

16 Prediction of criminality

Introduction

Here we attempt to predict criminality using a number of criteria of deprivation, either alone, with other family factors or with factors personal to the child. We then apply the multivariate statistical techniques of multiple regression, discriminant function and log-linear analysis.

In the 1950s there were several attempts to develop formulae which would give reasonably accurate predictions of delinquency, and more recently a number of workers in the United Kingdom have again taken up this theme, notably West and Farrington (1977) and Farrington and Tarling (1985). The limitations of prediction studies have been summarized by Rutter and Giller (1983), with two telling conclusions: many of the youths theoretically at high risk do not become delinquent, while a substantial minority apparently not at high risk do so.

The subjects and their offending

It is important to note that our social, family and child data, collected prior to offending, were independent of the subsequent data gathered about criminal offences. The research assistant who coded the criminal records had no access to other information about the individuals.

Method: statistical techniques

Single-factor prediction

One way to study predictive efficiency is to view potential predictors as screen measures. 'False positives' are those individuals wrongly identified as potential offenders, and 'false negatives' are those for whom a 'no offending' prediction proved false. For our purposes, 'sensitivity' refers to the capacity of a measure to select offenders as a percentage of all offenders; 'specificity' refers to the capacity to

select non-offenders as a percentage of all non-offenders. The percentage agreement, or overall accuracy, gives the sum of valid positives and valid negatives in relation to the total number of subjects.

Loeber and Dishion (1983) have tried to identify antecedents of delinquency which show good predictive validity. They attempted to improve prediction and identify principal predictors by developing a formula in percentage form for relative improvement over chance (RIOC) of the many predictors studied. They then ranked the predictors according to that improvement.

They found the best predictors of criminal behaviour were family management techniques, the child's previous conduct problems, parental criminality and the child's poor academic performance. For some analyses we have followed their model.

Two-factor prediction

This involves combining two explanatory variables, one of which is always deprivation. The other consists of a variety of family factors or those features personal to the child such as growth, measured intelligence, achievements and classroom behaviour. These data shown in Tables 16.1 to 16.4 were analysed by log-linear analysis.

Multiple regression analysis

We used a multiple regression model to highlight the most important items in a set of explanatory variables. The attractiveness of this method was that all the explanatory variables were looked at simultaneously and their relative importance and interrelationship could be examined. We analysed data for males and females together and then re-analysed that for males alone; we then selected sets of explanatory variables and used ratings of delinquency or criminality as a measure of performance. In this way we sought a set of weightings which, applied to the explanatory variables, would maximize the correlation between their combined effect on the one hand and the measure of performance on the other (Maxwell, 1977). Discriminant function analysis was also undertaken with the same sets of data (using a dichotomous dependent variable).

Initially we used social and family factors as explanatory

variables and found that they predicted only 10 per cent of the variance. Subsequently, the sets of independent variables were expanded to include the personal differences of behaviour at school, attitudes to school and ability measures.

Simple models

Prediction using a single predictive factor

The factors selected related to the home environment, to events in the child's life and to data on behavioural and intellectual ability measures collected in school. Tables 16.1 and 16.2 give the results from this and several other studies and, for each, the relative improvement over chance (RIOC). On comparing the findings, we discovered that the false negative rate was usually low, except when the screen was the criteria of multiple deprivation or the measure of neighbourhood crime. On the other hand, the false positive rate was low when the screen consisted of three or more criteria of deprivation. That suggests that the multiple deprivation criteria tend to select only individuals who do commit offences. Sensitivity proved to be highest when using any one of our criteria and specificity was particularly high when the criterion was of 'multiple deprivation', as we have defined it.

The overall agreement in all the longitudinal studies was high except when using truancy as a screen measure (Robins and Hill, 1966) and when the Newcastle single criterion of deprivation was employed.

We also explored the use of other family factors as predictors (Table 16.2). The false negative rates were low for family size and family interest in the child as reflected by school contact. The presence of three or more children in the family proved to be a moderate predictor with poor sensitivity but with good random improvement over chance; the good specificity probably reflects poor social circumstances in large families. The parents' interest in the children, as shown by school contact, also gave rise to high specificity and reasonable overall accuracy and a high random improvement over chance. This factor probably reflected the quality of parenting in the family.

The factors relating to the final year in junior school suggest that certain kinds of school data were remarkably good predictors of late delinquency. Some, such as the

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Another way history of the 2 adjusted by doing during childhood per cent of the 7 per cent of the quarter of the children predict less than from those who

intelligence and arithmetic quotients recorded at the 11-plus examination were totally objective and gave rise to high specificity, high percentage of correct predictions and good relative improvement over chance. The false negative rates were low for school achievements and the false positives were low for unreliable behaviour in the classroom. Some of the behaviour measures also proved to be good predictors. It seems that factors which reflected ability and scholastic achievements on the one hand and personality and temperament on the other were successful predictors, and others were reliability in the classroom, poor concentration and persistence at scholastic tasks. All showed good relative improvement over chance.

Data collected in the children's last statutory year at school were also used but are questionable predictors as the data were collected after some of the children had already committed offences. It was not surprising therefore that both poor school attendance and poor attitude to schoolwork showed a substantial improvement over chance in prediction. The latter also gave a low false negative rate and the former a moderately low false positive rate.

School predictors of adult criminality

An important question was whether judgements about children by school staff could predict adult criminality. When the children were 12 years of age they had been rated by teachers as to the likelihood of their becoming maladjusted or delinquent. Of 171 so rated 37 (21.6 per cent) later acquired a criminal record. Of the 558 otherwise rated, 50 (9 per cent) eventually offended. Thus, although the rates of adult criminality were more than twice as high in the group the teachers thought at risk, it would have been necessary to suspect five individuals for each offender.

Another way of looking at prediction is to study the later history of the 208 children who were considered to be maladjusted by doctors or to exhibit behavioural difficulties during childhood by teachers (Miller *et al.*, 1974). Some 24 per cent of that group acquired a criminal record against 7 per cent of children not rated as maladjusted, and over a quarter of the child population would have to be included to predict less than half the adult criminals. Looking backwards from those who were criminal, 43 per cent were predicted by

Table 16.1 Validity of predictors of delinquency

	'n'	False Negative	False Positive	Sensitivity	Specificity	Overall Agreement	RIOC ¹
Males: This Study							
Criteria of deprivation:							
One criterion	427	21.8	5.6	28.0	92.3	72.6	45.2
Two or more criteria	427	7.5	24.1	68.0	63.2	63.5	41.0
Neighbourhood crime (Newcastle Social Service 1979) ²	388	33.0	10.8	64.4	83.5	56.2	29.1
Other Studies							
Truancy (Robins and Hill, 1966)	296	10.8	28.0	57.9	62.2	61.1	26.2
Aggressiveness (Mulligan <i>et al.</i> , 1963)	2063	5.8	9.2	31.0	90.0	85.0	21.5
Teacher ratings (Wadsworth, 1979)	1798	9.9	14.6	27.4	83.1	75.5	11.2
Attitude to schoolwork (Farrington, 1979)	409	12.0	14.7	38.8	81.8	73.3	21.1
Troublesome (peer and teacher) (Farrington and West, 1971)	373	6.2	19.0	43.9	78.6	74.8	26.4
Parental disharmony							

Notes: 1. RIOC = relative improvement over chance.
2. Newcastle calculations assume zero attrition.

Table 16.2 Data from '1,000 Family Study'

	'n'	False Negative	False Positive	Sensitivity	Specificity	Overall Agreement	RIOC
Family Factors							
3+ children							

- Notes: 1. RIOC = relative improvement over chance.
2. Newcastle calculations assume zero attrition.

Table 16.2 Data from '1,000 Family Study'

	'n'	False Negative	False Positive	Sensitivity	Specificity	Overall Agreement	RIOC
Family Factors							
3+ children	427	10.3	22.9	45.3	79.1	66.6	39.2
Contact of family with school	303	10.2	19.0	57.0	84.1	70.7	46.3
Secondary School							
Score at 11-plus (dull = 90 or less)	356	16.6	13.2	49.6	80.3	70.2	33.5
Arithmetic quotient (100 or below)	358	9.8	15.1	59.3	80.0	74.6	43.1
Class ratings (bottom 20 per cent)	319	10.9	19.7	47.8	75.0	69.3	25.5
Poor reliability in class	317	24.0	10.1	45.7	81.9	66.0	29.9
Poor concentration/persistence	315	16.2	16.5	46.3	76.4	67.7	22.3
At 15 Years							
Poor attendance	299	16.4	12.0	49.5	82.2	71.6	36.3
Poor attitude to schoolwork	310	6.5	17.7	63.6	78.4	75.8	48.8

teachers and 56 per cent considered maladjusted. The insensitivity of these professional judgements is in line with reports from other research.

Neighbourhood factors and offending

So far we have described the relationship of intrafamilial influences and school assessments to offending. The literature has also underlined the effect of school and neighbourhood influences on behaviour (Power *et al.*, 1972; Gath *et al.*, 1977; Rutter *et al.*, 1979). We therefore looked for evidence in our study of any correlation between neighbourhood influences and offending.

Neighbourhood influences (Chapter 13) were then correlated with offending, and were highly significant for boys but not girls (Table 16.3). Yet, despite the high significance, the correlations were all low, the highest being with neighbourhood affluence, unemployment, adult drunkenness and crime. Similar results were obtained by chi square analysis.

Table 16.3 *Correlation of neighbourhood factors and offending*

	Male n=388		Female n=384	
	'r'	p	'r'	p
Neighbourhood affluence	0.19	< .001	0.12	< .01
Adult male unemployment	0.21	< .001	—	NS
Adult female unemployment	0.21	< .001	—	NS
Free school meals	0.18	< .001	—	NS
Adult crime	0.16	< .001	—	NS
Adult drunkenness	0.17	< .001	0.15	< .01
Families of concern to local authority	0.16	< .001	—	NS

Single-factor prediction in relation to sub-populations

So far we had studied single measures as predictors for the

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males in our study. The next question was the ability of such measures to predict criminality within the various degrees of deprivation in our families. Table 16.4 shows that the 'percentage correct' prediction of delinquency differed for each of the three sub-populations, supporting the hypothesis that predictor measures are variably efficient for different populations. For instance, dull intelligence, as represented by an IQ of 90 or less gave rise to a 77 per cent correct prediction in the non-deprived group, but only 61 per cent for the group in which there was some deprivation; whereas the criterion of three or more children in the family was similar for each of the three populations. For other predictor measures the most efficient level for one population differed from that for another.

Table 16.4 *Single-factor prediction: percentage correct in relation to different sub-populations*

	Non-Deprived % Correct	1 or 2 Criteria % Correct	3 or more Criteria % Correct
3+ children in family	67	62	65
Accidents by 5 yrs (2+)	69	52	61
(1+)	54	45	67
IQ at 11+ (dull < 90)	77	61	65
Arithmetic quotient at 11+	80	65	69
Reliability	67	61	64
Poor response in class	79	64	51
Poor concentration/persistence	74	69	53

Two-factor prediction: simple analysis — stress and protection

This is an extension of the previous theme with the population classified by two explanatory variables allowing a view of their joint influence. To do this, adult males were grouped into the three categories of deprivation in their family of origin. A series of complementary variables were then considered in sequence as derived from Tables 15.1-15.4

(pp. 283, 284 and 286). The usefulness of this method can be seen in relation to family size — where offending became more common as the number of children in the family increases and the degree of deprivation becomes more severe. There was therefore a considerable contrast between men coming from small non-deprived families and from large families with multiple deprivation, for only 17 per cent (36 of 214) from the former compared with 70 per cent (23 of 33) from the latter category became offenders. Nevertheless, in families with four or more children, prediction was only marginally better in multiply deprived families (70 per cent) when compared to the deprived (63 per cent).

Another potential predictor of offending consists of accidents in the first five years of life. Again, if the two extreme groups are compared, a combination of predictors is more efficient than a single predictor. From non-deprived families with three or more accidents, only 21 per cent of men became offenders, whereas from multiply deprived families 82 per cent did so. Accidents appeared to have a different predictive significance in non-deprived families and in deprived families.

A similar picture occurred with height at the age of three. Only 9 per cent (9 of 96) of the tall boys coming from a non-deprived background became delinquent as against 69 per cent of the short boys coming from multiply deprived families. While non-deprivation is protective in respect of poor growth, the reverse is not true. A similar explanation can be advanced for the distinction between poor growth in children from non-deprived homes compared to deprived ones. In the latter, poor physical growth may, in addition to a familial predisposition to short stature, have a basis in poor nutrition or psychological stunting, or both. It is for this reason that poor growth may be efficient as a joint predictor. We need better explanations of such associations, and suggest that those influences which were additional to deprivation represented other components of social and economic stress within the family. Less than average growth probably reflected both adverse social factors and poor nutrition. Fortunately, log-linear analysis allowed us to ascertain the independent contribution of each of these factors.

We also examined a series of personality/temperamental, intellectual, and educational achievement factors gathered

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when the children were 11 years of age. The combination of reliability in class and degree of deprivation appeared moderately efficient. Similar patterns were found with initiative and concentration/persistence, each in combination with family deprivation.

Intelligence at 11 years was a strong predictor, but absence of deprivation was not strongly protective in the face of poor intelligence. Good arithmetical ability at the 11-plus examination was also strongly protective against deprivation and interacted strongly with deprivation so that no deprivation and multiple deprivation had rates of 15 per cent (21 of 139) and 69 per cent (24 of 35) respectively. In other words, from a group of boys with an IQ exceeding 100 and no family deprivation, less than one in six were likely to offend, compared to seven out of ten of those with an IQ below 100 and from a deprived home.

Similarly, attitude to schoolwork and school attendance at the age of 15 appeared moderate predictors of offending in the non-deprived group and strong predictors in the multiply deprived group. However, these ratings were made after some of the individuals had already committed offences. Self-confidence proved a poor predictor. Neighbourhood influences combined with family deprivation were moderate predictors of offending. Nevertheless the data suggest that neighbourhood factors increase vulnerability to delinquency, irrespective of home circumstance. Thus 76 (37 per cent) of 204 males coming from neighbourhoods with the highest level of crime became offenders and of the 181 who came from deprived families in the same neighbourhood, 81 (45 per cent) became offenders. These data suggest that, in adolescence, the locality of residence was almost as effective in predicting delinquency as was family deprivation. But there was also interaction between high level of neighbourhood crime and family deprivation and, where they coexisted, 50 per cent of the youths became offenders, whereas without either only 14 per cent did so. Nevertheless, this was little better than using deprivation alone as a screen measure for, although the deprived families included fewer than 50 per cent of the male adolescent population, about 45 per cent of them became offenders.

Two-factor prediction: log-linear analysis

So far we have studied the effects of two explanatory variables by examining their percentage distribution when presented in tabular form. However, it is useful also to obtain information about the relative importance of these explanatory variables. For this we used log-linear analysis, treating deprivation as an explanatory variable.

The findings are presented in Table 16.5. Irrespective of

Table 16.5 Two factor prediction of male offending in Generation II

Log-Linear Analysis				
	Explanatory Variables	df	G2	Significance
(n=427)	Deprivation in Generation I	1	17.54	p < .01
	Family size at 5 years	1	20.32	p < .01
	(interaction)	1	4.01	p < .05
(n=356)	Deprivation in Generation I	1	6.83	p < .01
	IQ at 11+ examination	2	7.66	p < .01
(n=356)	Deprivation in Generation I	1	6.48	p < .05
	Arithmetic at 11+ examination	2	36.89	p < .01
(n=315)	Deprivation in Generation I	1	13.23	p < .01
	Concentration/persistence	1	12.11	p < .01
(n=324)	Deprivation in Generation I	1	11.65	p < .01
	Sociability	1	1.40	NS
(n=310)	Deprivation in Generation I	1	10.30	p < .01
	Attitude to schoolwork	2	36.03	p < .01
(n=310)	Deprivation in Generation I	1	17.87	p < .01
	Self-confidence	2	6.25	p < .05
(n=321)	Deprivation in Generation I	1	15.31	p < .01
	Reliable behaviour in class	1	10.12	p < .01
(n=298)	Deprivation in Generation I	1	7.66	p < .01
	School attendance at 15	2	30.48	p < .01
(n=388)	Deprivation in Generation I	1	12.88	p < .01
	Neighbourhood affluence	1	25.43	p < .01
(n=388)	Deprivation in Generation I	1	27.40	p < .01
	Neighbourhood male unemployment	1	6.14	p < .05
(n=388)	Deprivation in Generation I	1	29.27	p < .01
	Neighbourhood adult crime	1	5.48	p < .05

Note: Interaction significant in one analysis only.

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which other explanatory variable was used, family deprivation always had a significant effect. Family size too had a highly significant effect, but variables representing accidents and growth did not: their effects were probably absorbed by family deprivation or its associations. Intelligence and scholastic achievements had significant effects ($p < .01$). Of the variables representing behaviour or temperament in the classroom at the age of 11, only reliable behaviour in the classroom and the composite variable of concentration/persistence proved to have significant effects, both at a very significant level. Self-confidence proved significant but at a lower level ($p < .05$). Both attitude to schoolwork and school attendance measured at 15 years had significant effects. A number of the indices of neighbourhood influence exerted significant effects — namely, both male ($p < .05$) unemployment, and neighbourhood affluence ($p < .01$). Surprisingly, neighbourhood adult crime exerted only a moderate independent effect ($p < .05$).

Models using multiple explanatory variables

These analyses allowed us to highlight the most important items in a defined set of explanatory variables. Two types of analysis were undertaken: multiple regression analysis to identify the best predictors; and discriminant function analysis which allows a maximum discrimination between offenders and non-offenders. In the former, a crucial finding was that the single variable of poor quality of care and mothering made a significant contribution to the prediction of offending up to the age of 33. No other family variable, including social status and neighbourhood influence, did so. On the other hand, the summed deprivation index was a good predictor and so too was family size.

Juvenile delinquency, some temperamental factors and intelligence have been implicated as good predictors of later criminality and they were included in a further multiple regression analysis. They made a strong contribution with the total prediction set accounting for almost 43 per cent of the variance.

Discriminant function analysis correctly identified as criminal or non-criminal between 71 and 77 per cent of the males (Table 16.6). However, when juvenile delinquency was included as a predictor, further analysis correctly identified

Table 16.6 *Discriminant function analyses*

	Correct as Criminal		Correct as Non-Criminal		Overall Accuracy		Improvement over Chance
	n	%	n	%	n	%	%
Set 1	86	72	196	77	282	75.2	20.5
Set 2	86	73	196	76	282	74.8	20.5
Set 3	96	63	230	75	326	71.5	16.0
Set 4	86	72	196	79	282	76.6	21.3

between 82 and 84 per cent of the males. Despite these impressive statistics the false positive rates remained extremely high so that a large proportion of the male population would need to be screened to identify merely two-thirds of the eventual delinquents. When environmental factors relating to neighbourhood or family were included as predictors in multiple regression analysis, they accounted for only a small proportion of the variance of offending. However, when measures from home and school and others such as individual differences of ability, achievement and temperament were added, a powerful prediction of criminality was obtained. This could be improved by including a measure of previous juvenile delinquency. The explanation would seem to be that predictors of the same broad type and source, such as occupational class and deprivation, may well be correlated and therefore tend to predict the same group of individuals who eventually become offenders. Ideally, predictors in multiple regression analysis should not be highly correlated in order that addition of each new predictor may add to the group of individuals at risk (Loeber and Dishion, 1983).

Parental occupational status, while a reasonable predictor on its own, did not prove to be a powerful influence within a set of explanatory variables. This was not unexpected, since previous workers have shown that occupational status is a poor predictor of recidivism in large and less selected populations (Wolfgang *et al.*, 1972). Both good parental care (McCord, 1979) and family size were important predictors. Intactness of the family did not make a substantial contribution.

Family factors related to offending. The one at risk, from adolescence, of poor care of the data related to marital instability.

Our school intelligence and intelligence measures were powerful measures were the 11-plus examination. Nevertheless, with poor education.

We did not have Spots but we had delinquency, and contribution. Finally, skills were the

Ideally, measures to any offending collected up to the family project gathered during have argued that comparatively stable depended on individual referred to a particular influences were as a group predicted by other explanatory

Discussion

This section considers, on the one hand, and on predictions for the other

Epidemiological

Longitudinal research
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Family factors appeared to vary in their influence in relation to offences occurring at different stages of development. The one powerful influence over the full period of risk, from adolescence to adulthood, was the summed index of poor care of the child and poor mothering and re-analysis of the data relating to offences before 15 years of age showed marital instability and parental ill-health were important.

Our school data indicated that a low level of measured intelligence and particularly underachievement in arithmetic were powerful predictors of offending. These predictor measures were gathered in the final year of junior school or the 11-plus examination prior to the onset of offending. Nevertheless, we do not know the youngest age at which poor educational performance becomes a stable predictor.

We did not have data on criminality of parents of the Red Spots but we did have a rating of adult neighbourhood delinquency, and found it did not make a significant contribution. Finally, we concluded that measures of parenting skills were the most important predictors of criminality.

Ideally, measures of prediction should be collected prior to any offending and in most of our analyses we used data collected up to the end of the junior school at 11 years, and the family predictors used were based on information gathered during the first five years of the child's life. We have argued that the neighbourhood influences were comparatively stable over the decades and therefore have depended on information collected in early adulthood but referred to a period 10 years earlier. Yet neighbourhood influences were of doubtful utility despite being impressive as a group predictor. We assume their influence was absorbed by other explanatory measures.

Discussion

This section contains three parts: on epidemiological considerations, on protective factors in high-risk backgrounds, and on prediction. The findings in each section have implications for the others.

Epidemiological considerations

Longitudinal research into criminality

This study, being longitudinal, has a number of disadvantages.

It was not possible to study the relative increase in female delinquency over the past 25 years which has altered the sex ratio within the total (Rutter and Giller, 1983). The longer the period covered in a cohort study the greater the chance that results will reflect temporal changes imposing their elements on analysis and interpretation. Rutter (1979) pointed to some of the difficulties. For example, alterations in law may entail certain behaviour moving into or out of the ambit of criminal law; criminal statistics can be affected by the level of police activity; police treatment of offenders does not remain constant; and the opportunity to commit crime is affected by social phenomena such as the increase in the number of self-service stores and motor vehicles. On the other hand, as the population of Red Spots was an age-cohort, both the criminal and non-criminal were simultaneously exposed to the changes in society, particularly the increase in frequency of criminal acts and the variations in police processing of delinquent acts which have occurred in the past 30 years.

Criminal records as a data source

In studying delinquency, it is axiomatic that a truer measure of delinquency will be obtained by relatively contemporaneous interviews than by a study of official records. Official records underrepresent the true extent of criminal behaviour. Self-report surveys show that less than 15 per cent of criminal acts result in police contact (West and Farrington, 1977). Even when the police contact is made, the processing of the individual concerned may well vary according to age, sex, race and previous record (Landau, 1981). Official record studies fail to recognize the offence or conviction as merely one facet of a delinquent lifestyle. For example, the Cambridge study showed official delinquents at 18 to be almost uniformly at the socially deviant end of a spectrum with an excess of alcohol problems, driving offences, sexual experience, unemployment, poor family relationships and anti-establishment attitudes (Farrington, 1979). It must also be remembered that, although the majority of young people may have committed delinquent acts, only a small minority enter the criminal records (Rutter and Giller, 1983).

Our work was confined to the use of criminal records to

establish the incidence of indictable offences. 90 per cent of cases were frequent and serious during the years from 1960 to 1979.

While there is much to be identified by survey methods, on the other side, our method was limited to those who occur in studies requiring a tendency to high rates of convictions (Rutter and Giller, 1983).

Prevalence rates

A strength of the National Child Development Study is that the entire birth cohort was followed until the individual was 16, providing a good estimate of the prevalence of individuals from childhood to adulthood covering the main period of delinquency.

Three-quarters of the cohort were 16 years of age when the study was first conducted. A further 66 offenders were identified in 149 in all from a police record shown in Table 14.3. These were committed by males; 149 men had been charged with offences.

These local rates of delinquency, using inclusion criteria, provide prevalence rates for 16-year-olds (6 per cent), born in 1958, account only convicted individuals on a standard list which included drunkenness, prostitution, and other offences.

To date, the best estimate of one cohort is the Cambridge study, eight to nine years after the start of a working-class area. The group had been followed three by 24 years. The estimated lifetime prevalence based on a random sample of first convictions in the area was 10 per cent.

establish the incidence and types of juvenile and adult indictable offences but we have confirmed that, in over 90 per cent of cases, we were dealing with the most delinquent and serious criminal acts committed by the cohort during the years from 1957-81.

While there is much criminal behaviour which cannot be identified by surveys of criminal records, on the positive side, our method was free from the distortions which can occur in studies relying on self-reports where there is a tendency to high rates of non-response in delinquent populations (Rutter and Giller, 1983).

Prevalence rates

A strength of the Newcastle research is that it comprised an entire birth cohort for the city with delinquency data collected until the individuals were 33 years of age. It therefore provided a good estimate of the prevalence of offending individuals from childhood to the age of 33 years — a period covering the main period of risk for new offences.

Three-quarters of the 83 individuals charged before 15 years of age went on to commit further offences afterwards. A further 66 offended for the first time after age 15, making 149 in all from a population of 847. Rates of offending are shown in Table 14.3 (p. 273). At all ages most offences were committed by males and by the age of 33, 31 per cent of men had been charged, but only 6 per cent of women.

These local rates, despite differences of definition and inclusion criteria, approximated closely to the national prevalence rates for both males (31 per cent), and females (6 per cent), born in 1953. The national statistics took into account only convictions included on the Home Office standard list which excludes less serious motoring offences, drunkenness, prostitution, and police cautions.

To date, the best measure of juvenile criminality within one cohort is the Cambridge team's study of 411 boys aged eight to nine years taken from six state primary schools in a working-class area of London in 1961-62. One in five of the group had been convicted as juveniles, and nearly one in three by 24 years of age (West, 1982). Farrington (1981) estimated lifetime prevalence by using official statistics based on a random sample showing estimated numbers of first convictions in each age group. He simply added the

first-time conviction rate at each age and concluded that about one-third to one-half of males acquire a criminal record during their lifetimes.

The rate in our cohort at 33 years fell rather short of Farrington's (1979, 1981) estimates at 24 years. One possible reason was that Farrington's conclusions were influenced by the working-class composition of the Cambridge cohort, whereas the Newcastle population derived from a cohort of all births in the city over a defined period. Further, the Newcastle research displayed the often reported relationship between occupational class of the family of origin and contact with the law.

For men, the proportions ranged from one in six from non-deprived families to more than six in 10 from families in multiple deprivation, and some forms of deprivation appeared more harmful than others. Thus the risks were about five in 10 where there was marital breakdown, parental illness, overcrowding or social dependency; and about six in 10, with defective cleanliness and poor quality of mothering suggesting that the quality of parental care is of fundamental importance.

The cardinal finding of the Newcastle research was the dramatic increase in the rates of delinquency and criminality in relation to the severity of deprivation in the family of origin. Some 60 per cent of men from high-risk deprived families had a criminal record by 32 years. For girls, the rates were very much lower. In both sexes, the ratio of offences in the multiply deprived was much greater than the non-deprived — four times so in men and seven times in women (Kolvin *et al.*, 1988a).

Lifetime trends

Our data demonstrated another aspect of lifetime trends. The mean number of convictions peaked at 16–17 to 18–19 years and thereafter slowly declined (see, again, Figure 14.1, p. 276). Also, the mean numbers of convictions were closely tied to the severity of deprivation in childhood. The more severe the deprivation, the earlier were offences committed, peaking in late adolescence with a higher mean number of subsequent convictions. A secondary peak occurred at approximately 28–29 years, but we do not know any national or local circumstances which can explain this. West

and Farrington (1985) found a peak age for first offences at 17 for both numbers of convictions and offences.

These findings suggest a high risk for criminality while still at school for males offending before leaving school. Offences after leaving school are agreed with other research: a substantial proportion of offenders charged again in the next 5 years (Farrington and West, 1985). Offenders were again convicted at 18 per cent of convicted males in the St Louis Study, 60 per cent of those arrested for subsequent offences (Robins, 1966). Robins reported that 79 per cent of those in the juvenile court at 15 years of age by 48 years of age.

In summary, not all backgrounds at high risk of criminality, but as a group they are. It is not only that they commit many more offences in life there is a marked continuity of behaviour and we can predict that they do not become peaceful individuals commit

Types of offences (background)

All types of offences were related to the severity of deprivation. There was a strong association between the severity of deprivation and the types of offences committed.

Previous research has shown that rates of adverse early life experience are high for delinquents but, for the general population, 18–34 per cent for males and 18–24 per cent for women, the rates were lower. Thus, while delin-

and Farrington (1973 and 1977) also reported 14 years as a peak age for first conviction and 17 years as the peak for both numbers of convictions and individuals convicted.

These findings support the concept of a group of boys at high risk for criminality who commit their first offences while still at school. Almost eight in 10 of the Newcastle males offending before 15 years of age committed further offences after leaving school, while only one in six of non-offenders at 15 years were offenders by 33 years of age. This agrees with other prospective surveys showing that a substantial proportion of youths convicted as juveniles were charged again in adult life. In the Cambridge study, Farrington and West found 61 per cent of juvenile delinquents were again convicted as young adults and only 13 per cent of convicted adults had no juvenile convictions. In the St Louis Study, 60 per cent of juvenile delinquents had been arrested for subsequent non-traffic offences by 43 years of age (Robins, 1966) and, from Massachusetts, McCord (1978) reported that 79 per cent of 139 men convicted of offences in the juvenile court from 1933-51 had again been convicted by 48 years of age.

In summary, not only are children from multiply deprived backgrounds at higher risk for later delinquency and criminality, but as a group are subject to many more convictions. It is not only that more of them are criminal, but they commit many more criminal acts. Nevertheless, in adult life there is a marked fall in the frequency of criminal behaviour and we can conclude that most juvenile delinquents do not become persistent offenders. In addition, few individuals commit their first offences in their twenties.

Types of offences (based on criminal data for males)

All types of offences, particularly theft, increased with the severity of deprivation, but we did not find any association between the type of offence and the nature of deprivation.

Previous research had demonstrated relatively high rates of adverse early life experience in the backgrounds of delinquents but, for men, the rates were low, running from 18-34 per cent for the different types of deprivation. In women, the rates were higher running from 29 to 50 per cent. Thus, while delinquency was a less frequent occurrence

in females, where it did occur deprivation appeared to have had a potent influence.

While marital instability and parental illness were relatively commonly associated with offences before 15 years of age, in adult life this was uncommon. Poor care of the child and home and poor mothering appeared to have had similar associations with offences before and after 15. In addition, social dependency and overcrowding were important in relation to offences, but more so before than after 15 years.

Finally, while half the deprived and the majority of the multiply deprived men later committed offences a much smaller proportion (18-34 per cent) had experienced early life deprivation.

Family mechanisms

All of the criteria of deprivation had significant correlations with criminality. There was a strong relationship between delinquency and the mother's poor care of the home and child during the early years of life. Poor physical and domestic care of the child and home implies poor appreciation of the need for good parenting in the child's early years, and an inability to organize, plan or make wise provision for the future. In such circumstances, these mothers, or parents, fail to provide guidance, direction and supervision and are poor role models for their children. The two deprivations — poor quality of parenting and poor care of the home and children — appear to have had a much closer relationship with offending than did marital discord or family breakdown. Nevertheless, it is likely that they act both separately and together causing an atmosphere of family stress and disorganization and, to the child, a sense of lack of personal restraints (West and Farrington, 1973). It is tempting to suggest that these are the processes which lead to criminality. The work of McCord (1979) related child-rearing antecedents to criminal behaviour in middle age and demonstrated a significant link between home atmosphere in early life and adult criminality.

Significant predictors, considered to be direct measures of child-rearing, were parental conflict, supervision and mother's affection. Measures which reflected parental characteristics were parental aggressiveness, parental deviance and mother's self-confidence. All these proved to be significant predictors

of either crimes again. Surprisingly, absence of criminals from crime commented that the of parenting to quality that important research families studied: all the USA during the enforced the view that has an important in Newcastle work, less McCord, also suggest mothering and later c

In our study the dependent on the score was higher than in non-deprived families, lower than in families with care of the home and of deprivation were significant. It was not easy to estimate the contribution of each. Again, the effect was stronger for deprivation than for parents, supporting the findings of Gillier (1983).

We demonstrated that the neighbourhood variable was significant in one in six males and in three in the poorest. This suggests that with a significantly higher income, one can advance all the usual arguments of the meaning of such circumstances. The disadvantaged neighbourhoods are a social environment; lack of resources (Rutter and Giller, 1990). I remember that over the years, isolation from other influences, and economic circumstances, youth and the home, are likely to act in concert to

Another question was whether 10 per cent of male offend-

of either crimes against property or against persons, or both. Surprisingly, absence of the father failed to distinguish non-criminals from criminals, and elsewhere McCord (1982) commented that the focus should be turned from quantity of parenting to quality of parenting. However, the results of that important research were qualified by the nature of the families studied: all were reared in congested urban areas in the USA during the 1930s and 1940s. Nonetheless, it reinforced the view that family atmosphere during childhood has an important impact on subsequent behaviour. The Newcastle work, less subject to the limitations admitted by McCord, also suggests links between the quality of care and mothering and later criminality.

In our study the rate of male criminality in families dependent on the social services was at least three times higher than in non-deprived families. Nevertheless, it was lower than in families with poor quality of parenting and care of the home and children. Since, however, these criteria of deprivation were significantly correlated with each other it was not easy to estimate the independent or relative contribution of each. Again, an association with criminality proved stronger for deprivation than for occupational status of the parents, supporting the possibility that criminality has its origins in family deprivation and dysfunction (Rutter and Giller, 1983).

We demonstrated the usual ecological correlation between neighbourhood variables and offender rates, the latter ranging from one in six males in the more affluent areas to one in three in the poorest. Overcrowding in 1952 was also linked with a significantly higher rate of criminality in youths. We can advance all the usual explanations in terms of the social meaning of such circumstances to the inhabitants of a disadvantaged neighbourhood: lack of personal control over the social environment; lack of privacy; lack of a sense of safety (Rutter and Giller, 1983). However, it is important to remember that overcrowding does not often occur in isolation from other indices of deprivation and poor social and economic circumstances — such as poor care of the youth and the home, and social dependence — and these are likely to act in concert to produce their effects.

Another question was the significance of family size; 17 per cent of male offenders came from families with six or

more children in contrast to 3 per cent of non-delinquents. These rates are lower than those in the Cambridge study suggesting a lower correlation of family size with delinquency when the data derive from a representative population. But it does not detract from the close relationship of criminality with large families and the latter with deprivation and circumstances in which children do not receive adequate care.

Parental factors: criminality and personality

While we did not have data on criminality in the parents of Red Spots we did have information about major trends of parental personality based on judgements reached over 15 years (Miller *et al.*, 1974). Table 14.6 (p. 279) shows the importance of the father's personality characteristics in relation to the son's criminality and suggests that children of ineffective parents are at high risk.

Conclusion

We have assessed the relationship between social and family variables and offences against the law. The study was not designed to look at those influences currently the object of interest of modern criminological research such as differences of intake of troublesome boys into secondary schools, perceptions of consequences of offending, situational factors and possible peer group influences (Roff *et al.*, 1972; Gath *et al.*, 1977; Rutter *et al.*, 1979). Even though those factors are likely to be more common in the presence of adverse social and family circumstances, the operative mechanisms remain unclear. Perhaps adverse social and family influences and parental attitudes make boys more vulnerable to current environmental factors; the effects of family influences may be mediated through individual characteristics in the boys, or there may be interactions between all these factors but in different combinations in individual delinquents.

Mechanisms and processes

In recent years there has been a steady accumulation of information showing how undesirable life experiences may influence development and behaviour. Bowlby's (1951) emphasis on the affectional components of mothering gave impetus to such research, but he overestimated both the universality and irreversibility of the psychological

consequences of our study, though the explanations is that different risk of behavioural deviance may vary in their experiences (Rutter).

Stress and protection

We have tried to assess the effects of offences by deprived and non-deprived in our population while correlating sufficient control for the care-giving capacity as defined.

The other is that the three main variables are roughly the same in adolescent years. This allows for vulnerability in the major deprivation.

Summary of the study

Important stressors provide an overview of resilience in children.

In the first five years of some deprivation of care, more positive physical circumstances. The vulnerability to deprivation as experience of mothers' relative

In the pre-adolescent period characterized by five care-giving environments; the al-

consequences (Rutter, 1981a, 1985). From the viewpoint of our study, the most salient conclusion from recent investigations is that different undesirable experiences have different risk potentials in influencing cognitive and behavioural development (Rutter, 1985a) and that individuals vary in their degree of resilience to environmental experiences (Rutter 1985b).

Stress and protective factors

We have tried to establish stress factors associated with offences by the non-deprived and protective factors in deprived and multiply deprived non-offenders. Deprivation in our population was widespread, but deprivation in itself, while correlating highly with delinquency, was not a sufficient condition for its development. Other factors within the care-giving environment, and in the children themselves, appeared capable of modifying the influence of deprivation as defined.

The other influences have been categorized according to the three main periods in which the data were collected — roughly the pre-school years, the primary school and pre-adolescent years and, finally, the adolescent school years. This allows pinpointing of factors associated with vulnerability in the non-deprived and resilience in the face of major deprivation.

Summary of the findings

Important stress and protective factors are emphasized to provide an overview of the nature of vulnerability and resilience in childhood.

In the first five years the *resilient*, despite a background of some deprivation, were characterized by having good parental care, more positive social circumstances, and less adverse physical circumstances in the perinatal period and early childhood. The *vulnerable*, despite a background without deprivation as we defined it, were characterized by the experience of stressful social circumstances and their mothers' relative youth at marriage.

In the pre-adolescent period, the *resilient* were characterized by five different kinds of protective factors: a care-giving environment permitting good supervision of children; the absence of developmental delays; relatively

good intellectual development and educational achievements; positive temperamental qualities; and positive responses from peers and social activities such as membership of a youth club. The features which characterize the *vulnerable* relate to the children themselves: their level of intelligence and achievement, temperament, behaviour and their attitudes, rather than to aspects of their care-giving environment.

In adolescence, some of the factors associated with *resilience* were similar to those found in pre-adolescence: good intellectual development, scholastic progress and positive school qualities. In this period we should question the validity of the concepts of stress and protection as delinquency had already occurred in the majority of cases. Nevertheless the pattern of factors identified in adolescence was similar to that in pre-adolescence and it is not unreasonable to suppose that many were merely continuations of earlier protective influences. In addition, there were two important parental and family factors: family contact with the school and, in girls, the continuous presence of the natural father.

The factors associated with *vulnerability* were again similar to those in pre-adolescence, but there were three additional family and parental factors: the family which showed little interest in maintaining contact with the school; the youth who did not participate in family activities; and the mother and father who lacked effective personalities.

The factors uncovered

We now consider the nature and the mechanisms of the factors referred to above. Are they responsible for, or merely associated with, resilience in the face of deprivation and vulnerability against a background of 'non-deprivation'? And how reliable are they as predictors?

Peer influences It is often argued that delinquent activities may reflect the example set by friends of the potential delinquent. We examined the converse proposition that positive peer influences are associated with a decreased risk of delinquency in high-risk children. Taking the deprived group at 10 years of age we found that, while only 33 per cent of youth club members became delinquent, 54 per cent of non-members did so. Viewed retrospectively, only 55 per cent of

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delinquents as against 75 per cent of non-delinquents had been youth club members at 10 years of age. While it is difficult to disentangle cause and effect, this may be regarded as the resilience-conferring effect of youth club membership, on the basis that potentially delinquent youths choose delinquent friends whereas non-delinquent youths seek more approved forms of recreation provided in the youth club setting. Nevertheless, our findings do support the suggestion that beneficial social influences were associated with a measure of protection from delinquency even in high-risk children.

Family factors Long before children reach the age of criminal responsibility, data obtained from the home environment can be used to forecast later delinquency as effectively as other predictors. For example, we found that 71 per cent of deprived children receiving poor maternal and domestic care before five years of age became delinquent, whereas good care was a powerful protector since only 39 per cent of recipients subsequently entered the criminal records. Those figures differed only slightly when care was measured at age 10. In other words, good parenting protects against the acquisition of a criminal record. Good affectionate mothering is complementary to good care and supervision and it was not surprising that a similar pattern emerges. Research data often imply that the mechanism by which good care is translated into relatively good behaviour is simply that the caring parent has jurisdiction over the child's choice of friends and recreation but, given the early age at which the correlation emerges, the argument must be that good parental care and supervision is itself capable of giving rise to beneficial personal qualities (such as internal controls) that influence behaviour at a later stage. 'Good parenting' is by no means the only way of measuring a family's beneficial involvement in a child's development, and other family correlates of later delinquency were uncovered whose influence continued well into the children's teenage years. For example, data were collected on whether the family was interested in maintaining contact with the child's school, and when that was so at 15 years old the probability of later delinquency was substantially reduced for high-risk children from 57 per cent to 28 per cent.

Positive behavioural qualities of the father appeared to go some way towards reducing the detrimental effects of a deprived background. For high-risk 15-year-old children, to have an 'effective' father decreased the probability of delinquency from around one-half to one-third, whereas among low-risk youths an 'ineffective' father raised the probability from 11 per cent to 28 per cent. The same increased vulnerability was found in youths who did not share or participate in family activities.

Social factors

Social stresses appear to have been operative in low-risk families even before the children were five. These include greater density of the home territory; the family breadwinner having low occupational status; and the mother being under 19 years of age when first married. The effect of these stresses taken individually is significant rather than startling, but their combined effects may be more substantial. On the other hand, smaller households, older mothers and employed breadwinners had a protective influence.

Childhood accidents

The word 'accident' carries many shades of meaning: at one extreme it describes in neutral terms an occurrence that was not intended or has no perpetrator. But the term also encompasses what the law would term 'negligence', such as an occurrence occasioned wholly or in part by the carelessness — momentary or inherent — of its caretaker or by a lack of foresight on the part of the child's supervisors, reflecting generally ineffective care and control. Where there is no deprivation, accidents in the pre-school years do not appear to be stress factors. However, since in the deprived group a relative absence of accidents proved to be associated with resilience, it is reasonable to speculate that, in the multiply deprived group, accidents represent a combination of carelessness and ineffective care or perhaps even physical abuse.

School factors

Research has shown an association between dull intelligence and delinquency (Rutter and Giller, 1983), and our own data compiled from the results of the 11-plus examination bear

this out. In the cent of those w 100 as against 16 per cent o records scored 56 per cent of cent of the hig the mean becar whose ability v ability in Englis reasonable that attainment and it is also notew havioural qualit with a reduced r therefore vulner vulnerable childr to concentrate in criminal record, over 45 per cent intellectual abili temperamental a deprived backgr vulnerable. The before the emerg support the noti derived from me protective factor Alternatively, fa formance might i are still far from atmosphere be co May the teacher intellectually abl identification wit complexity of probably as near t

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this out. In the high-risk, multiply deprived group, 43 per cent of those who did not become delinquent had IQs above 100 as against 10 per cent of those who did. Similarly, only 16 per cent of deprived children who acquired criminal records scored more than the population mean of 100 while 56 per cent of those without convictions did so. Only 18 per cent of the high-risk group with arithmetical ability above the mean became delinquent, whereas 58 per cent of those whose ability was less than the mean did so. Results for ability in English were similar but not so impressive. It seems reasonable that positive attitudes to school, educational attainment and conduct in class should go hand in hand, but it is also noteworthy that positive temperamental and behavioural qualities in the classroom are strongly associated with a reduced risk of delinquency, even among deprived and therefore vulnerable children. Only 17 per cent of those vulnerable children who were described as having good ability to concentrate in class at 10 years of age went on to acquire a criminal record, but of those whose concentration was poor, over 45 per cent became offenders. On the other hand, low intellectual ability and scholastic achievements, and poor temperamental and classroom attitudes in youths from non-deprived backgrounds, appeared to render them more vulnerable. The great majority of these data were collected before the emergence of delinquency in most of the boys and support the notion that the sense of stability and esteem derived from meritorious school performance persists as a protective factor into later life (Rutter and Giller, 1983). Alternatively, factors encouraging positive academic performance might in themselves be protective. The mechanisms are still far from clear. For example, can a distressing home atmosphere be counterbalanced by a fulfilling school career? May the teacher react favourably to the high-risk, yet intellectually able, child and elicit from him a positive identification with the teacher's own values? Because of the complexity of interaction, anecdotal explanations are probably as near to the mark as any.

Male-female differences

Only a few factors protected girls against delinquency with any degree of significance and these differed considerably from those for boys. Furthermore, at 15 years, protective

factors were associated with a smaller decrease in the risk of delinquency in males than in females. In other words, not only were females less predisposed to delinquent acts, but also they had stronger shields to guard against the risk. At age five, the major protective factors in the deprived female group were: a father in skilled employment; a family not dependent on social welfare; an accident-free life; and a mother in good health. A girl with any one of these factors was between three and four times less likely to acquire a criminal record than one without those attributes.

By the tenth year the importance of parental care was evident in the case of both males and females; one in ten of deprived boys who did not become delinquent was experiencing poor parental supervision in contrast to one in four of those who did become so. Among girls, the continual presence of a natural father was an important factor. Good reliability in the classroom was protective for both boys and girls and good ability to socialize was protective for females but not for males. The numbers of protective factors were fewer for females than males.

At age 15, a greater number of protective factors emerged in females — some also being common to males — but, when present, the protective element was as great or greater than in males. These overlapping factors mostly concerned scholastic ability and interest, level of concentration, attitude to school-work, willingness to continue at school, and families' interest in maintaining contact with the school. By that time, however, the majority of delinquents had actually declared themselves in the criminal records so that the presence of adverse attitudes may merely reflect an already acquired delinquent predisposition.

Nevertheless, the same cannot always be said of certain other factors, peculiar to girls, that are reflections not of attitude but development. For example, good physical growth at age 13 is associated with only 8 per cent delinquency rate, whereas poor growth portended a 63 per cent rate; bedwetting at age five or beyond entailed a threefold increase in risk for later delinquency. Finally, more than half of the females who did not offend had fathers who were continually present during the child's pre-school and school years, compared with only one in five of offenders. Certainly the continued presence of the natural father appeared to be

an important protective quality of fathering.

Summary

We have explored the links between social deprivation and delinquency in young people. The grounds and 'protective' factors on the face of family 'stress' and 'protective' mechanisms by which the process is to be complex. In only.

In boys, important factors were ineffective personal characteristics in childhood, relative achievements, negative attitudes, absence of family contact, school progress, and the reverse of the above environment despite participation in socially approved activities and good physical growth.

In girls, the number of protective factors were fewer, important ones were independence of the deprivation; good presence of the natural father; school progress; good growth.

Prediction of criminality

Introduction

Our work on prediction had no information from Red Spot children and adult neighbourhoods of police contact and that a significant number were undetected, and w

an important protective factor in females. Presumably the quality of fathering is also important (McCord, 1982).

Summary

We have explored stress factors associated with vulnerability to delinquency in youths coming from non-deprived backgrounds and 'protective' factors associated with resilience in the face of family and social deprivation. A range of both 'stress' and 'protective' factors was identified, and the mechanisms by which they produced their influences proved to be complex. In girls, we could study protective factors only.

In boys, important stress factors included social factors, ineffective personalities of mother and father, accidents in childhood, relatively poor intelligence and educational achievements, negative temperamental characteristics, and negative attitudes to school and authority. In addition, absence of family cohesion and lack of interest in the youth's school progress proved significant. Protective factors were the reverse of the above with the additions of: a caring home environment despite a background of deprivation; participation in socially approved forms of recreation; and evidence of good physical growth.

In girls, the number of identified protective factors were fewer, important ones being good maternal health and social independence of the family despite a background of general deprivation; good parental supervision; the continuous presence of the natural father; family interest in the girl's school progress; good temperamental qualities; good physical growth.

Prediction of criminality

Introduction

Our work on prediction was limited in two ways. First, we had no information about criminality in the parents of the Red Spot children so, as a substitute, we used an index of adult neighbourhood criminality. The second was the use of police contact as our criterion variable. It is well known that a significant percentage of youth offences remain undetected, and we did not seek self-report data. But we

believe that our data, based on records of offending, included the most delinquent of the criminals in the local community.

Simple predictor factors

Prediction using simple factors revealed that these were efficient in different ways, some showing high specificity but low sensitivity, examples being three or more criteria of deprivation and three or more children in the family. None showed high sensitivity. School, rather than family, measures were the most efficient predictors of subsequent criminality.

We noted that the most efficient predictor for one population — for example, non-deprived families — may differ from that for others — such as multiply deprived families. For instance, two or more reported accidents by the age of five was a relatively efficient predictor only in the non-deprived; but one or more was the case in the multiply deprived. Similar contrast existed in the case of the measure of concentration/persistence and also the measure of sociability at school. These are excellent reasons for not using the same level of a particular measure (or even the same measures) when predicting delinquency in deprived inner city areas and non-deprived outer city neighbourhoods.

Two-factor prediction

Here we tried to obtain a view of the joint influence of two explanatory variables. This proved important for while, on the one hand, there was an evident trend for offending to become more common as the number of children in the family increased, on the other hand it seemed that small family size tended to protect boys from offending despite the presence of deprivation. In the same way accidents had a different significance in non-deprived and in deprived families. There were many other examples illustrating that there were complex relationships between the predictors studied and later offending. For certain pairings both predictors appeared important and efficient; however, some predictors seemed to function with differentiating efficiency only in the non-deprived group while others did so in the multiply deprived group. Nevertheless some combinations of predictors proved powerful in the sense that positive circumstances for both gave low rates of offending in the group concerned; and negative circumstances for both were

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associated with high rates of offending. Those in which combinations of positive and also negative circumstances were powerfully predictive consist of the combination of the factor of deprivation and the following: number of children in the family; response in class; reliability; intelligence at age 11; and arithmetical ability at age 11.

Multivariate analysis: some comments

In the 1950s much was promised from sophisticated methods of predicting delinquency (Glueck and Glueck, 1950, 1959), but later there was disappointment. Much of their data was gathered retrospectively, and subsequent attempts to use their index have shown a poor predictive performance (Dootjes, 1972). However, recent work suggests that the multiple regression techniques give, if anything, worse prediction than the simpler Glueck methods (Farrington, 1985). However, the relative inefficiency of delinquency prediction may have less to do with statistical technique and more to do with the relevance of the explanatory variables selected. In this respect, our work was limited in two ways: first, by the absence of information about parental criminality (we tried to substitute for this by using an index of adult criminality in the neighbourhood rather than differences between families); second, by the use of police contact as our criterion variable, because of the low detection rate of youth offences.

Our data did, however, yield some important facts:

- 1 The only variable representing family atmosphere which made a significant contribution to prediction of criminality was poor child care and mothering. Marital disruption, parental illness, factors representing adverse social family circumstances, parental personality, mother's age at marriage, occupational status and neighbourhood influence all failed to make any contribution.
- 2 The deprivation index — the summed score of criteria — was a good predictor as too was family size, which probably directly reflects home circumstances.
- 3 While individual differences between children, such as measured intelligence and achievements and classroom temperament, made important contributions, classroom behaviour did not appear to do so.

Finally, we used four sets of predictors and found, irrespective of the size of the sample studied or the variation of the predictive measures contained in the set or their number, that those which proved to be significant did so across all the above circumstances. Using the same four sets of predictors in discriminant function analysis we found they correctly identified as criminal or non-criminal between 71-77 per cent of the males, between 63-73 per cent of the criminal and between 75-79 per cent of the non-criminal. This constituted a 16-21 per cent improvement over random predictions.

The literature suggests that juvenile delinquency is one of the best predictors of later criminality and it was therefore used as a predictor to two further sets of predictions. The first set included the summed deprivation score and reliability in the classroom at 11 years; the second set included all six deprivation criteria (the two child care criteria were combined) and concentration/persistence in the classroom instead of reliability. The other predictive variables were occupational class, family size, mother's age, IQ at the 11-plus examination, neighbourhood crime and parental personalities.

In the multiple regression analysis the first predictor set accounted for 33 per cent of the variance and the second 34 per cent. On both occasions, juvenile delinquency proved to be the most powerful predictor. Furthermore, using discriminant function analysis, 84 per cent and 83 per cent respectively of the youths were correctly classified as criminal or non-criminal. We also analysed juvenile delinquency committed before school-leaving, but this proved less well predicted. Perhaps one important difference was that, when the separate criteria of deprivation were included in the prediction set rather than the summed deprivation score, the predictors of criminality were different. While marital disruption, parental illness and parental ineffectiveness were significant predictors of offences committed during the school years, the 'poor mothering' index was a significant predictor of criminality after the age of 15 years.

McCord (1979) has addressed the question of whether or not home atmosphere during childhood has an effect upon personality development (Jessor and Jessor, 1977). Records collected during childhood, and coded prior to knowledge of

adult behaviour, origin and home years information their criminal behaviour function analysis family atmosphere on subsequent behaviour mother's self-conflict; parental aggression father's deviance considered to reflect three — parental — were considered Father's occupation significantly related the effects of social controlled to allow The prediction model of the variance of the three direct discriminant function correctly identified or non-criminal a correctly identified when adult criminal of McCord's research reliably related to to distinguish the contrasts with work (Glueck and Glueck McCord's findings in congested inner measures did not criminal behaviour several reasons for homogeneous inner representative of had no information

adult behaviour, provided information about the family of origin and home circumstances of 200 men, and over 30 years information was collected from court records regarding their criminal behaviour. Multiple regression and discriminant function analysis indicated that six variables representing family atmosphere during childhood had important impact on subsequent behaviour. These were: parental supervision; mother's self-confidence; mother's affection; parental conflict; parental aggression; and father's deviance. Aggression, father's deviance and mother's self-confidence were considered to reflect parental characteristics, while the other three — parental conflict, supervision and mother's affection — were considered to be direct measures of child-rearing. Father's occupation and neighbourhood factors were also significantly related to criminality. In the prediction analysis, the effects of social status and parental characteristics were controlled to allow an evaluation of child-rearing practices. The prediction models accounted for between 36–39 per cent of the variance of which 24–26 per cent was contributed by the three direct measures of child-rearing. Subsequent discriminant function analysis, using the above six measures, correctly identified 74 per cent of the 200 men as criminal or non-criminal at any stage of their lives. The percentage correctly identified as criminal increased to 80 per cent when adult criminality alone was predicted. The importance of McCord's research is that, while home atmosphere was reliably related to criminal behaviour, parental absence failed to distinguish the criminal from the non-criminal. This contrasts with what had been reported in earlier work (Glueck and Glueck, 1950; Wadsworth, 1979). However, McCord's findings are limited in that all subjects were reared in congested inner city areas in the 1930s. The Newcastle measures did not account for such a great variance of criminal behaviour as did McCord's, and there could be several reasons for this. For example, hers was a more homogeneous inner city population, whereas ours was representative of the whole city. Furthermore, our study had no information about fathers' criminality.