convicted Stephanie Molina of second-degree murder in the strangulation and stabbing death of her eighteen-month-old child.²²¹ Although the trial court found Molina not guilty by reason of insanity, the appellate court held that reversible error had been committed by the court's refusal to allow instructions on the lesser-included offenses of voluntary and involuntary manslaughter.²²² The appellate court held that the jury could consider whether the defendant "actually formed" each of the required mental states under California Penal Code sections 25, 28 and 29.²²³ The court concluded that the "apparent meaning of the statutory language is that evidence of mental problems is inadmissible to show that a defendant lacked the capacity to form the requisite mental state, but is admissible to show that a defendant actually lacked the requisite mental state."²²⁴ This analysis confirms that the use of mental disease or defect evidence to show that the defendant did not actually form the required mental state is consistent with both California Penal Code sections 25 and 28.²²⁵ Therefore, although restricted by recent legislative developments, the use of XYY evidence to show a defendant lacked the requisite mental state for the crime charged may still be admitted.

D. Other Uses

1. Organic disease: hormone imbalance

Early research indicated that traits often associated with excessive hormone secretion, such as aggressive behavior, tallness, subnormal intelligence and acne, may also be characteristics of the XYY individual.²²⁶ Because the Y chromosome is the male sex determinant,²²⁷ the presence of two such chromosomes may result in a "supermale" with above normal hormone levels.²²⁸ According to one researcher, excess amounts of

220. 202 Cal. App. 3d 1168, 249 Cal. Rptr. 273 (1988).

221. *Id.* at 1168, 249 Cal. Rptr. at 273.

222. *Id.* at 1175-76, 249 Cal. Rptr. at 277.

223. *See supra* notes 194-95, 212 and accompanying text.

224. *Molina*, 202 Cal. App. 3d at 1173, 249 Cal. Rptr. at 275 (emphasis omitted).

225. *Id.*

226. *See* Walzer et al., *supra* note 53, at 565-66.

227. RATHUS, *supra* note 23, at 93.

228. *Id.* at 532. A male karyotyped as XYY is sometimes referred to as a "supermale." *Id.* This is because the Y sex chromosome determines whether or not a fetus will develop into a male. Testosterone is the male hormone responsible for characteristics associated with males

plasma testosterone, the hormone principally responsible for the development of the secondary male sex characteristics, exists in certain XYY individuals.²²⁹ If it can be shown that an extra Y chromosome causes this hormone to exist in abnormal amounts, then the hypersecretion of this hormone, which controls the degree of aggressive behavior,²³⁰ may be the vehicle that translates the XYY abnormality into antisocial behavior.

Such information is vital to understand the XYY individual and clarify the link between today's medical and technical advances and the impact such advances have in the legal arena. For example, postpartum disorders are now being recognized as valid defenses in cases of infanticide.²³¹ These disorders, which range from mild depression to a complete disassociation from reality, are also believed by many medical experts to be caused by tremendous upheavals in hormone levels after childbirth.²³²

The fact that not all XYY individuals develop a criminal history, or that not all new mothers experience postpartum psychosis or depression, does not negate the fact that many individuals are affected by such disorders.²³³ As medical research continues to dissect such disorders and ana-

such as muscle bulk, beards, body hair, deep voices and perhaps aggressiveness. Because testosterone is dependent upon the presence of the Y sex chromosome, two Y sex chromosomes may result in the production of greater amounts of testosterone, in turn resulting in exaggerated male characteristics. See Theilgaard, *supra* note 49, at 1-13.

229. ROBERT WILLIAMS, TEXTBOOK OF ENDOCRINOLOGY 316-17 (1950). But see Saul Weiner et al., *XYY Males in a Melbourne Prison*, 1 THE LANCET 150, 150 (1968) (Australian study unable to confirm increase of plasma testosterone).

230. See Theilgaard, *supra* note 49, at 13.

231. *People v. Massip*, 229 Cal. App. 3d 1400, 271 Cal. Rptr. 868 (new mother charged with six week old son's murder after running over him with Volvo station wagon), *review granted*, 798 P.2d 1212, 274 Cal. Rptr. 369 (1990), *vacated* 1992 Cal. LEXIS 612, at *1 (Feb. 13, 1992); see, e.g., Debra Cassens Moss, *Postpartum Psychosis Defense: New Defensive Measure for Mothers Who Kill Infants*, A.B.A. J., Aug. 1, 1988, at 22 (describing defense of postpartum psychosis); see also JOHN KAPLAN & ROBERT WEISBERG, CRIMINAL LAW: CASES AND MATERIALS 935-37 (1986) (Dr. Katharina Dalton, Englishwoman known for her testimony in premenstrual syndrome (PMS) cases, also helped establish use of PMS as valid defense in criminal cases in England).

232. See Joyce Hopkins et al., *Postpartum Depression: A Critical Review*, 95 PSYCHOL. BULL. 498, 501-03 (1984); Moss, *supra* note 231, at 22. Additionally, doctors have successfully warded off postpartum disorders by treating women with long-acting estrogen, injected immediately after the women give birth and given orally for several days thereafter. James Hamilton, a physician and spokesman for the Marcé Society, an organization dedicated to advancing the understanding and treatment of mental illness in mothers, reported his findings on hormone treatment in an interview. James A. Hamilton, *A California Doctor Delivers Good News to New Moms with Postpartum Blues: It's Curable*, PEOPLE, Dec. 15, 1986, at 105-06; see JAMES A. HAMILTON, POSTPARTUM PSYCHIATRIC SYNDROMES: NOTES ON TREATMENT 4 (undated).

233. See *supra* notes 49, 231-32 and accompanying text.

lyze their causes, the legal world must recognize the significance of such research in order to understand the relationship between medicine and law, determine appropriate punishments, and, hopefully, engage preventative measures.²³⁴

2. Competency to stand trial

A criminal defendant must be competent to stand trial, and a judge is constitutionally required to ascertain the competency of an individual who may be incapable of understanding the proceeding or assisting in his or her defense.²³⁵ While insanity concerns the defendant's state of mind at the time of the crime, it must be distinguished from incompetency to stand trial, which concerns the defendant's condition at the time of trial.²³⁶ Unlike insanity, incompetency to stand trial is not a defense, but requires that the proceedings be postponed until such time as the defendant regains his or her competency.²³⁷

An XYY individual who commits a crime may have been unable to control his actions at the time of the crime, but the individual may not be incapable of understanding the proceeding against him and assisting in his defense. Even if he were found incapable, the antisocial behavior that may have accounted for the crime is not necessarily of an ongoing, uncontrollable nature.²³⁸ The XYY individual, although possibly hampered by permanent mental deficiencies and learning disabilities,²³⁹ usually regains control of his emotional faculties. Because most jurisdictions require a competency determination within eighteen months of indictment,²⁴⁰ if the defendant's only mental disease or defect is the temporary loss of emotional control, in all likelihood he will recover within that period and be required to stand trial.²⁴¹ Competency, there-

234. If a causative link between plasma testosterone and an XYY's antisocial behavior were established, regulating or depressing the effect of this hormone may be a means of controlling the XYY's antisocial behavior. WILLIAMS, *supra* note 229, at 316-17; Weiner et al., *supra* note 229, at 150.

235. See JOSHUA DRESSLER, UNDERSTANDING CRIMINAL LAW § 25.02, at 290-91 & n.3 (1987).

236. *Dusky v. United States*, 362 U.S. 402, 402 (1960) (per curiam) (noting defendant is incompetent to stand trial where he lacks "sufficient present ability to consult with his lawyer with a reasonable degree both of rational understanding and . . . a rational as well as factual understanding of the proceedings against him").

237. *Id.*

238. Some studies indicate that as long as the XYY individual is free of a stressful environment and removed from frustrating situations, he can cope without displaying aggressive or violent outbursts. See Price & Whatmore, *supra* note 58, at 534.

239. See Walzer et al., *supra* note 53, at 566-68.

240. See Low et al., *supra* note 9, at 733.

241. Arguably, if the XYY defendant's aggressive, emotional loss of control is displayed

fore, would not usually be an issue by the time a trial began.

3. Voluntariness requirement

A basic tenet of the substantive criminal law is that an act must have been executed voluntarily in order to form the basis for criminal liability.²⁴² For example, the Model Penal Code states that a person is not guilty of an offense unless his or her conduct included a voluntary act that the person was physically capable of performing.²⁴³

Arguably, a man with XYY syndrome may be so emotionally distressed and out of touch with his surroundings that he is unable to refrain from the act that results in a crime and, therefore, may not satisfy the voluntary act requirement. If so, the man would be entitled to an acquittal on that ground.²⁴⁴ Additionally, if the crime involved a first-degree murder charge, the court may reverse the conviction and remand for a possible retrial for involuntary manslaughter or other lesser included offenses.²⁴⁵ The admission of physical and attendant psychological evidence relating to the XYY syndrome thus could potentially convince a jury that the defendant did not act voluntarily in committing the crime in question.

during times of stress, the XYY defendant may be unable to handle the stress of a trial just as he was unable to handle the stressful situation that resulted in the crime in the first place. *See supra* note 64.

242. *See* DRESSLER, *supra* note 235, § 9.05, at 77-79.

243. Section 2.01 provides:

- (1) A person is not guilty of an offense unless his liability is based on conduct that includes a voluntary act or the omission to perform an act of which he is physically capable.
- (2) The following are not voluntary acts within the meaning of this Section:
 - (a) a reflex or convulsion;
 - (b) a bodily movement during unconsciousness or sleep;
 - (c) conduct during hypnosis or resulting from hypnotic suggestion;
 - (d) a bodily movement that otherwise is not a product of the effort or determination of the actor, either conscious or habitual.
- (3) Liability for the commission of an offense may not be based on an omission unaccompanied by action unless:
 - (a) the omission is expressly made sufficient by the law defining the offense; or
 - (b) a duty to perform the omitted act is otherwise imposed by law.

MODEL PENAL CODE § 2.01 (1962) (Proposed Official Draft 1962).

244. The case of Huey P. Newton is a classic case involving the voluntariness requirement. *See* *People v. Newton*, 8 Cal. App. 3d 359, 87 Cal. Rptr. 394 (1970). The court reversed Newton's murder conviction for shooting a police officer because the trial court refused to charge the jury on the voluntariness requirement. *Id.* at 375-77, 87 Cal. Rptr. at 404-06. Newton's defense was that he pulled the trigger as a reflex resulting from a profound shock reaction after he was shot in the stomach. *Id.* at 373, 87 Cal. Rptr. at 402-03.

245. *Vaughan v. Virginia*, 376 S.E.2d 801, 808 (Va. Ct. App. 1989); *see supra* notes 220-22 and accompanying text.

IV. RECOMMENDATION

The present criminal law establishment is ill-prepared to adapt to the rapidly increasing wealth of knowledge about human behavior being uncovered by medical science. Based on an eighteenth century classical free-will ideology,²⁴⁶ the judicial system will not be able to adapt the handling of offenders to twentieth century realities.

Measures to adapt the criminal law to an evolving wealth of medical knowledge are essential. One method would be to accept that the XYY syndrome, in certain cases, may establish insanity. XYY syndrome clearly may establish insanity under a volitional standard, and possibly under a cognitive standard as well. XYY syndrome can also be deemed to satisfy a cognitive standard if the provision is interpreted broadly to require that the defendant affectively appreciates the nature and quality of his acts. Additionally, evidence of XYY syndrome also should be accepted at trial despite efforts to abolish the so-called diminished capacity defense.

The problems with promoting XYY syndrome as a defense include the lack of medical knowledge about the syndrome,²⁴⁷ the probability that the defendant, if acquitted, would not receive help for the disorder²⁴⁸ and the fact that the criminal legal system historically has been slow to change.²⁴⁹ At a minimum, however, such disorders could be used constructively at sentencing.

The sentence imposed upon a defendant ideally should implement the relevant theories of punishment. Under the retributive theory, society punishes to avenge crimes committed against its members.²⁵⁰ This impulse to punish is heightened by violent crimes against persons as opposed to crimes against property.²⁵¹ Under this theory, an XYY defendant would rightfully "do time" according to the severity of his crime. However, where an XYY individual has committed murder and the like, society may be hard pressed to acquit or lessen the punishment.²⁵²

246. See generally Low et al., *supra* note 9, at 1-28 (describing basis of criminal law system).

247. See *supra* notes 49-50, 53-58, 60, 72-75, 90-93 and accompanying text.

248. If acquitted, the defendant may not be subject to any penalties or restrictions whatsoever. The defendant, therefore, is free to resume his life without addressing the underlying cause of the criminal behavior—the disorder—increasing the possibility of recurrent criminal behavior.

249. See JOHNSON, *supra* note 204, at 317-27 (describing changes in insanity defense from 1843 to present).

250. For background on the purposes of punishment, see generally Low et al., *supra* note 9, at 1-28.

251. *Id.*

252. *Id.*

Under the deterrence theory,²⁵³ a socially valuable end is served by punishing a wrongdoer in order to deter others from committing similar crimes. General deterrence would not work, however, if XYY men who commit crimes truly cannot control their actions.²⁵⁴ Because deterrence is based on the assumption that the individual can *choose* whether or not to engage in criminal behavior, its application would be irrelevant in XYY cases where the defendant lacks this ability.²⁵⁵ For the same reason, specific deterrence might also prove irrelevant although it is possible that its application may make the individual XYY more conscious of his behavior, thus increasing his ability to control it.²⁵⁶

Rehabilitation focuses on the individual who repeatedly commits crime.²⁵⁷ This theory is based on the rationale that criminals endanger society, and that their criminal propensities must be eliminated before they can be returned to society.²⁵⁸ The problem with applying this theory to XYY individuals is that their criminal propensity is caused by a genetic abnormality that cannot be eliminated.²⁵⁹ The theory may, however, be useful in reducing the criminal propensity of the XYY defendant by providing support programs like protective confinement, home monitoring, mandatory periodic supervisory examinations and required enrollment in schools with controlled environments.²⁶⁰ It appears, therefore, that if the XYY syndrome is considered in sentencing—especially in light of the rehabilitative theory of punishment—society's interest in supervising the XYY individual and the XYY individual's interest in overcoming the aggressive tendencies created by his abnormality will both be served.²⁶¹

253. *Id.*

254. See Casey et al., *supra* note 60, at 859-60; Hook, *supra* note 74, at 139-43; Jacobs et al., *supra* note 55, at 1351.

255. See Low et al., *supra* note 9, at 7; Casey et al., *supra* note 60, at 859-60; Hook, *supra* note 74, at 139-43; Jacobs et al., *supra* note 55, at 1351.

256. Low et al., *supra* note 9, at 1-28.

257. *Id.*

258. *Id.*

259. Although medical technology exists to detect the extra Y chromosome through amniocentesis and chorionic villus sampling, technology does not exist to *eliminate* the extra Y chromosome. See RATHUS, *supra* note 23, at 96. Even if such technology were available, its use would raise substantial constitutional questions that are not addressed in this Comment.

260. Ashley Montagu, *Chromosomes and Crime*, PSYCHOL. TODAY, Oct. 1968, at 43, 49. Some geneticists who have researched the XYY phenomenon believe that antisocial behavior is the product not only of the genetic makeup of the individual but also of his environment, and that proper environmental conditioning might enable an XYY to overcome his biological propensity toward antisocial conduct. *Id.*

261. *Id.*

V. CONCLUSION

There is a serious need for continuing medical research to resolve uncertainties concerning the causation and parameters of XYY syndrome and other genetic and biological phenomena. Unfortunately, it is all too possible that in recognizing XYY individuals and proposing ways in which their interests can be protected, such genetic identification also could be used as a sword against them. If we label a certain genetic characteristic as a defect, are we automatically prejudicing individuals who carry that characteristic? Might society be quicker to brand such individuals as criminals? Recognizing the potential for criminal behavior, will society insist on genetic prenatal testing in order to identify the XYY fetus? As medical technology advances and more genetic defects are identified, might society insist on increased genetic controls?²⁶²

Society must, however, keep the spectre of such possibilities in perspective. Despite the above-mentioned scenario, there is no such thing as bad knowledge—there is only bad use of knowledge. One can only hope that as medical technology continues to reveal the answers to these questions, society will continue to develop the wisdom to incorporate them properly. The legal system is but one aspect of a societal community. It does not exist alone but rather functions as a part of, and in conjunction

262. Such controls, some fear, would make possible future scenarios like that portrayed by Aldous Huxley in the novel *Brave New World*. ALDOUS HUXLEY, *BRAVE NEW WORLD* (Perennial Library ed., HarperPerennial 1989) (1932). Through a fictitious method called "Bokanovsky's Process," egg cells from parents who are identically suited for certain types of labor are made to "bud." *Id.* at 4. From these buds up to 96 people with identical genetic makeups can be developed—filling whatever labor niches are required by society. As the director of a "hatchery" is leading a group of students on a tour, one student is foolish enough to question the advantage of Bokanovsky's Process:

"My good boy!" The Director wheeled sharply round on him. "Can't you see? Can't you see?" He raised a hand; his expression was solemn. "Bokanovsky's Process is one of the major instruments of social stability!"

Major instruments of social stability [wrote the student].

Standard men and women; in uniform batches. The whole of a small factory staffed with the products of a single bokanovskified egg.

"Ninety-six identical twins working ninety-six identical machines!" The voice was almost tremulous with enthusiasm. "You really know where you are. For the first time in history." He quoted the planetary motto. "Community, Identity, Stability." Grand words. "If we could bokanovskify indefinitely the whole problem would be solved."

Id. at 5-6.

Granted, through Bokanovsky's Process, society might be able to eliminate certain genetic disorders. Society might even be able to lower the incidence of crime, aggression and abnormal behaviors. For a society, however, which thinks that such a process might be a good idea, it must also consider that from none of these "Bokanovskified" eggs would there emerge a Shakespeare, a Beethoven or an Einstein. Perhaps society would avoid tyrants, but society would also be without geniuses and individuals who might shape the world in ways not foreseen.

with, other societal disciplines. As these other disciplines—such as medicine—evolve, so too must society's legal system. One aspect of the whole cannot remain static while the remaining aspects continue to grow and expand. Educating the public and the criminal justice system about XYY syndrome and the multitude of genetic and biological abnormalities is one of the most effective ways of breathing new life into the societal structure responsible for dispensing consistent justice to criminal offenders.

*Susan Horan**

* This Comment is dedicated to Mark for his shared experience. The author also extends special thanks to Rob for personal reasons, and to Professor Laurie Levenson for professional reasons.