Journal of Criminal Law and Criminology

Volume 74
Issue 1 *Spring*

Article 4

Spring 1983

Social Class and Crime in an Adoption Cohort

Katherine Teilmann Van Dusen

Sarnoff A. Mednick

William F. Jr. Gabrielli

Barry Hutchings

0091-4169/83/7401-249
THE JOURNAL OF CRIMINAL LAW & CRIMINOLOGY
Vol. 74, No. 1

Printed in U.S.A.

SOCIAL CLASS AND CRIME IN AN ADOPTION COHORT*

KATHERINE TEILMANN VAN DUSEN**
SARNOFF A. MEDNICK***
WILLIAM F. GABRIELLI, JR.****
BARRY HUTCHINGS*****

I. INTRODUCTION

It is by now trite to say that most theories of crime and delinquency depend on the notion that crime is found primarily in the lower socio-economic classes. Much sociological research focuses on the crime/class relationship because it is so central to crime and delinquency theory. This has been especially true since the 1960's when the growing popularity of the self-report method of measuring delinquency called the basic relation between social class and delinquency into question.[1] A more recent study by Tittle, Villemez and Smith reviewed selected literature

* This research is supported by USPHS grant No. MH 31433 from the Center for Study of Crime and

** Research Assistant Professor, Social Science Research Institute, University of Southern California, Ph.D., University of Southern California, 1976; B.A., California Southern University-L.A., 1972.

*** Professor of Psychology, Social Science Research Institute, University of Southern California; Director Psykologisk Institut, Kommune Hospitalet; Doctor of Medicine, University of Copenhagen, 1976; Ph.D., Northwestern University, 1954; M.A., Columbia University, 1950; B.S. City College of New York, 1949.

**** Research Associate Institute for Behavioral Genetics, University of Colorado at Boulder; Ph.D., University of Southern California, 1981; M.A., University of Southern California, 1981; B.A., California Southern University-Sacramento, 1977.

*****Associate Professor, University of Copenhagen; M. Phil., University of London, 1972; B.S.C., University of London, Birkbeck College, 1970.

[1] *See* M. GOLD, DELINQUENT BEHAVIOR IN AN AMERICAN CITY (1970); T. HIRSCHI, CAUSES OF DELINQUENCY (1969); Clark & Wenninger, *Socioeconomic Class and Area as Correlates of Illegal Behavior among Juveniles*, 27 AM. SOC. REV. 826 (1962); Reiss & Rhodes, *The Distribution of Juvenile Delinquency in the Social Class Structure*, 26 AM. SOC. REV. 720 (1961); Short & Nye, *Extent of Unrecorded Juvenile Delinquency: Tentative Conclusions*, 49 J. CRIM. L. CRIMINOLOGY & POLICE SCI. 296 (1958); *see also* Akers, *Socio-Economic Status and Delinquent Behavior: A Retest*, 1 J. RESEARCH CRIME & DELINQ. 38 (1964); Christie, *A Study of Self-Reported Crime*, in 2 SCANDIANAVIAN STUDIES IN CRIMINOLOGY (K. Christiansen ed. 1956); Dentler & Monroe, *The Family and Early Adolescent Conformity and Deviance*, 23 MARRIAGE & FAM. LIVING 241 (1961); Elmhorn, *Study in Self-Reported Delinquency Among School Children in Stockholm*, in 2 SCANDIANAVIAN STUDIES IN CRIMINOLOGY (K. Christiansen ed. 1956); Empey & Erickson, *Hidden*

and concluded that there is not now, nor perhaps has there ever been, a relation between class and delinquency.[2]

The Tittle article, together with rebuttals to it,[3] have revived the debate. Our research adds a new dimension; it notes a relation between class and criminality and suggests that both environmental and genetic factors are responsible for that relation. To date, there have been no published studies which separate, empirically, the environmental and hereditary social class influences that might affect the probability of criminal behavior.

Recent evidence has accumulated suggesting that the biological characteristics which increase the probability of criminal behavior can be genetically transmitted. In family studies, for example, a parent's criminal involvement is a good predictor of a child's criminal involvement.[4] Moreover, identical twins have been found to be more concordant for criminal behavior than fraternal twins.[5] Finally, a child who has been adopted at or near birth but has had no contact with its biological father has a higher likelihood of exhibiting criminal behavior if its biological father is or was a criminal.[6] The issues raised by this evidence led us to the present study since each of these findings might be partially explained by genetic processes.

II. METHOD

A. THE PRESENT STUDY

The purpose of this study is to test the hypothesis that there is both a hereditary and an environmental component to the relation of social class and criminality. This analysis is possible because of the availability of data on a population of adoptees in Denmark. Accurate and complete registers exist for both the adoptees and their biological and adoptive parents. Social class-related hereditary influences from biological parents may thus be separated from social class-related environmental influences from adoptive parents and their independent relationships to crime observed.

Delinquency and Social Status, 44 SOCIAL FORCES 546 (1966); Slocum & Stone, *Family Culture Patterns and Delinquent-Type Behavior: A Retest*, 25 MARRIAGE & FAM. LIVING 202 (1963).

[2] Tittle, Villemez & Smith, *The Myth of Social Class and Criminality: An Empirical Assessment of the Empirical Evidence*, 43 AM. SOC. REV. 643 (1978).

[3] *See* Braithwaite, *The Myth of Social Class and Criminality Reconsidered*, 46 AM. SOC. REV. 36 (1981); Clelland & Carter, *The New Myth of Class and Crime*, 18 CRIMINOLOGY 319 (1980).

[4] *See* D. WEST & D. FARRINGTON, WHO BECOMES DELINQUENT? 33 (1973).

[5] Christiansen, *A Preliminary Study of Criminality Among Twins*, in BIOSOCIAL BASES OF CRIMINAL BEHAVIOR 89 (1977).

[6] *See* Mednick & Volavka, *Biology and Crime*, in 2 CRIME AND JUSTICE: AN ANNUAL REVIEW OF RESEARCH 85 (1980).

B. SELF-REPORT VERSUS OFFICIAL RECORDS

Most studies that test the relationship of social class and crime using official criminality as a dependent variable suffer from sampling problems. The earlier studies typically used samples of adjudicated and incarcerated delinquents and compared them with samples of adolescent students, who were assumed to be non-delinquent.[7] Problems of bias pervaded this approach. Official records were used in spite of these problems because serious criminality is such a relatively rare event that a random sample of persons from the general population would not yield enough "cases" of criminality to allow meaningful analysis unless a prohibitively large sample was drawn.

The self-report method of measuring criminality was introduced, in part, to address these sampling problems. The new approach yielded more variability in criminality among youth, while using samples of modest size, than was possible using police or court records. The self-report method, however, brought with it new problems. Self-report instruments were usually administered in schoolrooms.[8] Lower class and seriously delinquent children were therefore excluded from the sample through truancy, dropout and illiteracy. As a result, any association between class and delinquency was attenuated. Another common problem has been that United States self-report studies often sample only Anglo youth,[9] thereby eliminating a large segment of the lower social classes from the analysis. These factors may partially explain the failure of self-report studies to find a crime/social class relationship.

The use of "official" criminality (including arrest data) as a dependent variable in the class/crime relation has specifically come under strong attack.[10] Critics conclude that what little evidence exists for a class/criminality relation rests on analysis of official data which reflect class and race biases inherent in the criminal justice system. Further, they suggest that in more recent studies, even this flawed evidence has disappeared as system bias has decreased.

Several compelling arguments and empirical analyses have countered these claims. The rebuttals[11] stress the weaknesses of self-report studies, as discussed above.[12] In addition, the point is made that those

---

7 *See, e.g.*, S. GLUECK & E. GLUECK, UNRAVELING JUVENILE DELINQUENCY (1950).

8 *See* T. HIRSCHI, *supra* note 1; Krohn, Akers, Radosevich & Lanza-Kaduce, *Social Status and Deviance: Class Context of School, Social Status and Delinquent Behavior*, 18 CRIMINOLOGY 303 (1980); Short & Nye, *supra* note 1, at 296.

9 *See* Short & Nye, *supra* note 1, at 296; Gold, *Undetected Delinquent Behavior*, 3 J. RESEARCH CRIME & DELINQ. 27 (1966).

10 *See* Tittle, Villemez & Smith, *supra* note 2, at 643.

11 *See* Clelland & Carter, *supra* note 3, at 319.

12 *See supra* note 8 and accompanying text.

who criticized use of "official" data have by their methods necessarily excluded ecological studies from their analyses. Interestingly, ecological studies[13] and victimization studies[14] tend to support the class/delinquency association.

A review of the literature also indicates that the more frequent and serious offenders are those who are most likely to be officially recorded.[15] In addition, self-report studies have been found to yield offense distributions that are highly skewed toward trivial offenses.[16] Even when categories on self-report instruments seem to imply serious offenses, they actually allow reports of trivial offenses to be included.[17] The heavy representation of trivial offenses would necessarily attenuate any class/delinquency relationship that might actually exist.

Finally, an extensive review of the class/criminality literature reveals: (1) when considering all self-report studies, the class/criminality relation is supported and (2) the self-report studies that do not support it exaggerate the amount of delinquency committed by the middle class.[18]

These arguments indicate to us that the class/criminality association issue is far from settled. In fact, if serious crime is the focus, it is arguable that official records are actually more appropriate in this analysis than self-reports.

C. THE POPULATION OF THIS STUDY

As suggested above, one of the major problems with using official data for serious criminality in a general population is the lack of variability in the number and type of arrests and convictions.[19] Serious offenses in the general population are too rare to allow analysis using such offenses. The problem is usually solved by taking a nonrepresentative

---

[13] *See* G. NETTLER, EXPLAINING CRIME (1978); C. SHAW & H. MCKAY, JUVENILE DELINQUENCY AND URBAN AREAS (1969); Boggs, *Urban Crime Patterns*, 30 AM. SOC. REV. 899 (1965); Schuessler, *Components of Variations in City Crime Rates*, 9 SOC. PROBS. 314 (1962).

[14] *See* P. ENNIS, CRIMINAL VICTIMIZATION IN THE UNITED STATES: A REPORT OF A NATIONAL SURVEY (1967); Hindelang, *Race and Involvement in Common Law Personal Crimes*, 43 AM. SOC. REV. 93 (1978); Krohn, Akers, Radosevich & Lanza-Kaduce, *supra* note 8, at 303.

[15] *See, e.g.*, T. HIRSCHI, *supra* note 1; R. KORNHAUSER, SOCIAL SOURCES OF DELINQUENCY: AN APPRAISAL OF ANALYTIC MODELS (1978); Erickson & Empey, *Court Records, Undetected Delinquency and Decisionmaking*, 54 J. CRIM. L. CRIMINOLOGY & POLICE SCI. 456 (1963); Gold, *supra* note 9, at 27; Murphy, Shirley & Witmer, *The Incidence of Hidden Delinquency*, 16 AM. J. ORTHOPSYCHIATRY 686 (1946).

[16] *See* Clelland & Carter, *supra* note 3, at 319.

[17] This was recognized by Gold who tried to reduce this problem through interview probing. *See* Gold, *supra* note 9, at 27. However, Gold's case descriptions reveal relatively nonserious offenses even at the most extreme end of his continuum of seriousness.

[18] *See* Clelland & Carter, *supra* note 3, at 319.

[19] *See supra* note 10 and accompanying text.

sample of the population that focuses on officially noted offenders. This method thus eliminates a very large portion of the offending and non-offending populations. A methodologically superior, but usually prohibitively expensive, solution is to take a sample large enough to allow sufficient variability in criminal or delinquent behavior to support valid analysis. The current study uses an entire, large, adoption cohort that considerably mitigates these sampling problems.

One of the major difficulties of studies using self-reported crime or delinquency data is the incompleteness of their samples. That is, this method usually misses the lowest classes, the most truant, the dropouts, in other words, the most delinquent. Again, the use of an entire cohort ameliorates this problem.

The current data set is based on non-familial adoptions that took place between 1924 and 1947 in the Kingdom of Denmark. "Non-familial" here means adoptions by persons not biologically related to the child. There were 14,427 such adoptions during that period, 6,700 involving male children and 7,727 involving female children.

D. CRIMINALITY IDENTIFICATION

Court conviction records were obtained for the adoptee, biological parents and adoptive parents from the office of the police chief in the region in which the subject was born. The criminal records in Denmark have been described as "probably the most thorough, comprehensive and accurate in the Western World."[20] In order to obtain this Conviction Register it was necessary to know the place and date of birth, as well as the name of the subject. Some subjects, primarily the biological fathers, were lost to this part of the study because information regarding their birthplaces was missing. Almost all adoptive parents, biological mothers and the adoptees were fully identified. The search of the conviction records was completed between 1976 and 1978 when the adoptees were between twenty-nine and fifty-two years of age. The completeness of this population allows the full range of criminality to be included in the analysis.

A sample population from Denmark has certain advantages. The major American study addressing the present issue is a Philadelphia study which also includes the advantage of population completeness.[21] The inclusion of blacks in that analysis, however, raises new problems. The study attempted to separate the effects of race and class and con-

[20] Wolfgang, *Foreword* to S. MEDNICK & K. CHRISTIANSEN (EDS.), BIOSOCIAL BASES OF CRIMINAL BEHAVIOR v-vi (1977).

[21] M. WOLFGANG, R. FIGLIO & T. SELLIN, DELINQUENCY IN A BIRTH COHORT (1972).

cluded that race has a stronger effect on delinquency than does class.[22] As the investigators recognized, it is difficult to know if this conclusion is valid since blacks probably represent the lowest end of the class continuum. It becomes impossible, therefore, to know what the "true" class effect is, aside from race. The present analysis is based on a racially homogeneous Danish cohort, which reduces this problem.

E. SOCIAL CLASS MEASURES

Social class measures used in class/crime literature have usually been inadequate. Often, children have reported their parents' occupations[23] or aggregate income levels have been applied to individuals within neighborhoods.[24] Both procedures are fraught with reliability problems.

Social class status in this study was rated individually from occupational title by a method adapted from one devised by Svalastoga.[25] This measure, based on prestige ratings, yields an excellent indicator of social status in Denmark. The scale, as adapted, ranges from zero to seven. Some examples of occupational titles associated with each class level are given in Table 1. For purposes of data analysis, the seven-point scale was divided into high, middle and low groups as shown in Table 1.

---

22 *Id.*

23 *See* T. HIRSCHI, *supra* note 1; Short & Nye, *supra* note 1, at 296.

24 *See* M. WOLFGANG, R. FIGLIO & T. SELLIN, *supra* note 21.

25 K. SVALASTOGA, PRESTIGE, CLASS AND MOBILITY (1959).

TABLE 1

EXAMPLES OF OCCUPATIONAL TITLES ASSOCIATED WITH EACH OF THE SOCIAL STATUS LEVELS[a]

Class Level:	Examples:
Low	0. Unskilled worker I: shoeshiner, agricultural laborer, maid, low level factory worker.
Low	1. Unskilled worker II: truck or taxidriver (not owner of vehicle), waiter (small restaurant), small fisherman, janitor, door keeper.
Low	2. Skilled worker: not self-employed, carpenter, mailman, street car conductor, shop assistant.
Medium	3. Subordinate clerk: minor responsibility, clerk, proof-reader, salesman.
Medium	4. Skilled craftsman: (self-employed with 0-3 skilled employees) factory foreman, grocer, policeman, lower level customs official, baker, nursery school teacher, journalist.
Medium	5. Owner of moderate-sized business—semi-professional: masterprinter, bookkeeper, hotel proprietor, accountant, librarian, elementary school teacher.
High	6. Professional—Manager in larger business: wholesale merchant, postmaster, editor, school principal, department head in larger firm, minister, member of parliament, engineer, general practitioner physician.
High	7. Big business director, supervising professional: chief of police, colonel in army, physician with high standing, managing director, professor, shipowner.

[a]K. SVALASTOGA, PRESTIGE, CLASS AND MOBILITY (1959).

III. RESULTS

Table 2 presents the social class distribution for biological and adoptive parents. As might be expected, the adoptive parents (hereinafter AP) are from a higher social class level than the biological parents (hereinafter BP). The class of the AP and BP correlate 0.14 ($P < 001$). This correlation is apparently due to the attempt of the adoption agency to match BP and AP.

TABLE 2

SOCIAL CLASS DISTRIBUTION OF BIOLOGICAL AND ADOPTIVE FAMILIES

Social Class[a]		Family	
		Biological	Adoption
High	N	2068	5230
	Percent	(16.6%)	(37.7%)
Middle	N	5202	4888
	Percent	(41.7%)	(35.2%)
Low	N	5206	3767
	Percent	(41.7%)	(27.1%)
Total	N	12,476	13,885
	Percent	(100.0%)	(100.0%)

[a]The family social class represents the social status of the higher of the two parents.

Table 3 demonstrates the basic relation between parents' social class and adoptees' criminality. The relation exists when considering the social class of biological parents as well as the social class of adoptive parents. It holds true for both male and female adoptees.

TABLE 3

PERCENT ADOPTED CHILDREN WITH CRIMINAL CONVICTIONS AS A FUNCTION OF PARENTS' SOCIAL CLASS BY SEX OF ADOPTEES

	Biological Parents		Adoptive Parents	
Social Class	Male Adoptees	Female Adoptees	Male Adoptees	Female Adoptees
High	11.64	0.99	11.58	2.01
	(971)[a]	(1067)	(2099)	(2384)
Medium	14.31	2.56	15.62	2.43
	(2341)	(2691)	(1985)	(2264)
Low	16.00	2.95	17.19	3.19
	(2337)	(2691)	(1565)	(1726)

[a]Numbers in parentheses are numbers of individuals in each cell.

Of course, in all previous work on the crime/class relationship, the hereditary and environmental social class for the parents were identical because the children were usually raised by their biological parents. In order to compare our findings with those of other studies, we selected cases in which the adoptive and biological parents had the same social class. For this special group, we then examined the criminal conviction

rates for adoptees by the social class level of their parents. Table 4 indicates that under these conditions as well, the children's criminal conviction rates vary inversely with parental social class. To express this relationship in the form of a *gamma*, the child's criminality was recoded at 0, 1, 2, 3 or more criminal offenses. For males, the parental class/crime *gamma* was -.19 (SE = .05). For females the amount of criminality was too small to permit calculation of a reliable *gamma*.

TABLE 4

ADOPTEE CONVICTION RATES BY "PARENTAL" SOCIAL CLASS[a]

		Percent Adoptees With Criminal Convictions	
		Male Adoptees	Female Adoptees
"Parental" Social Class	High	9.3 (441)[b]	0.64 (467)
	Middle	15.29 (870)	1.84 (980)
	Low	18.04 (787)	3.02 (861)

[a]Includes only cases for which the biological parents' social class is the same as the adoptive parents' social class.
[b]Numbers in parentheses reflect cell total N.

Table 5 presents criminal conviction rates of the adoptive children as a joint function of the biological and adoptive parents' social classes. As noted in Table 3, the marginal values reveal that conviction rates in the adoptive sons vary as a function of both biological and adoptive parents' class level. At all three social class levels of adoptive parents, the adoptive sons' rate of criminal convictions varies inversely with the biological parents' social class. Moreover, at all three social class levels of biological parents, the adoptive sons' rate of criminal conviction varies inversely with the adoptive parents' social class.

TABLE 5

PERCENT ADOPTED CHILDREN WITH CRIMINAL CONVICTIONS AS A FUNCTION OF ADOPTIVE AND BIOLOGICAL PARENTS' SOCIAL CLASS[a]

Adoptive Parents' Social Class	Male Adoptees Biological Parents' Social Class				Female Adoptees Biological Parents' Social Class			
	High	Middle	Low	Total	High	Middle	Low	Total
High	9.30 (441)	11.52 (903)	12.98 (775)	11.58 (2099)	0.64 (467)	2.56 (1056)	2.09 (861)	2.01 (2384)
Middle	13.44 (320)	15.29 (870)	16.86 (795)	15.62 (1985)	0.61 (330)	1.84 (980)	3.67 (954)	2.43 (2264)
Low	13.81 (210)	17.25 (568)	18.04 (787)	17.19 (1565)	2.38 (210)	3.66 (655)	3.02 (861)	3.19 (1726)
Total	11.64 (971)	14.31 (2341)	16.00 (2337)	14.55 (5649)	0.99 (1067)	2.56 (2691)	2.95 (2676)	2.48 (6374)

[a]Tabled values are percent adoptees with criminal convictions. Numbers in parentheses are cell total N's.

A. THE MODELS

The data presented in Table 5 constitute the core of the study. While data on a population generally do not require inferential statistical treatment, in this case inferential analyses were completed to permit us to estimate the size of the effects and to establish whether we could generalize to other adoption cohorts.

Our interest in this exposition is to determine relationships, first, between the social class of the adoptive parents and the adoptees' criminality and, second, between the social class of biological parents and the criminality of their separated offspring. Both determinations must account for the relationship between rearing and biological social class. The most appropriate method of analysis for this problem, especially given the dichotomous and highly skewed distribution for the "crime" variable, is a log-linear analysis, using Fay and Goodman's ECTA program.

Our general strategy was to fit a succession of models to the observed cell frequencies, beginning with a baseline model to which all others were compared. The baseline model consisted of a fit of the joint marginals for biological and environmental social class (B and E respectively). In conventional notation this model can be represented by the following:

[C] [BE] Baseline Model

This model generates expected cell frequencies based on the knowledge of the overall distribution of criminal convictions and on the joint distribution of the two sources of social class. Note that this model takes into account the relationship between biological and adoptive social class, but sets the relationships between social class and crime to zero. If there is no systematic relationship between either type of social class and crime, and if there is not substantial random fluctuation, the fit of this model would be very close to the observed data. In the event of an imperfect fit using the baseline model (i.e., a significant chi square), models adding environmental or adoptive social class, then biological social class and then both were fitted. These models are represented by the following:

[EC] [BE] Environmental Social Class Model

[BC] [BE] Biological Social Class Model

[EC] [BC] [BE] Complete Additive Model

In each case, one or more relationships between social class and criminal convictions are released from the assumption that they are zero, leaving them free to improve the fit over the baseline model. Of course, the baseline marginals remain in each model.

The relative contribution to the model for which each addition can

be credited was then assessed by subtracting the new model's likelihood ratio chi square from the analogous baseline chi square, thus producing a Reduced L^2. Using the degrees of freedom lost by the addition of new marginals to the model, the change in chi square can be assessed by standard criteria of size and stability.

We will first consider the model for the adoptive sons demonstrated in Table 6. The fit of the baseline model ([C][BE]) to the observed frequencies yielded a likelihood ratio chi square of 34.16 (8 df, $p < .001$). The model including the environment and crime marginals ([BE] [EC]) improves the fit substantially. The chi square representing the environmental model is 8.15 (6 df, p = n.s.); the difference between the baseline model chi square and the environmental model chi square (reduced L^2) is 26.01 (2 df, $p < .001$). The model including biology and crime marginals ([BE][BC]) also improves the fit. The chi square representing the biology model is 23.15 (6 df, $p < .001$); the difference between the baseline model chi square and the biological model chi square is 11.01 (2 df, $p < .01$). When the model includes both biological and environmental components the chi square is .33 (4 df, n.s.) indicating a very close fit with the observed frequencies. It is clear from this that there are no significant interaction effects.

TABLE 6

LOGIT ANALYSIS: ENVIRONMENTAL AND BIOLOGICAL SOCIAL CLASS INFLUENCE ON CRIME

Adopted Sons					
Direct L^2	DF	Model	Reduced L^2	DF	Goodman's R^2
34.16[a]	8	Baseline [C] [BE]			100.0
8.15	6	Environment [EC]	26.01[a]	2	74.0
23.15[a]	6	Biology [BC]	11.01[b]	2	34.2
0.33	4	Environment and Biology [BC] [EC]	33.83[a]	4	99.1
		Biology given Environment [BC]|[EC]	7.82[b]	2	22.2
		Environment given Biology [EC]|[BC]	22.82[b]	2	73.0

[a] $p < .001$
[b] $p < .01$

Finally, we can calculate the chi square for the biological effect, given the environmental effect, by subtracting the chi square for the environmental model from the chi square of the full additive model; similarly, the environmental effect, given the biological effect, can be

calculated. The result of these calculations can also be seen in Table 6. In both cases the resulting chi square is significant; that is, the environment shows a significant effect given biology and biology shows a significant effect given the environment.

These results indicate that the biological parents' social class *and* the adoptive parents' social class are significantly related to the adoptees' level of criminality. The relationship of the adoptive parents' social class to the adoptees' criminality is greater than that of the biological parents.

Table 5 also presents the adoptive daughters' criminal convictions as a joint function of BP and AP social class. First, it should be noted that they have lower levels of criminal activity than the adoptive sons. The marginal values indicate that conviction rates in the adoptive daughters vary as a function of both biological and adoptive parents' class level.

The models fitted for the adoptive sons were also applied to the adoptive daughters' criminality as demonstrated in Table 7. The fit of the baseline model ([C][BE]) to the observed frequencies yielded a likelihood ratio chi square of 27.67 (8 df, $p < .001$). The model including the joint environment and crime marginals ([BE][EC]) improves the fit. The chi square representing the environmental model is 22.08 (6 df, $p < .001$); the difference between the baseline model chi square and the environmental model chi square is 5.59 (2 df, n.s.).

TABLE 7

LOGIT ANALYSIS: ENVIRONMENTAL AND BIOLOGICAL SOCIAL CLASS INFLUENCE ON CRIME

Adopted Daughters					
Direct L^2	DF	Model	Reduced L^2	DF	Goodman's R^2
27.67[a]	8	Baseline [C] [BE]			100.0
22.08[a]	6	Environment [EC]	5.59	2	20.2
13.40[b]	6	Biology [BC]	14.27[c]	2	51.6
9.25	4	Environment and Biology [BC] [EC]	18.42[c]	4	66.6
		Biology given Environment [BC]/[EC]	12.83[c]	2	46.3
		Environment given Biology [EC]/[BC]	4.15	2	15.0

[a] $p < .005$
[b] $p < .05$
[c] $p < .01$

The model including the joint biology and crime marginals ([BE][BC]) improves the fit substantially. The chi square representing the biological model equals 13.40 (6 df, $p < .05$). The difference between the baseline model chi square and the biological model chi square is 14.27 (2 df, $p < .001$).

When the model includes both biological and environmental components but no interaction terms, the chi square suggests a poorer fit compared to the fit of this model for adopted sons. Inspection of Table 5, however, reveals that interpretable interactions are not apparent.

The two analyses presented suggest that:

(1) the social class of rearing environment has a measurable impact on the criminality of adoptees;

(2) there is a biological factor associated with lower social class and with criminality that may be genetically transmitted;

(3) for males, the environmental impact is larger than the biological, though both are substantial; and

(4) for females the biological factor is the more important.

B. TYPE OF CRIME

Similar analyses, based on data shown in Tables 8 and 9, were conducted for male adoptees with respect to more specific types of offenses; there were too few convicted daughters to allow such an analysis for females. The results for property offenses closely mirrored those reported for Table 5. Both environmental and biological factors contributed significantly to the fit of this model, again, with the environment being a stronger influence than the biological. In addition, the combined model (using both biological and environmental factors), without interaction terms produces an almost perfect fit with the observed frequencies.

TABLE 8

PERCENT ADOPTIVE SONS WITH PROPERTY OFFENSE CONVICTIONS AS A FUNCTION OF ADOPTIVE AND BIOLOGICAL PARENT SOCIAL CLASS[a]

Adoptive Parent Social Class	Biological Parent Social Class: High	Middle	Low	Total
High	7.47 (442)	8.97 (903)	9.80 (755)	8.95 (2100)
Middle	9.38 (320)	13.32 (871)	14.45 (796)	13.14 (1987)
Low	11.43 (210)	14.26 (568)	15.23 (788)	14.37 (1566)
Total	8.95 (972)	11.87 (2342)	13.21 (2339)	11.92 (5653)

[a]Tabled values are percent adoptees with property offense convictions. Numbers in parentheses are cell total N's.

For violent offenses (Table 9), the fit of the baseline model is very close to the observed frequencies (chi square = 5.04, 3 df, p = .17), suggesting that neither the biological nor the environmental factors contributed significantly to the adopted sons' violent behavior. Because of the small number of violent offenders, the high and middle class groups were merged in Table 9.

TABLE 9

PERCENT OF ADOPTIVE SONS WITH VIOLENT OFFENSE CONVICTIONS AS A FUNCTION OF ADOPTIVE AND BIOLOGICAL PARENT SOCIAL CLASS[a]

Adoptive Parent Social Class	Biological Parent Social Class: High + Middle	Low	Total
High + Middle	2.37 (2536)	3.42 (1551)	2.76 (4087)
Low	3.47 (778)	3.05 (788)	3.26 (1566)
Total	2.63 (3314)	3.29 (2339)	2.90 (5653)

[a]Tabled values are percent of adoptees with violent offense convictions. Numbers in parentheses are cell total N's.

IV. DISCUSSION

We have found that registered criminal convictions are more prevalent in the lower classes. This replicates the results of many United States studies and of another population study from Denmark.[26] The Danish study is particularly important for reporting this relationship on a birth cohort of *all* men born in Copenhagen between 1944 and 1947 (N = 31,434). We can therefore conclude that the class/crime relationship is not specific to adoptees. We should also mention that the relationship is continuous and not only due to a concentration of crime in the lowest class.[27] In addition, the extent of the relationship (*gamma* = −.19) is at about the level of earlier reports from American samples. In order to help interpret this *gamma* it should be noted that while there is a lower class in Denmark, the advanced social-welfare system has significantly reduced the financial discrepancy between classes, at least as compared to the United States.

The results of this study indicate that the class/crime relationship is influenced by two factors. Genetic factors associated with lower class origins account for a significant portion of crime variance, if controlling

[26] *See* Moffitt, Gabrielli, Mednick & Schulsinger, *IQ, Socioeconomic Status, and Delinquency*, 90 J. ABNORMAL PSYCHOLOGY 152 (1981).

[27] Johnson suggests that crime is not characteristic of the entire range of lower class but rather is concentrated in the very low class, which he terms the under class. *See* R. JOHNSON, JUVENILE DELINQUENCY AND ITS ORIGINS: AN INTEGRATED THEORETICAL APPROACH (1979).

for adoptive social class. Social class of the adoptive parents, which is independent of genetic factors, also influences the probability that a child will later engage in criminal behavior. To our knowledge this is the first empirical demonstration that the previously reported social class effect is indeed related to the *experience* of lower class upbringing. Inspection of Tables 5 and 8 suggests that for males in this population, the environmental influence is somewhat more important than the genetic influence.

In Tables 5 and 8 it may also be observed that favorable environmental influences seem capable of compensating, to some degree, for less fortunate genetically transmitted characteristics. Criminogenic influences of low social class biological origins can be offset by a middle class environment. The reverse is also true; low rearing social class is much less criminogenic for individuals born to high social class biological parents than for those born to low social class biological parents. These results may have implications for adoption placement policy. The results could also have implications for theories of the etiology of criminal behavior.

While for the male adoptees the environmental social class factors are stronger criminogenic influences than the genetic social class factors, the reverse is true for the female adoptees. This is consonant with earlier evidence indicating that male children are more sensitive to criminogenic environmental influences associated with social class status, such as unstable family life[28] and parental separation.[29]

A. BIOLOGICAL AND ENVIRONMENTAL CLASS CORRELATION

We have indicated that there is a correlation between the social class of the biological and the adoptive parents ($r = .14$). While this is not a very large correlation, it is of sufficient magnitude relative to the principal effects of interest here that it cannot be ignored.

The relation was, of course, taken into account in specifying the baseline model. This method is equivalent to an analogous statistical control in a multiple regression analysis; that is, it is an accepted method but is not perfect. It is impossible to control the effects of this covariation with complete confidence that the remaining effects of interest are pure. In this case, however, visual inspection of Table 5 is reassuring. The table demonstrates that within each category of environmental social

---

28 *See* B. Mednick, Longitudinal Studies of Biosocial Factors in Crime (1983) (final report to the National Institute of Justice).

29 *See* Mednick, Schulsinger, Teasdale, Schulsinger, Venables & Rock, *Schizophrenia in High-Risk Children: Sex Differences in Predisposing Factors*, in COGNITIVE DEFECTS IN THE DEVELOPMENT OF MENTAL ILLNESS (G. Serban ed. 1978); *see also* E. MACCOBY & C. JACKLIN, THE PSYCHOLOGY OF SEX DIFFERENCES (1974).

class there is an incremental percentage increase in the number convicted for each level of biological social class. The same is true when environmental social class is controlled for biological social class. This would not be the case if the "effect" observed earlier were only an artifact of the covariation between the two "independent variables."[30]

B. SITE EFFECTS

The results obtained in this study may have been influenced by the fact that the adoptions took place in Denmark. Denmark ranks among the more homogeneous western nations with respect to social, economic and most other deviance-related environmental dimensions. Its homogeneity has implications for the interpretation of the genetic findings.

The laboratory experimenter in behavior genetics reduces the variance attributable to environmental influences in an effort to explore behavioral differences between genetically differentiated strains. The less the environmental variance, the easier it is to interpret existing strain behavior differences as genetically inspired. As environmental variance increases, the strain difference effects become more and more masked. The researcher in human behavior genetics operates with considerably reduced or, more often, no control over the variability of the subject's environment. The extent of variability in a natural milieu, in our case Denmark, may markedly influence the extent to which existent genetic factors will be observed. As mentioned above, the amount of variability in Denmark for most known deviance-related environmental dimensions, is less than that of most Western countries. These arguments are especially relevant for anti-social behaviors because such behaviors are particularly sensitive to social inequalities.

Thus, the extent to which existing genetic predispositions to deviance are observed in any given empirical investigation depends on the study site's variability on critical dimensions. In a high variability site, existing genetic predispositions tend to be masked; in a low variability site, existing genetic predispositions are more readily expressed. Denmark is a relatively good environment in which to observe the expression of existing genetic factors. However, it is likely that the range of genetic variability is probably considerably lower in Denmark than it is in larger nations. As a result, extrapolation of our findings to different national circumstances must take these considerations into account.

C. GENETIC OR BIOLOGICAL?

We have ascribed to genetic factors the relationship between the

[30] "Independent variables" and "effects" are technically incorrect but convenient terms in the context of our use of log-linear techniques.

social class of the biological parent and the adoptees' criminality. One is justified in asking whether factors associated with the low social class of a biological mother, such as nutrition, may produce defects in the fetus which are reflected in the increased likelihood that the child will later engage in crime. Such a causal chain would, of course, reflect a biological, non-genetic relationship. It is known that social class is related to such negative perinatal[31] outcomes as low birth weight. We have studied the relationship between these negative perinatal outcomes and later anti-social behavior in a cohort (N = 9,125) born at a large metropolitan hospital in 1959-1961 in Denmark.[32] We have consistently found these negative perinatal outcomes to be related to later higher law abidance. That is, individuals who evidence anti-social behavior tend slightly, but not without statistical significance, to have experienced fewer perinatal difficulties. When only unmarried mothers in the perinatal cohort are considered, in order to make them more comparable to the biological mothers of the adoptees, no relationship is found between perinatal complications, including low birth weight, and later criminal behavior. These facts suggest that any increased perinatal stress suffered by the lower class biological mothers would probably not tend to increase the probability of their children later evidencing anti-social behavior.

D. Police Bias?

It has been suggested that at least a part of the class/crime relationship is the result of police bias producing a disproportionate number of arrests in the lower classes.[33] The police bias cited has been primarily racial or ethnic. In Denmark, these arguments are less relevant because the society is racially and ethnically homogeneous.

Police bias might influence these results if police were hesitant to arrest middle or upper class miscreants. It is difficult, however, to imagine how they might perceive the social class of an adoptee's biological parents. For this reason, the biological origins probably did not directly bias the behavior of the police. Criminologists' reports also suggest that in Denmark the rearing social class of potential arrestees does not influence police behavior significantly. Danish police officers have been noted to exercise less discretion than police officers in the United States. Furthermore, "the social status of police officers is comparatively high; they are regarded as being incorruptible."[34] It therefore seems unlikely

---

31 "Perinatal" refers to the period of time just before and just after birth—up to one year subsequent to birth.

32 B. Zachau-Christiansen & E. Ross, Babies: Human Development During the First Year (1975).

33 *See supra* note 8 and accompanying text.

34 *See* Christiansen, *supra* note 5, at 89.

that police bias was an important element in determining the relationship of the adoptee's criminality with either the social class of the biological or adoptive parents.

E. PRE-ADOPTION PERIOD?

For most of the adoptions in this study, the decision to give the child up for adoption was made prenatally by the biological mother. At birth the child was placed in a nursery and made available for adoption. The adoption agency then transferred the child to the adoptive home from this nursery. It is conceivable that the amount of time the infant spent in the nursery might be related to his or her later conviction record. Age at transfer, however, did not significantly influence the adopted children's conviction records ($r = .01$, n.s.).[35]

F. LABELLING EFFECTS?

One potentially confounding influence may be that adoptive parents were often aware of criminality in the adoptees' biological parents. The criminality in the biological parents was usually reported to prospective adoptive parents. This report might have produced adverse labelling effects. In order to test the influence of such disclosures, families in which the adoptive parents probably knew about the biological family's criminal history were compared with those in which the adoptive families could not know. If the biological parents' criminal careers began after the child was transferred to the adoptive family, this criminality information could not have been given to the adoptive parents. On the other hand, in cases in which the criminality of one of the biological parents was officially registered before the transfer, the information probably was given to the adoptive parents. Of the 1,954 male adoptees who committed some crime, 697 had biological parents who were convicted before the child was transferred. Of these 697 sons, 24.3% were later convicted themselves for an offense. Of the remaining 1,257 biological parents who were convicted of their first offense after the child was adopted, 25.4% of the sons were later convicted of an offense. Knowledge by the adoptive parents that the biological parents committed an offense apparently did not influence the likelihood of criminal behavior in their sons.

V. CONCLUSION

The results of this study indicate that social class is related nega-

[35] This same result was earlier reported for a small portion of this same population. *See* Hutchings & Mednick, *Criminality in Adoptive and Biological Parents of Registered Male Criminal Adoptees: A Pilot Study*, in BIOSOCIAL BASES OF CRIMINAL BEHAVIOR (1977).

tively to criminal convictions. The study tested and confirmed the hypothesis that social class has both genetic and experiential components which predispose class members to criminal involvement. On the experiential side it is known that lower class status is connected to a variety of crime-associated characteristics such as less intellectual stimulation and lower educational attainment, greater disparity between opportunities and aspirations and greater likelihood of criminal associations. On the genetic side, we know less about social class correlations with heritable biological factors which might predispose to crime. In this context we will be examining autonomic nervous system characteristics which may be heritable, as well as class- and crime-related characteristics. Other candidates for consideration as mediating variables are biological factors related to intelligence and temperament.

In this study, the findings for the male adoptees differed somewhat from those for the females. For the males, the environmental social class seemed to have a stronger effect than the biological social class. The additive model for the female adoptees did not fit as well as that for the males, implying some interaction effects. The pattern of the interaction effects, however, was uninterpretable. Nevertheless, the additive model did represent a substantial and significant improvement over the baseline model. Interestingly, for the females, the biological effect was stronger than the environmental effect and it was apparently stronger than the biological effect for the males.

The patterns observed, using all types of convictions, were mirrored by the patterns revealed when using only property offenses. However, the same was not true of the violent offenses. For these offenses, neither the biological nor the environmental social class was associated with convictions.

Finally, various potential alternative explanations for the findings were explored. This discussion included the potential influence of (1) carrying out the investigation in Denmark; (2) the slight correlation between biological and environmental social class; (3) the possibility that what we have ascribed to genetic effects were actually biological effects of some other type; (4) potential class bias by police in arresting offenders; (5) the variable length of time between birth and adoption; and (6) possible labelling effects due to revelation of the biological parents' criminal history to the adoptive parents. These problems were considered, but do not explain away the effects that are described in the paper.