

Impulse, Aggression and Sexuality in the XYY Syndrome

John Money

Follow this and additional works at: <https://scholarship.law.stjohns.edu/lawreview>

This Article is brought to you for free and open access by the Journals at St. John's Law Scholarship Repository. It has been accepted for inclusion in St. John's Law Review by an authorized editor of St. John's Law Scholarship Repository. For more information, please contact selbyc@stjohns.edu.

IMPULSE, AGGRESSION AND SEXUALITY IN THE XYY SYNDROME

JOHN MONEY*
RONALD J. GASKIN** AND HARRY HULL**

INTRODUCTION

Aggression has been much publicized as a feature of the XYY syndrome. There has been, however, all too little study of the psychology of the XYY individual in regard to either this so-called aggression or to any other aspect of his behavior.¹ The purpose of this paper is to examine the published literature that reports behavior of XYY individuals, and to add data from the case records, which include tape-recorded, transcribed interviews of all four XYY individuals who have been seen in the Psychohormonal Research Unit of The Johns Hopkins Hospital. Because of recent irresponsible publicity in the mass media, including material which has jeopardized individual privacy, we have chosen to disguise any reference to the personal identity of our patients.

SAMPLE SELECTION AND METHOD

The sample consists of the four individuals mentioned above, plus 31 others reported, with sufficient behavioral detail, in twelve different published papers.² Thirty were adults; two were teenagers of 16; three were boys, two aged 8 and one aged 5.

For the most part, the sample was deliberately drawn from men in prison, on the basis of preliminary evidence that XYY karyotypes would be easier to find among tall men in jail than elsewhere.³ Outside of the prison population, two men were identified. One was karyotyped fortuitously when a sample of his blood was being used experimentally. He was specified as a nonaggressive, unmarried loner who had fre-

* Department of Psychiatry and Behavioral Sciences and Department of Pediatrics, The Johns Hopkins University and Hospital; M.A., University of New Zealand; Ph.D., Harvard University.

This project was supported in research by Grant #HD-00325 and Grant #HD-K3-18635, United States Public Health Service. The authors wish to thank Dr. D. Borgaonkar and Dr. P. Welch for supplying chromosome data, and Dr. V. McKusick, Dr. S. Borkowf, Dr. B. Robinson and Dr. H. M. Boslow for permission to interview patients.

** Dr. Money was aided in the preparation of this article by Mr. Ronald Gaskin and Mr. Harry Hull, medical students.

1 Fox, *XYY Chromosomes and Crime*, 2 AUST. & N.Z.J. CRIMINOLOGY 5-19 (1969).

2 See Table 1, App. A [hereinafter Table 1].

3 Jacobs, Brunton, Melville, Brittain & McClemon, *Aggressive Behavior, Mental Subnormality, and the XYY Male*, 208 NATURE 1351-52 (1965).

quently changed jobs. The other was karyotyped because his two mentally retarded daughters, and he himself, were tall. He also was a loner who changed jobs often and was said to be of an aggressive nature.

The five young people were, as one would expect, not imprisoned. Two were karyotyped because of tallness and highly deviant behavior, two others because of tallness, aggressive behavior and radioulnar synostosis, and the fifth one on the basis of tallness only. The latter was said to have a definitely deviant personality — a loner, obsessive compulsive, with a tendency to overaggressiveness — but was not antisocial.

The method was to extract pertinent information from the patients' histories, or the published reports, and to rate it according to the categories of Table 1 (Appendix A). Two people made the decisions. The original sources of information had been predominantly from XYY patients themselves, supplemented in some cases by school, hospital and prison records, and by interviews with family members, when available.

The terms used in Table 1 are defined as follows:⁴

Family psychopathology — an abnormal home environment during the patient's childhood, consisting of a divorced, deserted or otherwise broken home, rejection by the parents, or an unstable or mentally ill parent.

Difficult child — a history of the patient's having been unreceptive to parental control.

Problems in school — truancy, daydreaming or disruptive behavior in the classroom, and/or gross underachievement.

Excessive daydreaming — a history of an inordinate amount of time given to fantasy, especially at school, to the detriment of learning.

Loner — a personality characterized by solitary activities, shyness and lack of intimate friendships.

Drifter — a vocational history characterized by frequent changes of employment.

Unrealistic future expectations — occupational, family and home-life plans that are magical insofar as no present groundwork is being laid.

Impulsiveness — a tendency to act on the basis of first thought, as though the law of consequences does not apply to oneself.

Sudden violence and aggression — rapid, violent or destructive response to inappropriately trivial stimuli.

Prison — authenticated prison record.

Heterosexual experience — reported actual sexual intercourse.

⁴ For a definition of other terms used in this article, see the glossary at App. B.

Homosexual experience — sexual activity with another male, regardless of role or orifice used.

Other paraphilias — includes transvestism, fetishism, exhibitionism, voyeurism, incest, pedophilia and sadomasochism, overtly expressed.

Frequency is defined as “+” if the trait was present in the patient’s history, “0” if insufficient information was available for classification, and “—” if the trait was absent in the patient’s history.

FINDINGS

The findings, as tabulated,⁵ speak for themselves. Some of the points and implications that these findings raise are dealt with, topic by topic, as follows:

Families

Fifteen of the thirty-five patients were rated as coming from family environments conducive to psychopathology. The remainder split evenly between satisfactory homes and “no data.” This finding raises the possibility that the psychodynamics of social interaction in early development may weight the balance in favor of either the expression or the suppression of personality disturbance in the XYY baby. His extra Y chromosome may make him specially vulnerable to insults from the interpersonal environment. Alternatively, he may be at no special chromosomal risk so far as developmental psychopathology is concerned. Incidence figures are still too incomplete to permit a definitive answer. However, at least a few XYY men with histories of severe behavior disturbance came from families that, by ordinary standards, qualify as adequate. Then one must infer either that the criterion of ordinary standards is not discriminating enough, or that XYY boys are not different from XY boys raised in similar homes whose behavioral development is profoundly disturbed. According to the latter inference, XYY and XY boys who develop behavior pathology in families that are not extraordinary may both have a special vulnerability, though not uniquely associated with the supernumerary Y chromosome. The disposition of the present authors,⁶ on the basis of physical correlates of XYY and a few available developmental studies of XYY boys, is that the extra Y chromosome does produce a population at risk — though not inexorably in every XYY baby without exception.

Whatever its possible significance, there are three XYY cases

⁵ See Table I.

⁶ This will be examined more fully in the DISCUSSION section.

known to us (two from our own series) in which one parent had a hospitalized schizophrenic history. In two cases it was the father, and in one the mother, who had been sick. Additionally, Cleveland, Arias and Smith reported a family history of schizophrenia in one of their two cases, without identifying who was affected.⁷

Difficult Child

The hypothesis of a population at risk gets some measure of support from the finding that 17 of the 35 XYY patients were reported as having been difficult children, in a behavioral sense. Only 6 were explicitly given a clean bill of behavioral health. In some cases it was stated that the XYY boy was the most difficult, or the only difficult child in the family—a coincidence not to be lightly dismissed, theoretically speaking.

Problems in School

It is possible that boys with the XYY syndrome are ill-equipped to cope with the ordinary stresses of learning and the academic environment; 19 of the 35 patients are recorded as having had problems in school, and only 4 as having been free of problems. In five cases, the problems were specified as behavioral, in four as underachievement, and in ten as both. Behavioral problems included dislike of school, deficient attention span, restlessness, truancy and disruption of the classroom routine. In at least one case, behavior was so bizarre as to resemble both brain-damage symptoms and psychosis. This latter case is instructive because the boy's behavior improved remarkably by the middle teenage years, under the influence of a planned, benign environment. Simultaneously, there was an improvement of the abnormal, spike-wave EEG (there had been no clinical seizures), the spike being no longer in evidence. Also the IQ rose from a 6½ year old low of 89, to 100 in teenage.

School difficulties did not especially correlate with IQ. They occurred over an IQ range from 63 to 125. The IQ was given in 18 cases, the median being 91, and the mean 89. The exact nature of the relationship of the extra Y chromosome to IQ will remain uncertain until incidence studies have been completed. So far, there does not appear to be an excess of severe mental retardation, as in the XXY syndrome (though note that some individuals with XXY do have superior IQ's above 120).

⁷ Cleveland, Arias & Smith, *Radioulnar Synostosis, Behavioral Disturbance, and XYY Chromosomes*, 74 J. PEDIATRICS 103-06 (1969).

Like IQ, relationship of the extra Y chromosome to EEG abnormality will be elucidated only when incidence studies have been completed. Meantime, the evidence to date suggests an elevated frequency of EEG abnormalities, some accompanied by clinical seizures. Among the 35 cases of the present sample, 7 were specified as having an abnormal and 3 a normal EEG, and nothing was mentioned in 25 cases.

Excessive Daydreaming

This category applies only to the four individuals studied in the Psychohormonal Research Unit, since other investigators did not take cognizance of it. All four of our patients reported themselves to have been daydreamers, especially in school years, when they could neither abide their school lessons nor force themselves to pay attention. The content of their rumination was variable, but emphasized, in particular, what they would do when they escaped from the imprisonment of the classroom. As to the youngest patient who was still in school, reports from the school confirmed what the boy himself reported, and indicated the extreme seriousness of what had been well nigh schizophrenic in proportion in earlier years.

Loner

All four of the patients in our sample characterized themselves, without hesitation, as loners, and 10 others in published reports qualified similarly. Information was missing on 15 cases, and only 6 patients qualified as non-loners. This quality of being a loner means that XYY boys and men get along without intimate human relationships, without deep affection and without continuity of relationship. Their relationships are perfunctory, with no follow-through or obligation involved. Within the limits of this condition they are cordial and sociable. Often they are not diffident, even in disclosing intimate personal details that could be self-incriminating.

Drifter

Like their school histories, the work histories of the XYY men were often unsatisfactory; 18 of the 35 qualified as unskilled or semi-skilled drifters and only 7 as occupationally stable.

Prison

Unstable work histories closely relate to prison histories, so far as the 30 men over the age of 16 in the present series are concerned, for some of them were in and out of jail two or more times. Some were in special institutions for men considered to be poor risks as chronic offenders. One had been in both a jail and a mental hospital.

The present sample includes 24 men with a prison record; 2 others were in hospitals for the criminally insane and 1 was in a regular psychiatric hospital because of sex offenses. These total 27 in detention. There were three children, one of whom at age eight had been in trouble with the law. The other two and one of the teenagers had exhibited grossly deviant behavior. In only one case (an adult) was the necessary information lacking. In the whole sample, therefore, there were three, one teenager and two men whose behavior was relatively normal and law abiding.

The sample is, of course, deliberately biased in favor of law breakers, for investigators were, by design, screening tall men in jails, in the belief that there would be more XYY men among them than elsewhere. Thus, the exact relationship between XYY and imprisonment also cannot be ascertained until proper incidence studies have been completed.

The offenses that kept men in detention varied from robbery to murder (3 cases). In 7 cases crimes against both property and person were specified (in another 7, attacks on property and person were noted, though not in connection with detention). In 11 cases, the subjects were imprisoned for an offense against property only, and in 7 others, for an offense against persons only, 5 of them sex offenses. It should be noted that in the sum total of sex offenses, both homosexual and heterosexual assaults and/or approaches were represented.

Unrealistic Future Expectations

All four of our patients exhibited a naive optimism about the future. They spoke of goals for which no present groundwork was being laid, and thus had little chance of materializing. The goals applied to marriage and family life as well as to occupation. One infers that the men had a poor sense of temporal continuity and consequences. It was as though they expected that things always happen to them on the basis of chance and the smiles or frowns of fate. Other writers did not mention this trait in either a negative or positive sense.

Impulsiveness

The poor sense of consequences mentioned above undoubtedly relates also to a tendency to impulsive action, though the relationship is not necessarily one of cause and effect. In fact, the reverse might be true, the tendency to impulsive action being adjusted to by the development of a poor sense of consequences. One of our four patients explained that he had great difficulty in controlling himself from having an assaultive rage reaction when startled by a poke in the ribs or a

sudden loud noise behind him. Yet, other inmates at the same institution, knowing of his weakness, deliberately baited him with such pokes and noises. Thus, to keep his record clean, he would lock himself away in his cell until he calmed down. Paroxysmal anger attacks of this type perhaps bear some relationship to epileptic seizures — indeed the patient who spoke of them had a history of major seizures. Quite possibly they may also be exacerbated by alcohol consumption, though XYY men as a group probably are not particularly prone to alcoholic excess or drug addiction.

In published reports, the presence or absence of behavior on impulse has been somewhat overlooked, there being no information available one way or the other in 14 cases. In the 18 remaining cases, impulsiveness was specified. It is interesting to note in this regard that Matthews and Brooks reported of one XYY patient who would "hit first and ask questions later."⁸

Sudden Violence and Aggression

In the case of the four patients interviewed in person, we were impressed, especially with three of them, by their shyness, meekness and gentleness of manner, as contrasted with aggressive "bullying," and assertion of dominance. Absence of aggression in some XYY individuals was specifically noted in two other reports — one by Court-Brown, Price and Jacobs⁹ and the second by Weiner and Sutherland.¹⁰

The myth linking the extra Y chromosome with aggression rather than impulse seems to have originated from two sources: first, in the fact that the first sizeable group of XYY karyotypes came from mass surveys of maximum-security institutions for dangerous, violent or criminal men; and, second, in a very naive view of human nature, namely, that males have one Y chromosome and are, as compared with women, aggressive. Thus, under this view, it would follow that males with 2 Y chromosomes are, accordingly, more aggressive.

Paradoxically, it would not have been unfeasible for a parallel myth to have linked aggression to the XXY karyotype, for many XXY individuals find their way to jail also. It was the extra Y chromosome, however, that was destined to be linked ever more strongly with aggression in the popular imagination, when two accused murderers, Hannel in Australia¹¹ and Hugon in France,¹² were found to have the

⁸ Matthews & Brooks, *Aggression and the YY Syndrome*, 1968 LANCET ii, 355-56.

⁹ Court-Brown, Price & Jacobs, *Further Information on the Identity of 47: XYY Males*, 1968 BRIT. MED. J. 2, 325-28.

¹⁰ Weiner & Sutherland, *A Normal XYY Man*, 1968 LANCET ii, 1352.

¹¹ See, e.g., TIME, Oct. 25, 1968, at 76; Washington Post, Oct. 10, 1968, § A, at 1, col. 2.

¹² See, e.g., N.Y. Times, Apr. 21, 1968, at 1, col. 3; TIME, May 3, 1968, at 41.

XYY karyotype, and Speck, the mass murderer of eight Chicago nurses, was wrongly publicized as an XYY.¹³

Sexuality

Proponents of a theory that an extra Y chromosome produces a breed of aggressive, "tough-guy," super males are doomed to disappointment by the statistics of homosexuality among XYY men. Sexual information was available in 16 cases—7 were reported as bisexual, 7 as homosexual, with no reference to heterosexuality, and 2 as heterosexual, with no reference to homosexuality.

It may, of course, be argued that homosexuality in incarcerated males represents only the optional or facultative, not the essential or obligative form of homosexuality. In other words, it may be no more than an adaptation to prison life. But the onset of homosexuality sometimes antedates imprisonment, in some cases in childhood. Two of the men in our own series, moreover, were interviewed when they had already been out of detention for some time. With them, their homosexuality was definitely not a mere expediency caused by the lack of opportunity to meet members of the opposite sex. Rather, their homosexual acts had an obligative and compulsive quality. Their contacts were casual, perfunctory, and not particularly enjoyable. In part they reflected an excessive diffidence about meeting women, even socially, and a lack of capacity to establish an affectionate relationship of any depth or durability. The most striking characteristic, however, was that in each instance, the individual was unable to repudiate the impulse to repeat a particular pattern of homosexuality once it had occurred for the first time (in his first experience of sex with a partner).

The issue of homosexuality, in this respect, seems to be closely related to the more general problem of sudden obedience to one's impulses. This "driveness" by impulse, without the expediency of forethought, may also help to explain the paraphilias, other than homosexuality, that were given special mention in 9 cases, namely, bisexual child incest, pedophilia (2 cases), voyeurism, exhibitionism (3 cases), indecent assault and a joint case of transvestism, sadomasochism and sex murder.

DISCUSSION

The present sample describes in summary the first 35 XYY individuals for whom some behavioral report is available. It deliberately distorts the XYY picture because it is overloaded (in the ratio of 30:5)

¹³ See, e.g., N.Y. Times, Apr. 22, 1968, at 43, col. 3; Chicago Tribune, Nov. 26, 1968, § 1 A, at 16, col. 1.

with patients who were either imprisoned or had experienced a severe behavior disturbance. This overload occurs because tall persons in jail have traditionally been considered to be a likely source of the XYY karyotype.

Valid statistics as to the frequency of association between XYY and crime and/or normal behavior will not be available until random probability screening, recently begun, has been completed. Such sampling will reveal the frequency incidence of behaviorally normal as well as abnormal XYYs in the total population of the sample area.

In view of the fact that, almost fortuitously, some men without criminal records and without noteworthy problems of behavior have already been karyotyped as XYY, it can safely be predicted that many more are represented in the population of so-called normal people. This is not the true question at issue, however, with regard to the much debated issue of a genetic predisposition to crime. That issue can legitimately be raised even if only some, but not all bearers of a given karyotype evidence abnormal or criminal behavior. It is not an "all or none" issue, as can very well be illustrated in the case of the XXY karyotype of Klinefelter's syndrome.

It is already known that men with the XXY syndrome have a greater chance of going to jail, to a mental hospital or a mental deficiency institution than men with a normal XY karyotype. These probabilities are known because the frequency incidence of the XXY karyotype in the general population has been determined by means of the cheap, quick, initial screening test of the sex chromatin. The sex-chromatin test identifies the presence of an extra X chromosome, following which the expensive and tedious process of chromosome counting is performed in order to see what the karyotype is—it may be XXY, XXYY or a variety of others. For the karyotype XYY, however, no rapid preliminary screening identification is available.

In one XXY screening study, nine hundred and forty-two mentally abnormal inmates liable to engage in criminal behavior were examined, and twelve (1.3%) were found to have the XXY karyotype,¹⁴ as compared to an incidence of 0.2% XXY in the general population. Seven (0.74%) of the inmates were found to have the XXYY karyotype, whereas, according to MacClean, Court-Brown, Jacobs, Mantle and Strong,¹⁵ the incidence in the general population is 0.02%, or one out of every ten chromatin-positive male births.

¹⁴ Casey, Segall, Street & Blank, *Sex Chromosome Abnormalities in the State Hospitals for Patients Requiring Special Security*, 209 NATURE 641-42 (1966).

¹⁵ MacClean, Court-Brown, Jacobs, Mantle & Strong, *A Survey of Sex Chromatin Abnormalities in Mental Hospitals*, 5 J. MED. GENETICS 165-72 (1968).

History, it would sometimes seem, has her own timetable for dictating the affairs of men: she could very well have timed the onset of nationwide, nay worldwide, controversy about genetically determined crime on the basis of XXY data, far ahead of the first XYY karyotyping of criminals. But XXY has none of the fake, supermale magic of an extra Y chromosome relentlessly dictating its possessor to be the victim of his superaggressiveness. The male stereotype in the popular imagination cannot tolerate the idea of the extra X chromosome of the female making the man who possesses it more aggressive.

Yet, it is not difficult to agree that there is some connection between the elevated incidence of crime and psychiatric pathology in the XXY population and the extra X chromosome they carry. It is not difficult because there is another stereotype to fall back on, namely mental deficiency. This is a stereotype that has causal respectability of long standing. It is well documented and widely accepted that the incidence of severe mental deficiency is elevated in the XXY population. It is also well documented that many XXY men are normal in intelligence, and some are superior and college graduates. Because this fact has not been widely publicized, it is easy to write off all the criminal and psychiatric cases of XXY as secondary to mental deficiency—which is not true. The truth is that XXY individuals, as a group, are more predisposed or vulnerable to personality disorder and/or mental deficiency than are XY individuals as a group. If they manifest personality disorder, it may be of the type that usually leads to trouble with the law, and prison, or of the type that usually leads to psychiatry and psychotherapy, the common denominator being, typically, poor rationale, if not frank bizarreness. In either case, the ill-conceived behavior can occur quite independently of mental deficiency as defined by low IQ.

There is no valid explanation at the present time as to why the fetal brain in some XXY babies differentiates so as to produce a hopelessly mentally defective child, whereas in others it produces only a certain incompetence to deal with the inevitable demands of living, and in yet others it produces negligible effect. This kind of variability is routinely familiar to geneticists. It does not require that one discount the influence of the genetic factor in inducing impairment, in those cases in which impairment occurs. Nor does it rule out the possibility of other contributing influences from the fetal environment, or the perinatal and postnatal environment. It may easily be that a genetic factor lays the foundation for easy vulnerability to prenatal, perinatal or postnatal stress, all or one of which may need to intervene before the genetic weakness fully declares itself.

Although the foregoing thesis has been presented in the context of the XXY syndrome, it can be transferred, as it stands, to the XYY syndrome. Thus, one does not expect *all* XYY men to be criminals or potential criminals in order to allow that the extra Y chromosome may predispose an XYY individual to abnormal and possibly criminal behavior.

Even though incidence figures have not yet been established to prove that XYY people constitute a population at greater risk for deviant behavior, there is already sufficient supporting evidence that the extra Y chromosome is not behaviorally dormant—at least in some individuals. One line of evidence comes from the unexpected frequency with which inborn physical defects are being found in XYY people. They are not, as has frequently been asserted, always physically normal, except for tallness. A chromosomal defect that can produce frequent physical defects may well, of course, also produce more subtle defects or malfunctions of the brain that will adversely affect subsequent behavioral development. In XYY people an adverse brain effect is not necessarily so subtle, since it has already been found, more often than by chance and even without systematic searching, manifested in EEG abnormalities and clinical seizures.

Another line of evidence comes from the study of children. Cowie and Kahn's case, which we can match with one of our own (neither being unique), illustrates the point in the following quotation:

He was referred when 4½ years old because he was unmanageable at home, destructive, mischievous, and defiant. He would smash his toys, rip the curtains, set fire to the room in his mother's absence, and kick the cat and his 8-month-old brother. He was over-adventuresome and without fear; he would climb high ladders in buildings, climb out on to window sills, several storeys high, and walk into the sea without regard to depth.

He had sudden periods of overactivity at irregular intervals lasting a few hours to a few days. At those times his face would be flushed and he would pursue his particular activity with grim intent. Between episodes he would play happily and constructively. His mother described two personalities—one considerate and happy, the other disgruntled and unstable.

He started school at 5 years, and his behaviour became intolerable at times. He had a particular interest in sharp-pointed objects, and had been suspended from school several times because of dangerous and aggressive use of sharp instruments. He rammed a screwdriver into a little girl's abdomen. . . .

He began wandering at 2 years. Since the age of 8 years he has become progressively less amenable to normal discipline. He began

playing truant and was apprehended by police on five occasions, having travelled considerable distances by train and ferry, and once was found on the streets at 5 a.m. with his small brother. The juvenile liaison officer of the police felt that his supervision and advice meant little to the boy.

. . . . His brother is normal, and his parents are a concerned, loving and intelligent couple.¹⁶

CONCLUSION

From the point of view of XYY babies who will grow up to be law-abiding citizens, it is immoral to spread a pseudoscientific rumor that the XYY karyotype inexorably spells crime and jail sentences. By contrast, it is equally immoral, from the point of view of XYY boys and men, already the victims of behavior beyond their capacity to control, to spread a pseudoscientific rumor that they are no different from other males and should be judged accordingly.¹⁷ We are already far beyond the stage of having to wait out the slow and costly procedure of gathering XYY incidence statistics before being able to unstraddle the fence. With all due respect to conservative caution, it is already archaic to maintain that: "no definite conclusions can be drawn about the relationship between the presence of the XYY chromosome and deviant criminal and/or violent behavior." We may confidently say that the XYY karyotype is sometimes related to law-breaking behavior. The relationship is positive and definite, but not universal or inexorable.

SUMMARY

By tabulating and reviewing available behavioral data on 31 published cases and 4 new cases of the XYY syndrome (the majority found by reason of investigative design in prisons), the following composite image for the XYY prisoner emerges: broken family; difficult child; school history of behavior problems and underachievement: IQ average; EEG probably abnormal; excessive daydreaming; socially a loner; occupationally a drifter; unrealistic future expectations; impulsive aggression and/or violence, but not an aggressive personality; bisexual or homosexual and impulsive in sexual expression, with no depth or continuance of affection. The percentage of behaviorally normal XYY males in the population is not yet known; but there are already sufficient other data to attribute behavioral abnormality in those manifesting it to the genetic defect.

¹⁶ Cowie & Kahn, *XYY Constitution Prepubertal Child*, 1968 BRIT. MED. J. 1, 748-49.

¹⁷ Money, *Editorial: XYY, The Law and Forensic Moral Philosophy*, 149 J. NERV. MENT. DIS. 309-11 (1969).

APPENDIX A

TABLE 1
Behavioral Characteristics of 47, XYY Individuals N = 35

Categories	Present Study	Authors						
		Bartlett, <i>et al.</i> 1968	Cleveland, <i>et al.</i> 1969	Cowie, <i>et al.</i> 1968	Daly, 1969	Forsman, <i>et al.</i> 1968	Jacobs, <i>et al.</i> 1968	
Number of Cases	4	2	2	1	10	1	9	
Frequencies ¹	+ 0	+ 0	+ 0	+ 0	+ 0	+ 0	+ 0	-
Family Psychopathology	3 0 1	0 2 0	2 0 0	0 1 0	6 2 6	0 1 0	3 1 0	5
Difficult Child	4 0 0	0 2 0	2 0 0	1 0 0	3 5 2	0 1 0	6 1 2	2
Problems in School	4 0 0	0 2 0	2 0 0	1 0 0	7 3 0	0 1 0	3 3 3	3
Excessive Daydreaming	4 0 0	0 2 0	0 2 0	0 1 0	0 10 0	0 1 0	0 9 0	0
Loner	4 0 0	0 2 0	0 0 2	0 0 1	3 6 1	1 0 0	2 6 1	1
Drifter	3 ² 0 1	0 2 0	0 0 2	0 0 1	6 3 1	0 1 0	5 3 1	1
Unrealistic Future Expectations	4 0 0	0 2 0	0 2 0	0 1 0	0 10 0	0 1 0	0 9 0	0
Impulsiveness	4 0 0	0 2 0	1 1 0	1 0 0	5 5 0	1 0 0	2 5 2	2
Sudden Violence and Aggression	3 0 1	0 2 0	1 1 0	0 0 1	4 6 0	0 1 0	2 4 3	3
Prison	2 0 2	2 0 0	0 0 2	0 0 1	8 0 0	0 0 1	9 0 0	0
Heterosexual Experience	3 0 1	0 2 0	0 2 0	0 1 0	4 6 0	0 1 0	0 9 0	0
Homosexual Experience	3 0 1	2 0 0	0 2 0	0 1 0	7 2 1	0 1 0	1 8 0	0
Other Paraphilias	0 0 4	0 2 0	0 2 0	0 1 0	5 5 0	0 1 0	2 7 0	0

TABLE 1 (continued)

Categories	Authors						Totals
	Lisker, et al. 1968	Matthews, et al. 1968	Persson, 1967	Richards, et al. 1966	Weiner, et al. 1968	Weiner, et al. 1969	
Number of Cases	1	1	1	1	1	1	35
Frequencies ¹	+	+	+	+	+	+	+
Family Psychopathology	0	0	0	0	0	0	15
Difficult Child	0	0	1	0	0	1	10
Problems in School	0	1	0	0	0	0	17
Excessive Daydreaming	0	1	0	0	0	1	12
Loner	0	1	0	0	0	0	4
Drifter	1	0	0	0	0	0	14
Unrealistic Future Expectations	0	1	0	0	0	0	18
Impulsiveness	0	1	0	0	0	0	10
Sudden Violence and Aggression	0	1	0	0	0	0	7
Prison	0	0	1	0	0	0	4
Homosexual Experience	1	0	0	0	0	0	31
Homosexual Experience	0	1	0	0	0	0	15
Other Paraphilias	0	1	0	0	0	0	24
	0	1	0	0	0	0	10
	0	1	0	0	0	0	24
	0	1	0	0	0	0	14
	0	1	0	0	0	0	19
	0	1	0	0	0	0	2
	0	1	0	0	0	0	22
	0	1	0	0	0	0	4

1 + present
 0 insufficient data
 - absent

² In the case of the teenager, this category is, on an age basis, inapplicable. See also Money, Behavior Genetics: Principles, Methods and Examples from the XO, XXY and XYY Syndromes, in SEMINARS IN PSYCHIATRY, ms. (1970).

APPENDIX B

GLOSSARY

- Chromatin positive: *see* sex chromatin. Cells in which a sex-chromatin spot is present are said to be chromatin positive. Normal female cells are chromatin positive, and normal male cells are chromatin negative.
- EEG (electroencephalogram): the ink tracing of wave patterns generated by electrical activity in the brain and recorded electromechanically; a brainwave tracing.
- Karyotype: the visual display of a cell's chromosomes, photographed, enlarged, measured, labeled, and arranged according to international convention.
- Klinefelter's syndrome: also known as the XXY syndrome, because of the presence of an extra X chromosome in the cells; an affected individual has the anatomic appearance of a male, but has defective testicles, is sterile and usually has only weak secondary sexual development.
- Paraphilia: any one of the psychosexual and sexual behavior disorders; a condition of being obsessively aroused sexually by and committed to an unusual, unacceptable or forbidden stimulus.
- Pedophilia: a psychosexual and sexual behavior disorder in which erotic arousal is stimulated by and directed toward prepubertal juveniles.
- Radioulnar synostosis: union of two bones of the forearm, the radius and the ulna, that are normally separate.
- Sex chromatin: the sex-indicator spot normally in the nucleus of cells taken from the blood, skin or other tissues of females; it is not found in cells from males, except in rare clinical cases of men with an extra X chromosome, for example, the XXY (Klinefelter's) syndrome and its variants, XXXY, XXYY, etc.
- Spike wave: a protruding and pointed pattern or spike in a brainwave (EEG) tracing; spike waves are abnormal and are usually indicative of convulsive seizures or epilepsy.
- XXY syndrome: a genetic condition in which every cell of the body has 47 instead of 46 chromosomes, the extra one being a Y. It occurs in men who may appear otherwise normal, or who may be unusually tall, with or without other birth defects.

APPENDIX C

BIBLIOGRAPHY

- Bartholomew & Sutherland, *A Defence of Insanity and the Extra Y Chromosome: R. V. Hannell*, 2 AUST. & N.Z.J. CRIMINOLOGY 29-37 (1969).
- Bartlett, Hurley, Brand & Poole, *Chromosomes of Male Patients in a Security Prison*, 219 NATURE 351-54 (1968).
- Casey, Segall, Street & Blank, *Sex Chromosome Abnormalities in the State Hospitals for Patients Requiring Special Security*, 209 NATURE 641-42 (1966).
- Cleveland, Arias & Smith, *Radioulnar Synostosis, Behavioral Disturbance, and XYY Chromosomes*, 74 J. PEDIATRICS 103-06 (1969).
- Court-Brown, Price & Jacobs, *Further Information on the Identity of 47: XYY Males*, 1968 BRIT. MED. J. 2, 325-28.
- Cowie & Kahn, *XYY Constitution in Prepubertal Child*, 1968 BRIT. MED. J. 1, 748-49.
- Daly, *Mental Illness and Patterns of Behavior in Ten XYY Males*, J. NERV. MENT. DIS., ms. (1969).
- Forssman, Akesson & Wallin, *The YY Syndrome*, 1968 LANCET ii, 779.
- Fox, *XYY Chromosomes and Crime*, 2 AUST. & N.Z.J. CRIMINOLOGY 5-19 (1969).
- Jacobs, Brunton, Melville, Brittain & McClemon, *Aggressive Behavior, Mental Subnormality, and the XYY Male*, 208 NATURE 1351-52 (1965).
- Jacobs, Price, Court-Brown, Brittain & Whatmore, *Chromosome Studies on Men in a Maximum Security Hospital*, 31 ANNALS OF HUMAN GENETICS 339-58 (1968).
- Lisker, Zenzes & Fonesca, *YY Syndrome in a Mexican*, 1968 LANCET ii, 635.
- MacClean, Court-Brown, Jacobs, Mantle & Strong, *A Survey of Sex Chromatin Abnormalities in Mental Hospitals*, 5 J. MED. GENETICS 165-72 (1968).

- Matthews & Brooks, *Aggression and the YY Syndrome*, 1968 LANCET ii, 355-56.
- Money, *Editorial: XYY, The Law and Forensic Moral Philosophy*, 149 J. NERV. MENT. Dis. 309-11 (1969).
- Money, *Behavior Genetics: Principles, Methods and Examples from the XO, XXY and XYY Syndromes*, in SEMINARS IN PSYCHIATRY, ms. (1970).
- Persson, *An XYY Man and His Relatives*, 11 J. MENT. DEFICIENCY RES. 239-45 (1967).
- Richards & Stewart, *The YY Syndrome*, 1966 LANCET i, 984-85.
- Welch, Borgaonkar & Herr, *Psychopathology, Mental Deficiency, Aggressiveness, and the XYY Syndrome*, 214 NATURE 500-01 (1967).
- Weiner & Sutherland, *A Normal XYY Man*, 1968 LANCET ii, 1352.
- Weiner, Sutherland & Bartholomew, *A Murderer with 47, XYY and an Additional Autosomal Abnormality*, 2 AUST. & N.Z.J. CRIMINOLOGY 20-28 (1969).