Collectively these essays reveal that questions of aetiology remain fiercely debated. The issue remains, though, of how far any one theory is capable of providing a comprehensive explanation. It is more likely that *certain* theories will remain better placed to analyse *certain* behaviours and social events, of which some may come to be defined as 'crime'. Numerous 'general theories' of crime causation continue to be advanced which seek to integrate many of the specific propositions raised in these individual chapters. But whatever is gained in generality is certainly lost in an unfettered multi-dimensional eclecticism. Given the widespread nature of crime, it may be that no specific motivational theory is required, or is indeed possible. Crime, as Durkheim (see Part One) argued, is as social fact. It may require no more or less an explanation than is required for any other everyday activity.

11

Genetic factors in the etiology of criminal behavior

Sarnoff A. Mednick, William F. Gabrielli Jr and Barry Hutchings

Human behavior patterns are generally ascribed to an interaction of life experiences and genetic predispositions, but the importance of genetic influences in shaping conduct has often been contested. This debate has been especially intense, and often emotional, in explaining criminal behavior (Sarbin and Miller, 1970). Reluctance to consider genetic factors in crime has had political overtones (Haller, 1968), but it may also reflect the fact that, until recently, the evidence for genetic influences consisted mainly of studies of twins, some of which were methodologically questionable.

Christiansen (1977a) reported on the criminality of a total population of 3,586 twin pairs from a well-defined area of Denmark. He found 52 per cent of the twins concordant for criminal behavior for (male-male) identical twin pairs and 22 per cent concordance for (male-male) fraternal twin pairs. This result suggests that identical twins inherit some biological characteristic (or characteristics) that increases their common risk of being registered for criminal behavior.

It has been pointed out, however, that identical twins are treated more alike than are fraternal twins (Christiansen, 1977b). Thus their greater similarity in criminal behavior may be partly related to their shared experience. This has produced a reluctance to accept in full the genetic implications of twin research. The study of adoptions better separates environmental and genetic effects; if convicted adoptees have a disproportionately high number of convicted biological fathers (given appropriate controls), this would suggest the influence of a genetic factor in criminal behavior. This conclusion is supported by the fact that almost

From *The Causes of Crime: New Biological Approaches* (eds S. Mednick, T. Moffitt and S. Stack), pp. 74–91. (Cambridge: Cambridge University Press, 1987.)

none of the adoptees know their biological parents; adoptees often do not even realize they have been adopted.

Two US adoption studies have produced highly suggestive results. Crowe (1975) found an increased rate of criminality in 37 Iowan adoptees with criminal biological mothers. Cadoret (1978) reported on 246 Iowans adopted at birth. Antisocial behavior in these adoptees was significantly related to antisocial behavior in the biological parents. In a study of Swedish adoptees Bohman, Cloninger, Sigvardsson, and von Knorring (1982) found that criminal behavior in the biological parents was significantly related to criminal behavior in the adoptees. This relationship held only for property crimes.

Table 11.1 Number of adoptions in five-year periods

Years	Male	Female	Total
1924–8	578	1,051	1,629
1929–33	730	1,056	1,786
1934–8	832	1,092	1,924
1939–43	1,650	1,731	3,381
1944–7 (4 years)	2,890	2,782	5,672
Year uncertain	20	15	35
Total	6,700	7,727	14,427

The study to be described in this chapter was based on a register of all 14,427 non-familial adoptions in Denmark in the years 1924–47. This register was established at the Psykologisk Institut in Copenhagen by a group of American and Danish investigators (Kety et al., 1968). The register includes information on the adoptee and his or her adoptive and biological parents. We hypothesized that registered criminality in the biological parents would be associated with an increased risk of registered criminal behavior in the offspring.

PROCEDURES

Information on all non-familial adoptions in the Kingdom of Denmark between 1924 and 1947 (n =14,427) was obtained from records at the Ministry of Justice. The distribution of adoptions by sex of adoptee for five-year periods appears in Table [11.1]. Note the increase in adoptions with increasing population, especially during the war years, and the larger number of females adopted.

Criminality data

Court convictions were used as an index of criminal involvement. Minors (below 15 years of age) cannot receive court convictions. Court convictions information

is maintained by the chief of the police district in which an individual is born. The court record (Strafferegister) contains information on the date of the conviction, the paragraphs of the law violated, and the sanction. To obtain access to these records it is necessary to know the place of birth. When subjects' conviction records could not be checked, it was usually because of a lack of information or ambiguity regarding their date and/or place of birth. The court record was obtained for all of the subjects for whom date and place of birth were available (n = 65,516).

Information was first recorded from the adoption files of the Ministry of Justice. In these files, birthplace was then available for the biological and adoptive parents but not for the adoptees; birthplace for the adoptees was obtained from the Central Persons Register or the local population registers. The Central Persons Register was established in 1968; adoptees who died or emigrated before 1968 were thus excluded from the study. There were some difficulties in these searches. The criminal records of persons who have died or have reached the age of 80 are *sometimes* removed from the registers and archived in the Central Police Office in Copenhagen. Thus if an individual had a court conviction but had died before our search began, his or her record might have been transferred from the local police district to the Copenhagen Central Police Office. There the record would be maintained in a death register. In view of this, the entire population (adoptees and parents) was checked in the death register. If an adoptee had died or emigrated before the age of 30, the adoptee and parents were dropped from the study since the adoptee had not gone through the entire risk period for criminal conviction. A small section of Denmark in southern Jutland belonged to Germany until 1920. If an individual from this area was registered for criminality before 1920 but not *after* 1920, that individual's record was lost to this study.

Table 11.2 Conviction rates of completely identified members of adoptee families

Family member	Number identified	Number not identified	Number of criminal law court convictions			
			None	One	Two	More than two
Male adoptee	6,129	571	0.841	0.088	0.029	0.040
Female adoptee	7,065	662	0.972	0.020	0.005	0.003
Adoptive father	13,918	509	0.938	0.046	0.008	0.008
Adoptive mother	14,267	160	0.981	0.015	0.002	0.002
Biological father	10,604	3,823	0.714	0.129	0.056	0.102
Biological mother	12,300	2,127	0.911	0.064	0.012	0.013

For each individual we coded the following information: sex, date of birth, address, occupation, place of birth and size of the community into which the child was adopted. The subjects' occupations permitted us to code socioeconomic status (Svalastoga, 1959). For the adoptees we also coded marital status in 1976.

Not fully identified cases

It will be recalled that in order to check the court register it was necessary to have name, date and place of birth. A considerable number of cases were lost to this investigation for the following reasons, (a) There was no record of place and/or date of birth, (b) In Denmark the biological mother is required by law to name the biological father. In some few cases she refused, was unsure, or named more than one possible father. These cases were dropped from the population, (c) Among the adoptive parents, 397 were single women. This was because either the adoptive father died just before the formal adoption or the child was adopted by a single woman (not common in this era), (d) Because of additional difficulties involved in checking the criminal registers before 1910, individuals who were born before January 1, 1885, were excluded from the study.

In the case of exclusion of an *adoptee* for any of the above reasons the entire adoptive family was dropped. If a parent was excluded, the remaining subjects were retained for analysis. Table [11.2] presents the number of fully identified individuals in each of the subject categories.

Results

The data to be reported consist of convictions for violation of the Danish Criminal Code (Straffeloven). The levels of court convictions for each of the members of the adoption family are given in Table [11.2]. The biological-father and male-adoptee conviction rates are considerably higher than the rates for the adoptive father. The rate for adoptive fathers is a bit below that (8 per cent) for men of this age group, in this time period (Hurwitz and Christiansen, 1971). Note also that most of the adoptive-father convictions are attributable to one-time offenders. The male adoptees and the biological fathers are more heavily recidivistic.

The rates of conviction for the women are considerably lower and there is considerably less recidivism than there is for men. The biological mothers and female adoptees have higher levels of court convictions than the adoptive mothers. The adoptive mothers are just below the population average for women of this age range and time period, 2.2 per cent. The individuals who gave up their children for adoption, and their biological offspring, show higher rates of court convictions than the general population and the adoptive parents.

In light of current adoption practices one might be surprised that adoptive parents with court convictions were permitted to adopt. It should be recalled, however, that many of these adoptions took place during the Great Depression and World War II. It was more difficult to find willing adoptive homes in these periods owing partly to the relative unavailability of adoptive parents and to the additional number of adoptees available. Adoptive parents were accepted if they had had a 5-year crime-free period before the adoption.

In most of the analyses that follow, we shall consider the relation between parents' criminal convictions and criminal convictions in the adoptees. If either mother or father (biological and/or adoptive) had received a criminal law

conviction, the *parents* of that adoptee will be considered criminal. In view of the low level of convictions among the female adoptees, the analyses will concentrate on the criminal behavior of the male adoptees.

Types of crime

Of the adoptive parents, 5.50 per cent were convicted for property crimes; 1.05 per cent committed violent acts; and 0.54 per cent were convicted for sexual offenses. Of the biological parents, 28.12 per cent were responsible for property crimes; 6.51 per cent committed violent crimes; and 3.81 per cent committed sexual offenses. Individuals could be registered for more than one type of crime.

Table 11.3 Cross-fostering analysis: percentage of adoptive sons convicted of criminal law offenses

Have adoptive parents been convicted?	Have biological parents been convicted?	
	Yes	No
Yes	24.5 (of 143)	14.7 (of 204)
No	20.0 (of 1,226)	13.5 (of 2,492)

Note: Numbers in parentheses represent the total number for each cell.

Cross-fostering analysis

Because of the size of the population it is possible to segregate subgroups of adoptees who have combinations of convicted and non-convicted biological and adoptive parents. Table [11.3] presents the four groups in a design that is analogous to the cross-fostering paradigm used in behavior genetics. As can be seen in the lower-right-hand cell, if neither the biological nor adoptive parents are convicted, 13.5 per cent of their sons are convicted. If the adoptive parents are convicted and the biological parents are not convicted, this figure rises to only 14.7 per cent. Note that 20.0 per cent of the sons are convicted if the adoptive parents are *not* convicted and the biological parents are convicted. If *both* the biological and adoptive parents are convicted, we observe the highest level of conviction in the sons, 24.5 per cent. The comparison analogous to the cross-fostering paradigm favors a partial genetic etiology. We must caution, however, that simply knowing that an adoptive parent has been convicted of a crime does not tell us how criminogenic the adoptee's environment has been. (Recall the preponderance of one-time offenders in the adoptive parents and the adoptive agency's condition that the adoptive parents not have a conviction for the 5

years preceding the adoption.) On the other hand, at conception, the genetic influence of the biological father is already complete. Thus this analysis does not yield a fair comparison between environmental and genetic influences included in Table [11.3]. However, this initial analysis does indicate that sons with a convicted biological parent have an elevated probability of being convicted. This suggests that some biological characteristic is transmitted from the criminal biological parent that increases the son's risk of obtaining a court conviction for a criminal law offense.

A log-linear analysis of the data in Table [11.3] is presented in Table [11.4]. Adoptive-parent convictions are not associated with a significant increment in the son's level of convictions. The effect of the biological parents' convictions is marked. The model presented in [Table 11.4] reveals that, considering only the *additive* effect of the biological parent and the adoptive parent, the improvement in the chi-square value leaves almost no room for improvement by an interaction effect.

The adoptive parents have a low frequency of court convictions. In order to simplify interpretation of the relations reported below we have excluded cases with adoptive-parent criminality. (Analyses completed that did include adoptive-parent criminality did not alter the nature of the findings to be reported.)

Table 11.4 Log-linear analysis: influences of adoptive-parent and biological-parent convictions on male-adoptee convictions

	Model			Improvement		
Model	X^2	di.	*P*	X^2	d.f.	*P*
Baseline (S, AB)	32.91	3	0.001			
Adoptive parent (SA, AB)	30.71	2	0.001	2.20	1	n.s.
Biological parent (SB, AB)	1.76	2	0.415	31.15	1	0.001
Combined influence (SB, SA, AB)	0.30	1	0.585	32.61	2	0.001
Biological parent given adoptive parent (SB/SA, AB)	–	–		28.95	1	0.001
Adoptive parent given biological parent (SA/SB, AB)	–	–		1.46	1	n.s.

Note: S denotes adoptee-son effect; A, adoptive-parent effect; B, biological-parent effect; n.s., not significant.

Figure [11.1] presents the relation between convictions in the sons and degree of recidivism in the biological parents. The relation is positive and relatively monotonic (with the scales utilized on the X and Y axes). Note also that the

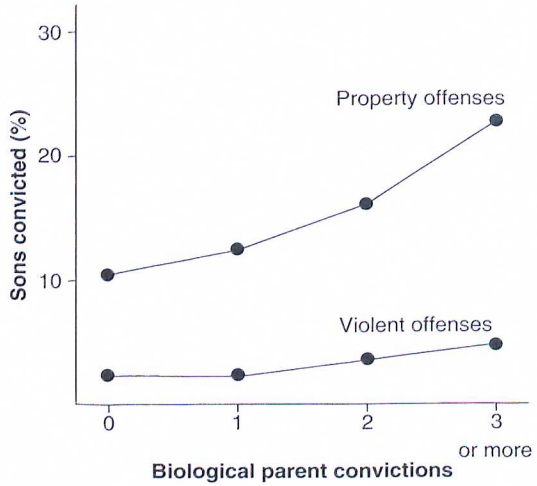

Figure 11.1 Percentage of male adoptee property offenders and violent offenders by biological-parent convictions

relation is highly significant for property crimes and not statistically significant for violent crimes.

The chronic offender

The chronic offender is rare but commits a markedly disproportionate number of criminal offenses. This extremely high rate of offending suggested that genetic predisposition may play an important role in these cases. We examined the relation between convictions of the chronic adoptee offender and his biological parents.

Table 11.5 Proportion of chronic offenders, other offenders, and non-offenders among male adoptees as a function of convictions of biological parents

	Number of biological-parent convictions			
Number of male-adoptee convictions	0	1	2	3 or more
Non-offenders (no convictions)	0.87	0.84	0.80	0.75
Other offenders (1 or 2 convictions)	0.10	0.12	0.15	0.17
Chronic offenders (3 or more convictions)	0.03	0.04	0.05	0.09
Number of adoptees	2,492	547	233	419

Note: Data do not include cases in which adoptive parents were convicted of criminal law violation.

In an important US birth cohort study (Wolfgang et al., 1972), the chronic offender was defined as one who had been arrested five or more times; these chronic offenders comprised 6 per cent of the males and had committed 52 per cent 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, this includes 4.09 per cent of the male adoptees. This small group of recidivists accounts for 69.4 per cent of all the court convictions for all the male adoptees. This is a high concentration of crime in a very small fraction of the cohort.

Table [11.5] shows how the chronic offenders, the other offenders (one or two convictions), and the non-offenders are distributed as a function of level of crime in the biological parents. As can be seen, the proportion of chronic adoptee offenders increases as a function of level of recidivism in the biological parents.

Another way of expressing this concentration of crime is to point out that the chronic male adoptee offenders with biological parents with three or more offenses number only 37. Although they comprise only 1 per cent of the 3,691 male adoptees in Table [11.5], they are responsible for 30 per cent of the male adoptee convictions. We should also note that the mean number of convictions for the chronic adoptee offenders increases sharply as a function of biological parent recidivism. The biological parents with zero, one, two, or three or more convictions have male adoptees (i.e., male children who are subsequently adopted by others) averaging 0.30, 0.41, 0.48 and 0.70 convictions, respectively.

We have presented evidence that there is an association between biological parents' convictions and the convictions of their (subsequently) adopted sons. The relation seems stronger for chronic offenders. The sons of chronic offenders account for a disproportionate number of the convictions in the cohort.

Sibling analyses

There are a number of instances in which a biological mother and/or biological father contributed more than one child to this population. These offspring are, of course, full and half-siblings; they were sometimes placed in different adoptive homes. We would predict that the separated full siblings should show more concordance for criminal convictions than the separated half-siblings. Both of these groups should show more concordance than two randomly selected, unrelated, separately reared male adoptees.

Table 11.6 Concordance for criminal law convictions in male siblings placed in separate adoptive homes

Degree of genetic relation	Pairwise concordance (%)
Unrelated, raised apart	8.5
Half-siblings, raised apart	12.9
Full siblings, raised apart	20.0
Half-siblings and full siblings, raised apart, criminal father	30.8
Unrelated 'siblings' raised together in adoptive home	8.5

The probability of any one male adoptee being convicted is 0.159. The probability of drawing a pair of unrelated, separated male adoptees with at least one having a conviction is 0.293. The probability that both of the pair will have been convicted is 0.025. Thus pairwise concordance for unrelated separated male adoptees is 8.5 per cent. This can be seen as a baseline. There were 126 male-male half-sibling pairs placed in separate adoptive homes. Of these, 31 pairs had at least one member of the sibship convicted; of these 31 pairs, 4 pairs were concordant for convictions. This yields a concordance rate for half-siblings of 12.9 per cent. There were 40 male-male full-sibling pairs placed in different adoptive homes. Of these, 15 pairs had at least one member of the sibship convicted; of these 15 pairs, three pairs were concordant for convictions. This yields a concordance rate for full siblings of 20 per cent. These numbers are very small, but the results are in the predicted direction. As the degree of genetic relation increases, the level of concordance increases.

We also considered the level of concordance of the sibling pairs whose biological father was a criminal (had at least one conviction). Of 98 fathers with at least one pair of male-male, separated, adopted-away siblings, 45 had received at least one conviction. (It should be noted that this is a significantly higher rate of convictions (45.9 per cent) than the conviction rate (28.6 per cent) for the total population of biological fathers, $\Psi^2(1) = 14.6$, $p < 0.01$.)

We combined full- and half-sibling pairs (because of the small number and because the siblings shared criminal biological fathers). Of the 45 sibling pairs, 13 had at least one member with a conviction; of these 13, four pairs were concordant for convictions. This yields a concordance rate of 30.8 per cent. Table [11.6] summarizes these sibling analyses. The pairwise concordance rates can be compared with the male-male rates for twins from a population twin study; Christiansen (1977a) reported 36 per cent pairwise concordance for identical twins and a 13 per cent rate for fraternal twins.

Although these numbers are very small, they represent all of the cases, as defined, in a total cohort of adoptions. The results suggest that a number of these separated, adopted siblings inherited some characteristic that predisposed both of them to being convicted for criminal behavior. As would be expected, in those instances in which the biological father was criminal, the effect was enhanced.

Specificity of a genetic relation

Earlier, we mentioned a study of a small sample of adoptees (Crowe, 1975). Crowe reported the impression that there was some similarity in the types of crime committed by the biological mother and the adoptee. This suggests specific genetic predispositions for different types of crime. In order to explore this possibility, we examined the rates of violent crimes in the adoptees as a function of violent crime in the biological parents. We completed similar analyses for property crimes. We also examined more specific types of crime (theft, fraud, assault, etc.) for similarity in the biological parent and the adoptee.

If the genetic predisposition was specific for type of crime, these 'specificity' analyses should have resulted in our observing a closer relation between adoptee

and biological-parent levels of conviction for each of these types of crime. The best predictor of each type of adoptee crime, however, was number of biological-parent convictions rather than type of biological-parent offense. This suggests that the biological predisposition the adoptee inherits must be of a general nature, partly determining the degree of law abidance shown by the adoptee. It is also possible that the data of this study are too gross for the detection of a specificity relation. This may require careful coding of details of the criminal behavior. This was not possible in our study.

Sex differences

As can be seen in Table [11.2], convictions of females for criminal law violations are very infrequent. It might be speculated that those women who do exhibit a level of criminal behavior that prompts a court conviction must have a severe predisposition for such behavior. Criminal involvement of many men, on the other hand, may tend to be more socially or environmentally inspired. These statements suggest that convictions in the biological mother are more closely related to the adoptee's conviction(s) than criminal behavior in the biological father.

In every analysis we conducted, the relation between biological-mother conviction and adoptee conviction is significantly stronger than the relation between biological-father conviction and adoptee conviction. In comparison with the relation between biological-father and adoptee convictions, convictions of the biological mothers are more closely related to convictions of the daughters. This result is statistically significant, but the relatively low frequency of female convictions forces us to interpret these findings with caution.

Historical period

The period of these adoptions (1924–67) spans some important historical changes in Denmark, including a world war, the Great Depression, and industrialization. It is conceivable that the influence of genetic factors might be affected by these social upheavals. It is also possible that changes in level or type of crime during these years might influence the relations observed. Analyses conducted for the entire population were repeated for each of the 5-year periods. The results were virtually identical for all of the periods and virtually identical to the analyses of the total sample. The social changes during these years did not interact with the relation between biological-parent and adoptee crime.

Controlling genetic influence in examining environmental effects

In many social science investigations genetic characteristics are not considered. In some analyses this may contribute error; sometimes omission may lead to incomplete conclusions. For example, separation from a father is associated with an increased level of delinquency in a son. This has been interpreted as a result

of failure of identification or lack of consistent discipline. As we can see from Table [11.2], some fathers who permit themselves to be separated from their child have a relatively high level of criminal convictions. The higher level of delinquency found for separated children might be partially due to a genetic transmission of criminogenic predispositional characteristics from antisocial fathers. If this genetic variance were partially accounted for, the environmental hypotheses could be more precisely tested. We utilized such partial genetic control to study an important criminological variable, social status. We separated the variance ascribable to 'genetic' social class and 'rearing' social class (Van Dusen et al., 1983). We examined adoptee convictions as a joint function of biological parents' social class and adoptive parents' social class. It is clear from inspection of Table [11.7] that male-adoptee convictions vary as a function of both genetic and environmental social class; log-linear analyses reveal that both effects are statistically significant. Although the genetic effect is of interest here, we emphasize that, to our knowledge, this is the first controlled demonstration that *environmental* aspects influence the social class–crime relation. This finding suggests that, regardless of genetic background, improved social conditions are likely to lead to a reduction in criminal behavior.

Table [11.7] is of interest in another regard. Careful inspection reveals a correlation between adoptive-parent socioeconomic status (SES) and biological-parent SES. This represents the attempt by the adoptive agency to match certain characteristics of the two sets of parents in order to increase the likelihood that the adoptee will fit into the adoptive home. In terms of the adoption research design, this correlation is undesirable because it reduces the independence of the genetic rearing and environmental influences on the adoptee. Since social class is not independent of convictions (Table [11.7]), it is conceivable that the relation between biological-parent and adoptee convictions is, in part, mediated by social class. Inspection of Table [11.7] reveals, however, that this relation exists at each level of adoptive-parent social class. In addition we have conducted stepwise multiple regression analyses that varied the order of entry of biological-parent convictions and SES and adoptive-parent convictions and SES. These analyses indicate that, independent of SES, biological-parent convictions are significantly related to adoptee convictions.

METHODOLOGICAL ISSUES

Not fully identified subjects

If we are to generalize from the results of this study, it is useful to consider what biases might be introduced by the loss of subjects in specific analyses. Table [11.2] indicates the total number of subjects who could not be fully identified (name, birthday and birthplace). We should note that we know the name, occupation, birthdate and other facts concerning most of the lost subjects; in almost all cases a subject could not be checked in the court conviction register because we were not certain of the subject's place of birth.

Table 11.7 Percentage of male adoptees with criminal convictions as a function of adoptive and biological parents' socioeconomic status

	Biological parents' SES			
Adoptive parents' SES	**High**	**Middle**	**Low**	**Total**
High	9.30	11.52	12.98	11.58
	(441)	(903)	(775)	(2,099)
Middle	13.44	15.29	16.86	15.62
	(320)	(870)	(795)	(1,985)
Low	13.81	17.25	18.04	17.19
	(210)	(568)	(787)	(1,565)
Total	11.64	14.31	16.00	14.55
	(971)	(2,341)	(2,337)	(5,649)

Note: Numbers in parentheses represent total number for each cell.

The information is relatively complete for the adoptive parents. In contrast, 26.5 per cent of the biological fathers and 14.7 per cent of the biological mothers are not fully identified. These differences probably reflect the relative importance of the adoptive and biological parents to the adoption agency. The agency's chief concern was with the placement and welfare of the adoptee. After the adoption, they had less reason to be concerned with the biological parents.

The most general characteristic of those not fully identified is that they tend *slightly* to come from areas outside Copenhagen. Perhaps the urban adoption offices followed more thorough recording procedures than did offices outside the city. The differences are very small. The sons of the biological fathers not fully identified have a rate of 10.3 per cent criminal law convictions; the identified biological fathers' sons have criminal law convictions in 11.4 per cent of cases. In cases in which the biological mother is not fully identified, slightly fewer of the sons have criminal law convictions (9.6 per cent). The adoptees who were not fully identified have biological mothers and biological fathers with slightly higher SES than those who were fully identified. Their rearing (adoptive) homes were of almost identical SES.

Our consideration of the characteristics of those not fully identified does not suggest that their inclusion would have altered the nature of the results presented above. Perhaps the most critical facts in this judgment are that the adopted-away sons of parents not fully identified have levels of criminal law convictions and rearing social status that are approximately the same as for the sons of those parents fully identified. The differences observed are small; it is difficult to formulate any manner in which the lost subjects might have an impact on the relations reported.

Transfer history

Most of these adoptions were the results of pregnancies of unwed women. The adoptive agency had a policy of taking newborns from their biological mothers and either immediately placing them in a previously arranged adoptive home (25.3 percent of the adoptions) or placing them in an orphanage from which they were available for adoption. Of those placed in an orphanage, 50.6 per cent were placed with an adoptive family in the first year, 12.8 per cent were placed with an adoptive family in the second year, and 11.3 per cent were placed after the age of 2.

Within each of these age-of-transfer groups, analyses were conducted to ascertain whether the biological parents' convictions were related to male-adoptee conviction. Similar significant positive relations were observed at each transfer age. Age of transfer did not interact with genetic influence so as to alter significantly the relations observed with the full population. It should be noted that there was a statistically significant tendency for a high level of adoptee criminality to be associated with more time spent in an orphanage awaiting adoption. This effect was true for males only.

The operational definition of criminal behavior in this study included only court convictions for criminal law offenses. (We completed an analysis of police arrest data using a subsample of this adoption cohort and obtained very similar results; see Hutchings and Mednick, 1977.) Use of the conviction definition has some advantages. We are relatively certain that the individual actually committed the offense recorded. Court convictions imply a high threshold for inclusion; minor offenses are less likely to result in court conviction. There are also disadvantages. The subject's behavior goes through several screening points. Someone must make a complaint to the police, or the police must happen on the scene of the crime. The police must decide that a crime has been committed and apprehend the culprit. The prosecuting attorney must decide that the evidence is sufficient to warrant a court trial. The court must then find the culprit guilty. There are decision points all along the way that may result in the elimination of individuals who have actually committed offenses against the criminal code. Such individuals might then end up among our control subjects (assuming that they do not also commit offenses for which they are convicted). In this case they add error to the analyses. Data comparing self-reports of crimes and official records of crimes suggest, however, that whereas only a fraction of crimes committed by an individual are noted by the police, those who 'self-report' more crimes have more crimes recorded in the official registers. Those offenders who are not found in the official registers have typically committed very few and very minor offenses (Christie et al., 1965).

Labeling of the adoptee

The advantage of the adoption method is the good separation of genetic and rearing contributions to the adoptee's development. But the adoptions were not

arranged as controlled experiments. The adoption agency's prime concern was the welfare of the adoptee and the adoptive parents. Prospective adoptive parents were routinely informed about the criminal convictions of the biological parents. This could result in the labeling of the adoptee; this in turn might affect the likelihood that the adoptee would commit criminal acts. Thus the convictions of the biological parents might have had an environmental impact on the adoptee via the reactions of the adoptive parents.

We examined one hypothesis related to this possibility. If the biological parents received a criminal conviction before the adoption, it is likely that the adoptive parents were so informed; if the biological parents' first conviction occurred after the adoption, the adoptive parents could not have been informed. Of the convicted biological parents, 37 per cent had received their first conviction before the adoption took place. In these cases, the adoptive parents were likely to have been informed of this criminal record. In 63 per cent of the cases the first conviction occurred after the adoption; in these cases the conviction information could *not* have been transmitted to the adoptive parents. For all convicted biological parents, the probability of a conviction in their adopted-away son was 15.9 per cent. In cases in which the biological parent was first convicted before adoption, 15.6 per cent of the male adoptees were convicted. In cases in which the biological parent was convicted after the adoption, 16.1 per cent of the male adoptees were convicted. In the case of female adoptees, these figures were 4 per cent and 4 per cent.

These analyses utilized convictions. In a previous analysis with a large subsample of this population a very similar result was obtained by studying the effect of timing of the initial arrest of the biological father (Hutchings and Mednick, 1977). Additional analyses by type or severity of crime revealed no effect of the adoptive parents' having been informed of the convictions of the biological parents. The fact that the adoptive parents had been informed of the biological parents' convictions did not alter the likelihood that the adoptive son would be convicted. This result should not be interpreted as suggesting that labeling (as defined) had no effect on the adoptees' lives. It did not, however, affect the probability that the adoptee would be convicted for a criminal act.

Denmark as a research site

This project was carried out in Denmark; on most crime-related social dimensions, Denmark must rank among the most homogeneous of the Western nations. This fact may have implications for the interpretation of this study. An environment with low variability permits better expression of existing genetic tendencies in individuals living in that environment. This factor probably magnifies the expression of any genetic influence. At the same time, however, the Danish population probably has less genetic variability than some Western nations; this, of course, would minimize the expression of genetic influence in

research conducted in Denmark. It is very likely impossible to balance these two considerations quantitatively. We are reassured regarding the generality of our findings by similar results in adoption studies in Sweden and Iowa (Bohman et al., 1982; Cadoret, 1978; Crowe, 1975).

SUMMARY AND CONCLUSIONS

In a total population of adoptions, we noted a relation between biological-parent criminal convictions and criminal convictions in their adopted-away children. The relation is particularly strong for *chronic* adoptee and biological-parent offenders. There was no evidence that the type of biological-parent conviction was related to the type of adoptee conviction. A number of potentially confounding variables were considered; none of these proved sufficient to explain the genetic relation. We conclude that some factor is transmitted by convicted parents that increases the likelihood that their children will be convicted for criminal law offenses. This is especially true of chronic offenders. Because the transmitted factor must be biological, this implies that biological factors are involved in the etiology of at least some criminal behavior.

Biological factors and their interaction with social variables may make useful contributions to our understanding of the causes of criminal behavior.

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12

Personality theory and the problem of criminality

H.J. Eysenck

INTRODUCTION

In psychiatry generally, the diathesis-stress model is widely accepted; it postulates a *predisposition* to develop certain types of mental illness, such as neurosis or psychosis, which is activated by certain environmental stress factors. A similar conception can be applied to criminality; certain types of personality may be more prone to react with anti-social or criminal behaviour to environmental factors of one kind or another. To say this is not to accept the notion of 'crime as destiny', to quote Lange's famous monograph in which he showed that identical twins are much more alike with respect to criminal conduct than are fraternal twins. There is no predestination about the fact that heredity, mediated through personality, plays some part in predisposing some people to act in an anti-social manner. Environment is equally important, and, as we shall see, it is the interaction between the two which is perhaps the most crucial factor.

Much of the research in this field has been episodic and following the principles of benevolent eclecticism; in this chapter we will rather adopt the method of looking at a general theory of anti-social behaviour, which makes predictions as to the type of personality expected to indulge in such conduct, and summarize the evidence relating to the theory. Before turning to the evidence, it will therefore be necessary to present in brief outline the theory in question (Eysenck, 1960, 1977). The reason for singling out the theory is, in the first place, that it has attracted far more research than any other, and secondly, that it is the only one which has tried to link together genetic factors, a causal theory, and personality in one general theory.

From *Applying Psychology to Imprisonment* (eds B. McGurk, D. Thornton and M. Williams), pp. 30–1; 34–46. (London: HMSO, 1987.)