

Congenital Determinants of Violence

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Specialization—the predisposition to violent behavior persisting over an extended period of time—is considered in relation to congenital factors, to determine whether such factors are contributory to this predisposition. Congenital factors include inherited characteristics and perinatal experiences. Evidence for inherited characteristics in criminal behavior is approached through family studies, the study of twins, and adoption studies. Of those three, adoption studies provide the most fertile ground for study. Predisposition toward criminal behavior is noted to be limited to property crime. The second congenital factor is the perinatal experience. Minor physical anomalies appear to be strongly related to hyperactivity and later criminal involvement, but only if the offender was reared in an unstable, nonintact family. Indices of perinatal problems relate to later violent crime, rather than to property crime, and may have as their basis some form of trauma occurring very early in life.

Can congenital determinants influence the likelihood that an individual will behave violently in adolescence or adulthood? If so, the influence must be some deviance in genetics, pregnancy, delivery, or neonatal experience. Such a factor, already established so early in life, must have a long-term effect on behavior. In view of this, it is not unreasonable to suppose that individuals so influenced may display this predisposition to violent behavior over a large part of their

life span; they should be repeatedly and consistently violent. But do such reliably violent offenders exist?

Criminal Specialization

In criminology this conceptual issue has been considered under the rubric of specialization. In general, criminologists tend to say that specialization in crime does not exist. Wolfgang and associates¹ studied a Philadelphia birth cohort and concluded that delinquents do *not* specialize. They defined specialization as the tendency to commit the same crime on *consecutive* offenses. This definition has merit but is perhaps too limiting. We would suggest another:

Specialization has been observed if an individual who commits a violent offense is more likely to commit a subsequent violent offense than an individual who commits a property offense.

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This definition is currently used in many psychiatric settings. Studies have shown that the best predictor of violent patient behavior in a psychiatric hospital is arrests for *past* violence.²

Armed with this definition, we set out to determine whether specialization exists in a birth cohort consisting of 31,436 men born to residents of the city of Copenhagen, Denmark, from January 1, 1944, to December 31, 1947. Of the 28,879 men still alive and in Denmark when they reached 27 years of age, 10,918 (37.8%) had experienced at least one police contact for a criminal law offense; 721 (2.5%) had committed at least one violent offense, and 173 had committed two or more violent offenses. These 173 recidivistically violent offenders—our potential “specialists”—comprise 0.6 percent of the men and were responsible for 43.4 percent of the violent offenses in the 28,879 men of the cohort.

Comparing individuals with an initial violent offense with individuals with an initial property offense in this cohort, we computed the proportions of these groups who committed at least one future violent offense. Controlling for the number of future offenses and number of prior offenses, a first-time violent offender was 1.94 times more likely to become a future violent offender than was the first-time property offender. This effect was also found when analyses were restricted to offenses committed before the age of 18 years; therefore, our data suggest that specialization for violence (as defined) also occurs in juvenile offenders.³

Genetic Influences in Specialization

The existence of specialization suggests that certain individuals have some enduring personal characteristics that predispose them to repeated violent acts. We can now consider whether congenital factors contribute to this predisposition.

We construe congenital factors to include inherited characteristics and perinatal experiences. Note that these factors are in all cases determined many years before criminal violence manifests itself. There are often 18 to 25 years of experience interposed between a predisposing congenital factor and the violent behavior. The relationship between congenital factors and violent behavior, therefore, would require considerable strength to be detected through 20-odd years of intervening experiential “noise.”

First we will consider the evidence for genetic influences on criminal violence. There have been three approaches to genetic studies in this area. Family studies have shown that the best family predictor of antisocial behavior in sons is criminal acts in their fathers.⁴ This relation has not been specifically studied for violent acts. Family studies are limited, however, by the fact that the father contributes a psychosocial environment as well as genes to his sons.

Studies of Twins Another method for detecting genetic influence involves the study of twins. Identical twins have identical genes; fraternal twins are as genetically similar as siblings. Because the twins are born at almost the same

Congenital Determinants of Violence

time and are almost always reared together, greater similarity of behavior within identical twin pairs than within fraternal twin pairs is attributed to their greater genetic similarity. A review by Mednick and Volavka⁵ notes that, across a series of studies, identical twins have a greater concordance for criminal behavior than do fraternal twins. A definitive population study⁶ found 35 percent concordance for identical twins and 13 percent concordance for fraternal twins. Studies such as these have provided us with evidence for genetic influences on criminal involvement, but usually too few subjects have been included for analyses of violent crime. Moreover, the twin data have been questioned. After all, identical twins are not only more similar genetically but are also treated more similarly by their family and friends. It is possible that their similar criminal behavior is in part due to this similar environmental treatment.

Adoption Studies To address this problem, adoption studies have been utilized. These are natural experiments in which the effects of genetic and rearing influences may be separated to a relatively high degree. For example, if the

biological son of a severely criminal father is adopted away at birth to a non-criminal family and that son becomes severely criminal, that may be seen as evidence (with appropriate controls) that the criminal father passed on to his son a biological characteristic which predisposed both men to criminal acts. Crowe⁷ found evidence of a relationship between criminal behavior in an adopted-away child and its biological mother. Similarly, Cadoret⁸ found that antisocial behavior in adoptees is significantly related to antisocial behavior in the biological parents.

In Denmark, we gathered a birth cohort of all 14,427 nonfamilial adoptions from 1924 to 1947. For each adoption we recorded the psychiatric hospital diagnoses and court conviction histories of the adoptee, the biological mother and father, and the adoptive mother and father. Court convictions were taken as an index of the individual's criminal involvement, and occupation was taken as an index of the individual's socioeconomic status.⁹

The conviction rates of the completely identified members are shown in Table 1. The rates of biological fathers and

Table 1
Conviction Rates of Completely Identified Members of Adoptee Families

Family Member	Number Identified	Number Not Identified	Conviction Rate by Number of Convictions			
			0	1	2	>2
Male adoptees	6,129	571	0.841	0.088	0.029	0.049
Female adoptees	7,065	662	0.972	0.020	0.005	0.003
Adoptive fathers	13,918	509	0.938	0.046	0.008	0.008
Adoptive mothers	14,267	160	0.981	0.015	0.002	0.002
Biological fathers	10,604	3,823	0.714	0.129	0.056	0.102
Biological mothers	12,300	2,127	0.911	0.064	0.012	0.013

their adopted-away sons are considerably higher than those of adoptive fathers. The adoptive father rate (8%) is a little below the average rate in the population for men of the same age range and time period.¹⁰ Most of the criminal adoptive fathers were one-time offenders, whereas male adoptees and their biological fathers were more heavily recidivistic. The conviction rates of the women in this study were lower than those of the men but followed the same pattern. In view of these lower rates of conviction for women, the analyses will concentrate on male adoptees.

The size of the population permits segregation of subgroups of adoptees with combinations of convicted and nonconvicted biological and adoptive parents in a design analogous to the cross-fostering model used in behavioral genetics. If neither the biological nor the adoptive parents are convicted, 13.5 percent of the sons are convicted. If the adoptive parents are convicted and the biological parents are not, this figure rises only to 14.7 percent. However, if the adoptive parents are not convicted

and the biological parents are, 20.0 percent of the sons are convicted. If the adoptive parents as well as the biological parents are convicted, 24.5 percent of sons are convicted. These data favor the assumption of a partial genetic etiology. Simply knowing that an adoptive parent has been convicted of a crime, however, does not reveal how criminogenic the adoptee's environment has been. At conception, on the other hand, the genetic influence of the father is complete. Thus, this is not a fair comparison between environmental and genetic influences but indicates only that sons whose biological parents have court convictions for criminal offenses have an increased probability of becoming convicted.

The relation between criminal law convictions in the sons and degree of recidivism in the biological parents is positive and relatively monotonic (Fig. 1). Note that the rate of convictions in the sons of biological parents with three or more offenses is twice that of the sons whose biological parents have no convictions.

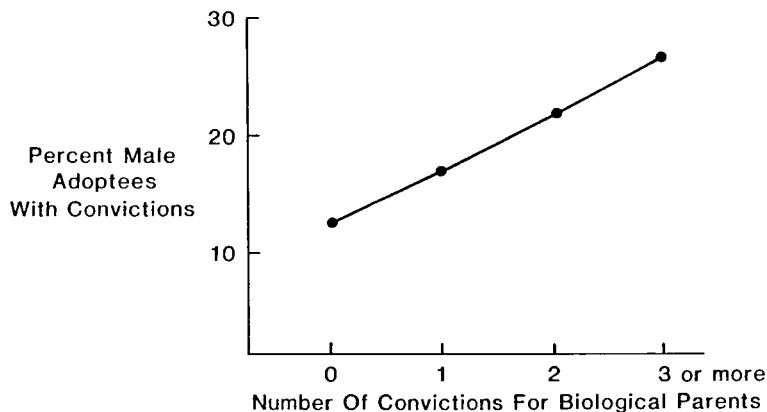


Figure 1. Percentage of male adoptee convictions. This figure only includes cases in which the adoptive parents have no convictions. All convictions are for criminal law offenses.

Congenital Determinants of Violence

The chronic offender is infrequent but commits a markedly high proportion of crimes in a cohort. This high rate of offending suggested the hypothesis that genetic predisposition plays a substantial role in these cases. In one U.S. birth cohort study,¹ the chronic offender was defined as one who had been arrested five or more times; these chronic offenders, 6 percent of the men, had committed 52 percent of the offenses. In our adoption cohort we recorded court convictions rather than arrest data. If we select as chronic offenders those with three or more court convictions, they were 4.09 percent of the male adoptees. This small group of recidivists accounts for 69.5 percent of all court convictions for all the male adoptees, a high concentration of crime in a small fraction of the cohort.

The strong relationship between chronic offending in biological parents and chronic offending in their sons is shown in Figure 2. Note, however, that a genetic influence is not sufficient to produce criminal convictions in the

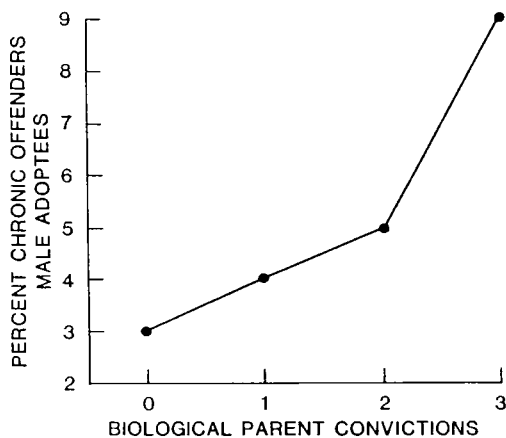


Figure 2. Percentage of chronic offenders in the male adoptees.

adoptee. Of those adoptees whose biological parents have three or more convictions, 75 percent never received a court conviction. Another way of expressing this concentration of crime is that the chronic male adoptee offenders with biological parents having three or more offenses number only 37. They make up 1 percent of the 3,718 male adoptees in Figure 2 but are responsible for 30 percent of the male adoptee convictions. The mean number of convictions for the chronic adoptee increases sharply as a function of biological parent recidivism.

There are instances in which a biological mother, a biological father, or both contributed more than one child to this population. Most of these children, who were full or half-siblings, were placed in different adoptive homes. The probability of any one male adoptee's being convicted is 0.159; the probability of at least one of a pair of unrelated, separated male adoptees' being convicted is 0.293. The probability of both of a pair's being convicted is 0.025. Thus the concordance rate for pairs of unrelated, separated male adoptees is 8.5 percent. This can be viewed as a baseline.

As the closeness of the genetic relationship increases (from unrelated to half-siblings to full siblings), the concordance for criminal convictions increases (Table 2). Note that the half and full siblings with convicted biological fathers have a concordance rate of 30.8 percent. The results suggested that a number of these separated adoptee siblings inherited some characteristic that made both vulnerable to criminal behavior. In those instances in which the bio-

Table 2
Concordance for Criminal Law Convictions in
Male Siblings Placed in Separate Adoptive
Homes

Degree of Genetic Relationship	% of Pairwise Concordance
Unrelated, raised apart	8.5
Half siblings, raised apart	12.9
Full siblings, raised apart	20.0
Half and full siblings, raised apart; criminal father	30.8
Unrelated "siblings" raised together in adoptive homes	8.5

logical father is criminal, the effect is enhanced.

Convictions of women for criminal law violations are infrequent (Table 1). Perhaps women whose criminal behavior prompts a court conviction have a predisposition for such behavior. Criminal involvement in many men, on the other hand, may be more socially or environmentally induced. We might expect, therefore, that criminal behavior in the biological mother will be more closely related to the adoptees' convictions than criminal behavior in the biological father.

In all our analyses, the relations between biological mother conviction and adoptee conviction is significantly stronger than that between biological father and adoptee convictions. In comparison to the biological fathers, crime in the biological mothers is more closely related to crime in the daughters. This result is statistically significant, but in view of the relatively low frequency of female convictions the findings must be interpreted with caution. These results, however, have been replicated by a Swedish adoptee study.¹¹

Adoptee Convictions The adoptees' convictions separated into property and violent convictions are presented in Figure 3. Those categorized as property offenders had no convictions for violent offenses. Those categorized as violent offenders may have also committed property offenses. Note that there is a definite relationship between biological parent and adopted-away son for property convictions, but there is no significant relationship for violent offenses. These results are completely congruent with a moderately large Swedish study¹¹ that also found that property crime was under genetic influence and violent crime was not. These negative findings intrigued us, especially in light of an exception to them which surfaced recently. Moffitt¹² examined the influence of a biological parent's psychiatric diagnosis on the violent crime of the adoptee. If one biological parent was a chronic criminal and the other had an "antisocial" psychiatric diagnosis (drug or alcohol addiction, antisocial personality disorder), the offspring registered a threefold increase in the proportion of

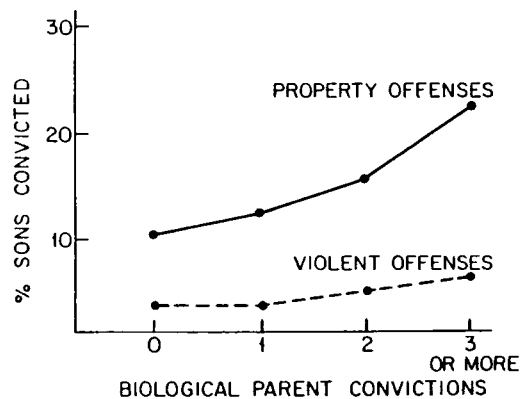


Figure 3. Percentage of male adoptee property offenders and violent offenders by biological parent convictions.

convicted violent offenders over the remainder of the population. This may represent a distinct genetic contribution from the psychiatrically ill mother or may simply reflect the especially wretched pregnancy and nonoptimal fetal development experienced by adoptees with addicted, antisocial mothers. We are continuing to explore this finding.

Perinatal Factors This observation leads us directly to the second of the congenital factors possibly contributing to violent behavior—perinatal problems. The assessment of perinatal problems presents certain difficulties. Whereas delivery difficulties may be observed by a competent rater, pregnancy problems can be extremely elusive. A pregnant woman might indulge in an inappropriate diet, might ingest drugs and alcohol, or might subject herself (and her fetus) to other detrimental environmental conditions. If those conditions are not so severe that they result in gross fetal malformations, they might never come to the attention of the researcher.

These difficult to detect pregnancy difficulties may be massive, leading to the death or serious malformation of the fetus. Pregnancy complications may also produce less severe disturbances in the development of the fetus, however. For example, let us consider the development of the ears. The ears begin low on the neck of the fetus and slowly drift into their accustomed position. With the introduction of some teratogenic event or substance, the development may be slowed or stopped and the ears' drift upward will terminate prematurely, re-

sulting in low-seated ears. Similarly, the lobes of the ears should, but sometimes do not, dangle below the point at which the ears adhere to the head. These minor aural malformations are examples of disturbed fetal development and are termed "minor physical anomalies" (MPAs). It is reasonable to assume that the teratogenic agents that caused the visible physical anomalies at a specific time during fetal development also produced covert anomalies in concurrently developing organs, including the central nervous system. Thus a count of such apparent anomalies may be seen as an index of hidden anomalies (including possible central nervous system damage). Although some heritability of MPAs has been demonstrated, Rapoport *et al.*¹³ and Waldrop and Halvorsen¹⁴ have noted that MPAs are strongly associated with disorders of pregnancy (e.g., rubella during pregnancy or bleeding during the first trimester).

Studies that we and others have completed have shown that minor physical anomalies (MPAs) are strongly related to hyperactivity and subsequent criminal involvement. For example, Waldrop *et al.*¹⁵ found that the newborn count of MPAs explains almost half of the variance in hyperactivity at age three. In addition, Fogel *et al.*¹⁶ found support for a relationship between hyperactivity in males and MPAs. Hyperactivity in boys is highly related to later serious delinquency.¹⁷

In the context of a prospective study we examined the relation of MPAs to police records of criminal law offense at age 21. The MPAs were assessed in a sample of 129 children (aged 12) by an

experienced pediatric neurologist. Previous research by Waldrop *et al.*¹⁵ has shown that almost all of the anomalies detected at 12 years of age were present at birth. The sample of 129 children was followed up in police records when the subject was 21 years of age. The results indicated that MPAs were totally unrelated to property offenses if the offender had no violent offenses on his record. They were, however, strongly related to violent offending (these violent offenders may have had previous property offenses). More careful inspection of the data revealed that the MPAs *only* predicted to violence for individuals raised in unstable, nonintact families. A stable family environment seems to compensate for the biological vulnerability represented by the MPAs.¹⁸

In another study, data were examined from a random sample of 847 children drawn from a Copenhagen birth cohort of 9,125 consecutive deliveries. Aggressiveness (bullying, fighting, and so on) was assessed at age 18 by the subject's teachers. A similar interaction to the one noted above was found; again, MPAs only predicted to violence for offenders who were raised in unstable environments.¹⁹

This interaction between perinatal problems and family stability has been previously noted. In 1964, Drillien²⁰ reported that premature babies do relatively poorly in school. Prematurity is a heavy-handed biological variable that is possibly related to deviant brain development. Drillien noted that the long-term disadvantage for the premature infants was especially marked if the child was raised in an unstable, disturbed fam-

ily setting. On the other hand, premature children raised in stable homes showed no or minimal disadvantage.

Conclusions

The data summarized provide compelling evidence to support the idea that genetic factors predispose to crime. However, this predisposition is limited to property crime. An exception illustrated by the Moffitt study¹² suggests that if the biological father is registered for crime and the biological mother for antisocial personality disorder, violence in the son can be predicted. However, because these mothers frequently provided a less-than-ideal womb for the developing fetus, the Moffitt effect may be perinatal rather than genetic.

Perinatal complications have not been widely studied, perhaps because of the difficulties imposed by assessment and by the time span between the birth and subsequent violence (approximately 20 years). However, two studies were briefly described which found that indices of perinatal problems relate to later violent rather than property crime. Stable family rearing seems to compensate for the perinatal damage. These findings are highly consonant with repeated reports of a high incidence of brain damage in violent offenders.²¹

Rearing conditions for many criminals are certainly less than optimal. We would nevertheless wager, however, that a good proportion of street and home violence is a function of vulnerability brought on by less than optimal brain functioning. In view of the fact that aggressive behavior is a consistent pattern for many troubled boys from early child-

Congenital Determinants of Violence

hood, it seems perfectly reasonable to entertain the possibility that the damage that perhaps weakens cortical control occurs early in life. Perinatal difficulties, therefore, could be an important source of such damage.

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