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CRIMINAL RECIDIVISM: FROM ADOLESCENCE TO ADULTHOOD

A thesis submitted to the Graduate School of the University of Wisconsin-Madison in partial fulfillment of the requirements for the degree of Doctor of Philosophy

BY

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A thesis submitted in partial fulfillment of the
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This dissertation is dedicated to my mother,

MADGE BENDA

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ABSTRACT

The central problem with which this study is concerned is how well we can predict juvenile (defined as any recommitment to a correctional facility for adolescents) and adult (defined as any adult felony conviction) criminal recidivism of adolescents released for the first time in their lives from Wisconsin schools for boys. We used a ten-year longitudinal, follow-up design, and recorded information from files at the Wisconsin Division of Corrections on 31 predictor variables. All predictor variables used occur prior to a juvenile's first release (e.g., race, age variables, family situation, pattern of offenses, etc.). We drew two samples. We have one sample (N=432) from all first admissions to Wisconsin schools for boys in 1965, and one sample (N=500) of all first admissions in 1967.

We provide a general description of our samples with bivariate as well as multivariate relationships.

We used three statistical procedures to make predictions (e.g., Predictive Attribute Analysis, logistic regression, and a Burgess-like procedure). We compared these procedures by examining the differences between expected failure rates (based on rates observed in one

sample) and observed rates (based on rates observed in the other sample) of groups identified. We also classify persons as failures and successes in one sample based on their probability of failure and see how well we predict in a separate sample.

We found a juvenile recidivism rate of 60% and an adult rate of 35%. Our findings indicate that we have small, and comparable, total differences between expected and observed failure rates with all three statistical procedures for juvenile recidivism and adult recidivism.

To compare our statistical procedures with regard to classifications, we used some rules about when classifications were useful (e.g., less errors are made as groups are identified which have recidivism rates near 0 or 1).

Using different size zones in the middle of the probability distribution wherein we do not use classifications made, we examined how many classifications were useful and how many errors are made in each direction (predicted successes who fail and predicted failures who succeed). We found there were differences in statistical procedures along the foregoing dimensions.

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CHAPTER 1

INTRODUCTION

What is this research about?

This study is concerned with the juvenile and adult criminal recidivism of adolescents. We are attempting to classify persons into high and low risk groups with regard to further criminal behavior after their first admission to a juvenile correctional institution. No estimate of future behavior, regardless of the classification method used, can be made with certainty. Consequently, we classify persons and then make statements about the expected performance for members of the classes. The expected performance for specific classes should be those which provide the most probable values for the population as a whole, which raises the question of the validity of any classification procedure.

Evidence of the validity of any classification procedure with respect to the specific criterion of interest (in our case criminal recidivism) is necessary before any practical application can be assumed. The best way of establishing validity is to see how well a classification model derived in one sample predicts in a separate sample (Gottfredson, 1967; Simon, 1971).

Thus, our primary concern is trying to derive valid risk classifications of persons by checking how well we can predict in a separate sample.

Prediction, it is asserted, is a requisite to any effective crime prevention or control program.

Background

No doubt juvenile delinquency has been with us since the beginning of time. Certainly our earliest written records allude to unruly adolescents (Teeters & Reineman, 1950). The oldest known code of laws, the Code of Hammurabi (around 2270 B.C.), has regulations referring to punishment of wayward youth (Cavan & Ferdinand, 1975, p. 3). Over the centuries we have seen a gradual distinction being made between adolescent and adult with regard to punishment, and in the United States the first Juvenile Court Act was enacted in Illinois in 1899. The tenor of this legislation, which was enacted in other states over the next twenty years, was to remove adolescents from the criminal law process and to create special programs for them (Platt, 1969; Goldfarb & Singer, 1973). Much of the impetus for these legislative changes came from the so-called "child savers", a loose coalition of liberals, feminist groups, and professional philanthropic organizations; and, no doubt they had a significant impact on society's approach to delinquency (Platt, 1969). Courts for juveniles became less formal than adult courts, with no lawyers or convictions. Court dispositions are made for adolescents instead of sentencing (Fox, 1971).

It appears fair to say, however, that noteworthy changes in treatment philosophy, since the early changes after the turn of the century, have not occurred. Institutionalization is still a common dispensation for seriously delinquent adolescents. Institutions are large, secluded, and have few "real" commitments to rehabilitation. Many correctional institutions for adolescents remain overcrowded (Cavan & Ferdinand, 1975, Chapter 20). Overcrowding is a serious problem throughout all of the correctional system, and has led to predictions of greater crises in the future (Flanagan, 1977).

Statistical data indicate a soaring rate of delinquent and criminal behavior since World War II. These increasing rates in crime are being seen in all nations. Even the areas in the United States thought to be the citadels of conforming behavior (i.e., rural areas, affluent areas, and small towns) are experiencing rapidly rising delinquency rates. Allowing for the improvement in recording of rates over the years, expansion of legal machinery, and increases in regulations, the figures remain sobering. For example, with the exception of 1972, crime and delinquency arrest rates between 1968 and 1973 went up 30 percent. When this figure is adjusted for the 5 percent increase in population during those years, the increase in the crime rate amounted to nearly 25 percent (Federal Bureau of Investigation, 1974, p. 3). Even more dramatic, if we look at court-disposed delinquency cases per 1000 of the United States population ten through seventeen years of age, we can see that delinquency rose from below 20 percent to about 34 percent, a 70 percent increase from 1957 to 1973 (U.S. Department of Health, Education, and Welfare, 1974, p. 7). In Wisconsin, the number of adult and juvenile offenses rose 92 percent between 1967 and 1976. And, in 1976, juveniles comprised 59 percent of all arrests made in Wisconsin, while 75 percent of the arrests made were of persons under 21 years of age (Wisconsin Criminal Justice Information, 1976).

Concern with rising delinquency rates has naturally given rise to considerable debate in several professional and lay arenas. The debate over causes of delinquency stems in part from the confusion of passive and active social control, where traditional values vie with scientific ones, where public protection values compete with those of child protection and treatment. There does appear to be some consensus that delinquency is causally different from adult crime, and that adolescents are more amenable to treatment than are adults. And, if we look at recent theory and policy with regard to delinquency, there appears to be a moving away from various inherited factors to concern with individual differences and social environment as causal factors. It also appears to be true that within these larger areas of agreement there is little consensus as to what is a fully satisfactory explanation of delinquency (Nettler, 1974; Sutherland & Cressey, 1978). There are no major theories of why people discontinue criminal behavior; yet, evidence has existed for years that with advancing age people do discontinue criminal activities (Wooton, 1958).

Moving to treatment, we see a vast array of strategies, methods, and modes of intervention have been used to prevent, reduce, and control delinquency and crime (Martinson, 1974). There is increasing attention being given to diversion programs at this time in the correctional field (see the October, 1976 issue of Crime and Delinquency).

One way to make some sense of the foregoing discussion is to view the larger social system. Decisions about what to do in regard to delinquency are the result of several factors. Certainly, changes in policy result from immediate public pressures, but longer-term norm changes have also brought about changes in treatment philosophy.

In the preceding decade, we saw the impact of federal decisions on policy with regard to delinquency. In 1960 the Children's Bureau and the National Institute of Mental Health made an extensive summary of the knowledge about delinquency to the 86th Congress. In this report, they state that the thread running through most work dealing with the crime problem of adolescents is that delinquency is a concern of the total community. In November 1961, President Kennedy appointed a Committee on Employment. The Committee's report, The Challenge of Jobless Youth, April, 1963, stressed the urgency and need for a coordinated approach to the problem of delinquency, with public and private groups at the local, state, and federal levels participating on a broad scale in every community. Programming to prevent and deal with delinquency got an impetus from the Office of Juvenile Delinquency and Youth Development, in the Department of Health, Education, and Welfare. Together with the President's Committee on Juvenile Delinquency and Youth Crime, the Office of Juvenile Delinquency and Youth Development gave out special training and planning grants to a number of cities to demonstrate programs for the community treatment of adolescents in trouble with the law (Benjamin et al., 1968). These programs, along with ones initiated by the 1964 Economic Opportunities Act, no doubt gave birth to the currently fashionable community treatment models (Wright & Dixon, 1977).

However, most institutions and alternative facilities used for the correction of adolescents are run by the state. Consequently, state planners, judges, and legislators exercise considerable influence over the direction treatment takes. Communities exercise their influence over treatment by pressuring legislators. Therefore, there is considerable variance from state to state in how delinquents are treated (Vinter et al., 1976). However, when we examine how effective these various interventions have been we find a need for more thought about what might be effective.

Students of recent efforts to reduce criminal recidivism have judged our interventions, on the whole, as less than successful. (Moynihan, 1969; Hackler, 1966; National Research Council, 1978; Hackler & Hogan, 1972; van den Haag, 1975; and Doleschal & Klapmuts, 1973). Bailey (1966) evaluated one hundred studies of the results of correctional programs and concluded that "evidence supporting the efficacy of correctional treatment is slight, inconsistent, and of questionable validity" (p. 160). He finds that with increased methodological sophistication, there is a parallel increase in reported failure of the programs.

Examining the effects of casework intervention in experimental designs, Powers and Witmer (1951); Tait and Hodges (1962); Meyer, Borgetta, and Jones (1965); and, Miller (1962) all find that subsequent police contacts or court referrals for youngsters treated in the experimental group were either the same as, or higher than, those in the untreated group.

After a review of 231 studies of rehabilitative programs, Martinson (1974) concludes:

> With few and isolated exceptions, the rehabilitative efforts that have been reported so far had no appreciable effect on recidivism (p. 25).

It has been argued that Martinson de-emphasized the programs that were effective (Palmer 1975); an allegation denied by Martinson (1976).

The latest intervention, although not new, to be advocated by the correctional system is diversion programs (see the October, 1976, issue of Crime and Delinquency, especially the article by Lundman). Bohnstedt (1978) reports on an evaluation of eleven California diversion projects:

> . . . the research findings indicate that only half of the clients were diverted. . . . The other half would not have been processed further if the projects had not been available. . . . Program costs were greater than savings. With regard to recidivism, most of the diversion project clients were rearrested within six months at about the same rate as the matched comparison cases which were processed traditionally (p. 109).

It has also been argued that any intervention has the possibility of harm as well as help (Wheeler et al., 1967; Gottfredson, 1979). Some have asserted that, in intervening, we label delinquents, and because of this label delinquents are encouraged (it is unclear how this mechanism works - see Gibbs, 1966; Gove, 1975) to continue criminal behavior (Schur, 1971, 1973). However, labeling propositions about criminal careers have not been supported (Ward, 1972; Tittle, 1975).

Researchers have questioned whether our intervention with offenders has been soon enough or intensive enough (Quay, 1977). Others have argued that early intervention and more intensive intervention do not improve success rates (Toby, 1965; Harlow, 1970). In summary, it appears fair to say we are not sure what should be done to deal with the problem of delinquency.

Ideally, our intervention efforts would be guided by delinquency theories (Etzioni, 1976) which explain why some adolescents continue criminal behavior and why others do not continue it. However, our major theories of delinquency (for reviews of these theories, see Kornhauser, 1978; Gibbons, 1976; Nettler, 1974; Vold, 1958; and, Matza, 1969) give no explanation for why most delinquents do not continue criminal behavior into adulthood (for evidence that most delinquents discontinue crime as they reach adulthood, see Boyle et al., 1974; Sharon, 1977; and, Wolfgang, 1977). For example, we have no explanation as to why one group becomes more rewarding than another for those delinquents who discontinue crime as adults (ala Sutherland, 1956a, 1956b; Glaser, 1956), nor is there any explanation of a moral conversion (ala Hirschi, 1969; Nye, 1958; Cloward and Ohlin, 1960). Why is a label effective for some but not others (ala Becker, 1963; Goffman, 1959, 1961a, 1961b, 1963; Lemert, 1950). Why is there less strain for some than others (Merton, 1938, 1957; Cohen, 1955). Our delinquency theories implicitly predict far more criminality than actually occurs (Matza, 1964, pp. 21-30). Delinquency theorists have simply ignored the evidence that most delinquents do not become adult offenders (Reckless, 1967). Influenced by our major delinquency theories, our intervention policy with regard to delinquency appears to be based on the assumption that without intervention delinquency leads to adult crime (Sutherland & Cressey, 1978).

However, recent evidence (Sharon, 1977) suggests that we can identify groups of adolescent first-admissions to a school for boys which vary considerably in their probability of returning to a juvenile correctional facility and in their probability of having adult felony convictions. Using multivariate statistical procedures to combine characteristics, Sharon found that some people were very likely to fail, while others were very unlikely to fail. In terms of both short-range and long-range outcome, it may well be that further intervention is unnecessary for some adolescent first admissions. And, if we could accurately identify these young people who are unlikely to continue in crime, we could lower the costs (i.e., to the individuals involved, to society, and to the correctional system) of intervention by using it only where it is needed.

Furthermore, by identifying first admissions who are likely to fail, we are finding out which young people (it is unknown whether those likely to succeed in the future benefited from their first institutional stay) were not influenced by institutionalization to discontinue crime. In other words, by identifying these high risk people, we are locating where we need to focus much more concern.

However, the question at this point is whether we can <u>accurately</u> classify persons as future failures or future successes based on probabilities associated with certain characteristics. To assess accuracy, we need to see how many errors are made when we classify people as failures or successes, based on probabilities derived in one sample, in a separate sample.

Summary

Human beings have had lengthy exposure to the social problem of delinquency, and it appears that delinquency is increasing in recent years. Despite our considerable experience with the problem of delinquency, we have conflicting explanations about why young people enter crime, and these theories have not accounted for the fact that most adolescents in trouble with the law do not become adult criminals. These theories imply that delinquents become adult offenders. Our intervention has been based on the assumption that without intervention delinquency leads to adult crime. Yet, evidence shows that most delinquents do not become adult offenders. Evidence also suggests that adolescent first admissions to a school for boys do vary in their likelihood of failure as juveniles and as adults. The central purposes of this study are to see if we can replicate the juvenile and adult failure rates found in an earlier ten-year longitudinal, follow-up study of adolescent first admissions to Wisconsin School for Boys (Sharon, 1977), and to see if we can accurately classify persons as future failures or future successes in a separate sample based on their probability of failure in another sample.

CHAPTER 2

RATIONALE FOR THE STUDY AND LITERATURE REVIEW

Introduction

In the first section of this chapter, we will discuss the rationale for this study in light of the criticism that prediction studies lack theoretical underpinnings for their findings (Toby, 1965; Dean, 1968; and, Dean & Duggan, 1969). The second section deals with how we go about making predictions from statistical procedures as well as with what we want to predict. The third section is concerned with some issues of prediction dealt with in previous studies. In the fourth section, we review rates of recidivism found in previous studies, and in the final section we discuss factors found to predict criminal recidivism in previous studies.

Rationale for this study

As we discussed in the previous Chapter, our theories of delinquency (see, Trasler, 1962; Cloward & Ohlin, 1960; Sellin, 1938; Sellin & Wolfgang, 1969; Sykes & Matza, 1957; Scheff, 1966; Garfinkel, 1956; Reckless, 1956, 1957, 1961; Eysenck, 1964, 1966; Aichhorn, 1935; Friedlander, 1947; Eissler, 1949; Redl & Wineman, 1951, 1952; Short &

Stodtbeck, 1965; Elliot et al., 1979; and Schur, 1971, 1973) implicitly predict that delinquents will become adult criminals. Except for the very few meager attempts to extend current theory about the entrance into delinquency to account for criminal recidivism (see Meisenhelder, 1977; Dean & Duggan, 1969; and Stott and Wilson, 1977), delinquency theorists have ignored the fact that most delinquents do not become adult offenders. The human development literature (Weiner, 1970; Offer & Offer, 1975; Gallatin, 1975; White & Speisman, 1977; Rogers, 1977; and Sebald, 1977) suggests that adolescence is a period in which people experience problems unique in their intensity (there are conflicting reasons given for this phenomenon ranging from expanding cognitive structures - see Piaget, 1972; Flavell, 1977; Kohlberg & Gilligan, 1971; and Kohlberg & Freundlich, 1974 - to identity confusion - see Erikson, 1968; Freud, 1958; and Sullivan, 1953), and these problems ameliorate with advancing age.

Hence, the assumptions about the delinquency/criminal continuum are important, unsupported by evidence, and can be questioned from a developmental perspective.

It seems clear that further theorizing is in order if we are to account for recidivism. Theoretical hypotheses can be derived from a number of scientific pursuits. However, we have seen that ignoring the task of discovering theory relevant to a given substantive area has too often led to the forcing of data to validate existing theory thought to supply all the necessary concepts and hypotheses (Glaser & Strauss, 1967; Zetterberg, 1963; and, Brennan, 1975).

The argument here is that we are at a most rudimentary level of understanding in the field of criminal recidivism. It is extremely difficult to validate postulates which seek to explain causes. We have some awareness of the rates of recidivism, among the general population of delinquents, of juveniles as adults (see Glueck & Glueck, 1930, 1931; 1937; 1943; 1950; Wolfgang, 1977). However, we do not have replicated rates of recidivism, among institutionalized adolescents, of juveniles as adults. Our first problem is to see if we can replicate some findings by Sharon (1977). In view of the lack of attention to the fact that most delinquents do not become adult offenders, replication seems worthwhile.

Before theoretical hypotheses relevant to a given substantive area can be formulated, a summary of relationships at a descriptive level is essential. One of our problems is to see if descriptive variables used to characterize juvenile recidivism and adult recidivism also characterizes juvenile to adult recidivism.

There is also evidence that multivariate descriptive models can explain more variance than bivariate relationships (Sharon, 1977). Sharon found that using multivariate relationships allowed him to classify people into groups which varied considerably in their rate of failure as juveniles and as adults. However, these probabilities could be unreliable, so another problem we are approaching is whether these rates remain stable in a separate sample.

Another approach, besides explanation, to beginning to understand the problem of criminal recidivism is to see if we can classify people as successes or failures accurately. The method of allowing statistical procedures to pick important variables has been shown to be able to predict future criminal behavior; the proofs are rigorous and reproducible (see Simon, 1971). Empirical prediction methods provide a shortcut to identifying future successes and future failures. Classification reduces phenomena to more systematic observation. Once we can began to identify successes and failures, we can seek to discover similarities and differences between them. We have seen that studies of prognosis have proved to be a royal road to much of the understanding in the medical field, whether or not the causes were understood. In the end, studies of prognosis have usually led to greater knowledge of causes. Our central problem is one of seeing if we can accurately classify persons as failures or as successes by noting errors made in a separate sample. In a moment, we will discuss how to classify persons. Also, some additional concerns about making classifications will be presented.

Classification can lead to theoretical development by suggesting characteristics with which theory is to deal. The relationships used to derive the classification should suggest theoretical hypotheses (see Clinard & Quinney, 1973). However, immediately, and perhaps most importantly, classification tells us where to look for differences. For example, we could see if probation officers would pick the same cases as failures and successes, and, if so, we could ask them to explain the reasons behind their choices. It is likely that much of the information, which is collected from files created for administrative purposes, used in empirical prediction studies is inadequate for explaining criminal recidivism. In other words, we can begin to look more deeply into the personal and social circumstances for differences which may help to explain why some adolescents continue criminal behavior into adulthood while others discontinue criminal behavior once we can classify.

Furthermore, attempts to classify persons as future failures or as future successes can tell us something about how relevant available information is for predicting recidivism for different types of juvenile offenders. As we shall shortly see, there are some groups of people for whom we make poor predictions about criminal recidivism. Especially for these latter persons, considerable more information is needed.

Once we can discriminate between failures and successes we have a new framework from which to began to probe for a better understanding of why some continue crime while others discontinue it. Predictive factors are not causes, and a little reflection will suggest that they are unlikely to be causes. To be effective they must predict for a wide range of conditions, hence they are likely to be aggregates of separate causes or to represent factors which are common to a number of causes. Relationships exhibited in multivariate prediction models may, or may not, be valid. The purpose of predictive models, aside from the practical policy implications to be discussed momentarily, is to assist us with identification of where we should probe deeper for possible causal factors by showing us which people differ greatly in their likelihood of future failure.

Another issue is the policy implications of a prediction study. We must be clear about for whom the classifications are relevant. Clearly a predictive classification derived from a sample of first admissions to juvenile correctional facilities is not useful for classifying all delinquents. Juvenile first admissions represent only a small proportion of all delinquents. For that matter, prediction tables developed on first admissions are not relevant for admissions in general, which include persons returning to an institution.

A classification developed for juvenile first admissions is only relevant for this subpopulation of delinquents.

Furthermore, we need also to be clear about the point in processing of juveniles into the justice system where a particular classification is relevant. Classification is relevant for only the point where it was developed to make predictions about the future. A predictive classification which classifies future behavior after first release is not relevant to any processing point prior to the first institutional release. For example, it cannot help us predict behavior in the institution, a setting which contains a set of influences on behavior which are unlike the influences on the behavior actually predicted.

Predictive classifications derived from empirical procedures can help us make logical decisions because they are based on explicit logical procedures, unlike clinical judgments which are the basis for decision-making today. The primary problem with clinical judgment is the lack of systematic attention to errors. However, we need to be more specific about what type of decisions should be guided by empirical classifications. Predictive classifications derived from statistical procedures is seen as more relevant to system-wide decisions in the justice system (e.g., decisions about resources, supervision, etc.) than to decisions about specific individuals (e.g., release versus no release). No statistical method of prediction can predict failure or success for a particular individual. Rather, statistical predictions are made about a number of individuals who share the same critical characteristics. At this time, statistical procedures give us classifications which have errors, as we shall shortly see. It cannot be stated that decisions based on clinical judgments are superior to predictions based on statistical procedures (in fact, evidence shows that predictions based on statistical procedures are about twice as accurate as those based on clinical judgements - see, Sawyer, 1966). Statistical procedures do not allow us to deal with the amount of information that can be processed clinically. Clinical judgments can supplement statistical procedures for making decisions. Using clinical judgment as well as statistical procedures for making decisions should lead to less errors than either method alone.

Another useful function of empirical prediction methods is that baseline data about what are the risk rates of different groups of offenders can be very useful in getting some handle on program effectiveness in an environment (e.g., juvenile justice system) where experimental designs are all but non-existant. Furthermore, we can avoid the situation where we overrate our program's success because we only include low-risk persons (see Scott, 1975). Lastly, it has been shown that while a program may lower recidivism rates of low-risk people, it may actually raise rates of high-risk people (Grant & Grant, 1959, Adams, 1970; and, Carney, 1969). Thus, a programs effectiveness could be masked by not differentiating risk groups by having effects offsetting one another.

<u>How do we go about making predictions</u>?

Criminal prediction studies in the past have been unclear about what is meant by predicting recidivism. It is one issue to speak about the probability that individuals will fail (i.e., return to a juvenile institution or be convicted of an adult felony). It is quite a different issue to predict that individuals <u>will</u> or <u>will not</u> fail. For example, we can use statistical procedures to identify which combination of predictor variables (characteristics) gives us the largest residuals in a multiway table. When we find which combination of variables explains the most variance in the table, we will have categorized people according to a set of characteristics, each category having a probability of failure associated with it. One category might be persons who come from southeast Wisconsin and who are below average in intelligence, while another category might be persons who come from southeast Wisconsin and are above average in intelligence. In the first category of people, we might find that 95 of the 100 persons with those characteristics failed. Thus, we could say that people from southeast Wisconsin who are <u>below</u> average in intelligence have a 95% probability of failure. Likewise, we might find that 75 persons, of the 100 persons who come from southeast Wisconsin and are <u>above</u> average in intelligence, failed. Again, we could say persons with the foregoing characteristics have a 75% probability of failure. Previous studies have used these probabilities of failure as predictions for what percent will fail in identical categories of people in a separate sample. For example, they enter a separate sample and identify persons who are from southeast Wisconsin, and who are below average in intelligence, and they compare the 95% predicted probability of failure with the actual failure rate in the separate sample. This type of so-called prediction has been called group predictions (Simon, 1971).

However, people actually fail or do not fail (they either have a felony conviction or they do not have a felony conviction). Thus, prediction is where we classify persons as either failures or non-failures (0 or 1 probability). Predictions about failure versus non-failure have been referred to in the literature as individual predictions. However, the terminology of group and individual predictions is unfortunate as both are about individuals. In one case, we are saying individuals have a 95% probability of failure and in the other case we are predicting that individuals will or will not fail.

The so-called group predictions are not predictions about what individuals will or will not do (no one is a 95% felon). However, the criminal prediction literature has compared statistical procedures with regard to predictive power by comparing what percent of each identified category of people fail in a separate sample with what percent was predicted to fail (based on what percent failed in identical categories in the original sample). Instead of using the misleading term, group predictions, we will refer to these so-called predictions as probability predictions.

Classifying persons into failure versus non-failure is really discriminant analysis. We are attempting to see if we can discriminate between those who fail and those who do not fail. Discriminant analysis is a classical prediction problem dating back to the early 1900's with R. A. Fisher's work (see Solomon, 1976). Instead of referring to these 0 or 1 predictions as individual predictions, we will call them discriminant analysis predictions.

In addition to examining the predictive power of procedures by comparing the predicted percent of failures with the percent who fail in a separate sample, we will, unlike many previous studies, compare how well different statistical procedures can discriminate between failures and non-failures. We can see how many errors are made in classification (predicted failures who succeed and predicted successes who fail).

To make discriminant analysis predictions we could simply say that if an identified category of persons has a predicted percent of failure above 50% (higher than chance alone), we will predict that everyone in that category is going to fail. Likewise, if a category of persons is identified which has a failure rate below 50%, we could predict everyone in that category will succeed. We could then see how many errors we make by counting up how many persons did not behave as predicted (predicted failures who succeed and predicted successes who fail).

Since multivariate statistical procedures are complicated, and require time to compute, they should give us better predictions than predictions made using the base rate for the sample. For example, in the hypothetical table given below, we have the following results:

JUVENILE RECIDIVISM AS ADULTS: FAILURE RATES AS ADULTS IN RELATION TO NUMBER OF JUVENILE ADMISSIONS TO A SCHOOL FOR BOYS

Number of Juvenile Admissions

Adult Failure	1	2	3	4	5 or More	Total
No	141	84	44	29	26	324
Yes	64	50	41	30	30	215
Total	205	134	85	59	56	539
Failure Rate	.31	.37	.48	.51	.54	.40
Proportion of Total Cases in Group	38%	25%	16%	11%	10%	100%

The above table (which uses only one predictor variable, but the principle to be shown applies directly to groups defined by multivariate procedures) is not a powerful prediction table. The base rate of failure for the sample is .40. However, the best risk group has a failure rate of .31 and this group has nearly two-fifths of the cases. The risk differences between 3 chances in 10 and 4 chances in 10 are not very great. Predicted probabilities which range from .31 to .54 are not very near 0 or 1; yet, 60% of the cases are observed successes (probability 0) and

40% are failures (probability 1). If a predicted probability of under .50 were regarded, for selection purposes, as successes, and one of over .50 as failures, 210 cases would be wrongly classified. However, 210 cases is only 5 less cases than the 215 errors that would be made by predicting all cases as successes, using only knowledge of the base rate of failure for the sample. Thus, as Simon (1971, p. 17) states:

> Administrators who may wish to use prediction tables or equations as guides to selection will want them to identify, as far as possible, the future successes and failures. Since (as long as a dichotomous criterion of success and failure is used) a person's observed probability of failure, once the event has occurred, is either 0 or 1, the aim of a predictive device should be to allot to each case a predicted probability as near that 0 or 1 as possible. The predictive power of the device may be regarded as the extent to which the predicted probability of failure corresponds to the observed probability of failure (0 or 1), case by case. A prediction table of high power will be able to separate most of the cases into groups in which the predicted rate of failure is either very low . . . or very high. . . .

Comparing statistical procedures

It is unclear which statistical procedure to use to achieve the best predictions of criminal recidivism (the literature shows no statistical procedure to be superior overall in making predictions - see Simon 1971), thus a comparison of procedures is useful for administrative purposes. In the first step toward making comparisons between procedures, we can obtain a probability of failure for each identified group. Entering a separate sample, we can examine the difference between predicted and observed probability rates for each identical group in the new sample (probability predictions). After getting a total difference between predicted and observed probabilities, we can see which procedure has the least overall difference. However, we can take an additional step and force a classification of persons into predicted failures and predicted successes (discriminant analysis predictions). For example, we can predict that <u>all</u> individuals in groups which have a rate of failure <u>above</u> the base rate of failure in the sample will fail, and <u>all</u> individuals in groups which have a rate of failure <u>below</u> the base rate of failure in the sample will succeed. By classifying individuals as failures or successes, we can then see which statistical procedures make the most errors, and in which direction (predicted successes who fail and predicted failures who succeed) when we use the classification in a separate sample. It is clear that we will make proportionately more errors in discriminant analysis predictions as we identify groups which have rates of failure that depart farther and farther from a probability of 0 or 1.

Thus, for administrative purposes (i.e., aids to decision-making about release/no release, supervision/no supervision, etc.), we may want to use prediction tables for only a portion of the sample (i.e., persons in groups which have recidivism rates on the extreme ends of the probability distribution--near 0 or 1). For persons in groups which have a recidivism rate in the middle of the probability distribution, prediction tables are inappropriate for classifying individuals as failures or successes (i.e., they make too many errors), and additional information would be required to aid decision-making (i.e., social histories, psychological testing, observation, etc.).

We can declare a zone in the middle of the probability distributions where we do not use prediction tables for decision-making purposes (e.g., a 10% zone on each side of the base rate in the sample). The number of errors we make in each direction (predicted successes who fail and predicted failures who succeed) is a function of how wide we make the zone where we declare the prediction table useless for classification and where identified groups' rates of failure are along the probability distribution. The proportion of errors is not a direct function of number of useful classifications we make. We may simply be more successful in identifying a large number of people on the extremes of the probability distribution with one statistical procedure than with another and thus we will make fewer errors (see Wilcox, 1979; Ott & Kronmal, 1976).

Thus, once we decide upon a set of rules about classifying persons, we can compare statistical procedures as to their usefulness. We can see how many useful classifications can be made with each statistical procedure. Then, given we have found out how many useful classifications are made, we can also examine how many errors are made in making predictions of success and in making predictions of failure.

Administrators should use classification procedures only after examining the statistical procedures along three dimensions. They should look at how many classifications are useful with increasing width of the zone of useless classifications. Then, within each zone, they should see how many errors they make in classifying persons as successes and how many errors they make in classifying failures.

It is important to examine our prediction tables with regard to making probability predictions and discriminant analysis predictions. A table may have few differences between expected and observed rates of failure, but be unable to make many useful classifications, and also make several errors in either, or both, directions (see Ohlin & Duncan, 1949).

For example, a classic prediction table (Mannheim & Wilkins, 1955, Table 81, p. 146 and Table 85, p. 163) derived from multiple regression shows the following results if we arbitrarily (remembering that we should, because the importance of errors is an administrative decision, look at tables with different size zones of useless classifications) decide on rules that we will declare that the table is useless for classification purposes when we identify a group which has a recidivism rate within 10% of the base rate. With a base rate of 0.41, Mannheim and Wilkins' table would be useful for classifying 282 persons out of 338 in the validation sample (the sample where predictions are validated), or 83% of the sample. They would have 19% errors in predicting successes and 35% errors in predicting failures. Beverly's (1968) table (Table 6, p. 12) would be useful, with the above rules, for 47% of the 4102 persons in his validation sample. Beverly's base rate was 0.45. In predicting successes, he would make 25% errors, and he would make 38% errors in predicting failures. In examining a recent table (van Alstyne & Gottfredson, 1978, Table 5, p. 185), we find, with the above rules, that we would have only 93 useful classifications out of 2793 individuals in their validation sample. Each of the preceding studies report good probability predictions, however, they were unable to classify everyone as successes or failures accurately.

It should also be clear that prediction tables are not useful as the base rate nears 0 or 1 as you are less and less likely to be able to make predictions that are better predictions than those made based on knowledge of the base rate (e.g., predicting everyone in the sample to succeed when the base rate of failure is near 0 and predicting everyone in the sample to fail when the base rate is near 1).

One last comment about prediction tables is that they should be updated periodically as demonstrated by Hakeem (1948) and Ohlin (1954).

Outcome measure - what are we predicting?

There have been several definitions of delinquency (Glueck & Glueck, 1950; Wirt & Briggs, 1975; and, Faust, 1973). Except for the labeling perspective's notion that rates of delinquency are constructed (by selecting out certain groups to label as delinquent) by control agencies and therefore are social facts, par excellence (Kitsuse & Cicourel, 1963, p. 139), most definitions of delinquent behavior lead to the echinated problem of how to measure it (Sellin & Wolfgang, 1964). The fact is official records underreport crime (Tittle & Logan, 1973; Gold, 1970; Hood & Sparks, 1970; and, Sellin & Wolfgang, 1964). Another problem has to do with whether we use arrests (which includes people later found not guilty) or convictions (which excludes some guilty persons) as a measure of delinquency or recidivism.

Researchers have noted that there is differential responding to crime among social control agencies (Gottfredson, 1967). An increase in recidivism may reflect increased offending behavior by parolees, increased surveillance by parole agents, or changes in policy of paroling authorities.

Other scientists have argued that the solution to the foregoing problems is self-report studies. There have been some excellent demonstrations of the validity and reliability of self-report measures using "lie detectors", official records, and informants (Gold, 1966; Erickson, 1972; Blackmore, 1974; and, Clark & Tifft, 1966). At the same time, self-report measures have been criticized for involving very minor offenses (Gold, 1970; Nettler, 1974; and, Hood & Sparks, 1970).

There is evidence that the most serious offenders and the most frequent offenders are the ones officially recorded (Williams and Gold, 1972). It is with the most serious and/or frequent offenders that the research reported in this dissertation is concerned. We are concerned with the "hard core" delinquents (ones who have criminal behavior warranting institutionalization). Our sample is from adolescents first admitted to a correctional school for boys. And, we are counting a return to a correctional school as a measure of adolescent criminal recidivism and an adult felony <u>conviction</u> as a measure of adult criminal recidivism. In view of Williams and Gold's findings (1972), it would appear that our outcome measures have reasonable validity. It should be clear that we are talking about the extreme end of the delinquency continuum; our sample is from a subpopulation of the total delinquent ~~population and they comprise only about 4% of the~~ delinquent population (Williams & Gold, 1972).

There is evidence that our outcome measures are reliable as three independent studies (using the same methodology as reported here) in Wisconsin have found the juvenile recidivism rate to be about 60% and the adult rate to be about 35% in a ten-year longitudinal follow-up (Boyle et al., 1974; Sharon, 1977; and, the data gathered for this dissertation).

Recidivism studies

The first published study of factors associated with parole outcome appears to be by Warner (1923). Warner called for prediction studies, and within a short period several prediction studies emerged (Burgess, 1928; Glueck & Glueck, 1930; Vold, 1931; Monachesi, 1931; and, Tibbitts, 1931). No summary of these early studies is given as extensive summaries can be found elsewhere (Mannheim & Wilkins, 1955; Gottfredson, et al., 1972; and, Simon, 1971). Some more recent studies have used multivariate statistics for prediction. For example, the Division of Research of the California Youth Authority has, since 1959, developed base expectancy tables for male wards released to parole (Gottfredson et al., 1972). Using base expectancy scores, these tables distribute parolees within a given period of time among several class intervals, each of which specifies the probability of parole violation. These base expectancies are derived from multiple linear regression. Thinking that there was appreciable diversity among these wards with respect to a number of background characteristics, Beverly (1968) suggested that tables might be more predictive of parole performance if they were differentially developed upon more homogeneous subpopulations. The subpopulations defined were: 1) younger juvenile court first admissions; 2) older juvenile court first admissions; 3) younger juvenile court readmissions; 4) older juvenile court readmissions; 5) older criminal court first admissions; and, 6) older criminal court readmissions. By inspecting a matrix of chi square tables, Beverly decided that those subpopulations for which the independent variables appeared to be decidedly related to parole outcome were: younger juvenile court first admissions, older juvenile court first admissions, and older criminal court first admissions. He constructed multiple regression prediction equations for each of these subpopulations, and went into a new sample to see how well he predicted. The interesting finding of Beverly's study is that using these subpopulation regression equations did not give him better predictions than the ones derived in the larger population.

Gottfredson (1962, 1963, 1972) has compared several statistical procedures, and in general he has found that the simple Burgess (1928) procedure of weighting each variable by a factor of one predicts as well as associational analysis, multiple regression, and other multivariate procedures.

Simon (1972) drew a sample of 539 young men who were between 17 and 21 years of age when their probation orders began, and used a criterion variable of reconviction of a Standard List offense (Britain) within three years from the date of the order. For the predictive analyses, the sample was divided into a construction sample (N=270) and a validation sample (N=269). Sixty-two predictor variables were examined in various combinations with 17 different statistical procedures. She found all procedures to be low in power to predict for individuals. The statistical procedure selected as having the best predictions was predictive attribute analysis. However, when she applied this model to a completely new sample (a third sample), she found she made rather poor predictions.

Defining success as no new convictions for which sentences were given for a period in excess of sixty days, Brown (1978) followed 12,676 parolees for a period of two years. He developed a risk classification system using discriminant analysis. He split his sample into a construction sample and a validation sample. He finds that his multivariate procedure predicts better than any of the univariate statistics (F-tests), and he finds that variables may seem like good predictors as single variables, but be unimportant in a multivariate model. And, some variables which seemed unimportant as single variables were important in a multivariate model.

Counting as successes all those who continued on parole without violations, all those who were continued on parole with a new minor conviction, and all those who were returned to prison without a new violation, van Alstyne and Gottfredson (1978) drew a sample of 5,587 parolees in Ohio between 1965 and 1972. The subjects were followed for a period of one year after release on parole. They compared the simple Burgess (weight each important factor by one) procedure to logistic regression. Based on "group predictions", they found the simple Burgess (1928) procedure predicts as well as logistic regression.

Overall, the general conclusion is that the simple statistical procedures give us as accurate predictions as do the more complicated procedures. However, it should be noted that comparisons between statistical procedures have usually been made using probability predictions and not discriminant analysis predictions. It is very possible to have very good probability predictions and very poor discriminant analysis predictions because categories identified have risk rates near the base rate of failure in the sample.

Rates of recidivism

In an early work, Sheldon and Eleanor Glueck (1930, 1937, 1939, 1943) made an intensive follow-up study of a thousand seriously delinquent boys during three consecutive five-year periods. The average age of the boys was 13.5. These boys had been referred to a child-guidance clinic by the Boston Juvenile Court during the years 1917-1922. At the end of the first follow-up period, 20% of these boys had not been re-arrested. Ten years after the referral to the clinic 34% had not been re-arrested during the second five-year period. Fifteen years after the referral to the clinic 42% had not been arrested during the third five-year period. The Gluecks found that 27.6% of the original group could be thought of as "hard core" delinquents (e.g., were guilty of serious offenses throughout the fifteen years of study, from an average age of 13.5 years to an average age of 29 years).

In a thirty-year follow-up study of a consecutive series of children referred to the St. Louis Municipal Psychiatric Clinic between 1924 and 1929, Robins (1974) studied 524 children whose median age at first contact with the clinic was 13 years. Thirty-seven percent of these children had had juvenile court referrals at the time they first came to the clinic. Robins had four groups of children: 1) juvenile court referrals; 2) referred for antisocial behavior; 3) referred for other than antisocial or juvenile court reasons; and, 4) control group (had not been referred to the clinic, and they were matched with the clinic group with respect to sex, race, and year of birth). With regard to adult crime, she found in her 30-year follow-up:

	Group 1	Group 2	Group 3	Group 4
Non-traffic arrests	60%	43%	20%	11%
3 or more arrests	38%	20%	9%	3%
1 or 2 arrests	22%	23%	11%	8%
Prison	28%	13%	6%	1%
No arrests	38%	53%	77%	84%
Number	176	191	119	97

During the third five-year period of the Glueck study, 58% of the offenders were arrested. In the St. Louis study, during the entire 30 years of follow-up, 60% of the juveniles referred to the clinic by the court were arrested. Some of the Glueck cases were arrested at earlier periods but not in the third period, thus the total percentage arrested at some time would be greater than for the St. Louis study. The differences may be due to differences in police practice, but also the St. Louis delinquents were about one-fourth girls, who had a lower proportion of adult arrests than did the boys, while the other study was exclusively of boys.

The Gluecks (1950) also followed 500 boys who had been committed to a state training school in Massachusetts. Again, three consecutive five-year surveys were made. The boys averaged fifteen years of age at the time of the initial study.

The first five-year study was of the five years preceding their admission to a correctional facility. The second five-year study covered the years up to the boys' 25th birthday. Among those admitted to the Massachusetts training school, 77% were arrested between their 17th and 25th birthdays. From age 25 to 31, 51% were arrested.

This second Glueck study (conducted in Boston as was the first study) shows that the interval of about 20 years between the two study periods made little difference in the trend of crime from the juvenile delinquency age up to about thirty years of age.

Shaw and McKay (1942), using official records and a definition of recidivism as any adult appearance in court (felony or misdemeanor), followed up to 1938 the careers of one-third of all Chicago boys sent to Juvenile Court of

Cook County on a delinquency petition during 1920. They found that 60% of their boys subsequently appeared in adult court, a figure similar to the St. Louis study using arrests instead of court appearances, and in an 18-year follow-up design as opposed to the 30-year follow-up used by Robins.

Rumney and Murphy (1952) studied the subsequent careers, over an eleven year period of time, of subjects placed on probation in 1937. The proportion of subjects who still had a clear record after the eleven years was 22% of those aged 10-12 at the time of their original offense, 39% of those aged 13-15, and 30% of those aged 16-18. They were counting any infraction as recidivism. Their rate of recidivism for the subjects aged 13-15 is very similar to the above study and the St. Louis study with similar aged children, however, this figure is lower than the figure reported by the Gluecks.

Among these studies, we see that rates of recidivism vary depending on the age group selected for study (the younger the age group selected the higher the rate of recidivism). Different follow-up periods were used, yet the first Glueck study showed higher recidivism rates than the St. Louis study, the Chicago study, or Rumney and Murphy's study, the latter study being the only one with a shorter period of follow-up than the Glueck study. Whether these differences reflect geographic differences or cohort differences cannot be assessed. Inclusion of girls may account for why the St. Louis study found similar rates as the other studies (excluding the Glueck studies) in a longer follow-up period.

In more recent work, Wolfgang (1977) has followed up a 10% random sample of his original (1972) birth cohort of 9,945 boys to age 30. At age 30, Wolfgang finds that the probability of being an adult offender (defined as aged 18+) given one has been a juvenile offender (defined as aged 17 and below) is 44%. In all cases, his outcome measure is arrests. Of course, Wolfgang is studying a different cohort than the earlier studies, and he includes as juvenile offenders anyone arrested, while the earlier studies included only delinquents who had enough history of delinquency to be referred to a juvenile court. In fact, Wolfgang finds that chronic delinquents (those who had 5 or more offenses as a juvenile) had an adult arrest rate of 76%, which is a figure closer to the Gluecks' rate using admissions to a juvenile correctional facility (1950).

Shannon (1973, 1976a, 1976b, 1978a, 1978b, and 1979) reports on a longitudinal study of delinquency and crime based on records of police contacts with two birth cohorts of people; the first was born in 1942 (N=1352) and the second was born in 1949 (N=2099). The current data is as of June 1, 1974. His criterion variable is police contacts in all cases. He defines juvenile as ages 6-17 and adult as 18+. Looking at non-traffic related police contacts he found that 68% of those who had juvenile contacts also had adult contacts in his 1942 male cohort. For the 1949 male cohort, he found 65% of the juveniles with police contacts had adult police contacts. Shannon's study has the softest criterion variable of all studies discussed so far, and thus his recidivism rate is higher than the one reported by Wolfgang.

A follow-up study of Glasgow juvenile delinquents as adults was conducted by Stott and Wilson (1977), which consisted of 414 boys put on probation for the first time in Glasgow during 1957 and 267 boys found guilty of an offense during the first five months of 1959. Traffic offenses were excluded as a measure of recidivism except for driving without a license. However, most of the offenses included in the results were such that in Scotland they are designated as crimes. They followed these boys until December 31, 1968, and results were analyzed by age-group of the offender at the time of the court appearance (18th to 21st and 21st to 24th birthdays). Thirty-eight percent of the 18 to 21 year old persons had one or more convictions. During the 21-24 age period, 15% of the former juvenile delinquents had one or more convictions. Thus, using a harder criterion measure than Shannon or Wolfgang, the latter study does find a lower rate of return.

Other studies have examined recidivism in terms of other criterion variables, and in shorter follow-up periods. Babst and Hubble (1964) studied 753 first-released boys from Wisconsin juvenile institutions, defining recidivism as any return to a public institution within a year of the first release. Their recidivism rate was 43%. Weeks (1958), using any return to court or institutionalization during one year of release, found a 53% return rate for Annandale and a 37% return rate for Highfields in Michigan. Arbuckle and Litwack (1960) defined recidivism as a return to the same institution (Lyman School for Boys in Illinois) during a seventeen month follow-up, and studied 500 boys, aged twelve to seventeen. Their recidivism rate was 35%.

Causal or associational variables of recidivism

Prior criminal record. Many studies, over several years, have demonstrated that the longer one has engaged in criminal actions prior to the period under consideration the worse the prognosis (Burgess, 1928; Tibbits, 1931; Glueck & Glueck, 1950; Glaser & O'Leary, 1966; Buikhuisen & Hoekstra, 1974; Mannheim & Wilkins, 1955; Glaser, 1954; Solomon, 1976; and, Brown, 1978). Prior history of crime appears to be the single best predictor of further criminal behavior (Babst & Hubble, 1964; Wilkins & MacNaughton-Smith, 1964; and Sharon, 1977).

Age factors. The younger people are when they enter crime the longer they remain in it (Mannheim, 1955; Wolfgang et al., 1972; Wolfgang, 1977; Waller, 1972; Carney, 1967; and, Pallone & Hennessy, 1977). Age of first admission to a correctional facility is inversely related to criminal recidivism (Mannheim & Wilkins, 1955; Meyers & Levy, 1978; Brown, 1978; and, Wilkins & MacNaughton-Smith, 1964). Age variables appear to be second only to prior criminal history in terms of predicting further criminal behavior (Brown, 1978; Sharon, 1977; Solomon, 1976; and, Glaser, 1964, 1969).

Pattern of delinquent behavior. Sharon (1977) found less than 26% of his subjects were involved in only one class of offenses prior to their first institutionalization. Many researchers have found that persons who engage in only, or primarily, status offenses are less likely to be recidivists than are property offenders or violent offenders (Wolfgang et al., 1972; van Alystne & Gottfredson, 1978; Shannon, 1973, 1978a, 1978b, 1979; Mannheim & Wilkins, 1955; and, Mannheim, 1955). Pattern of offenses appears to be one of the strongest predictors of further criminal behavior (Brown, 1978; van Alystne & Gottfredson, 1978; Glaser & O'Leary, 1966; and, Babst et al., 1972).

Family. Stability of the family and whether siblings and parents are delinquent have been found to be correlated with recidivism (Glueck & Glueck, 1939, 1962; Mannheim & Wilkins, 1955; Weeks & Ritchey, 1956; Arbuckle & Litwack, 1960; Buikhuisen & Hoekstra, 1974; McCord & McCord, 1959; and Robins, 1974). Number of siblings has also shown a positive relationship to recidivism (Mannheim & Wilkins, 1955; Waller, 1972; Sharon, 1977; and, Glueck & Glueck, 1939). Coming from an unstable or broken home increases one's probability of failure (Glueck & Glueck, 1962; Robins, 1974).

Race. Several studies report a significant correlation between race and criminal recidivism (minorities having higher risk rates than whites) patterns (Babst & Hubble, 1964; Guze, 1964; Wolfgang, 1977; Mannering, 1958; Rumney & Murphy, 1952; and Heilbrun, 1978). Using multivariate procedures, Wolfgang finds race to be his best predictor (Wolfgang et al., 1972). Glaser and O'Leary (1966) argue that controlling for variables associated with poverty would reduce the correlation between race and recidivism to non-significance. Wolfgang's study does not control for several poverty variables.

School. Most researchers report a significant negative relationship between school achievement and recidivism

(Arbuckle & Litwack, 1960; Weeks & Ritchey, 1956; Shannon, 1977, 1979; and Caldwell, 1951). Guze (1964) and Mannering (1958) failed to find a relationship between achievement and further criminal behavior. Truancy and misbehavior at school are usually found to be positively associated with further criminal behavior (Simon, 1971; Mannheim & Wilkins, 1955).

Type of offense. Most research finds the highest rates of recidivism among those whose crime is auto theft, burglary, forgery, fraud, and general theft (Glaser, 1964; Metzner & Weil, 1963; Glaser & O'Leary, 1966; Solomon, 1976; and, Brown, 1978). The lowest rates are for assault, homicide, rape or other sex offenses, while robbery, narcotics and liquor violations are somewhat intermediate.

Work record. It appears that if people can find and keep a job they are more likely to remain free of crime for longer periods of time than if they are unemployed or sporadically employed (Glueck & Glueck, 1930, 1939; Mannheim & Wilkins, 1955; Reitzes, 1955; Glaser, 1964; Waller, 1972; and Robins, 1974).

Mental disorders and personality. The Gluecks (1930) were among the first to find a positive relationship between mental disorders and recidivism, however, their methods of getting these results have been criticized (Wooton, 1958).

Guze (1964) has also found a positive correlation between mental disease and recidivism to support the earlier Glueck study. Cowden (1966) has found that a positive personality prognosis is related to less recidivism (also, see Eysenck & Eysenck, 1974). Although Mandel et al. (1964) found insignificant relationships between MMPI scores and recidivism, recent work (see the June, 1977, issue of <u>Criminal Justice and Behavior</u>) by Megargee and his associates shows promising results for the use of the MMPI as a predictive measure. Fitts and Hamner (1969) have presented some preliminary data that Fitts' Tennessee Self-Concept Scale can differentiate between recidivists and non-recidivists.

Other measures of personality that have shown the ability to discriminate between recidivists and non-recidivists are the Socialization Scale of the California Personality Inventory (Gough et al., 1965), the K.D. Proneness Scale (Kvaraceus, 1961), and there is suggestive evidence for Rotter's (1966) locus of control measure (Inger, 1976).

<u>Residence.</u> There is some evidence that residence is related to recidivism (Shannon, 1973, 1976a, 1976b, 1979). Shannon has found that the poorer and more run down sections of a city have higher rates of criminal recidivism than better areas. There is also evidence that being from an urban area gives one a higher probability of failure than being from

a rural area (Wilkins & MacNaughton-Smith, 1964; Mannheim & Wilkins, 1955; and, Pallone & Hennessy, 1977).

Family moves. Although it is infrequently examined as a factor related to criminal recidivism, the number of family moves has been shown to be inversely related to continued criminal behavior (Buikhuisen & Hoekstra, 1974; Wolfgang et al., 1972).

Friends. In general, people who associate with, and commit crimes in company of, other criminally-oriented persons are more likely to be recidivists (Waller, 1972; Mannheim & Wilkins, 1955; Wilkins, 1955; Wilkins & MacNaughton-Smith, 1964; and, Shannon, 1973, 1977, 1979) than are persons committing crimes alone.

Socio-economic status. There is evidence that socio-economic status is inversely related to criminal recidivism (Wolfgang et al., 1972; Shannon, 1977, 1978, 1979).

Other factors. Factors presented in the foregoing discussion have demonstrated stronger and more consistent relationships to criminal recidivism than factors cited below.

Intelligence has been measured fairly often, with inconsistent findings (Laulicht, 1963; Tennent & Goth, 1975; and, Caplan & Powell, 1964). Difficulties with IQ measures have been attributed to low motivation on the part of offenders, to the fact that many crimes reflect emotion rather than rational thinking and so IQ is irrelevant, and to the fact that IQ measures are taken at the time of admission when individuals are disoriented (Glaser & O'Leary, 1966). However, when a relationship between IQ and criminal recidivism is found, it is the duller person who has the greatest risk of failure.

Institutional adjustment (Arbuckle & Litwack, 1960; Glueck & Glueck, 1930; Cowden, 1966; Mandel et al., 1963; and, Weeks & Ritchey, 1956) in general has been demonstrated to have some predictive value, as has length (the average length of incarceration for juveniles is 8 months in most states - see Cavan & Ferdinand, 1975) of incarceration (Brown, 1978).

Marital status has shown inconsistent and low relationship to criminal recidivism (Mannering, 1958; Reitzes, 1955; and, Mandel et al., 1963).

<u>Purposes of this research</u>

The purposes of this research are to: 1) provide a detailed description of the adolescents first released from Wisconsin correctional facilities in 1967; 2) construct prediction models (for juvenile and adult criminal recidivism) using three different statistical procedures;

3) examine how well the three statistical procedures can predict juvenile and adult recidivism in a separate sample; and, 4) construct an adult and a juvenile logistic regression model.

CHAPTER 3

METHODOLOGY

A longitudinal follow-up design was used for this study. Persons, chosen for this study, were first admissions to a juvenile correctional facility and they were followed up for a period of ten years with regard to official criminal behavior.

Study population

The study population was all juveniles admitted for the first time in their lives to the only two schools for boys (Wisconsin School for Boys, located in Wales; and Kettle Moraine Boys School, located in the Kettle Moraine area near Fond du Lac) that were operated by the State of Wisconsin during the study periods (1965 and 1967). The primary problem with which this study is concerned is prediction. Thus, we have two samples; one from all first admissions during the calendar year of 1965 and one from all first admissions during the calendar year of 1967. Throughout the remainder of this dissertation the first sample (first admissions during 1965) will be referred to as the <u>Construction Sample</u> (which is consistent with the literature) and the second sample (first admissions during

1967) will be referred to as the Validation Sample.

The choices of the base years requires some discussion. Wisconsin created a new identification procedure for offenders in 1963 whereby a number is given to juveniles who enter the juvenile justice system that remains with them throughout adulthood should they have adult offenses (misdemeanors or felonies). Prior to 1963, the correctional file number given to juveniles was different from the one given to them as adults, consequently, it is much more difficult to make a study of the nature described here for a study period that precedes 1963 because of the potential for loss of data.

Sharon (1977), who drew the construction sample in 1975, picked the study year of 1965 at random from three candidate years of 1963, 1964, and 1965 that were available to him since he wanted a ten year follow up.

The year 1967, for the validation sample drawn in 1978 by the writer, was selected at random from 5 candidate years of 1963, 1964, 1966, 1967, 1968. Admissions were taken from the entire calendar years of 1965 and 1967 because of seasonal bias (it is argued in the literature that juveniles differ qualitatively in offenses during the cold weather months from those of the warm weather ones--Nettler, 1974).

Samples

The construction sample is comprised of 432 first admissions selected from 865 total first admissions to Wisconsin schools for boys during the calendar year of 1965. The validation sample consists of 500 of the 992 total first admission to Wisconsin schools for boys during the calendar year of 1967. It was thought that at least half of the total number of first admissions were needed to perform the multivariate analysis being planned.

List of elements for study

The names and file numbers of the adolescents who made up the sampling populations were obtained from a master list of first admissions maintained by the Wisconsin State Division of Corrections. The list is ordered by month and names and file numbers appear in chronological order of admission within each month.

Sampling procedure

About the construction sample, Sharon writes "The sampling procedure used was the systematic random sampling technique, with K=2 (since every second case was to be selected). The odd numbers were selected" (1977, p. 68).

The validation sample was drawn by simple random sampling procedures (Smith, 1975, p. 120). Using the number that ordered the list of first admissions during 1967 on the computer printout received from the Division of

Corrections, the table of 5000 random digits was used that appears in Appendix B of Smith (1975). One member of the file reading team for this study gave the other member two numbers between -1 and 100 that occurred to her. The other member used these numbers to determine the row in which to enter the table. We took every other number (using only the first 3 digits of the number) appearing in the rows and moved down the table when we got to the end of a row, using each row as it appeared in the table.

Cases eliminated

Cases were eliminated from the samples when the subjects died during the period between their first admission as a juvenile and ten years later without establishing an adult conviction for a felony. Those who died after being convicted of an adult felony remained in the samples. Six cases were eliminated from the construction sample and seven cases from the validation sample because of death. Of these individuals who died, none had reached their nineteenth birthday.

Twelve cases in the construction sample and 18 cases in the validation sample were eliminated because the records indicated that the subjects had moved out of the state prior to committing further juvenile offenses after their first juvenile admission and/or prior to committing adult felonies.

Two cases were eliminated from the validation sample because the record indicated that the juveniles had been in correctional schools for boys in other states prior to their admission in Wisconsin.

Lastly, 10 cases had to be eliminated because the microfilm was illegible or contained only the discharge and admission sheets. All 10 cases were in the validation sample because when the validation sample was studied original records had been destroyed (all are microfilmed), and in a few instances the only information on microfilm is the Face Sheet (showing limited information about admission) and the Discharge Sheet (showing only the date of discharge from the juvenile justice system). The reason for these limited-information files, according to Division of Corrections officials, is clerical error. The problems of limited information or illegibility did not arise in the construction sample because at the time data was collected for it the original files were, for the most part, available.

Eighteen additional cases in the construction sample and 37 additional cases in the validation sample were randomly selected, with replacement.

Instrument

The instrument, appearing in the Appendix of this dissertation, consists of 59 items, which are ordered similarily to their order as recorded in the files. Each item operationalizes a separate variable, thus the term variable will be used in lieu of the term item.

Conception of variables

The variables can conceptually be ordered into six general areas listed below. These variables are numbered here as they appear in the questionnaire. Variables are separated into pre-release variables (variables which occur prior to subjects' first juvenile release from a correctional facility) and post-release variables.

PRE-RELEASE VARIABLES

1. Identifying Information: 1) file number; 2) criminal identification number; and, 3) name of subject. These variables are not used in the analyses to follow nor are they discussed.

2. Individual and Family Characteristics: 4) race or ethnic group; 5) community size; 6) region of the state in which persons resided; 7) tatoo markings; 8) living arrangement (with both natural parents, foster home, etc.) at the time of first juvenile admission; 9) reason for single-headed family if applicable; 10) number of family moves during the 10-year period prior to first admission as a juvenile; 11) number of alternative living arrangements in the 10-year period prior to first admission (i.e., foster home); 12) number of

siblings; 13) occupation of household head; 14) education of household head; 15) family contact with police other than concerning subject of this study; 16) school grade level at time of first admission; 17) status at time of first admission (i.e., in school, out of school and unemployed); 33) measured level of intelligence.

3. Behavior Prior to First Juvenile Institutionalization: 18) achievement level in school during the year preceding first juvenile institutionalization (letter grades); 19) truancy; 20) behavioral problems at school; 21) type of committing offense as described in the court disposition; 22) actual description of committing offense; 23) accompanying person(s) during commission of committing offenses only; 24) Code for committing offense by court disposition; 25) number of police contacts prior to first admission; 26) use of alcohol in crimes prior to first admission; 27) pattern of offenses prior to first admission; 28) age at first police contact; 29) age at first juvenile admission; 30) supervision prior to first admission (i.e., social service agency).

Description and discussion

Variable 21 is committing offense as it appears in the judge's decision. In some files, more than one offense is discussed in which case the most serious offense was recorded for this study. Variable 22 is the actual committing offense as it appeared in police and probation officers' reports. It was in a minority of (around 10%) cases that variables 21 and 22 differed for juvenile offenses. Variables 24 and 27 refer to a classification system developed by Flanagan and Kapture (1974). The advantage of this classification for our study is its compactability and simplicity. Flanagan and Kapture's classification has two systems (one for juveniles and one for adults), with three classes of criminal behavior in each. The three classes comprising the juvenile system are: 1) offenses for which the primary motive is to produce income or goods; (i.e., burglary, and robbery); 2) offenses in which there is violence without a primary motive to produce income or goods (i.e., assault, rape, and battery); and, 3) status offenses (i.e., running away from home and vandalism). A complete classification of offenses under Flanagan and Kapture's system appears in the Appendix.

Primarily, Flanagan and Kapture's system aids in establishing relationships between classes and sequences of crimes with eventual outcome, rather than relationships between specific crimes and eventual outcome. When two offenses are recorded in the files as committing offenses (variable 24), combinations of classes of offenses are used. There are six possible combinations of classes of offenses, and they are coded as 1 to 6 with code 7 as a category for other. Examples of code 7 are arson and sexual perversion.

Variable 27 also uses the Flanagan/Kapture system and numerical combinations represent the chronological pattern of offending behavior. For example, if an adolescent committed three violent offenses (code 2) followed by an income producing offense (code 1), we coded the combination as (21). If this same individual committed additional violent offenses at a later time, the combination is still (21). Should our same offender commit a status offense (code 3) following all offenses mentioned so far, we would code the combination as (213). The objective is to record types of criminal behavior and not the entire pattern.

4. Variables about Institutional Stay: 32) where institutionalized; 31) length of first stay in the institution; 34) peer adjustment at the institution; 35) pattern of peer interaction (i.e., heavy or loner); 36) disciplinary problems at the institution; 37) age at first release from juvenile institutionalization.

Discussion

Variable 34 refers only to behavior of the person as seen by institutional counselors.

POST RELEASE VARIABLES

5. Circumstances following First Release:

38) where was offender released to; 39) number of arrests following first juvenile release from an institution until final discharge from the juvenile justice system; 40) use of alcohol in offenses while under juvenile supervision; 41) amount of time between first release and first police contact, or revocation of parole; 42) number of recommitments to a juvenile correctional facility; 43) age at final discharge from the juvenile justice system; 45) status at final discharge as a juvenile (i.e., full-time employment); 59) possession of a high school diploma at final discharge as a juvenile.

6. Variables about Adulthood: 46) criminal file status at the end of our follow-up period; 47) evidence of minor offenses as an adult; 48) number of minor offenses as an adult; 49) evidence of adult felonies; 50) number of adult felonies; 55) amount of time between subjects' last active file and end of study period;
The following naturally pertains only to part of our sample (those with adult felonies): 51) age at first adult felony; 52) pattern of adult felony offenses; 53) description of first adult felony; 54) educational level when committing first adult felony; 55) marital

status when committing first adult felony; 56) did subject have children; 57) employment status when committing first felony.

Discussion

Variable 47 refers to adult misdemeanors. In Wisconsin misdemeanors are defined as offenses which do not call for a minimum jail sentence of one year or more (Wisconsin Statutes, 1975, Ch. 939.60). Felonies (Variable 49) are defined by Wisconsin as offenses which carry a minimum prison term of one year or more (Wisconsin Statutes, 1975, Ch. 939.60). Most states use the same definitions.

Variable 52 (pattern of offenses) refers to the adult system of the classification developed by Flanagan and Kapture (discussed earlier). There are some modifications to what we said earlier with the adult classification. Code 3 covers most other offenses (i.e., joy riding, sexual relations with a minor) than income producing and violent offenses. Some offenses were considered felonies in 1965 and 1967, but are not considered as such in 1978 (i.e., possession of certain drugs). Because so few cases (under 15 in each sample), were involved, we decided to apply the laws as they existed at that time.

Conceptualization of adult vs juvenile status

In Wisconsin, the age of majority was 21 in 1965 and 1967 (it was changed to 18 in 1973). However, persons could be tried as adults in adult court while they were under 21 years of age. The files were very clear about whether offenders were treated as juveniles or as adults. For purposes of this study, the terms juvenile and adult refer to the legal status of offenders.

Variables

For a general description of our samples, we used a total of 52 independent variables (59 total variables minus 3 identifying variables and 3 variables dealing with outcome and one variable dealing with whether subjects had a tatoo). However, our predictions methods use only those independent variables that occur prior to the first release from a juvenile correctional institution (listed in the preceding section under the subheading of 'Pre-Release Variables') and our dependent variables: 1) number of recommittals to a juvenile correctional facility (variable 42); and, 2) convictions for an adult felony (variables 49 and 50). We did not use the variable of tatoo markings as it was gathered for anecdotal purposes only. Variables 21 and 22 were not used, except for defining variables 24 and 27, for prediction.

Dependent variable used as independent variable

To find out if there was a relationship between number of recommittals to a juvenile correctional facility and adult felony convictions, we used our first dependent variable (variable 42) as an independent variable.

Data collection

Data gathered for this study came from the files of the Wisconsin Division of Corrections in Madison, Wisconsin. We were given access to the data with two constraints: 1) no names of juveniles or adults be mentioned; and, 2) no contact be made with any persons included in the sample to supplement the data. Data for the construction sample was gathered in 1975 by Nachman Sharon (1977) and data for the validation sample was gathered by the writer and another reader in 1979. The files are currently in the process of being microfilmed after about five years of being inactive. In 1975, when the data for the construction sample was collected, most records were complete and in original form. In 1979, when data for the validation sample was collected, all cases were microfilmed and very few original files have not been destroyed.

Overall, the data was organized and consistently recorded. The majority of the variables had no missing data (e.g., race, region, all variables pertaining to age, number of siblings, number of juvenile recommittals, whether there were adult felonies and how many). Other variables were missing under 1% (e.g., occupation of household head, prior probation experience). Of the 31 independent variables used in our prediction methods, only 7 had data missing in more than 1% of the cases (6 were missing under 3% and 1 was missing 13% in the validation sample--education of household head).

One problem was uniformity of recording with some variables and specifics of this problem will be discussed when we use the variables to give a general description of our samples. For example, the variable of school problems was often recorded as "seems to have school problems" without being specific in any way and without giving us some knowledge about who were the informant(s). When informants were listed, some cases showed them to be school officials while others stated the information came from a parent or the adolescent being admitted.

Administration of instrument

The instrument used in this study was administered to the 432 cases that comprises our construction sample. To be sure that the validation sample files contained all of the data, 10 cases from the 1967 population (cases not used in this study) were read using our instrument prior to gathering data for this study.

Reliability of readers

For the construction sample, Sharon (1977, p. 87) reports, "It was decided to calculate reliability coefficients for five cases coded jointly by the two workers. The average reliability coefficient for the five cases was .95. (The range was .91 to .97)."

For the validation sample, percent of agreement was calculated between the two readers, who read 25 cases jointly (cases not used in our study), on 55 variables (59 minus 3 identifying variables and the variable tatoo markings). A complete listing of these variables and what percent of agreement was achieved is given in the Appendix. For variables of interval level of measurement, Pearson's Product Moment Correlations (r) were run and these are also given in the same appendix.

As for percent of agreement, we achieved an average of 94% agreement for all variables. The percent of agreement ranged from 76% to 100%, with 80% of the variables showing over 90% agreement.

All Pearson's r's were in the +.90's, with most near, or at +1.00. (Some variables are treated as interval even though there was an upper limit because no cases exceeded the upper limit - see family moves on questionnaire).

Data analysis

Most of the analyses were done with the procedure known as Crosstabs, a part of SPSS. Logistic regression analyses were done with stepwise procedures in BMDP3F.

Descriptive information

Prior to using inferential statistics, we used frequency tables to give a general description of our samples. For this general description, variables were not collapsed across categories (they remained exactly as they appear on our questionnaire).

Statistical analyses

Where statistical tests are performed and where we use the Phi coefficient as an aid to describing our samples, variables were dichotomized (theoretically, possession of an attribute versus does not possess attribute). Prior to creating any dichotomies, distributions were examined for skewness and density of cells. In most cases, our dichotomies are in accordance with previous studies and theory. In some cases, we had to make decisions based solely on the distributions. For example, as mentioned in the second chapter of this dissertation, most states report an average length of stay in the institution for juveniles to be near eight months. Consequently, many research studies use dichotomies which cannot be used here due to the fact that Wisconsin appears to keep adolescents institutionalized for shorter periods of time than many states.

Choosing statistical procedures

Recently, evidence has emerged that interactions between predictor variables are important in investigating criminal recidivism (Wilkins & MacNaughton-Smith, 1964; Glaser, 1962; Dean & Duggan, 1969; and, Solomon, 1976).

Although interactions between predictor variables appear important for the study of criminal recidivism, the decision as to what statistical procedure to use to achieve the greatest predictive efficiency remains unclear. Multiple linear regression (Wonnacott & Wonnacott, 1970) has been used for predicting criminal recidivism (Mannheim & Wilkins, 1955) and it is widely received in the criminological literature (Wilkins, 1973).

In multiple linear regression, we are interested in main effects of predictor variables, and we assume complete independence between predictor variables. The logic behind multiple linear regression treats interactions as nuisances. Multiple regression procedures are not designed to uncover interactions that may exist. If interactions have been detected by some other procedure, there are weighted regression procedures which provide very similar results to procedures specifically designed to detect interactions (Goodman, 1976). However, the researcher must know where these interactions are prior to doing regression analysis.

A procedure specifically designed to detect important main effects and interactions between predictor variables has been recently suggested for predicting criminal recidivism (Solomon, 1976). The procedure suggested by Solomon is logistic regression.

Logistic regression procedures are also specifically designed for dichotomous dependent response variables (Fienberg, 1978), unlike regression procedures, where interval level variables are assumed or a dummy variable (has attribute versus does not have attribute) is created. Most dependent measures in criminology are dichotomous, thus it would seem reasonable to use procedures designed specifically for dichotomous data.

Furthermore, the usual regression procedures assume that the variances in the cells of a table are homogeneous, an assumption not required by logistic regression. Homogeneous variance may be demonstrably false for criminological data (Gottfredson, 1963; Palmer & Carlson, 1976).

Logistic regression expresses the odds (e.g., recidivism to non-recidivism) as an additive-effects model for the logarithm of the odds. The logistic regression formula, which expresses the log-odds ratio as a sum of certain main effects and interactions, can also be expressed in equivalent weighted multiple regression forms (provided interactions are already known). Although the predi .ted proportion (proportion predicted to fail, for example) and the corresponding log odds are quite different models, the relationship between the predicted proportion and the corresponding log odds is approximately linear for values of the predicted proportion in the range from 0.25 to 0.75 (Goodman, 1976, p. 91; Theil, 1970, p. 106). However, if some of the predicted proportions are not within the above range, then the models (logistic regression and weighted regression) can be very different. In this situation, it is clearer how to test whether the log odds ratio fits the data (since the test does not rely on the assumption of homoscedasticity) than to test whether the weighted regression model (which assumes homoscedasticity) fits the data (Goodman, 1976, pp. 99-103).

As stated earlier, while logistic regression simultaneously tests for main effects as well as interactions, the usual regression procedures require that interactions be known before the regression analysis. If 6 predictor variables are used, and we wanted to examine all possible 2-way interactions, we would have to look at 64 (2^6) possible interactions before doing the regression analysis. If higher order interactions are to be examined, the problem of finding them is geometrically multiplied. The problem of interpretation of a number of interactions in regression can become extremely complex.

Several statistical procedures have been suggested out of concern for the validity of the assumptions of multiple regression: 1) predictive attribute analysis (Wilkins & MacNaughton-Smith, 1964); 2) base expectancies (Gottfredson & Beverly, 1962; Hoffman & Beck, 1974); 3) configurational analysis (Glaser, 1962); 4) association analysis (Williams & Lambert, 1959, 1960; Simon, 1971); and, 5) cluster analysis (Fildes & Gottfredson, 1972). Simon (1971) compared 17 statistical procedures with regard to predictive efficiency (including multiple regression, associational analysis, a Burgess procedure, and configurational analysis). She found no statistical procedure to have clear superiority in predictive power, although predictive attribute analysis showed an advantage with regard to reproduceability of the constructed model in a separate sample. Grygier (1969), also, found some advantage to using predictive attribute analysis over multiple regression, associational analysis, and other procedures, however, the soundness of his conclusions is unclear due to the fact that he does not fully present his analysis.

We choose to compare logistic regression, predictive attribute analysis, and a Burgess procedure as to predictive power. The literature is unclear about which statistical procedure gives us the best predictions.

Phi (Conover, 1971, pp. 180-184) is a non-parametric statistic and is a linear transformation of Chi Square (X^2):

$$\phi = \left(\frac{X^2}{N} \right)^{\frac{1}{2}}$$

For 2 by 2 contingency tables (exclusively used here with Phi), Phi varies between 0 and 1.

Where tests of significance were performed, we set alpha (region in the sampling distribution where we could reject the hypothesis under test -- commonly mislabelled the null hypothesis) at 0.05, one-tailed.

Predictive attribute analysis

All tests of significance were performed with Phi in constructing Predictive Attribute Analysis Models (Wilkins & MacNaughton-Smith, 1964; Simon, 1971) and in forming total points scores (to be discussed).

Theoretically, predictive attribute analysis is an analog to analysis of variance. The objective of predictive attribute analysis (PAA) is to create groups which have maximum between-group variance and minimum within-group variance. Based on selecting only variables which explain the most variance in the dependent variable separately, PAA allows for interactions between independent variables while examining their relationship to the dependent measure.

PAA proceeds in the following fashion: 1) at the first stage, after all variables have been dichotomized, we select the independent variable most highly associated with our dependent variable; 2) the second stage involves controlling for the main effects of the variable selected at the first stage by creating two groups (based on the variable's dichotomy), and selecting from all the <u>remaining</u> independent variables the one most highly associated with our dependent measure within <u>each</u> of our two groups created at the first stage; 3) we create two new groups within each of the original two groups obtained at stage one (at this point we have four groups); 4) the next stage involves again selecting from the <u>remaining</u> independent variables the one most highly associated with the dependent measure, given that we have controlled for the effects of all preceding independent variables, within each of our four groups obtained at step 3; 5) creating two groups from each of these most highly associated independent variables would give us eight new groups; 6) and, we continue in this branching-out fashion (see Diagram 1 in Chapter 5). Two constraints on PAA (Wilkins & MacNaughton-Smith, 1964) are: 1) variables selected for creating groups must be statistically significant (we used alpha = 0.05, one-tailed); and 2) the number of persons in any final group should not be less than about 10% of the sample. Provided at least one independent variable was statistically significant, we continued our levels of search with any one group until a group was obtained which contained near 10% of the sample. Ideally, we hoped to arrive at final groups nearly equal in size.

Total points scores

We also used Phi in significance testing to form total points scores. We simply picked from all independent variables those most highly associated with our dependent variable. Coding the highest recidivism category of each dichotomized independent variable picked as 1 and the other category as 0, we added across variables. This procedure gives us groups which vary in total points scores from zero (meaning these individuals were never in the high recidivism category of any variable considered) to the total number of independent variables used. Obviously, total points scores, by themselves, do not allow for inter-correlations and interactions.

Chi square and gamma

We also used Chi Square and Gamma to see if juvenile recidivism is related to adult recidivism. Chi square was used for testing significance of differences in proportions. Gamma is a measure of association between two ordinal variables that have no zero points or equal intervals. Gamma is also a measure of reduction in error (Hays, pp. 332-329 & 436-437).

We treated adult felony convictions (yes or no) as ordinal (to not have a felony conviction is a better outcome than to have one).

Cramer's V

Cramer's V (Conover, 1971, pp. 180-201) is a modified version of Phi which is suitable for tables larger than 2 by 2, since Phi in larger tables has no upper limit. Cramer's V adjusts Phi for either the number of rows or the number of columns in the table, depending on which of the two is smaller. We used Cramer's V as a measure of explained variance for our PAA Models.

$$V = \left(\frac{\phi^2}{\min (r-1),(c-1)} \right)^{\frac{1}{2}}$$

Log-linear and logistic regression

A multivariate procedure that considers interactions between variables is using log-linear analysis as a tool for logistic regression. Detailed descriptions of using log-linear analysis as a tool for logistic regression are given elsewhere (Bishop, Fienberg, and Holland, 1975; Fienberg, 1978). Log-linear analysis allows for all possible interactions (first order up to highest order) between variables, and it is appropriate when we do not distinguish between dependent and independent variables. Logistic regression examines the interactions between the dependent variable and each independent variable, but always uses the highest order interaction between all of the independent variables. In other words, in logistic regression we declare a dependent variable, and examine, in the case of a dichotomous dependent variable, the probability of being in one category of the dependent variable as opposed to being in the other, given our configuration of independent variables.

In a step-wise procedure (for example, Goodman's procedure--see Fienberg, 1978, pp. 65-68), we can use log-linear analysis to find a model, among several competing models, which fits the data well (meaning that the expected, or estimated, probabilities are near the observed probabilities).

In the log-linear procedure, we look at only hierarchical models (meaning that in order for an interaction to be considered the main effects of the interacting variables have to be present in the model, and in order for a higher order interaction to be considered, all lower order interactions plus main effects have to be in the model for the variables that comprise the higher order interaction). There can be little doubt that interactions do occur without their main effects being significant, however, at this time there is little understanding of non-hierarchical models.

By way of explanation, log-linear provides a way to examine all possible interactions in a multiple contingency table and to select out the most important ones. It provides two very useful tools: 1) it provides us with estimates of the main effects of variables as well as interactive effects, which focuses the analysis on those effects demonstrating a significant contribution to the variation in cell density; and, 2) it allows us to indirectly (meaning iterative procedures are used--see Fienberg, 1978, pp. 33-36) test hypothesized relationships among variables by creating competing models and comparing the expected cell frequencies of these models with the observed cell counts.

With log-linear techniques, we are seeking to estimate cell frequencies in a multiple contingency table using a minimum number of marginal totals from the full table. Thus, log-linear examines the importance of each possible effect and suggests to us which effects may be ignored, while still arriving at estimates of cell frequencies which are close to the observed ones. In this study, we used maximum likelihood estimates.

We used the following step-wise procedure for selecting a model from Fuchs (Fuchs & Flanagan, 1979):

"Step 1 Define the cells in the original table including the largest number of cells for which there is available data.

Step 2 Fit the model $$\text{Log} \frac{p}{1-p} = \emptyset$$

Call this 'the tentative Model.'

Step 3 Fit all the possible models which differ from the "tentative model" by only one effect. If the chi-square obtained by fitting the 'tentative model' is nonsignificant and the difference due to none of the effects is significant, go to Step 5.

Step 4 Among the new models, select the one which provides the largest reduction in chi-square per degree of freedom, from the 'tentative model'. Go to Step 3.

Step 5 Check whether there is a main effect whose inclusion tests nonsignificant in all the fitted models. If there is such an effect, go to Step 6. If there is no such effect, - Stop - 'the tentative model' is 'the selected model'.

Step 6 Collapse the table over the nonsignificant main effect. The new table is now the original table. Go to Step 2."

Note: Ø = Grand mean

As we mentioned earlier, log-linear analysis treats all variables and interactions alike. When there is a natural dependent variable (as in this study, at least one return to a juvenile correctional facility = 1+, and no returns = NR), log-linear models can be modified for a logistic regression. In logistic regression, we are seeking an odds ratio (in this study the odds of being returned to a juvenile correctional facility). For example, in a specific situation determined by the independent variables, let p denote the probability of being returned to a juvenile correctional facility at least one time. Then (1-p) is the probability of not being

CONTINUED

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returned and p/(1-p) is the (1+)/(NR) odds ratio.

Note: x = expected value to fall in a particular cell in a specific model
I = incidence of juvenile recidivism (dependent variable)
D = disciplinary problems
S = school grade level
A = age at first admission
R = region of residence
U^{A} = main effect of variable, age at first admission
U^{AR} = effect due to the interaction between variables, age at first admission and region of residence
$\emptyset$ = grand mean

Using analysis of variance notation, a fully saturated (meaning all possible interactions are allowed to be present in the model) log-linear (do not distinguish a dependent variable) model is expressed as:

$$\begin{aligned}\text{Log } x = {} & \emptyset + U^{I} + U^{D} + U^{S} + U^{A} + U^{R} + U^{ID} + U^{IS} + U^{IA} + \\ & U^{IR} + U^{DS} + U^{DA} + U^{DR} + U^{SA} + U^{SR} + U^{AR} + U^{IDS} + \\ & U^{IDA} + U^{IDR} + U^{ISA} + U^{ISR} + U^{IAR} + U^{DSA} + U^{DSR} + \\ & U^{DAR} + U^{SAR} + U^{IDSA} + U^{IDSR} + U^{ISAR} + U^{DSAR} + \\ & U^{IDSAR}\end{aligned}$$

On the other hand, the full logistic regression model in terms of the log odds ratio is:

$$\begin{aligned}\text{Log}\left(\frac{p}{1-p}\right) = {} & \emptyset + U^{D} + U^{S} + U^{A} + U^{R} + U^{DS} + U^{DA} + \\ & U^{SA} + U^{SR} + U^{AR} + U^{DSA} + U^{DSR} + U^{DAR} + \\ & U^{SAR} + U^{DSAR}\end{aligned}$$

Our goal is to fit a parsimonious model, which is equivalent to retaining the "null" hypothesis H_o: U=0 for as many factors as possible. For example, to say that the model $$\log\left(\frac{p}{1-p}\right) = \theta$$

fits the data well is equivalent to saying that the log odds ratio is constant over all of the (DxSxAxR) configurations. On the other hand, a model like

$$\text{Log}\left(\frac{p}{1-p}\right) = \theta + U^{S} + U^{A} + U^{AS}$$

is fitted, the interpretation is that the incidents/non-incidence odds ratio is dependent upon the specific configuration of 'age at first admission' and 'school grade level', but after controlling for these factors, the variables of 'disciplinary problems' and 'region of residence' seem to be nonsignificant.

Limitations of methodology

There are some major methodological flaws in this study which should be pointed out. The flaws result primarily from external constraints.

Reporting

Our adult counts of felony convictions are affected by the design of this research in that we are unable to know how many people may have moved out of the state of Wisconsin after they were finally released from the juvenile justice system, but before committing adult felonies. Additionally, we do not account for all felonies in that many go undetected and persons are not always convicted of a felony even though they may have committed a felony. In both instances (moving out of the state and unrecorded crime), our estimates are conservative.

Misdemeanors turned out to be an unreliable measure due to differential reporting from county to county in Wisconsin.

Another issue that may be of large concern has to do with lack of rigor reflected in recording information in the files. Certainly, this problem of recording has been alluded to in numerous studies for the past fifty years (Simon, 1971; Hood & Sparks, 1970, p. 185). Because records are constructed for administrative purposes, and not for research purposes, some information is simply not suitable for research. Other information is so vague as to highly suspect for research. And, there is some evidence that there is some sloppy recording in that there were instances in which information was contradictory. The problem that these issues of poor recording creates for us is that the very sophisticated statistical techniques, with their precision, capitalize on errors, while the simpler techniques, with their crude examination of relationships, do not overemphasize errors.

The last issue is that we are working with variables which have been dichotomized. It can be argued that dichotomizing variables helps to reduce errors provided we may assume that errors are random. It could increase errors if the errors are systematic (a large percentage of errors in one category of a variable). The limited number of studies dealing with whether dichotomies reduce predictive efficiency from that obtained with interval levels of measurement so far shows there is no reduction using categorical data of a dichotomous nature (Simon, 1971, Mannheim & Wilkins, 1955; and, Grygier, 1965).

Follow-up period

An important question is how long to follow up delinquents to insure that most of the adult failures that are going to occur have occurred. Kitchener et al. (1977) show that the level of adult recidivism does not become stable for ten years. Since there has been no study of juvenile to adult criminal behavior with regard to how long a period of follow-up is needed, we chose a ten-year follow-up.

CHAPTER 4

RESULTS: 1) DESCRIPTIVE INFORMATION

Introduction

The discussion of results is partitioned into four chapters. Chapter 4 deals with the general descriptive characteristics of the individuals in our samples. Chapter 5 is concerned with sorting individuals into groups, some of which have a high probability of recidivism and others of which have a low probability of recidivism, for both adults and juveniles. Also in Chapter 5, we discuss rates of recidivism. In Chapter 6, we compare how well models constructed in one sample can predict juvenile and adult recidivism in another sample. Finally, Chapter 7 presents models constructed when we combine our two samples (N=932).

General characteristics of the samples

As stated in the previous chapter, our construction sample is comprised of 432 randomly selected individuals from the total of 865 first admissions to Wisconsin juvenile correctional facilities during 1965. Our validation sample is made up of 500 randomly selected persons from the total of 992 first admissions to Wisconsin juvenile correctional institutions during 1967. For a complete set of frequency tables about the construction sample, and a discussion of them, the reader is referred to Sharon (1977).

Although we include in our discussion how strongly associated each independent variable (for the validation sample only) is with our respective dependent measures, only in the construction sample were sets of hypotheses tested with regard to main effects of the independent variables. The reader is again referred to Sharon (1977) for these tests of significance. Sharon used Chi Square to determine which variables were associated, and Gamma (where both variables were made up of ordinal data) or Theta (where one variable was comprised of nominal data while the other was made up of ordinal data) to determine the strength of association. Recidivism was treated as an ordinal variable. Except where we specifically refer to tests of significance made by Sharon, the discussion of association between variables should be viewed as simply another way of characterizing our sample. For this general description of association, all variables were dichotomized and tests, using Phi (ϕ) (Conover, 1971, 180-185), were run with each independent variable against juvenile recidivism and adult recidivism in the validation sample. Phi is a linear transformation of Chi Square and therefore a direct comparison could seemingly be made with Sharon's tests of significance. However, Sharon often created more than two categories for a variable, therefore no comparison will be made. Phi is significant for any value larger than 0.088 at alpha=.05 and 0.115 at alpha=.01. Except for the Phi tests, we did not collapse over categories of any variable to derive the discussion in this Chapter.

Race

White youth comprised most of the individuals in both samples (70% of the construction and 66% of the validation samples). The proportion of blacks in the samples (23% of the construction and 28% of the validation) was greater than their proportion in the state during the time of this study (Wisconsin Blue Book, 1966). The Phi measures of association with race are given below. This format will be used with all variables to follow. The entries in the table are Phi values obtained between the variable under discussion and juvenile as well as adult recidivism.

Phi Values

JR = .165

AR = .121

Note: JR=juvenile recidivism; AR=adult recidivism.

Race was dichotomized as white vs. minority and the minority were more likely to be recidivists.

Intelligence

Forty-six percent of the construction sample and 41% of the validation sample, the mode for each sample, were of average intelligence. Only about 2% in each sample were of superior intelligence. Roughly two-fifths of these young people were below average in intelligence, a much higher proportion than is true for national norms (Blake, 1974) on all adolescents.

<u>Phi Values</u>

JR = .209

AR = .167

Intelligence was dichotomized as average or above vs. below average and the below average were more likely to fail.

<u>Community size</u>

Fifty-two percent of the construction sample and 50% of the validation sample came from Milwaukee, which in the periods studied comprised about 20% of the state population (*Wisconsin Blue Book*, 1966). Other communities contributed about the same proportion each as their proportion in the state.

<u>Phi Values</u>

JR = .092

AR = .029

Community size was dichotomized as Milwaukee vs. others. Milwaukee people failed at a greater rate than others.

Region

Although southeast Wisconsin has about 30% of the state population, it contributed to about 65% of the construction sample and 68% of the validation sample. The next largest contributer to our samples was South Central Wisconsin, with about 10%. Other regions all contributed about equally.

Phi Values

JR = .103

AR = .042

Region was dichotomized as Southeast Wisconsin vs. others. Southeast residents were more likely to fail than others.

Living situation

Most of the boys in both samples lived with both natural parents (45% in the construction sample and 47% in the validation sample). However, 28% and 32%, respectively, of the construction and the validation samples were from single-headed households. These rates are more than twice the rates for all children under 18 who lived in single-headed households in the state during these study periods (National Conference on Social Welfare, 1977). Divorce and desertion were the primary reasons for the single-headed households, and by far the largest number of these are headed by women. Roughly 15% in both samples lived in a situation not involving at least one natural parent.

Phi Values

JR = .167

AR = .049

Living situation was dichotomized as both natural parents vs. other. People from homes with both natural parents were less likely to fail than others. As noted in the Appendix, we used two other ways of dichotomizing with nearly the same Phi level achieved.

Family moves

Fifty-nine percent and 69% of the construction and validation samples, respectively, moved their residence more than two times in the ten years preceding their offspring's first admission to a correctional facility. The mode in both samples was zero, with a mean around 2.

Phi Values

JR = .105

AR = .186

Family moves was dichotomized as 2 or less vs. 3 or more (several moves meant more likelihood of failure).

Alternative living arrangements

Most of these subjects (70% of the construction and 63% of the validation samples) experienced no living situation outside their home (i.e., foster care, other institutions, etc.) during ten years preceding their correctional placement for the first time. About 12% of the construction sample and 15% of the validation sample did experience 2 or more placements.

Phi Values

JR = .194

AR = .114

This variable was dichotomized as some vs. none.

Number of siblings

The following number of children do not include the boy in our sample. The mode (16% in both samples) was 4 siblings for both samples, with both having a mean of 5. Roughly 50% of the subjects in both samples had 6 or more siblings.

Phi Values

JR = .069

AR = .065

The above variable was dichotomized as 4 or less vs. 5 or more. The larger households produced the most failures.

Occupation of household head

In about 70% of both samples, the household head was employed in a less than skilled job. Eleven percent of the construction sample and 13% of the validation sample were on welfare.

<u>Phi Values</u>

JR = .222

AR = .115

Occupation was dichotomized as unskilled or unemployed vs. others. Young people from less than semi-skilled homes had the highest failure rates.

<u>Education of household head</u>

Fully 72% of the construction and 63% of the validation samples' household head did not finish high school. Less than 10% of both samples attended any type of school after high school. The median schooling for the U.S. in the late 1960's was 12.1 years (U.S. Census Bureau, <u>Family Composition</u>, 1970). Our median was partial high school in both samples.

Education was dichotomized as high school graduate or above vs. others.

<u>Phi Values</u>

JR = .075

AR = .095

People with less educated parents had the higher rate of failure than others.

<u>Family contacts with the law</u>

Fifty-seven percent and 59%, respectively, of the construction and the validation sample had some other member of the family involved with arrests. About 30% in both samples had parents involved in arrests. Though not gathered formally as data, there were numerous instances in which the records indicated that parents were known to the community as troublemakers and/or problem drinkers.

Phi Values

JR = .235

AR = .162

Family contacts was dichotomized as none vs. some.

School

To obtain a measure of school retardation, we subtracted from the grade subjects were in at the time of their first correctional institutionalization the grade they should be in given their age (i.e., first grade = 6 years old, second grade = 7 years old, and so on). The result indicates that the mode for both samples is a minus two grades (with 36% in the mode for the construction sample and 41% in the mode for the validation sample).

Phi Values

JR = .103

AR = .034

School grade level was dichotomized as minus two grades or more vs. other.

Given their ages, it is natural that roughly 90% in both samples were in school at the time of their first juvenile admission.

In regard to school achievement, the files we read were exceptionally poor in recording this information. Where the grades were recorded for the year preceding first admission, a grade of C or better was treated as average or above. However, in many cases there was a simple statement like "doing below average work". Though reasonable interrater reliability was achieved, the validity of recording can be questioned. Given these problems, about 80% of both samples show below average achievement. However, school achievement was not significantly related to either juvenile or adult recidivism in either sample.

Truancy was another poorly recorded variable in the files, though reasonable interrater reliability was achieved. The number of days, in the preceding year, missed was recorded in some cases, but many cases simply contained statements like "had truancy problems". Sixty-nine percent of the construction sample and 82% of the validation sample appeared to have truancy problems.

<u>Phi Values</u>

JR = .293

AR = .107

Truancy was dichotomized as no vs. yes. Truants were more likely to fail than non-truants.

Like truancy, the variable of school problems was in many cases based on statements without any means to judge the validity or reliability of what was being measured. For example, in some cases an administrator, at the school where the boy had attended prior to admission, was the informant; in other cases, it was a single teacher or the boy's parents. In many cases, we have no information about the informant(s). Roughly half of each sample had school problems. This variable was not used in any further analyses, because of its vagueness.

<u>Phi Values</u>

JR = .320

AR = .170

School problems was dichotomized as yes vs. no.

<u>Age at first police contact</u>

The mean age at first police contact was 14 for the construction sample and 13 for the validation sample. By 15 years of age, 80% of the construction and 89% of the validation sample have had at least one police contact. The median was 14 for the construction sample, while it was 13 for the validation sample. This variable was among the six best single predictors of juvenile recidivism in the construction sample (Sharon, 1977).

Phi Values

JR = .532

AR = .244

Age at first police contact was dichotomized as 14 or less vs. 15 or more.

Number of police contacts prior to first admission

The mode shows that about 32% of the construction and about 25% of the validation sample had from 4 to 6 police contacts prior to their first admission. About 6% and 10% of the construction and validation samples, respectively, had 15-plus police contacts prior to first admission. About 40% of the construction and 50% of the validation sample had 7 or more contacts.

Phi Values

JR = .325

AR = .222

Police contacts was dichotomized as 6 or less vs. 7 or more.

Pattern of offenses prior to first admission

Twenty-six percent and 21%, respectively, of the construction and validation samples were involved in only one type of offense. Twenty-one percent of the construction sample and 15% of the validation sample were involved in status offenses only (which includes auto theft). Less than

1% in each sample were involved in violence-only offenses and roughly 4% were involved in income-producing only. Clearly, the most typical pattern was of status offenses followed with income-producing (29% of the construction and 36% of the validation sample).

<u>Phi Values</u>

JR = .356

AR = .244

Pattern was dichotomized as status only vs. other (status only offenders less likely to return).

Pattern of offenses is among the six best predictors in the construction sample, of juvenile as well as adult recidivism. (Sharon, 1977, juvenile--Chi-Square=20.51, df:1, $p \angle .0000$, Gamma=.498; adult--Chi-Square=18.77, df:1, $p \angle .0000$, Gamma=-.531).

<u>Committing offense(s) at time of first admission</u>

In both samples, for the primary offense with which adolescents are charged, the highest frequencies occur in burglary and car theft, followed by theft. For 69% of the construction sample and 58% of the validation sample, individuals are charged with only one offense at the time of first admission. Roughly 70% of both samples are charged with status offenses only or status plus income-producing offenses. Status only offenses comprise 46% of the construction and 37% of the validation sample.

Phi Values

JR = .026

AR = .002

Commiting offense was dichotomized as status vs. other.

Whether crime is committed alone

About a third committed offenses alone in both samples. About one-third committed them with only one other present, leaving one-third who committed them with 2 or more persons present. These figures are for committing offenses at the time of first juvenile admission only.

Phi Values

JR = .017

AR = .010

The above variable was dichotomized as alone vs. other. Persons commiting offenses alone were less likely to fail than persons with at least one other. As noted in the Appendix, other dichotomies were used (gave similar results).

Alcohol usage in commission of offenses

Sixty-three percent of the validation sample and 54% of the construction sample had no offenses involving alcohol. Only about 2% in each sample had a committing offense of drinking at the time of first admission.

<u>Phi Values</u>

JR = .029

AR = .079

Alcohol was dichotomized as yes vs. no (alcohol users more likely to fail than non-uses).

<u>Prior supervision experience</u>

Due to the fact that the data for the construction sample was collected while the original files were available and the data for the other sample was collected when all files had been microfilmed, the comparability of the data for this variable cannot be determined. The reason for the hesitation in saying the data is comparable is because probation experience is not always recorded in the microfilmed cases. Only sections of the original files have been microfilmed and the original file has been destroyed. We were able to get a computer print-out from the state, which was made when the original records were available, that showed what type of supervision youths had received prior to their first admission. However, results show that 65% of the construction sample were on formal probation while only 47% of the validation sample were on it. It is unknown why there is such a discrepancy in the number on probation between the two samples. However, it seems reasonably clear that most youngsters were under supervision of some type (only 19% of the construction and

16% of the validation sample were not under supervision). This variable did not come up for consideration in any of our analyses as strongly related to our dependent measures.

Age at first admission as a juvenile

The mode in both samples is 16 for age of admission. The mean is 15½ years of age in both samples. About 80% of both samples were between 15 and 17 years of age when they were first admitted to a correctional facility. Subtracting age at first police contact from age at admission showed the mode to be 2 years difference, with a mean of nearly 3 years.

Phi Values

JR = .523

AR = .184

Age was dichotomized as 15 or younger vs. 16 or older.

Months stayed

Most of these people stayed in the institution 4 months (about 40% in each sample). The mean period stayed was 5 months. Ninety percent of the construction sample and 85% of the validation sample stayed 6 months or less. This compares to an average stay of 8 months nationwide (Cavan & Ferdinand, 1975, p. 405).

Phi Values

JR = .008

AR = .140

Stay was dichotomized as 4 or less months vs. 5 or more months. People staying 4 or less months were somewhat less likely to be adult offenders than others.

Institution where time spent on first admission

Ninety-three percent in each sample spent all of their time in custody at either Kettle Moraine or Wales. The other 7% were transferred, usually within a month after admission, to another type of institution or to one of the satellite camps for a type of "community treatment." Of those who were at Kettle Moraine or Wales for the duration of their stay, almost equal proportions were found in both samples to have gone to the two institutions.

Phi Values

JR = .062

AR = .087

Peer adjustment at institution during first stay

Though satisfactory interrater reliability could be established, this variable was based upon counselors' statements which tended to be rather vague and undifferentiating among individuals. Eighty-three percent in each sample were found to have good or fair peer adjustment. The same questions can be raised about the data in regard to level of peer interaction. The distributions varied rather noticeably between the validation and construction samples (for example, 15% of the former and 11% of the latter were heavily involved with peers). Since two sets of data collectors (one for each sample) are involved and no interrater reliability was established across sets of collectors, it is likely that peer interaction was rated differently by each set. Neither of these peer variables came up for consideration in our analyses, and showed rather weak relationship to our outcome measures on the initial tests (before interactions were considered), except for peer adjustment and adult recidivism at Phi = .108 (significant at alpha = .05).

<u>Institutional problems</u>

Again the data seemed to be rather vague, although there appeared to be differentiation at the gross level of serious or some problems versus few or no indication of problems, and, thus, our analyses used this variable dichotomized in this fashion. The mode in both samples was no problem. Only 4% of the validation and 13% of the construction sample had serious problems. However, the distributions between the samples vary relatively more than other variables. Together with the less than strong interrater reliability, this distributional difference cautions us about placing confidence in its usage.

<u>Phi Values</u>

JR = .309

AR = .250

Youngsters with some or serious problems were more likely to fail than adolescents with few or no problems.

Age at release from first institutional stay

Obviously, with only an average of 4 or 5 months stay at the institution, the age at release is about the same as age at admission (an analysis of overlapping variables showed these variables to be the most highly intercorrelated of all variables considered, as would be expected).

Phi Values

JR = .497

AR = .160

Where released to

The overwhelming majority in both samples were released to their home after their first institutionalization--almost three-quarters in both samples.

Number of additional offenses after first juvenile commitment

About 20% of the boys in both samples had no additional arrests after their first stay in a correctional facility. Another 20% had 2 or less contacts. However, 40% of the validation and 37% of the construction sample had 5 or more additional contacts prior to final release from the juvenile system. Sharon (1977) found this variable to be his best single predictor, among the variables discussed here, of juvenile and adult recidivism (Chi-Square=142.34, p$<$.0000 with df:2, Gamma=.817 for juvenile recidivism; and, Chi-Square=91.78, p$<$.0000 with df:2, Gamma=.699 for adult recidivism).

Phi Values

JR = .598

AR = .341

The above variable was dichotomized as 4 or less vs. 5 or more.

Amount of time until first police contact after release

Since the data is in months, we cannot be real specific about how long these people remained crime free. About half of those who were without police contact for only one month after their institutional release were arrested within days of their release, according to informal data gathering in the validation sample. By two months, 28% of the construction and 34% of the validation sample had police contacts. By six months, about 60% of the former and 70% of the latter had been arrested. Clearly, these young people are arrested within relatively short periods. Only 20% in each sample were without further arrests.

This variable was dichotomized as 2 months or less vs. 3 or more.

Phi Values

JR = .242

AR = .171

Alcohol involved in offenses after first juvenile commitment

Nearly 40% and 50%, respectively, of the construction and validation sample had arrests which involved alcohol consumption, which is a potential violation of parole. Reliability, both in terms of recording in the files and in terms of interrater, can be questioned. Too often when other offenses were the primary emphasis in the files, the word alcohol simply appeared in parenthesis without any further discussion, leading us to wonder how many times it may simply have been overlooked by the file recorder.

Phi Values

JR = .052

AR = .134

Age at release from juvenile system

The mode for both samples is 18 years of age. The mean and median were 19 years of age in both samples. Three quarters of both samples were 18 or 19 years of age when they were finally released.

Phi Values

JR = .077

AR = .007

Age was dichotomized as 17 or less vs. 18 or more.

Marital status at final discharge

Eighty-nine percent of the construction sample and

83% of the validation sample were never married by the time they were released from the juvenile system.

Phi Values

JR = .044

AR = .146

Status at final discharge from juvenile system

The modal category in each sample is full-time employment (48% in the construction sample and 47% in the validation sample). However, the validity of this variable, especially in the microfilmed records (the entire validation sample), is questionable. Statements in the files were vague about whether employment was part-time or full time at times, and at other times we were given contradictory information.

Characteristics of adult felons

Age at first felony conviction

Ninety-five percent of people who had adult felony convictions in both samples had their first felony conviction by 22 years of age. Ninety percent and 92% of those with felony convictions, respectively, of the construction and validation sample, were convicted of a felony by age 21, the age when the law, at that time, declared persons as adults. As we noted earlier, most juveniles were released from the juvenile system prior to age 21; most were 18 or 19 years of age. We will discuss this further later, as some of the adult rate could be an artifact of adolescents being "kicked up to the adult system" before the age of 21.

Pattern of felony offenses

The modal category for pattern of felonies in both samples was income-producing offenses only (51% of the validation sample and 62% of the construction sample). Violence only was involved in 6% of the construction sample and 13% of the validation sample. Status only involved 7% of the validation sample and 8% of the construction sample.

Type of felony

The modal category for type of felonies was burglary in both samples (42% in the construction and 35% in the validation). The rest of the offenses were spread rather thinly across the categories, with car theft and forgery running in second and third place respectively (less than 10% in both samples for each offense).

Status at time of first adult conviction for a felony

Seventy-five percent of the validation and 70% of the construction sample were not high school graduates at the time of their first felony conviction among those convicted. About 80% of both samples were never married by the time of their first felony conviction as an adult among those convicted. There were very few who had children according to the records, however, this variable was so inconsistently recorded it cannot even be used as descriptive information. In most cases, children simply are not mentioned. About 55% of the construction and 50% of the validation samples were unemployed and out of school at the time of their first felony conviction as an adult among those convicted. Only about 20% of the individuals in the samples were fully employed at the time of their first adult felony conviction among those convicted. The rest were in school or had only part-time employment. Sixty-eight percent of the validation and 54% of the construction sample have not had an active adult criminal file for 37+ months. Roughly a quarter in each sample had an active adult criminal file 10 years after their first release. Eighty-five percent of the validation sample and 83% of the construction sample did not have high school diplomas at the time they were released from the juvenile system.

Number of felony convictions

Of those convicted of an adult felony, 51% of the construction and 46% of the validation sample were convicted of a single felony. About 95% of both samples, among those convicted, had 3 or less felonies.

CHAPTER 5

RESULTS: 2) RATES OF RECIDIVISM AND MODEL CONSTRUCTION

Introduction

In the first section of this chapter, we will attempt to replicate some findings of Sharon (1977) about rates of recidivism. The second section of this chapter deals with model construction.

Rates of recidivism

As can be seen in Table 1, most adolescents first admitted to a school for boys (64% in the validation sample) do go on to additional commitments after their first release, which as we can see replicates a finding by Sharon (61% of his sample had at least one additional juvenile admission after first release).

Insert Table 1 about here

Table 1 shows that the majority of juvenile first admissions (61% in the validation sample) do not have adult felony convictions in the ten years we followed them. Sharon found that 64% of his first admissions do not have adult felony convictions.

TABLE 1

NUMBER AND PERCENTAGES OF FIRST ADMISSIONS TO A JUVENILE INSTITUTION WHO CONTINUE CRIMINAL BEHAVIOR AFTER THEIR FIRST ADMISSION

Criminal Experience		Outcome YES	NO	Total
Additional Police Contacts Following First Release	cs*	349 81%	83 19%	432 100%
	vs*	398 80%	102 20%	500 100%
Additional Commitments to a Juvenile Institution	cs	264 61%	168 39%	432 100%
	vs	320 64%	180 36%	500 100%
Adult Felony Convictions	cs	154 36%	278 64%	432 100%
	vs	197 39%	303 61%	500 100%
Active File Status Ten Years After First Juvenile Release	cs	118 27%	314 73%	432 100%
	vs	110 22%	390 78%	500 100%

Note: *_cs_ = construction sample, _vs_ = validation sample

We see that rates of recidivism decline from those who have additional juvenile police contacts after first admission as a juvenile (about 80%), to those with additional juvenile commitments (about 60%), to those convicted of an adult felony (about 40%), to those who have active criminal files ten years after their first juvenile release (about 25%).

Predicting adult criminal recidivism by use of juvenile recidivism

As we can see in Table 2, in the construction sample the probability of having an adult felony conviction increases from 18% for juveniles with no institutional recommitments to 76% for adolescents with 4 or more recommitments.

Insert Tables 2 and 3 about here

In the validation sample, the chance of having an adult felony conviction increases from 21% for juveniles with no further commitments after first release from a juvenile school for boys to 84% for juveniles with 4 or more recommitments (see Table 3).

Recidivism as a juvenile without recidivism as an adult and recidivism as an adult without recidivism as a juvenile

Some very interesting findings are contained in Tables 2 and 3. Thirty individuals in the construction

TABLE 2

RECOMMITMENT TO JUVENILE INSTITUTIONS AND ADULT FELONY CONVICTIONS: (N=432)

Conviction (s) for Adult Felony	Number of Juvenile Recommitments 0	1	2-3	4 or more
None	138 82%	80 71%	51 44%	9 24%
Yes	30 18%	32 29%	64 56%	28 76%
	168 100%	112 100%	115 100%	37 100%

Chi Square = 73.16 df: 3 p $<$.0000 Gamma = 0.70

TABLE 3

RECOMMITMENT TO JUVENILE INSTITUTIONS AND ADULT FELONY CONVICTIONS: (N=500)

Conviction (s) for Adult Felony	Number of Juvenile Recommitments 0	1	2-3	4 or more
None	143 79%	87 59%	69 47%	4 16%
Yes	37 21%	60 41%	79 53%	21 84%
	180 100%	147 100%	148 100%	25 100%

Chi Square = 59.83 df: 3 p $<$.0000 Gamma = 0.51

sample and 37 people in the validation sample (about 7% of each sample) had adult felony convictions without being recommitted to a school for boys after their first release from such a school. An interesting comparison is between those persons who were recidivists as adults but not as adolescents and those who were recidivists as adolescents but not as adults.

Insert Tables 4 and 5 about here

Tables 4 and 5 have the following possible outcomes:

Group 1: Youth who did not recidivate as a juvenile or as an adult.

Group 2: Youth who did not receive a recommittal to a juvenile institution, but who were convicted of a felony as an adult.

Group 3: Young people who were recommitted as a juvenile, but had no adult felony convictions.

Group 4: Adolescents who were both recommitted to a juvenile correctional facility and convicted of an adult felony.

A further analysis was done involving groups 2 and 3 only, with the Phi coefficient and variables dichotomized. Please refer to Appendix A for a discussion of the analysis.

TABLE 4

RECIDIVISM: JUVENILE ONLY, ADULT ONLY, BOTH, AND NONE
CONSTRUCTION SAMPLE N=432

Conviction (s) for Adult Felony	Not Recommitted as A Juvenile	At Least One Juvenile Recommitment	TOTAL
None	138	140	278
Yes	30	124	154
Total	168	264	432

TABLE 5

RECIDIVISM: JUVENILE ONLY, ADULT ONLY, BOTH, AND NONE
VALIDATION SAMPLE N=500

Conviction (s) for Adult Felony	Not Recommitted as A Juvenile	At Least One Juvenile Recommitment	TOTAL
None	143	160	303
Yes	37	160	197
Total	180	320	500

Results using PAA to construct a model for juvenile recidivism

In Chapter 3, we discussed how to construct predictive attribute (PAA) models. Two restraints, (used here) noted by Wilkins and MacNaughton-Smith (1964) are: 1) analysis is continued only as long as there is an independent variable significantly associated with our outcome measure; and 2) stop any further analysis within a group whenever the number of individuals in that group has been reduced to about 10% of the original sample size. We added two additional restraints. We did not use invalid variables (the problem of invalid variables only arose on one occasion using PAA, and in this case a valid variable was a very close competitor in terms of the Phi coefficient).

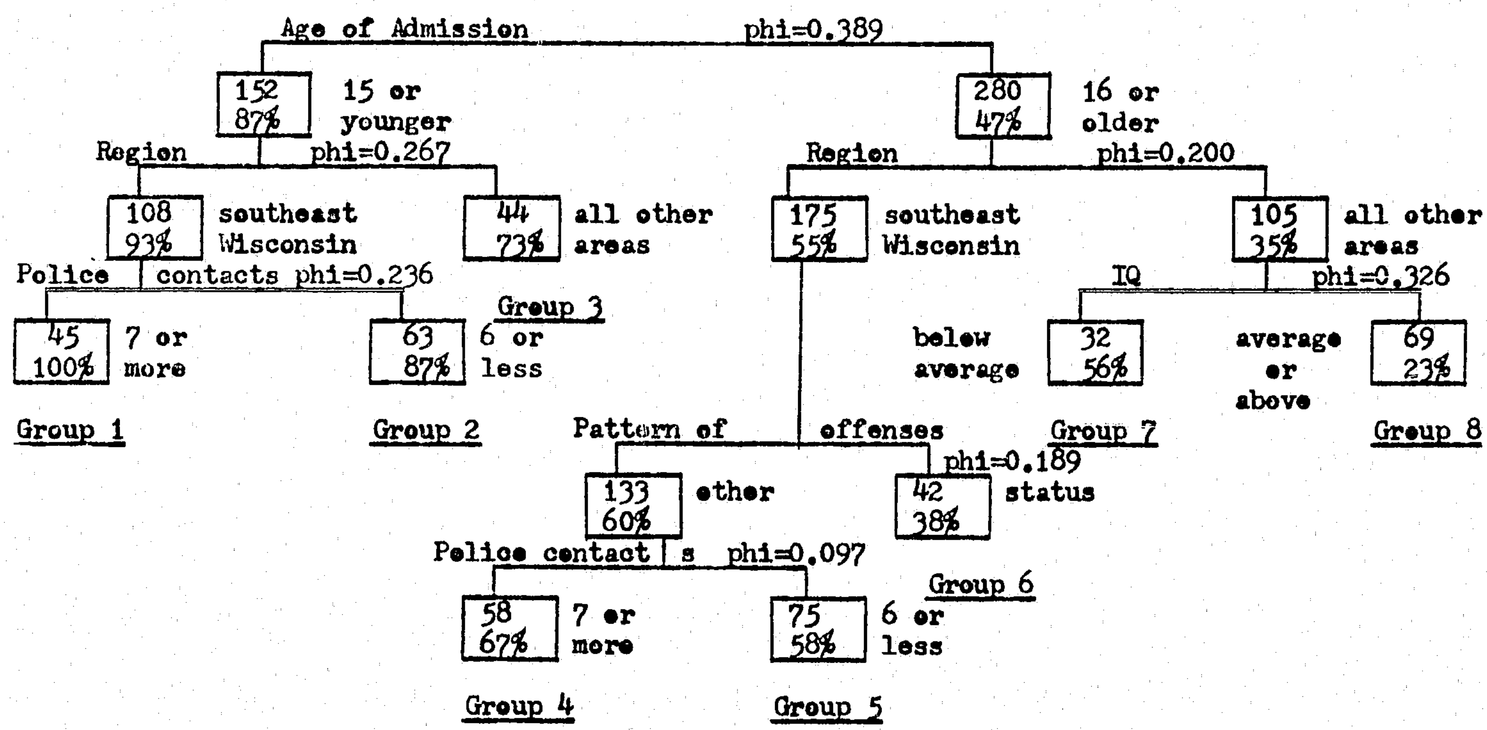
We were also concerned about not using highly intercorrelated variables. Intercorrelation was analyzed with Phi coefficients and appears in the Appendix. Age variables (e.g., age at first police contact, age at first admission, age at first release, school grade level upon first admission) appear to overlap. Region and race appear to overlap some. Other variables did not appear to overlap. Thus, if a variable presented itself for selection in our PAA model which overlapped with a variable already in the Model, we did not select the overlapping variable for the model. Overlapping variables and invalid variables were not used to construct logistic regression models, or the total points scores used in the next chapter.

PAA model for adolescents

For our analyses in the remainder of this dissertation, we were only concerned with variables that occur prior to the first release from a juvenile correctional facility since this is all the information probation officers have available to them at the time of first release. We were concerned about providing information about the probability of further criminal behavior, at the point of first release from a juvenile institution, to parole officers so they can order priorities in terms of supervision, services, and time, immediately. Early intervention may be crucial for those adolescents who return within 2 months or less to the institution (as mentioned in Chapter 4, many of the people who returned to a school for boys did so within two months, and from gathering the data, this writer can say that those who returned several times did so in very brief periods and these youngsters were the ones most likely to have an adult felony conviction). (For the remaining analyses in this dissertation, variables were dichotomized as shown in the Appendix).

Diagram 1 provides a schematic description of the search process and its results using PAA to predict juvenile recidivism. This model was derived using the sample of first admissions to a juvenile facility during

Juvenile Model: based on Predictive Attribute Analysis **Diagram 1**



Note: Four cases missing data about IQ.

the calendar year of 1965 (construction sample).

Beginning with age at first admission (the variable which was most highly associated with juvenile recidivism), we continued our search with as many independent variables as our restraints allowed. Eight groups subsequently were created, representing the final levels of search. Each group is mutually exclusive of all others. There are more than eight groups, as can be seen from the diagram, however, our predictions are based only on the final layer (Eight groups).

The number in each box represents the number of individuals in that group; the percents are the percent who recidivate as a juvenile, and the phi coefficients represent the association with juvenile recidivsm that variable attained, given that we conditioned on the variables above it in the case of variables below the initial split on age of admission.

Levels of search

As can be seen, the model is asymmetric. The number of individuals in the groups is skewed and there are different levels of search involved across groups.

Description of the search process

As can be noted, the first split was made on age at first admission (the best single predictor of recidivism with an association with juvenile recidivism of phi=0.389). Holding age at first admission constant, we can see that region is the most highly associated independent variable with juvenile recidivism for the persons who were 15 years or younger upon their first admission. Continuing only on the left side of the model, we see that further analysis was not possible for those who were 15 or younger upon first admission and who resided outside Southeast Wisconsin because they were numerically small. For those who were 15 or younger, and who came from Southeast Wisconsin, further analysis revealed number of police contacts was most highly associated with juvenile recidivism. Since both groups that were created with this latter variable were close to being only 10% of the sample the search was discontinued. Groups 7 and 8 do not add up to the total persons from other than southeast Wisconsin because 4 cases are missing IQ data.

We could expect to achieve only a modest increase in the probability of returning to a juvenile institution for those 15 or younger at the time of admission by further consideration of interactions because of their high probability of recidivism associated with the main effect of their age (87%). However, we were able, by adding the variables of region and number of police contacts prior to first admission, to increase the probability of returning to 100% for Group 1. In addition, we lower the rate of return to 73% for Group 3.

On the right side of the model, we see that starting with a rate of recidivism of 47% for persons 16 years of age or older at time of first admission, we are able, by considering interactions, to differentiate groups that vary in recidivism from 23% to 67%. A problem evident within the right side of the model is that for persons 16 or older upon admission and from Southeast Wisconsin the variable, pattern of offenses, results in creating two groups which are quite unequal in size. Further analysis of these persons who also had other than just status offenses resulted in only one variable significant at alpha=.05. As can be seen, the spread in recidivism between the final groups is not very much, but more importantly, these rates are not very far from the base rate of recidivism (61%) for the entire sample. In other words, knowing the interactions involved in creating Groups 4 and 5 cannot improve our prediction much over simply predicting based upon knowledge of the base rate for these persons (see discussion in Chapter 2 under the heading 'Prediction').

The variables of age at first police contact and type of offense(s) were the only other variables, which were significant and did not have an even greater inequality in their categories than pattern of offenses, that could be analyzed in place of it. Age of first police contact is highly intercorrelated with age of first admission (the variable used at the first level of analysis), and further analysis at lower levels could not improve upon the problems we already had on our hands. Although type of offense is not highly intercorrelated with previous variables used, it was not able to improve upon the model as presented. We also tried race and pattern of offenses prior to first admission instead of region (as used in the model depicted here) for those 16 or older at time of their first admission, without resolving our problems at the lower levels of analysis (these former variables were the two next most significantly associated with juvenile recidivism for those 16 or older). Again, it should be noted that Group 7 and Group 8 do not add up numerically to 105 because 4 cases from areas other than southeast are missing data on IQ.

We did not try a completely new model (initial split with a variable other than age of admission) because of the danger of overfitting our model to the data in the construction sample, which can affect prediction greatly (see Simon, 1971) in the validation sample. Overall, we have created groups which vary in recidivism rates from 23% to 100% in a sample with a base rate of 61%. Cramer's V (explained in Chapter 3) showed that our PAA model explained 50% of the total variance in the dependent variable.

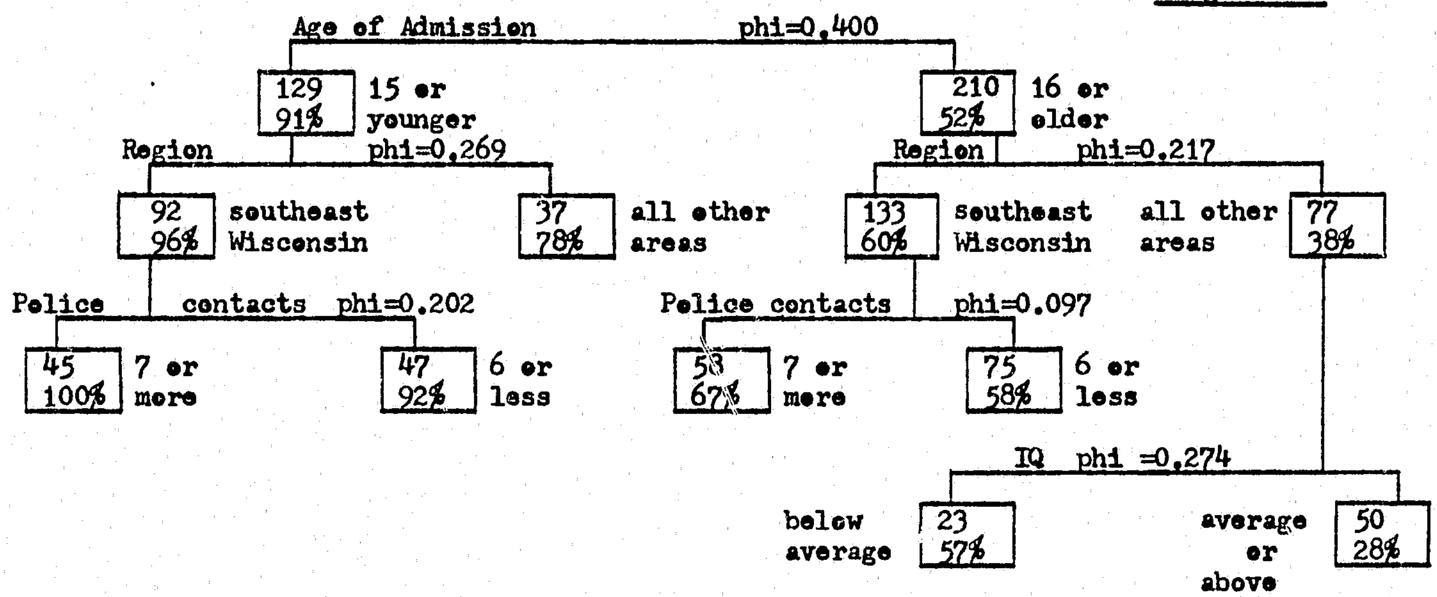
<u>PAA model with status-only offenders removed</u>

At this particular time, there is concern at the federal level, and in Wisconsin, that status offenders not be processed very far into the juvenile correctional system (<u>Juvenile Justice Standards and Goals</u>, 1975). For example, currently Wisconsin has an objective of lowering the number of status offenders held in secure detention facilities, over a year period, by 75% of the preceding year. Wisconsin lists as its number one priority for the juvenile justice system in 1975, the deinstitutionalization of status offenders (<u>Juvenile Justice Standards and Goals</u>, 1975, pp. 17-20). Although there is a lack of hard evidence about whether status offenders are being institutionalized, it could be argued that our juvenile PAA model is not relevant for today's institutionalized adolescents because there are few, if any, status offenders in correctional facilities. Consequently, a further analysis was done in the construction sample with status only offenders removed entirely from the analysis.

Referring to Diagram 1-A, we observed overall that removing status only offenders does not change which variables are selected to differentiate groups or at what level they are used. All variables used in the model displayed in Diagram 1-A were clearly the most highly associated variables with juvenile recidivism at their respective levels. With status offenders removed,

Juvenile Model: based on Predictive Attribute Analysis (Status offenders removed from analysis) N=339

Diagram 1-A



Note: Four cases missing data on IQ.

age at first admission was still the most highly associated variable with juvenile recidivism, and within the groups created with this variable, region of residence appeared most highly associated with juvenile recidivism in both groups.

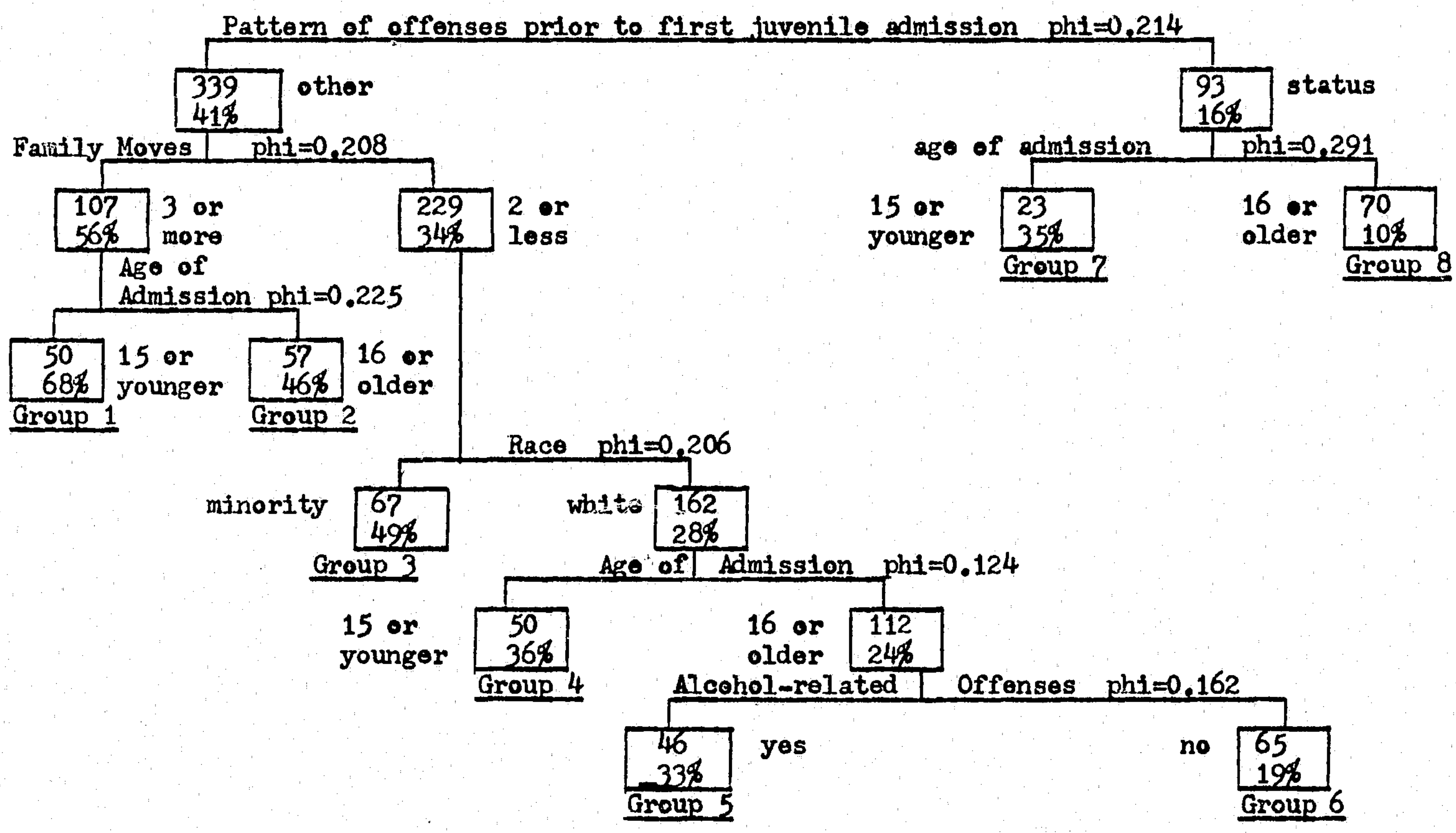
The Phi values increased some from the model with status offenders included as did the percent who fail in each group because status offenders have a lower recidivism rate than do persons who engage in other than status-only offenses.

In general, it is clear that removing status offenders does not change the model, except to remove from consideration the variable, pattern of offenses (status only vs. other than status-only).

Adult model using PAA

Since the adult model was constructed in the same fashion as the juvenile model no significant discussion is presented here. In general, we note (see Diagram 3) that starting with a sample with a base rate of 36% failures we were able to select groups which vary in recidivism rates from 10% (those who were status offenders prior to their first institutionalization and who were 16 or older at the time of their first admission) to 68% (those who committed other than just status offenses prior to first admission, and who came from families who moved

Adult Model: based on Predictive Attribute Analysis **Diagram 3**



3 or more times prior to first admission, and who were 15 or younger upon first admission). We see, further, that starting with a group with a 41% rate of recidivism (those who committed other than just status offenses), we selected a group, within the original group of other than just status offenders, whose recidivism is only 19% (Group 6). Within the same original group of other than just status offenders, we were able to identify a group with a recidivism rate of 68% (Group 1).

Addressing ourselves to the right side of the model, we see that if adolescents were status offenders prior to their first admission, and 16 or older when admitted, they have a very small probability of adult convictions for felonies over the next ten years.

For those who were status offenders, we were concerned about splitting on the variable, age at first admission, because of the small cell density of Group 7. Our primary concern was that small groups may not be representative with regard to recidivism rates; and, consequently lead to unstable predictions. However, age of admission was the most highly related predictor variable with our dependent measure within status offenders, it is theoretically plausible, and it provides us with a group which has nearly zero probability of failure as an adult.

Viewing the model as a whole again, we see that knowing age of admission is important as it appears in three different places in the model. Historically, as we stated in Chapter 2, age variables are second only to knowing whether one has prior convictions in predicting recidivism. Pattern of offenses, our initial split with the adult PAA model, has also been consistently found to be a strong predictor of recidivism. When family moves has been used as a predictor variable, it has consistently predicted recidivism, and within our study population, it very likely is an indication of family stability (which has been a consistent predictor of who continues criminal behavior). Race appears in our model as an important factor for those who commit offenses other than just status and who come from a family which moves infrequently. It should be clear that we have not designed a research project which adequately deals with the many problems that are involved in making interpretations about the association between race and criminal behavior. For example, we have not removed the effects of the many poverty variables before looking at the relationship between race and crime. When examining a relationship between race and crime, we may be getting some measure of access to opportunity in the Mertonian tradition. At any rate, although race consistently showed high association with adult recidivism, we clearly have no measure of racial disposition.

For those older, white, juveniles, who come from families relatively stable in their residence, and who commit other than just status offenses, it appears that using alcohol makes considerable difference as to whether they go on to adult crime. Alcohol usage as a factor in criminal prediction is supported throughout the literature (Brown, 1978).

Cramer's V showed that our adult PAA model was able to explain 38% of the total variance in the dependent variable (adult felony conviction). It should be noted that groups 5 and 6 do not add up to 112 because one case is missing data about alcohol use.

Conclusion about juvenile and adult models

In line with previous studies, we see that in the juvenile model the younger persons are when they are committed to a juvenile facility, the more likely they are to return as a juvenile, and there is strong indication that age of admission is an important predictor of later adult criminal behavior. In the juvenile model, region of residence was the most highly associated independent variable with return to a juvenile correctional facility after the initial split. Although region is infrequently investigated by criminal prediction studies, rural versus urban has been heavily investigated in other kinds of recidivism with similar findings. Region did not show high association with adult felonies at any level of our analyses.

It may be that while urban areas provide more models of deviance, more anonymity, and more opportunity for juveniles to become involved with, and continue in, delinquency than rural areas, it may also provide more job opportunity and training than rural areas for adults. Employment has shown some relationship to criminal recidivism. However, no definitive hypothesis can be generated about region of residence from this research.

For those younger juveniles, who come from southeast Wisconsin, number of police contacts prior to first admission produces a group which has 100% juvenile recidivism. Number of police contacts was also significant for those older juveniles from southeast Wisconsin, who were committing offenses other than just status offenses. Intuitively, it seems reasonable that number of police contacts would be highly overlapping with age of admission, however, our analysis of intercorrelations did not show this (see Appendix). Although number of police contacts prior to first admission does not appear in our adult model, it remained highly associated with adult felonies throughout our analyses. We also note that pattern of offenses, as in the adult model, is important for prediction for those who are 16 or older and from southeast Wisconsin in the juvenile model. Thus, involvement in other than just status offenses (primarily income producing as our distributions demonstrate) is a good indicator of further criminal behavior (juvenile and adult). Older offenders from other than southeast Wisconsin show differential juvenile recidivism when IQ is considered. IQ does not appear in the adult model, however, it was significantly related to adult felonies at level one of our PAA analysis, and it came close to the most highly associated predictor variable with our adult dependent measure at the lower levels for other than status offenders.

<u>Logistic regression model</u>

Another statistical procedure that accounts for interactions between independent variables, while examining their relationship to the dependent variable, is logistic regression. Because of the complexity of the procedure, the reader is referred to Chapter 3 of this dissertation for a discussion of logistic regression and to Bishop, Fienberg, and Holland (1975) or Fienberg (1978). One primary advantage logistic regression has over predictive attribute analysis is that when a stepwise procedure is used which adds effects one at a time to the model, and tests competing models, the most parsimonious model is the one selected. PAA, on the other hand, can give us inelegant models.

As mentioned in Chapter 3, log linear analysis is used as a tool for logistic regression. Log linear analysis treats all variables alike, while logistic regression is suited to the situation where a natural dependent variable exists (e.g., criminal recidivism).

In our logistic regression step-wise procedure (Goodman, 1971), we conditioned on all independent variables in the model and added one effect at a time, adding effects which differ from one another by only one effect. The rules for when to select a model are according to Fuchs (Fuchs & Flanagan, 1979), and they are given in Chapter 3 of this dissertation.

One of the first problems that faced us was the number of independent variables in our research. Even removing from consideration, variables which are vague and variables highly overlapping, we would still have around 15 independent variables which were significantly related to juvenile recidivism. With all variables dichotomized, we would have 65,536 cells in our table (2^{16}) if we used 15 independent variables plus one dependent measure. Obviously, our sample size could not support such a large table. Thus, the question became how to collapse the table. At the first stage we decided to use only valid and non-overlapping variables. Secondly, we decided to use variables most highly associated with our dependent measures (most of which appear in our PAA models). It should be stated at this juncture that problems having to do with a large number of predictor variables and insufficient sample size to analyze relationships between these variables have not been discussed in the statistical literature. Consequently, decisions about collapsing the table had to be made on the basis of what appeared reasonable. Since all predictor variables had been used in several PAA model analyses, we could be reasonably confident about which variables seemed to be most important.

Thirdly, it was decided to take four predictor variables most highly associated with juvenile recidivism and four most highly associated with adult felony convictions, given that they were valid and non-overlapping. Further, to be sure we could collapse the table over other important variables, we decided we would add one variable at a time to each of the original four predictor variables, which would mean we would be analyzing a table of 64 cells if an added variable could not be collapsed over. The table is collapsed over variables when adding their effect to a previous model does not significantly reduce Chi Square.

To obtain a juvenile model, we used age of admission, region, pattern of offenses, and number of police contacts as our predictor variables. However, it quickly became evident that even with four predictor variables our data was spread very thin. Nine of the 16 groups defined by these four independent variables had less than 30 persons in them and 6 of these groups had less than 10 persons in them. Although there is no difficulty in preceding with the model selection under the circumstances just described (see Bishop, Fienberg, and Holland, 1975), we had the problem that when we added IQ to our original juvenile table we found we could not collapse the table over it. Consequently, our problem of small group sizes was compounded. Exactly the same problem occurred when we added IQ to predictor variables of race, family moves, pattern of offenses, and age of first admission for adults. We faced two major problems at this point: 1) other variables were likely to enter the model; and 2) predictions would be unstable and/or absurd as groups became very small (in many cases we would be predicting from groups of 2 to 10 persons).

It was evident in inspecting our tables that our sample size could support only three independent variables if we were to have sufficiently large groups from which to make predictions. Thus, it was decided that we would do logistic regression with all possible permutations of six of the most highly associated independent variables with our dependent measures, taken 3 at a time. Thus, we began with 40 models of independence (20 for juvenile recidivism and 20 for adult) and within each model we added one effect at a time until a model was selected; selecting a model was based on rules by Fuchs (Fuchs & Flanagan, 1979). Roughly, 200 models were examined (the number of models examined within any one set of three independent variables varied according to number of significant effects and whether we could collapse the table over a variable).

Juvenile model using logistic regression

We chose the following six predictor variables for logistic regression: 1) age at first admission; 2) race; 3) pattern of juvenile offenses; 4) number of police contacts prior to first admission; 5) region of residence; and, 6) IQ. All six variables were among the most highly associated predictor variables with our dependent measure and all but race appear in our PAA model for juveniles. Taking 3 predictor variables at a time, we looked at all possible permutations of 6 independent variables. Thus, we examined models within 20 models of independence. The symbols for the variables are given below along with the 20 permutations of six variables, taken three at a time. All analyses were performed in the construction sample only.

J=juvenile recidivism
A=age of admission
P=pattern of offenses
R=region
E=race
I=IQ
N=number of police contacts

JPRA	JIRA	JPRN	JPIE
JNPA	JERA	JPRI	JRNI
JIPA	JNIA	JPRE	JPNE
JEPA	JNEA	JPNI	JRIE
JNRA	JEIA	JRNE	JNIE

Within each of these models of independence, we added one effect at a time according to Goodman's step-wise procedure (Goodman, 1971), and selected a model according to Fuchs' rules (Fuchs & Flanagan, 1979). Consequently, we came up with 20 best models (one for each set of 3 independent variables). The models are displayed below along with the amount they reduced their respective models of independence's likelihood Chi Square. The notation is read in the following fashion: J,PRA is (notice where commas are placed) the model of independence conditioned on PRA. JP,JR,PRA means there is a significant relationship between J and P, and between J and R, conditioning on PRA. The relationship between J and A was not significant after the other relationships had entered the model. JIA,JP,IAP means there is an interaction between predictor variables I and A and a significant relationship between J and P, conditioned on IAP. Remember, we always condition on the highest order interaction between predictor variables.

Variables Used		Best Model	Reduction in Likelihood Chi Square
1.	JPRA	JP,JR,JA,PRA.	.3638
2.	JNPA	JN,JA,JP,NPA.	.3029
3.	JIPA	JI,JP,JA,IPA.	.5419
4.	JEPA	JP,JE,JA,EPA.	.3664
5.	JNRA	JN,JR,JA,NRA.	.3437
6.	JIRA	JI,JR,JA,IRA.	.0589
7.	JERA	JE,JR,JA,ERA.	.4422
8.	JNIA	JAN,JAN.	1.0000
9.	JNEA	JN,JE,JA,NEA.	.3963
10.	JEIA	JE,JA,EA.	.0790
11.	JPRN	JN,JR,RN.	.6218
12.	JPRI	JP,JR,PR.	.7108
13.	JPRE	JR,JP,JE,PRE.	.8393
14.	JPNI	JN,JP,PN.	.1400
15.	JRNE	JR,JE,RNE.	.0578
16.	JPIE	JP,JE,PE.	.7973
17.	JRNI	JN,JR,RN.	.6218
18.	JPNE	JP,JE,PNE.	.2858
19.	JRIE	JR,JE,RE.	.3193
20.	JNIE	JN,JE,NE.	.8250

As can be seen, in several instances we were able, according to Fuchs' rules, to collapse the table over a predictor variable, in which case we started our model selection from the model of independence with two predictor variables by adding effects that differ from the previous model by one effect (i.e., models 8, 10, 11, 12, and so on). Using a decision rule that we would select the model that reduces its model of independence's Chi Square the most among the 20 best models would give us model 8 (JAN), which reduced Chi Squre by 100% since it is the fully saturated model (meaning the expected values in the cells equal the observed values). In other words, we have the highest order interaction between variables present in Model 8. We will use this model to demonstrate how we chose all models.

We started with a set of 3 predictor variables (NIA). To the model of independence (J,NIA) was added the following models which differ from J,NIA by only one effect: 1) JN,NIA; 2) JI,NIA; 3) JA,NIA. As can be seen on page 135, all these models were significant. So we chose model JA,NIA as the tentative model, since this effect reduced Chi Square the most. To model JA, NIA, we added effects which differed from it by only one effect: 1) JN,JA,NIA and 2) JI,JA,NIA. JN,JA,NIA turned out to be non-significant and would become our chosen model. However, according to Fuchs' rules, we can collapse the table over a variable if at any step its effect is non-significant. Thus, the effect of I was non-significant when it was added to our model, so we collapsed the table over I. Starting with model J,AN our selected model became JAN, the fully saturated model.

MODEL	D.F.**	LR CHISQ***	PROB.	PEARSON CHISQ	PROB.
J,NIA	7	93.88	.0000	78.60	.0000
JN,NIA	6	80.79	.0000	69.11	.0000
DDT* JN	1	13.08	.0003	9.50	.0021
JI,NIA	6	89.50	.0000	74.84	.0000
DDT JI	1	4.38	.0364	3.77	.0522
JA,NIA	6	22.85	.0008	19.36	.0036
DDT JA	1	71.02	.0000	59.24	.0000
JN,JA,NIA	5	7.80	.1678	7.10	.2134
DDT JN	1	11.39	.0007	10.38	.0013
JI,JA,NIA	5	14.73	.0116	12.53	.0282
DDT JI	1	4.45	.0349	4.94	.0262
JI,JN,JA,NIA	4	7.39	.1169	4.95	.2927
DDT JI	1	3.32	.0683	3.69	.0547
JAN,NIA	4	6.09	.1926	5.55	.2357
DDT JAN	1	4.62	.0316	3.09	.0786
J,NA	3	88.09	.0000	75.17	.0000
JN,NA	2	74.69	.0000	65.31	.0000
DDT JN	1	13.40	.0003	9.85	.0017
JA,NA	2	17.05	.0002	14.57	.0007
DDT JA	1	71.05	.0000	60.59	.0000
JN,JA,NA	1	4.35	.0370	3.49	.0518
DDT JN	1	12.70	.0004	11.09	.0009
JAN	0	.00	1.0000	.00	1.0000
DDT JAN	1	4.35	.0370	3.49	.0618

*DDT = difference due to
**D.F. = degrees of freedom
***LR CHISQ = Likelihood Chi Square

The table resulting from model JAN (highest order interaction between predictor variables, age at first admission, and number or police contacts) is:

Insert Table 6 about here

Model JAN gives us four groups:

1. 15 or younger at first admission, 6 or less police contacts.
2. 15 or younger at first admission, 7 or more police contacts.
3. 16 or older at first admission, 6 or less police contacts.
4. 16 or older at first admission, 7 or more police contacts.

From the table, we see that 81 juveniles returned to a juvenile correctional facility out of 100 in group 1 (81%). In group 2, 51 of the 52 adolescents returned to a juvenile facility (98%). Eighty-four individuals out of 198 in group 3 were juvenile recidivists (42%), while 48 of the 82 individuals in group 4 returned to an institution as juveniles (58%). There is a large difference between the proportions who are juvenile recidivists according to age of admission, and within these ages, according to number of police contacts.

TABLE 6

LOGISTIC REGRESSION TABLE: BASED ON PREDICTOR VARIABLES--AGE AT FIRST ADMISSION AND NUMBER OF POLICE CONTACTS*

Age at Admission	Number of Police Contacts	Juvenile Recidivism NO	YES
15 or younger	6 or less	19	81
	7 or more	1	51
16 or older	6 or less	114	84
	7 or more	34	48
TOTALS		168	264

*Juvenile Model, Construction Sample (N=432)

If we are uncomfortable with using number of police contacts because this variable measures only official recording, which may underestimate actual delinquency due to either sloppy recording or differential responses across agencies, our chosen model would be JP,JR,JE,PRE (it reduces its model of independence's likelihood Chi Square the second most among the 20 best models). This alternative model says that the relationships between each predictor variable (pattern of juvenile offenses, region of residence, and race) and the dependent variable are needed, but there are no interactions between the independent variables. The table is:

Insert Table 7 about here

We see from Table 7 that being from southeast Wisconsin and involved in offenses other than just status means your chances of returning to a juvenile facility are higher than the base rate: considerably higher for minorities with these characteristics (81%). There were few minorities from areas outside southeast Wisconsin, and few who were only status offenders. The best odds of not having a juvenile return to a correctional facility were for white status offenders from other than southeast Wisconsin (26%).

TABLE 7

LOGISTIC REGRESSION TABLE: BASED ON PREDICTOR VARIABLES, PATTERN OF JUVENILE OFFENSES, REGION, AND RACE*

Race	Region	Pattern	Juvenile Recidivism No	Juvenile Recidivism Yes	Recidivism Rate
White	S.E. Wisconsin	Status	26	21	45%
		Other	37	83	69%
	Rest of State	Status	25	9	26%
		Other	53	48	47%
Minority	S.E. Wisconsin	Status	4	7	---
		Other	20	85	81%
	Rest of State	Status	0	1	---
		Other	3	10	---
TOTALS			168	264 = 432	

*Juvenile Model, Construction Sample (N=432)

Adult model using logistic regression

For an adult model, we chose the following six predictor variables: 1) number of siblings (S); 2) age at first juvenile admission (A); 3) race (E); 4) family moves (M); 5) pattern of juvenile offenses (P); and, 6) IQ (I). In order to arrive at a model of how these predictor variables are related to adult felonies (F), we, as with the juvenile case, examined all permutations of six independent variables, taken three at a time. Thus, we began with 20 models of independence, which are shown below:

F,EMA	F,EAI	F,MAP	F,MIS
F,EMP	F,EAS	F,MAI	F,API
F,EMI	F,EPI	F,MAS	F,APS
F,EMS	F,EPS	F,MPI	F,PSI
F,EAP	F,EIS	F,MPS	F,AIS

Examining models which differ by only one effect in a step-wise procedure according to Fuchs' rules, we arrived at the following best models (one for each set of 3 predictor variables):

Variables	Model	Reduction in Likelihood Chi Square
FSEA	FA,FE,EA.	.2284
FEMI	FM,FE,EM.	.7918
FEMP	FM,FP,FE,EMP.	.8558
FSEM	FM,FE,EM.	.7118
FMAP	FM,FA,FP,MAP.	.2554
FMAI	FI,FM,FA,MAI.	.4266
FMAS	FS,FM,FA,MAS.	.0689
FAPI	FA,FP,API.	.1501
FSAP	FP,AP.	.2069
FPIM	FM,FP,PIM.	.2258
FISP	FP,IP.	.1232
FISE	FI,FS,IS.	.1788
FISM	FM,IM.	.0553
FISA	FI,FA,IA.	.5877
FSMP	FM,FP,MP.	.3703
FSEP	FP,FE,EP.	.7168
FPEA	FA,FP,FE,PEA.	.4787
FPIE	FP FE,EP.	.7168
FEMA	FM,FA,FE,EMA.	.3701
FEAI	FE,FA,EA.	.2284

Using the criteria of selecting from these 20 best models the one that would reduce its model of independence's likelihood Chi Square the most, we would select the model FE,FM,EP,EMP. This model states that race, family moves, and pattern of juvenile offenses are all needed in the model, but there are no interactions between independent variables when we condition on race, family moves, and pattern of juvenile offenses.

MODEL	D.F.**	LR CHISQ***	PROB.	PEARSON CHISQ	PROB.
F,EMP	7	50.28	.0000	48.45	.0000
FE,EMP	6	26.19	.0002	26.00	.0002
*DDT FE	1	24.08	.0000	22.45	.0000
FM,EMP	6	36.18	.0000	34.72	.0000
DDT FM	1	14.10	.0002	13.73	.0002
FP,EMP	6	28.59	.0001	28.93	.0001
DDT FP	1	21.69	.0000	19.52	.0000
FM,FE,EMP	5	15.87	.0072	14.62	.0121
DDT FM	1	10.33	.0013	11.38	.0007
FP,FE,EMP	5	11.42	.0436	11.76	.0383
DDT FP	1	14.77	.0001	14.24	.0002
FM,FP,FE,EMP	4	1.33	.8558	1.33	.8561
DDT FM	1	10.09	.0015	10.43	.0012
FEP,EMP	4	11.29	.0235	11.58	.0208
DDT FEP	1	.13	.7168	.18	.6722
FEM,FP,EMP	3	1.00	.8020	.98	.8060
DDT FEM	1	.34	.5622	.35	.5538
FEP,FM,EMP	3	.91	.8237	.90	.8244
DDT	1	.43	.5140	.43	.5136
FMP,FE,EMP	3	.98	.8052	1.00	.8002
DDT FMP	1	.35	.5545	.33	.5675
FEP,FEM,EMP	2	.61	.7360	.61	.7382
DDT FEP	1	.38	.5356	.37	.5412
FMP,FEM,EMP	2	.49	.7811	.53	.7673
DDT FMP	1	.50	.4783	.45	.5020
FMP,FEP,FEM	1	.23	.6300	.24	.6265
DDT FMP	1	.38	.5371	.37	.5428

*DDT = difference due to
**D.F. = degrees of freedom
***LR CHISQ = Likelihood Chi Square

The table upon which our selected model is based is:

Insert Table 8 about here

Groups derived from the selected adult model are:

1. White, 2 or less moves, status.
2. Minority, 2 or less moves, status.
3. White, 3 or more moves, status.
4. Minority, 3 or more moves, status.
5. White, 2 or less moves, other.
6. Minority, 2 or less moves, other.
7. White, 3 or more moves, other.
8. Minority, 3 or more moves, other.

Groups 5 and 6 are the same individuals as shown in the PAA model (Diagram 3), where the split was made that gave us group 3 (minority, 2 or less moves, and other than just status offenses) and the group, white, 2 or less moves, and other than just status offenses.

Our selected logistic regression model tells us that except for group 5, individuals who engaged in other than just status offenses prior to their first juvenile admission have a higher rate of adult recidivism as a group than the base rate. Being in a minority group, from a family which moves frequently, and involved in other than status-only offenses, gives one a 63% chance of an adult felony conviction. If one is white, from a family who moves infrequently, and a status offender, the chance of an adult felony is 12%; except for this last group, there are few

TABLE 8

LOGISTIC REGRESSION TABLE: BASED ON PREDICTOR VARIABLES, PATTERN OF JUVENILE OFFENSES, FAMILY MOVES, AND RACE*

Pattern of Offenses	Family Moves	Race	Felony No	Felony Yes	Felony Rate
Status	2 or less	White	50	7	12%
		Minority	7	3	---
	3 or more	White	20	4	17%
		Minority	1	1	---
Other	2 or less	White	117	45	28%
		Minority	34	33	49%
	3 or more	White	30	29	49%
		Minority	19	32	63%
TOTALS			278	154 = 432	

*Adult Model, Construction Sample (N=432) status-only offenders in the groups.

Conclusions

From both the PAA procedure and the logistic regression procedure, we learn that male juveniles who are 15 years of age or younger upon first admission, and who have 7 or more police contacts prior to their first admission, have a very high rate of return to a juvenile institution (98% irrespective of where they resided and 100% if they are from southeast Wisconsin).

Even if they have 6 or fewer police contacts prior to first admission, being 15 or younger upon first admission still gives them a high risk of failure as a juvenile (81% irrespective of residence and 87% if they are from southeast Wisconsin). Being from other than southeast Wisconsin appears to improve one's chances some for those 15 or younger (73% failure). If male adolescents are 16 or older upon first admission, and have 6 or fewer police contacts, their chance of juvenile failure is 42% irrespective of residence; however, it is 58% for those from southeast Wisconsin and who were involved in other than just status offenses (it is also 58% for those 16 or older and who have 7 or more police contacts).

The best prognosis in regard to juvenile recidivism appears to be for those average or above in intelligence, from other than southeast Wisconsin, and who are 16 or older upon first admission (23% failure). However, for those who were older upon first admission, and from other than southeast Wisconsin, having below average intelligence seems to raise their chances of juvenile failure considerably (56%).

In regard to juveniles having adult felony convictions within ten years after their first admission, it appears status offenders who are 16 or older have a low chance of failure (10%). Being white, from a family that moves infrequently, and a status offender is also a good prognosis in regard to adult felony convictions (12% fail). Being involved in other than status offenses, and from a family that moves frequently, raises the risk of failure as an adult considerably over the base rate for those 15 years of age or younger upon first juvenile admission (68%), or in a minority group (63%).

Both PAA and logistic regression tell us that being in a minority group whose family moves infrequently, and involved in other than status-only offenses, raises one's risk of adult failure (49%) over being white with the same characteristics (28%). If a male adolescent is white, with the preceding characteristics, and is 16 or older upon admission, and has no offenses involving alcohol, his chances of adult failure are reasonably low (19%). However, if a person with the above characteristics has some alcohol related offenses, his chance of adult felony convictions climbs (33%) near the base rate (36%). If he is white, with other than status offenses prior to first admission, and his family has moved frequently, his chances of failure as an adult rise (49%) above the base rate.

Again it must be emphasized that we do not have an indicator of race that permits us to say the race variable is not in fact a measure of poverty variables.

CHAPTER 6

RESULTS: 3) PREDICTION

Introduction

In Chapter 5, we constructed models using predictive attribute analysis (PAA) and logistic regression. However, the real test of a model is to see how well it can predict in a separate sample.

In this chapter, we examine three statistical procedures by constructing models in one sample and seeing how well they make predictions in a separate sample. The three statistical procedures used are: 1) predictive attribute analysis (Wilkins & MacNaughton-Smith, 1964); 2) Burgess-like procedure called total points scores (Simon, 1971); and 3) logistic regression (Fienberg, 1978).

Rules for comparing procedures with regard to classifying

For our first set of comparisons of statistical procedures with regard to classifying people (discriminant analysis predictions) as failures and successes, we will classify everyone in the sample (see the section entitled 'Comparing Statistical Procedures' in Chapter 2 of this dissertation for a discussion of the usefulness of classifications). However, in other comparisons we will declare a zone around the base rate of failure in the sample where we do not use the table to classify persons because the discriminant analysis predictions produce so many errors within this zone. After declaring a zone of useless classifications, we can then compare statistical procedures to see how many useful classifications they give us and how many errors they make in each direction (predicted failures who succeed and predicted successes who fail).

As stated in Chapter 2, the usefulness of prediction procedures should be determined only after examining them with respect to how many classifications can be made, and how many errors are made in each direction, with different size zones wherein we do not use prediction tables.

For the comparison of statistical procedures in the first case where we classify everyone in the sample, we will predict that everyone in groups which have a failure rate above the base rate of failure in the sample will fail, and everyone in groups which have a failure rate below the base rate in the sample will succeed.

In the cases where we declare a zone of useless classifications, we will predict that everyone in groups which have a failure rate above the base rate of failure in the sample, and outside the zone, will fail. Likewise, we will predict that everyone in groups which have a failure rate below the base rate of failure in the sample, and outside the zone, will succeed.

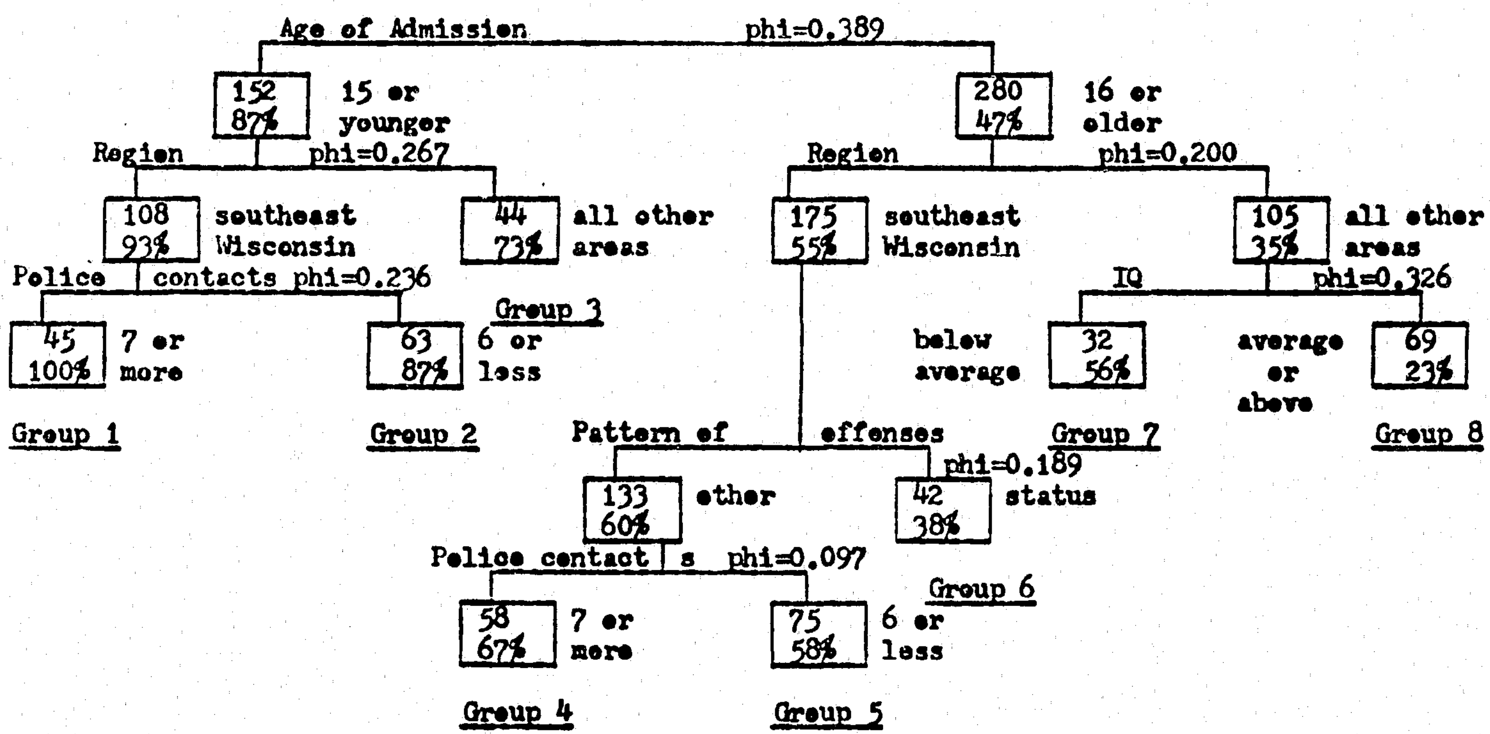
It should be clear that these classification predictions are different from probability predictions (where we examine the difference between the expected failure rate and the observed rate for each group). Our zone of useless predictions does not apply to probability predictions, since we are not classifying persons as failures or successes.

Juvenile prediction using PAA

We used the juvenile PAA model constructed in Chapter 5 to make predictions in a separate sample of 500 first admissions to a juvenile correctional facility in 1967. We used only the final groups (categories) resulting from the search process in making predictions (groups 1 through 8--see Diagram 1). As noted in the previous chapter, groups 7 and 8 do not add up to the total for all other areas of Wisconsin because 4 cases are missing data about IQ.

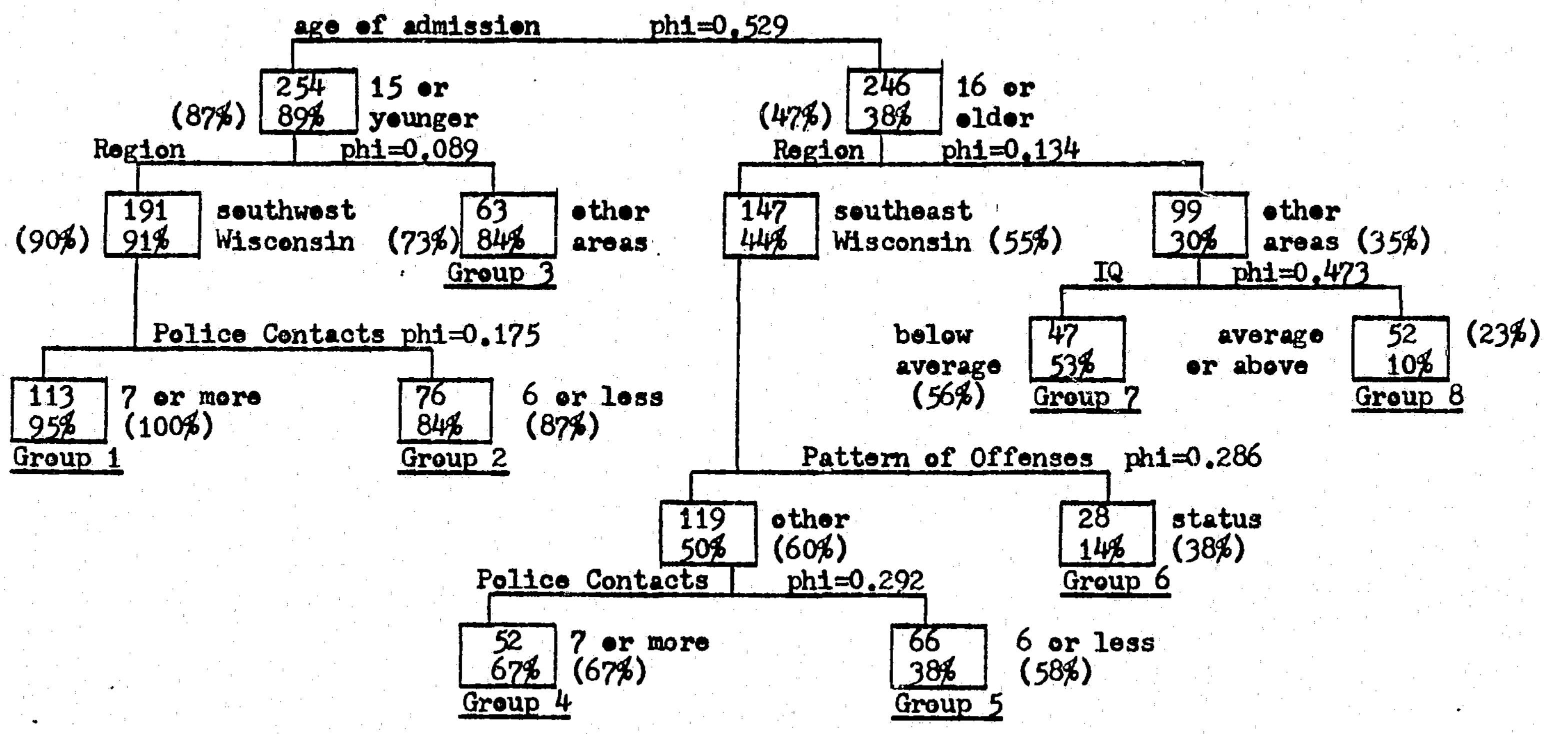
For example, we see that group 1 (those who were 15 or younger upon first admission, from southeast Wisconsin, and had 7 or more police contacts) had a recidivism rate of 100%. Thus, we predicted that individuals, with the same characteristics as group 1 in the construction sample, in the validation sample would return to a juvenile correctional facility at a rate of 100%. By the rules given earlier in this chapter, we would also make discriminant analysis predictions that all would fail in group 1. Diagram 2 depicts groups in the validation sample that were constructed in the construction sample. The number in the boxes is the number of individuals in that respective group in the validation sample. The percents in the boxes are the percents who failed in the validation sample. The percents outside the boxes, and in parentheses, are the percents

Juvenile Model: based on Predictive Attribute Analysis **Diagram 1**



Note: Four cases missing data about IQ.

Juvenile Model: based on Predictive Attribute Analysis in the Validation Sample Diagram 2



expected to fail (based on the percent who failed in that group in the construction sample). As noted above, we predicted that 100% would fail in group 1, and we see that 95% did fail. Groups 1 and 2 do not add up to 191 because we had 2 cases missing data about number of police contacts, and groups 4 and 5 do not add up to 119 because 1 case is missing data about number of police contacts.

Turning our attention to the prediction table based on the PAA model for juveniles, we first notice the table is divided into probability predictions and discriminant analysis predictions.

Insert Table 9 about here

The group numbers displayed in the first column correspond to the group numbers shown in Diagram 2. We note in column 1 that there were 113 individuals in group 1 in the validation sample (n is always the size of the group in the validation sample in these prediction tables). In column 2, we see that we made a probability prediction of 100% failure. We are saying that individuals have 100% probability of failure. In fact, 107, or 95%, actually failed, as shown in column 3. Thus, our difference between the expected and observed probabilities is 5%. This 5% difference is not really a prediction error as reported in

TABLE 9

Prediction Table: based on Predictive Attribute Analysis of juvenile recidivism

Columns 1	2	3	4	5	6	7	8	9
Probability predictions				Discriminant analysis predictions				
Number in group	Percent predicted to fail	Percent actually fail	difference	Prediction for individuals	Number actually fail	errors n*	type	Percent correct classification
1 (n=113)**	113 100%	107 95%	6 5%	all fail (n=113)	107	6 5%	2	95%
2 (n=76)	66 87%	64 84%	2 3%	all fail (n=76)	64	12 16%	2	84%
3 (n=63)	46 73%	53 84%	7 11%	all fail (n=63)	53	10 16%	2	84%
4 (n=52)	35 67%	35 67%	0	all fail (n=52)	35	17 33%	2	67%
5 (n=66)	38 58%	25 38%	13 20%	all succeed (n=66)	25	25 38%	1	62%
6 (n=28)	11 38%	4 14%	7 24%	all succeed (n=28)	4	4 14%	1	86%
7 (n=47)	26 56%	25 53%	1 3%	all succeed (n=47)	25	25 53%	1	47%
8 (n=52)	12 23%	5 10%	7 13%	all succeed (n=52)	5	5 10%	1	90%

Note: *n=number of errors
**number in the validation sample

previous studies (van Alstyne & Gottfredson, 1978) as we are not classifying people as successes and failures. In column 5, we see that we classified all 113 persons in group 1 as failures (since the group's failure rate is above the base rate of failure in the sample, which is 61%). We note in Column 6 that 107 actually fail, thus we misclassified 6 persons who succeeded (see Column 7) which is a type 2 error (see Column 8).

<u>Type of Error</u>

<u>Type one error</u>: predicted successes who fail

<u>Type two error</u>: predicted failures who succeed

Column 9 tells us what percent of correct classifications we made.

In regard to probability predictions, our differences between the expected and observed failure rates ranged from 3% to 24%.

In terms of discriminant analysis predictions (when we use the table for everyone in the sample), we misclassified (total of Column 7) 104 persons (as successes or failures), or 21% errors irrespective of direction. We classified 193 persons as successes (by rules given earlier in this chapter), and we were wrong for 59 persons who failed (31% errors). We classified 304 persons as failures, and we were wrong for 45 persons who succeeded (15% errors).

Using a zone of useless predictions

If we decided that we wanted to only use the table for classifying people when we make few errors, we can declare a zone of useless classifications around the base rate of failure in the sample (base rate is 61%). For example, a zone of 10% on each side of the base rate (51% to 71%), would give us the following results. We would be able to classify 332 (66% of the sample) persons (we would not classify persons as successes or failures in groups 4, 5, and 7).

We classified 252 persons as failures, and we were wrong for 28 who succeeded (11% errors). We classified 80 persons as successes, and we were wrong for 9 persons who failed (11% errors). Overall, we misclassified 37 persons (11% errors). Using a zone of useless classifications, we reduced our overall errors from 21% to 11%. We reduce the errors in predicting success from 15% to 11% by using a 10% zone, and from 31% to 11% in predicting failure.

If we place a 20% zone of useless classifications around the base rate (41% to 81%), we find we can classify 269 persons (54% of the sample) in the sample (we add group 3 to groups 4, 5, and 7 as groups in which we do not use the table for classification). We classified 189 persons as failures, and we were wrong for 18 persons who succeeded (10% errors). We classified, as with the 10% zone, 80 persons as successes, and we again were wrong for 9 persons who failed.

A complete table of the comparisons of classification under each of our conditions (e.g., using a 0% zone of useless classifications, a 10% zone, and a 20% zone) using all three statistical procedures is given in an upcoming section. We decided to compare statistical procedures to see how well they predict.

Total points scores

The first procedure we used to compare predictive efficiency with PAA was a Burgess procedure, which we labelled Total Points Scores (see Simon, 1971, for a discussion of Total Points Scores). To derive total points score groups, we simply gave individuals one point each time they were in the highest recidivism category of the dichotomized predictor variables used, and then we added across predictor variables for each individual. Thus, we created groups of individuals varying in total point scores from zero (meaning people in this group were never in the highest recidivism category of any predictor variable used) to the number of predictor variables used.

As with out PAA model, groups here are mutually exclusive.

A problem that immediately confronted us was one of not being able to find groups whose recidivism rate varied enough from the base rate for the sample (61%) to improve upon discriminant analysis predictions based solely on knowledge of the base rate. For example, when we used only three variables (the most highly associated with our dependent variable), one of the four groups had a recidivism rate so close to the base rate so as to not improve upon discriminant analysis predictions based on the base rate as will be seen in the section to follow.

In view of the foregoing problem, we continued to look for a more satisfactory total points score method. The next procedure was to get total points scores based on the variables that comprised our PAA Model for juvenile recidivism. Again, with this new set of total points scores, we found we would not be able to make discriminant analysis predictions on 3 groups, or about 30% of the sample, using a 10% zone of useless classifications on each side of the base rate of failure in the sample (see discussion of prediction, Chapter 2).

The next total points scores were derived by using all variables significantly associated with juvenile recidivism at alpha equals .01 which did not appear highly correlated with each other according to our intercorrelational analysis. With these new total points scores, we encountered not only the problem alluded to above, but the number of persons in the lowest and highest total-points groups were reduced to as low as 2 persons. Combining these scores into fewer groups did, of course, give us larger numbers of people in fewer groups, but this did not improve upon the former problem.

Another analysis was done where all significantly related variables (at alpha equals .01, again) with juvenile recidivism were used regardless of their intercorrelations (which meant we were weighting some variables by more than a factor of one). Again, problems of not being able to make discriminant analysis predictions which improved upon those using only knowledge of the sample base rate for large numbers of people and small numbers of persons in some groups cropped up. Combining groups did not improve upon our first set of total points scores based on three variables.

Thus, we decided, in view of parsimony, to make predictions based upon the first set of points (3 variables). Discussion of these 3 variables and results follows in the next section.

<u>Results from total points scores for juvenile recidivism</u>

The three variables selected for deriving total points scores for juveniles were: 1) age at first admission to a juvenile correctional facility; 2) pattern of offenses (status only vs. other than status only); and, 3) region of residence. These variables were among those most highly associated with juvenile recidivism, they appeared in our PAA Model, and they show low intercorrelations.

Insert Table 10 about here

From Table 10, we see that we identify 4 groups whose recidivism rates vary from 25% to 96%. It is interesting to note that with both PAA and total points scores, we were much more successful in identifying groups near 100% failure than groups near 0% failure. We also observe that our groups vary considerably in size (from 28 to 186).

Insert Table 11 about here

Examining Table 11, which is read in the same fashion as Table 9, we see that we find differences between expected and observed failure rates of 3% to 18% with probability predictions.

In making classifications for everyone in the sample (as successes or failures), we find we classified 370 persons as failures, and we were wrong for 85 persons who succeeded (23% errors). We classified 130 persons as successes, and we were wrong for 35 persons who failed (27% errors).

TABLE 10

TOTAL POINTS SCORE GROUPS FOR JUVENILE RECIDIVISM
(BASED ON CONSTRUCTION SAMPLE N=432)

Total Score Groups	Number in Construction Sample Group and Percent of Sample	Number Who Have Adult Felony Convictions and Percent of Group
1	28 7%	7 25%
2	126 29%	48 38%
3	186 43%	121 65%
4	92 21%	88 96%
TOTALS	432 100%	264 61%

TABLE 11

PREDICTION TABLE: BASED ON TOTAL POINTS SCORE FOR JUVENILE RECIDIVISM

PROBABILITY PREDICTIONS				DISCRIMINANT ANALYSIS PREDICTIONS				
Number in Group	Percent predicted to Fail	Percent actually Fail	Difference	Prediction for Individuals	Number actually Fail	errors n	errors type	Percent Correct Classification
1 (n=28)*	7 25%	2 7%	5 18%	All succeed (n=28)	2	2 7%	1	93%
2 (n=102)*	39 38%	33 32%	6 6%	All succeed (n=102)	33	33 32%	1	68%
3 (n=195)*	127 65%	122 63%	5 2%	All fail (n=195)	122	73 37%	2	63%
4 (n=175)*	168 96%	163 93%	5 3%	All fail (n=175)	163 93%	12 7%	2	93%

Note: *number in group in validation sample

Using a zone of useless classifications

Using a zone of useless classifications of 10% on either side of the base rate of failure in the sample, we find that we are able to classify 305 persons (we would not use the table for persons in group 3 in Table 11), or 61% of the sample. We predicted 175 persons to fail, and we were wrong for 12 persons who succeeded (7% errors). We predicted 130 persons would succeed, and we were wrong for 35 persons who failed (27% errors). Thus, while we make the same proportion of errors in predicting successes as when we classify everyone in the sample, we make less errors proportionately with less predictions (23% errors to 7% errors) in predicting failure.

A 20% zone of useless classifications does not affect any dimension of our classifications (i.e., how many, or errors in either direction) from those with a 10% zone.

Thus, while a 20% zone reduces the number of classifications we use with PAA (from 66% of the sample to 54% of the sample), it does not affect total points scores (61% of the sample). Further comparisons are forthcoming.

Prediction of juvenile return using logistic regression

In this section, we discuss the results obtained in trying to predict juvenile return to a correctional facility (J) using logistic regression. As we discussed

CONTINUED

2 OF 4

in the previous chapter, we examined around 100 logistic regression models of juvenile recidivism within all possible permutations of six variables, taken 3 at a time. From these initial models, we selected 20 best models (one for each set of 3 predictor variables). Then we selected from the 20 best models the model that reduced it's respective model of independence's likelihood Chi Square most. The model selected was a fully saturated model using age at first admission (A) and number of police contacts prior to first admission (N) as predictor variables (we were able to collapse the table over IQ).

The resulting table for model, JAN, is given below.

Insert Table 12 about here

The resulting prediction table (Table 13) from the model, JAN, is read in the same fashion as the tables for the PAA model and for total points scores. Characteristics of the groups in Table 13 are (using age at admission and number of police contacts):

<u>Groups</u>:
1. 15 or younger, 6 or less.
2. 15 or younger, 7 or more.
3. 16 or older, 6 or less.
4. 16 or older, 7 or more.

Insert Table 13 about here

TABLE 12

JUVENILE RECIDIVISM: BASED ON LOGISTIC REGRESSION USING AGE OF ADMISSION AND NUMBER OF POLICE CONTACTS TO PREDICT JUVENILE RETURN*

Age at Admission	Number of Police Contacts	No	Yes	%Fail
15 or younger	6 or less	19	81	81%
	7 or more	1	51	98%
16 or older	6 or less	114	84	42%
	7 or more	34	48	58%
TOTALS		168	264	

*Construction Sample (N=432)

TABLE 13

PREDICTION TABLE: BASED ON LOGISTIC REGRESSION USING AGE OF FIRST ADMISSION AND NUMBER OF POLICE CONTACTS TO PREDICT JUVENILE RECIDIVISM

PROBABILITY PREDICTIONS				DISCRIMINANT ANALYSIS PREDICTIONS				
Number in Group	Percent predicted to Fail	Percent actually Fail	Difference	Prediction for Individuals	Number actually Fail	errors n	errors type	Percent Correct Classification
1 (n=107)*	87 81%	86 80%	1 1%	All fail (n=107)	87	20 19%	2	81%
2 (n=145)*	142 98%	137 94%	5 3%	All fail (n=145)	137	8 6%	2	94%
3 (n=160)*	67 42%	45 28%	22 14%	All succeed (n=160)	45	45 28%	1	72%
4 (n=85)*	49 58%	49 58%	0	All succeed (n=85)	49	49 58%	1	42%

Note: *number in the group in the validation sample

Table 13 shows that we have differences in the expected and observed failures in probability predictions ranging from no difference to 14% difference. Our group sizes are rather large. There are 3 cases missing data about police contacts.

When we classify everyone in the sample, we find we classify 252 persons as failures and we were wrong for 28 persons who succeeded (11% errors). We classified 245 persons as successes, and we were wrong for 94 persons who failed (38% errors).

Using a zone of useless classifications

Using a 10% zone of useless classifications, we find we are able to classify 412 persons (82% of the sample) in the sample (we would not use Table 13 for persons in group 4). Eighty-two percent of the sample classified is our largest number classified using a 10% zone wherein we do not use the table (66% classified with PAA and 61% classified with total points scores). We classified 252 persons as failures, and we were wrong for 28 persons who succeeded (11% errors). We classified 160 persons as successes, and we were wrong for 45 persons who failed (28% errors).

Using a 20% zone of useless classifications, we find we are able to classify 252 persons (51% of the sample). This 51% figure compares to 54% of the sample with PAA and 61% of the sample with total points scores. With the

20% zone, we were not able to make predictions for persons in groups 3 and 4 (see Table 13). We would make no predictions of success with logistic regression and we would classify 252 persons as failures, with 28 errors (11% errors).

<u>Alternative juvenile model</u>

An alternative model to using model, JAN, for juveniles, would be JR,JP,JE,PRE. (See Chapter 5 for description of how to read model representation.) Model JR,JP,JE,PRE reduced Chi Square the most after JAN, and it used region, pattern of offenses, and race to predict juvenile recidivism (see Table 7 in Chapter 6). This model might be more satisfying to those concerned about how official recording of police contacts reflects real delinquent behavior. Table 14 shows we again make reasonably good probability predictions. We are able to make 316 discriminant analysis predictions using a 10% zone of useless classifications (63% of the sample); 176 predictions of success (35% of sample) with 86 errors (49% errors), and 140 predictions of failure (28% of sample) with 28 errors (20% errors). Clearly this model is unsatisfactory with regard to making discriminant analysis predictions because of errors (114, or 36%). Characteristics of the groups in Table 14 are:

<u>Groups</u>: 1. White, southeast Wisconsin, status.
2. White, southeast Wisconsin, other.
3. White, rest of state, status.
4. White, rest of state, other.
5. Minority, southeast Wisconsin, status.
6. Minority, southeast Wisconsin, other.
7. Minority, rest of state, status.
8. Minority, rest of state, other.

Insert Table 14 about here

<u>Comparison of statistical procedures for predicting juvenile recidivism</u>

When we sum the difference between the expected and observed rates of failure across groups, we find:

PAA Model	Logistic Regression	Total Points Scores
43=9%	28=6%	21=4%

Each statistical procedure gives us rather small differences, and, as in previous studies, we conclude that the simple procedure gives us as small differences as do the more complicated procedures.

In Table 15, we note our findings when we classify persons as successes or failures using probability rates. (<u>Note</u>: PAA is predictive attribute analysis, LR is logistic regression, and TPS is total points scores.) Table 15 has 3 columns (one for each statistical procedure) and along the rows we notice that there are 3 major sections (one for each size zone of useless classifications we declared around the base rate). The first row tells us how many

TABLE 14

PREDICTION TABLE: BASED ON LOGISTIC REGRESSION USING PATTERN OF JUVENILE OFFENSES, REGION, AND RACE TO PREDICT JUVENILE RECIDIVISM

	PROBABILITY PREDICTIONS			DISCRIMINANT ANALYSIS PREDICTIONS				
Number in Group	Percent predicted to Fail	Percent actually Fail	Difference	Prediction for Individuals	Number actually Fail	errors n	type	Percent Correct Classification
1 (n=30)*	14 45%	13 43%	1 3%	All succeed (n=30)	13	13 43%	1	57%
2 (n=154)	105 68%	111 72%	6 4%	All fail (n=154)	111	43 28%	2	72%
3 (n=28)	7 26%	3 11%	4 14%	All succeed (n=28)	3	3 11%	1	89%
4 (n=118)	58 49%	70 59%	12 10%	All succeed (n=118)	70	70 59%	1	41%
5 (n=14)		1 7%	no** prediction	no** prediction				
6 (n=140)	115 82%	112 80%	3 2%	All fail (n=140)	112	28 20%	2	80%
7 (n=2)		0	no** prediction	no** prediction				
8 (n=14)		10 71%	no** prediction	no** prediction				

Note: *number in the group in the validation sample
**number too small in both samples

predictions of success we made with each statistical procedure and the second row tells us how many errors we made and what percent this was of the total number of predictions of success (predicted successes who failed). The third row tells us how many failures we predicted, and the fourth row shows the number of errors (predicted failures who succeeded). Finally, we observe in the fifth row how many total predictions we made and in the sixth row we see how many errors we made when we do not consider direction and what percent this is of the total number of predictions.

Insert Table 15 about here

We notice that when we use the prediction table for everyone in the sample (i.e., have a zero zone of useless classifications), we make comparable errors overall (irrespective of direction) with all three statistical procedures (21% errors with PAA, 24% errors with total points scores, and 24% with logistic regression). When we examine the direction in which errors are made, we observe that PAA (31% errors) and total points scores (27% errors) make less proportional errors than logistic regression (38% errors) in predicting success. However, logistic regression (11% errors) and PAA (15% errors) give us less

TABLE 15
COMPARISON OF STATISTICAL PROCEDURES USING ZONES OF USELESS CLASSIFICATIONS - JUVENILE RECIDIVISM
(N=500)

	PAA*	TPS*	LR*
		0% ZONE	
Predicted successes	193	130	245
errors	59=31%	35=27%	94=38%
Predicted failures	304	370	252
errors	45=15%	85=23%	28=11%
TOTALS predictions	497**	500	497**
errors	104=21%	120=24%	122=24%
		10% ZONE	
Predicted successes	80	130	160
errors	9=11%	35=27%	45=28%
Predicted failures	252	175	252
errors	28=11%	12=7%	28=11%
TOTALS predictions	332	305	412
errors	37=11%	47=15%	73=18%
		20% ZONE	
Predicted successes	80	130	0
errors	9=11%	35=27%	
Predicted failures	189	175	252
errors	18=10%	12=7%	28=11%
TOTALS predictions	269	305	252
errors	27=10%	47=15%	28=11%

Note: *PAA=predictive attribute analysis, TPS=total points scores, and LR=logistic regression
**3 cases missing data

errors proportionately than total points scores (23% errors) in predicting failure. Overall, it might be stated that for any comparison of two procedures, while one gives us less errors in one direction, the other procedure gives less errors in the other direction or they are very similar in errors made.

When we decide to not use the prediction table for classification of persons who are in groups which have recidivism rates within a zone of 10% on each side of the sample's base rate of failure, we see in row 11 that logistic regression gives us more useful classifications (412 useful) than PAA (332 useful) or total points scores (305 useful). With the 10% zone, we make somewhat comparable errors overall (11% errors with PAA, 15% with total points scores, and 18% with logistic regression).

However, when we examine the direction in which these errors are made, we see that while PAA gives us less predictions of success (80 classified) than total points scores (130 classified) or logistic regression (160 classified), it gives us less errors (11% errors) than total points (27% errors) or logistic regression (28% errors). Logistic regression and PAA give us the same number of predictions of failure (252 classified), with the same number of errors (11% errors), which is more predictions of failure than we get with total points scores (175 classified). Total points makes a few less errors than the other procedures (7% errors with total points scores).

Using a zone of 20% on each side of the sample's base rate of failure, we see in the bottom third of Table 15 that total points scores gives us some more classifications (61% classified) than PAA (54% classified) or logistic regression (50% classified). The more sophisticated statistical procedures give us a few less errors (10% errors with PAA and 11% errors with logistic regression) than total points socres (15% errors) overall (irrespective of direction). When we look at the direction of errors, we see that logistic regression is unable to give us any predictions of success. PAA continues (as with the 10% zone) to give us 80 predictions of success and total points scores continues to give us 130 predictions of success. With the 20% zone, the logistic regression table would be useful only in predicting failure (it gives us 252 predictions of failure with 11% errors). PAA gives us 189 predictions of failure (10% errors), while total points scores gives us 175 predictions (7% errors).

From the preceding analyses, we see that how many classifications we can make, and then how many errors we make in each direction is a function of where we decide to not use prediction tables for classifying individuals as successes or failures. The wider our zone of useless classifications the less predictions we make and the less errors we make. Errors are a direct function of how wide we make the zone of useless classifications and not of how many classifications we make.

Predicting adult felony convictions using PAA

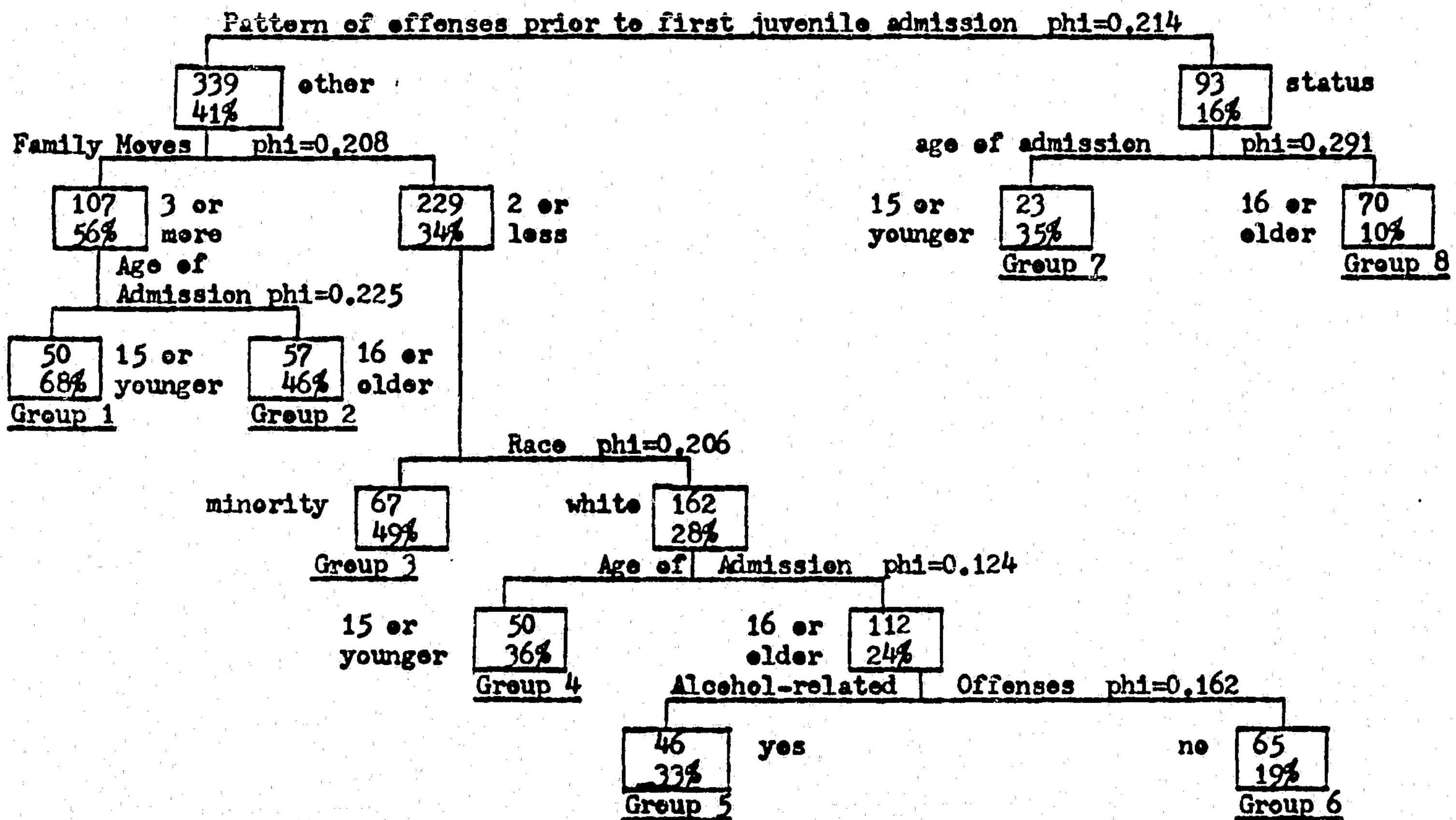
We constructed a model using PAA for adult recidivism in Chapter 5 (see Diagram 3). Viewing Diagram 3, we see that we have probability rates ranging from 10% failure to 68% failure in a sample with a base rate of failure of 36% as adults. Groups 5 and 6 do not add up to 112 because 1 case is missing data about alcohol use.

Moving now to Diagram 4, we can see how much difference there is in expected rates of failure and observed rates of failure for each identified group (e.g., in Group 1 we have an expected failure rate of 68% and an observed rate of 60% failure). Groups 5 and 6 do not add up to 96 because 3 cases are missing data about alcohol use.

Insert Table 16 about here

Table 16 shows us that we have few differences between the expected and observed rates (in four groups our expected equals the observed failure rates). Group number in the prediction table correspond to number in Diagrams 3 and 4.

Adult Model: based on Predictive Attribute Analysis Diagram 3



Adult Model: based on Predictive Attribute Analysis Diagram 4

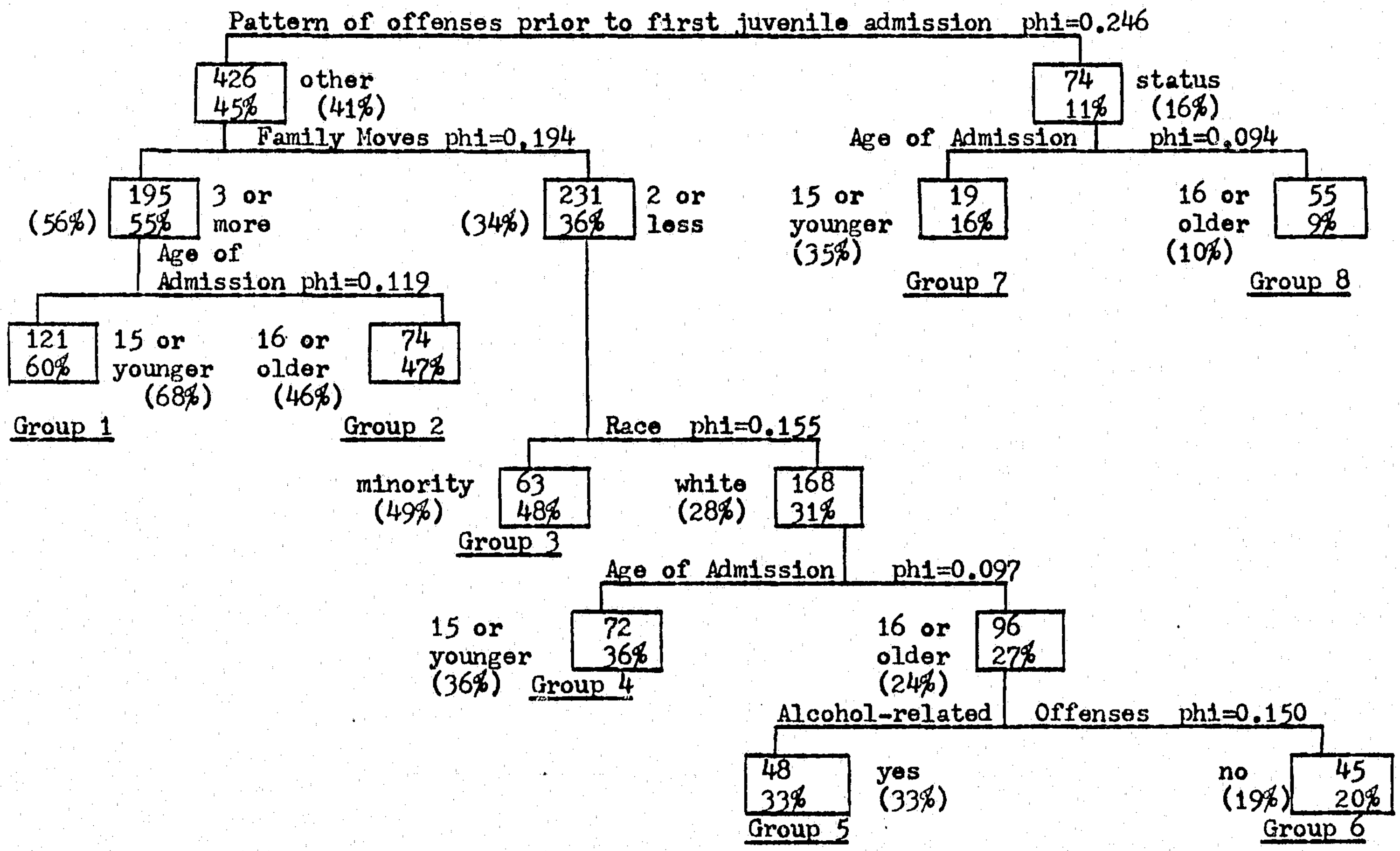


TABLE 16

PREDICTION TABLE: BASED ON PREDICTIVE ATTRIBUTE ANALYSIS OF ADULT RECIDIVISM

	PROBABILITY PREDICTIONS			DISCRIMINANT ANALYSIS PREDICTIONS				
Number in Group	Percent predicted to Fail	Percent actually Fail	Difference	Prediction for Individuals	Number actually Fail	errors n	type	Percent Correct Classification
1 (n=121)*	82 68%	72 60%	10 8%	All fail (n=121)	72	49 40%	2	60%
2 (n=74)*	34 46%	35 47%	1 1%	All fail (n=74)	35	39 53%	2	47%
3 (n=63)*	31 49%	30 48%	1 2%	All fail (n=63)	30	33 52%	2	48%
4 (n=72)*	26 36%	26 36%	0	All fail (n=72)	26	46 64%	2	54%
5 (n=48)*	16 33%	16 33%	0	All succeed (n=48)	16	16 33%	1	67%
6 (n=45)*	9 20%	9 20%	0	All succeed (n-45)	9	9 20%	1	80%
7 (n=19)*	7 35%	3 16%	4 21%	All succeed (n=19)	3	3 16%		84%
8 (n=55)*	5 10%	5 9%	0	All succeed (n=55)	5 9%	5 9%	1	91%

Note: *number in group in validation sample

The sum of differences between the expected rates of failure and the observed rates was 16, or 3% total difference.

If we use the PAA prediction table for everyone in the sample (0% zone of useless classifications), we find that our total errors are 200, or 40% errors. We classified 167 persons as successes, and we were wrong for 33 persons who failed (20% errors). Classifying 330 persons as failures, we found 167 persons so classified actually succeeded (51% errors).

When we declare a 10% zone on each side of the base rate of failure in the sample (base rate is 36%) in which we decide not to use the prediction table, we find we would not use Table 16 for persons in Groups 4, 5, and 7. We would use Table 16 for 378 persons (72% of the sample), and we would classify 100 persons as successes (with 14 errors). We classified 258 persons as failures, and we were wrong for 121 persons who succeeded (47% errors).

Declaring a 20% zone of useless classifications on both sides of the base rate would mean we would not use Table 16 for persons in Groups 2, 3, and 6 in addition to Groups 4, 5, and 7 which were eliminated under the 10% zone. We would use Table 16 for 176 persons (36% of the sample), with a 20% zone. We classified 55 persons as successes, and we were wrong for 5 persons who failed (9% errors). We classified 121 persons as failures, and we were wrong for 49 who succeeded (40% errors).

Total points scores for adult recidivism

To create total points scores for adult felony convictions, we encountered exactly the same difficulties as we had with juvenile recidivism (e.g., groups varying considerably in size and very small groups when more than 3 predictor variables were used). We examined the same 6 different ways of forming total points scores as examined for juvenile recidivism (see section entitled 'Total Points Scores' of this chapter).

As in the juvenile case, our most satisfactory way of getting total points scores to predict adult felony convictions was using only 3 predictor variables. The variables used were: 1) pattern of offenses prior to first adolescent admission; 2) age at first juvenile admission; and, 3) number of family moves prior to first juvenile admission.

Insert Table 17 about here

As we see in Table 17, our group sizes vary rather much.

In examining Table 18, we note that we find few differences between expected and observed values with probability predictions (3% overall difference).

Insert Table 18 about here

TABLE 17

TOTAL POINTS SCORE GROUPS FOR ADULT RECIDIVISM
(BASED ON CONSTRUCTION SAMPLE N=432)

Total Score Groups	Number in Construction Sample Group and Percent of Sample	Number Who Have Adult Felony Convictions and Percent of Group
1	52 12%	6 12%
2	184 43%	51 28%
3	142 33%	62 44%
4	50 11%	34 68%
TOTALS	428* 99%	152** 36%

Note: *Four cases are missing data on at least one variable.
**Two cases with at least one variable missing data had adult Felony Convictions.

TABLE 18

PREDICTION TABLE: BASED ON TOTAL POINTS SCORES FOR ADULT RECIDIVISM

	PROBABILITY PREDICTIONS			DISCRIMINANT ANALYSIS PREDICTIONS				
Number in Group	Percent predicted to Fail	Percent actually Fail	Difference	Prediction for Individuals	Number actually Fail	errors n	type	Percent Correct Classification
1 (n=37)*	5 12%	3 8%	2 5%	All succeed (n=37)	3	3 8%	1	92%
2 (n=144)*	40 28%	36 25%	4 3%	All succeed (n=144)	36	36 25%	1	75%
3 (n=198)*	87 44%	86 43%	1 0.1%	All fail (N=198)	86	112 57%		43%
4 (n=121)*	82 68%	72 60%	10 8%	All fail (n=121)	72	49 40%	2	60%

Note: *number in group in validation sample

When we use Table 18 for everyone in the sample, we see that we misclassify 200 persons (40% errors). We classify 181 persons as successes (with 39 errors; 22% errors) and we classify 319 persons as failures (with 161 errors; 50% errors).

With a 10% zone around the base rate of failure in the sample within which we do not use Table 18, we find that we would use the table for 158 persons (32% of the sample). We would not use the table for persons in Groups 2 and 3. We classify 37 persons as successes, and we make 3 errors (8% errors). We classify 121 persons as failures, and we make 49 errors (40% errors). Thus, with the 10% zone, we reduce our errors from these made with a 0% zone in making success predictions from 22% to 8%.

Using a 20% zone of useless classifications, we find no change in any dimension of our results from those when we use a 10% zone.

Logistic regression model for predicting adult recidivism

In Chapter 5, we discussed how we examined about 100 models using logistic regression with 6 predictor variables (see Chapter 5 for this discussion). We started with 20 models of independence (all possible permutations of 6 variables, taken 3 at a time), and based on reduction in their respective independent model's likelihood Chi Square, we chose 20 best models (one for each set of 3 predictor variables). Then, we selected the model that reduced its independent model's likelihood Chi Square the most among the 20 best models. The model selected was FM,FP,FE,EMP, which says that each predictor variable (family moves-M; pattern of juvenile offenses-P, and race-E) is associate with our dependent measure and is needed in the model, but there are no interactions between independent variables. See Table 19 for the configuration of our data.

Insert Table 19 about here

Looking at Table 20, we note that our probability predictions for the 6 groups large enough to make predictions are reasonable near our observed failure rates, (adding our observed minus expected values gives us a total difference of 29, or a 6% difference). Characteristics of the groups in Table 20 are:

<u>Groups</u>:
1. Status, 2 or less, white.
2. Status, 2 or less, minority.
3. Status, 3 or more, white.
4. Status, 3 or more, minority.
5. Other, 2 or less, white.
6. Other, 2 or less, minority.
7. Other, 3 or more, white.
8. Other, 3 or more, minority.

Insert Table 20 about here

TABLE 19

LOGISTIC REGRESSION TABLE: BASED ON RACE, FAMILY MOVES, AND PATTERN OF JUVENILE OFFENSES PREDICTING ADULT FELONIES*

Pattern of Offenses	Family Moves	Race	Felony Conviction No	Felony Conviction Yes	Felony Rate
Status	2 or less	White	7	50	12%
		Minority	3	7	---
	3 or more	White	4	20	17%
		Minority	1	1	---
Other	2 or less	White	45	117	28%
		Minority	33	34	43%
	3 or more	White	29	30	49%
		Minority	32	19	63%
TOTALS			154	278	= 432

*Construction Sample (N=432)

TABLE 20

PREDICTION TABLE: BASED ON LOGISTIC REGRESSION USING RACE, FAMILY MOVES, AND PATTERN OF OFFENSES TO PREDICT ADULT FELONIES

	PROBABILITY PREDICTIONS			DISCRIMINANT ANALYSIS PREDICTIONS				
Number in Group	Percent predicted to Fail	Percent actually Fail	Difference	Prediction for Individuals	Number actually Fail	errors n	type	Percent Correct Classification
1 (n=38)*	7 12%	3 8%	4 11%	All succeed (n=38)	3	3 8%	1	92%
2 (n=9)	**no predictions			**no predictions				
3 (n=20)**	4 20%	4 20%	0	All succeed (n=20)	4	4 20%	1	80%**
4 (n=7)	**no predictions			**no predictions				
5 (n=168)	47 29%	52 31%	5 3%	All succeed (n=168)	52	52 31%	1	69%
6 (n=63)	30 48%	30 48%	0	All fail (n=63)	30	33 52%	2	48%
7 (n=104)	48 46%	57 55%	9 9%	All fail (n=104)	57	47 45%		55%
8 (n=91)	61 67%	50 55%	11 12%	All fail (n=91)	50	41 45%	2	55%

Note: *number in the group in the validation sample
**number too small in both samples

Please note that 16 persons were never classified as failures or successes because the number of persons with these characteristics in both sample was very small and likely to lead to unstable predictions. When we use Table 20 for everyone in the sample, we find we misclassify 180 persons out of 484 persons classified as failures or successes (37% errors). When we look at the direction in which these errors are made, we see that we classified 226 persons as successes, and we were wrong for 59 persons who failed (26% errors). We classified 258 persons as failures, and we made 121 errors (48% errors).

Zones of useless classifications

Using a 10% zone on both sides of the base rate wherein we do not use Table 20 for prediction, we see that we would not use the table for persons in Group 5 in addition to Groups 2 and 4, which were eliminated because of small numbers of people. We would use the table for 316 persons (63% of the sample). With 10% zone, we classify 58 persons as successes, and we make 7 errors (12% errors). We classify 258 persons as failures, and we made 121 errors (47% errors). As a function of using a 10% zone in which we do not use predictions, we reduce our errors from those when we use the table for everyone in the sample from 26% to 12% in predicting success.

Using a 20% zone wherein we do not use predictions, we see that we would not use Table 20 for any groups except Groups 1 and 8. We would use Table 20 for 129 persons (26% of the sample). We classify, with the 20% zone, 38 persons as successes, and we make 3 errors (8% errors). We classify 91 persons as failures, and we make 41 errors (45% errors).

<u>Comparison of statistical procedures for predicting adult recidivism</u>

In terms of making probability predictions, we, as in the juvenile case, note that there is comparable difference in total expected minus observed failure rates with all three statistical procedures:

PAA	Total Points Scores	Logistic Regression
16=3%	17=3%	29=6%

Examining Table 21, we see that when we use the prediction tables for everyone in the sample (0% zone of useless classifications), we make somewhat comparable errors with all three statistical procedures overall when we classify persons as successes or failures (200 errors with PAA, 200 errors with total points scores, and 180 errors with logistic regression). When we examine the direction in which we make these errors, we notice that we predicted 167 persons to succeed with PAA, and we were wrong for 33 persons who failed (20% errors). We predicted 181 persons to succeed with total points scores, and we were wrong for 39 persons who failed (22% errors), and with logistic regression we predicted 226 persons to succeed, and we were wrong for 59 persons (26% errors).

Insert Table 21 about here

In predicting failure with a 0% zone, we find that PAA gives us 330 prediction, total point scores gives us 319 predictions, and logistic regression gives us 258, and we make comparable proportion of errors (51% with PAA, 50% with total points scores, and 47% with logistic regression). Our error rate is noticeably high in predicting failure for adults.

When we use a 10% zone on each side of the base rate of failure in the sample (base rate of failure in the construction sample was 36%) wherein we do not use our predictions, we find that we are able to classify 358 persons with PAA (72% of the sample), 158 with total points scores (32% of the sample), and 316 with logistic regression (63% of the sample). We make considerably more predictions of success with PAA (100 classified as successes) than with logistic regression (58 classified as successes) or total points scores (37 classified as successes), with a few more errors proportionately (14%

TABLE 21
COMPARISON OF STATISTICAL PROCEDURES USING ZONES OF USELESS CLASSIFICATIONS - ADULT RECIDIVISM
(N=500)

	PAA*	TPS*	LR*
		0% ZONE	
Predicted successes	167	181	226
errors	33=20%	39=22%	59=26%
Predicted failures	330	319	258
errors	167=51%	161=50%	121=47%
TOTALS predictions	497**	500	484***
errors	200=40%	200=40%	180=37%
		10% ZONE	
Predicted successes	100	37	58
errors	14=14%	3=8%	7=12%
Predicted failures	258	121	258
errors	121=47%	49=40%	121=47%
TOTALS predictions	358	158	316
errors	135=38%	52=33%	128=41%
		20% ZONE	
Predicted successes	55	37	38
errors	5=9%	3=8%	3=8%
Predicted failures	121	121	91
errors	49=40%	49=40%	41=45%
TOTALS predictions	176	158	129
errors	54=31%	42=33%	44=34%

Note: *PAA=predictive attribute analysis, TPS=total points scores, and LR=logistic regression
**3 cases missing data
***16 persons in groups too small to make predictions

errors with PAA, 12% with logistic regression, and 3% with total points scores). In terms of predicting failure with a 10% zone, we find that we make the same number of predictions with PAA and logistic regression (258 classified as failures) and the same amount of errors (47% errors). With total points scores, we classify 121 persons as failures, and we make 49 errors (40% errors).

With a 20% zone of useless classifications, we reduce the number of people we classify with PAA as successes, compared to the 10% zone, from 100 to 55 (with logistic regression we reduced the number from 58 to 38). By using the wider zone, we also reduce the proportion of errors in predicting success from 14% errors to 5% errors with PAA. While total points scores is not affected in any way by the 20% zone that was not also true for the 10% zone, PAA makes less predictions of failure with the 20% zone (258 versus 121) as does logistic regression (258 versus 91).

As with predicting return to a school for boys, we see that the number of errors made in classifying persons as having felony convictions is a function of whether we decide to use zones wherein classifications are not used, and how wide we make them (e.g., as we increase the width of those zones we make less errors).

CHAPTER 7

RESULTS: 4) LOGISTIC REGRESSION MODELS

Introduction

As we discussed in Chapter 5, one problem we had in constructing logistic regression models was that we have a sample size which can support only a few independent variables in a model. On the other hand, we have several independent variables that are seemingly highly related to our dependent measures, and which might remain in a model if we had a sufficient sample size in which to construct a model. Thus, we decided to combine our construction sample and our validation sample in order to see what models might be constructed. Combining our two samples gives us 932 individuals.

As with our previous analyses, we used only those variables that occur prior to first juvenile release from an institution. And, we did not use highly intercorrelated variables or variables which appeared to be suspect in regard to validity. We used the same dichotomies as with earlier analyses.

Juvenile model

We decided to begin our analyses with four independent variables. The four independent variables used at level one of our analyses were: 1) region of residence (R); 2) race (E); 3) pattern of offenses (P); and, 4) age of first admission (A). We selected these 4 variables because they were among the most highly related variables to juvenile return (J). We also added one variable at a time, using three of the next most highly related independent variables with our dependent measure. The variables used were: 1) number of police contacts prior to first admission (N); 2) family law contacts (L); and 3) IQ (I).

To construct a juvenile logistic regression model, we used a step-wise log linear procedure (Goodman, 1971) and selected models according to the steps by Fuchs (Fuchs & Flanagan, 1979). As in previous analyses, we started with the model of independence, J, REPA, and added effects one at a time, which differed from the previous effect by only one effect.

With the initial 4 independent variables (REPA), we found we were able to collapse the table over the variable of race (see rules by Fuchs, 1979).

Model	df*	LR CHIS**	PROB	PCHIS***	PROB****
JE,JR,JP,JA,REPA	11	16.55	.1220	16.12	.1368
DDT*a JE	1	1.53	.2155	1.44	.2298

Note: *df - degrees of freedom
**LR CHIS = likelihood chi square
***PCHIS = Pearson's chi square
****PROB = probability
*aDDT = difference due to

At this point, starting with the model of independence, J, RPA, we would select the model, JR,JP,JA,RPA.

Model	df	LR CHIS	PROB	PCHIS	PROB
JR,JP,JA,RPA	4	3.08	.5445	3.08	.5440
DDT JR	1	22.02	.0000	22.63	.0000

The above model reduces its independent model's likelihood chi square by .5445.

To the 3 independent variables shown immediately above, we added the variable, number of police contacts. Starting with the model of independence, J,RPAN, we selected the model, JR,JN,JP,JA,RPAN.

Effect	df	LR CHIS	PROB	PCHIS	PROB
JR	11	7.30	.7744	7.20	.7830
DDT JR	1	18.56	.0000	19.51	.0000

The above model, again, uses all independent variables and contains no interactions between them. This new model reduces its independent model's likelihood chi square by .7744. Thus, JR,JN,JP,JA,RPAN would become our overall selected model using the criteria that we choose the model that reduces its respective independent model's likelihood chi square the most.

We also started with the model of independence with IQ added to the initial three independent variables (RPA). Our selected model became JRI,JP,JA,RPAI.

Effect	df	LR CHIS	PROB	PCHIS	PROB
JRI	10	7.28	.6992	7.34	.6928
DDT JRI	1	12.61	.0004	13.00	.0003

The above model says we have an interaction between region and IQ and that both age of admission and pattern of offenses are needed in the model as significantly associated with our dependent measure. With model, JRI,JA,JP,RPAI we reduce the model of independence's likelihood chi square by .6992. Therefore, our overall selected model remains, JR,JN,JP,RPAN.

The last variable to be added to our initial 3 independent variables (after we collapsed the table over race) was family law contacts. The model selected after starting from the model of independence (J, RPAL) was JL,JA,JP,JR,RPAL.

Effect	df	LR CHIS	PROB	PCHIS	PROB
JL	11	16.66	.1185	17.62	.0909
DDT JL	1	7.46	.0063	8.43	.0037

We see that our new model reduces its independent model's likelihood chi square considerably less than our overall selected model's reduction of its independent model's chi square.

We also added family law contacts to the independent variables used in our overall selected model (RPAN) to see if it was needed. The model selected was JR,JN,JA,JP, PRANL.

Effect	df	LR CHIS	PROB	PCHIS	PROB
JR	27	29.55	.3349	31.57	.2485
DDT JR	1	16.49	.0000	17.79	.0000

We see above that our overall selected model remains JR,JP,JA,JN,RPAN (reduced its independent model's likelihood Chi Square by .7744).

Adding IQ to the independent variables R,P,A, and N, we selected the model, JN,JR,JP,JA,RPAIN.

Effect	df	LR CHIS	PROB	PCHIS	PROB
JN	27	38.86	.0653	40.61	.0449
DDT JN	1	18.09	.0000	17.50	.0000

Certainly, the above model would not become our overall selected model.

The last model of independence we started with was J,RPAINL, which added family law contacts to the independent variables of R,P,A,I, and N. With these six independent variables, our selected model became JR,JA,JP,RPAINL.

Effect	df	LR CHIS	PROB	PCHIS	PROB
JR	60	71.15	.1537	73.42	.1143
DDT JR	1	23.61	.0000	23.37	.0000

Thus, our overall selected model is JN,JP,JA,JR,RPAN. The table for our overall selected model is shown on the next page.

Insert Table 22 about here

TABLE 22

LOGISTIC REGRESSION TABLE: BASED ON USING REGION, PATTERN OF OFFENSES, AGE OF ADMISSION, NUMBER OF POLICE CONTACTS, AND JUVENILE RETURN TO AN INSTITUTION

I	A	P	R	Return No	Return Yes	Failure Rate
6 or less	15 or younger	Status	S.E.Wi.	9	18	.67
			Rest	6	4	---
		Other	S.E.Wi.	12	101	.89
			Rest	14	43	.75
	16 or older	Status	S.E.Wi.	43	17	.28
			Rest	43	8	.16
		Other	S.E.Wi.	77	67	.47
			Rest	66	37	.36
7 or more	15 or younger	Status	S.E.Wi.	1	4	---
			Rest	0	0	---
		Other	S.E.Wi.	5	146	.97
			Rest	3	37	.93
	16 or older	Status	S.E.Wi.	7	3	---
			Rest	3	1	---
		Other	S.E.Wi.	35	73	.68
			Rest	25	20	.44
TOTALS				349 +	579 =	928*

Note: *Four cases missing information about number of police contacts.

Our overall selected model tells us that number of police contacts, pattern of offenses, age of first admission, and region of residence are all needed in the model, but there are no interactions between independent variables. In a sample (N=932) with a base rate of failure of 62%, we have rates of failure varying from 16% to 97%. However, we do not have a separate sample in which to verify these rates, so they must remain tentative. We see that being 15 years of age or younger upon first admission, having 7 or more police contacts, and from southeast Wisconsin, gives the other than status offender a very high risk of failure (tentatively, 97%). Our lowest rate of recidivism comes in the group which has 6 or less contacts with the police, are 16 or older at the time they were first admitted, are status offenders, and come from other than southeast Wisconsin.

The model which reduces its independent model's likelihood chi square the second most (.6992 versus .7744) was JRI,JA,JP,RPAI, which states that there is an interaction between region and IQ which is independent of age of admission and pattern of offenses. The table for JRI,JA,JP,RPAI is Table 23.

Insert Table 23 about here

TABLE 23

LOGISTIC REGRESSION TABLE: BASED ON USING REGION, PATTERN OF OFFENSES, AGE OF ADMISSION, IQ, AND RETURN TO A JUVENILE INSTITUTION

I	A	P	R	Return No	Return Yes	Failure Rate
Average or Above	15 or younger	Status	S.E.Wi.	7	15	.68
			Rest	6	4	---
		Other	S.E.Wi.	12	115	.91
			Rest	14	53	.79
	16 or older	Status	S.E.Wi.	37	13	.26
			Rest	35	3	.08
		Other	S.E.Wi.	65	79	.55
			Rest	64	18	.22
Below Average	15 or younger	Status	S.E.Wi.	3	7	---
			Rest	0	0	---
		Other	S.E.Wi.	5	132	.96
			Rest	3	25	.89
	16 or older	Status	S.E.Wi.	13	6	.32
			Rest	11	6	.35
		Other	S.E.Wi.	46	58	.56
			Rest	25	37	.60
TOTALS				346 +	571 =	917*

Note: *Fifteen cases missing information on IQ.

Thus, we see, for example, that if one is 15 years of age or younger upon first admission, engaged in other than just status offenses, from other than southeast Wisconsin, and average or above in intelligence, the risk of failure is 79%, while it climbs to 89% if one has the same characteristics except being lower in intelligence.

Conclusions about juvenile recidivism

It appears that urban youngsters who enter crime at an early age (9 to 14 according to our data) and accumulate a number of police contacts which are other than just status offenses, are very likely to continue adolescent crime after their first admission. Older status offenders from outside southeast Wisconsin have a very low risk of failure (around 10%), unless they have below average intelligence (around 35% failure).

Even rural youngsters who are 15 or younger at admission, and who are engaged in other than status offenses have a high failure rate, especially if they have considerable police contact.

For those living outside southeast Wisconsin, IQ appears to be a factor in whether they return to a juvenile institution. Perhaps where crime is less visible on the streets, it is the socially and cognitively underdeveloped person who continues criminal behavior.

All of these conclusions must remain speculatory as we have not tested them as hypotheses.

Adult logistic regression model

As with the juvenile model, we chose 4 of our most highly related independent variables to our dependent measure to begin our logistic regression analysis of an adult model. The independent variables used to construct a model of adult felony convictions (F) were: 1) race (E); 2) family moves (M); 3) age at first juvenile admission (A); and, 4) pattern of juvenile offenses (P). These variables appeared important in our prior analyses and were the most highly related variables with our dependent variable.

Using the same procedures and decision rules as used to select a juvenile model, we began with the model of independence, F,EMAP. Our selected model became FE,FA,FM, FP,EMAP.

Effect	df	LR CHIS	PROB	PCHIS	PROB
FE	11	14.22	.2209	13.02	.2920
DDT FE	1	8.40	.0037	9.49	.0021

The above model reduced its independent model's chi square by .2209, and it tells us that there are no interactions between independent variables.

To see if other variables are needed, we decided to add three of our next most important variables, one at a time, to the four used initially. We first added the variable, community size (C). As seen below, we are able to collapse the table over community size.

Model	Effect	df	LR CHIS	PROB
FC,FP,EMAPC	FC	29	83.19	.0000
DDT FC	FC	1	3.79	.0516

Next we added to the independent variables E, M, A, and P the variable of number of siblings (N). As with the previous added variable, we were able to collapse the table over number of siblings.

Model	Effect	df	LR CHIS	PROB
FN,FP,EMAPN	FN	29	83.84	.0000
DDT FN	FN	1	2.44	.1184

The last independent variable to be added to our original four variables was IQ (I). Beginning with the model of independence F,EMAPI, we would select the model FA,FM,FP,EMAPI. At no level were we able to collapse the table over IQ or race, though they do not enter our model.

Model	Effect	df	LR CHIS	PROB
FA,FM,FP,EMAPI	FA	28	35.28	.1619
DDT	FA	1	17.85	.0000

As we see above, we reduce the independent model's likelihood chi square by .1619, which is less than the reduction attained with the model FE,FM,FA,FP,EMAP (reduced its independent model's likelihood chi square by .2209). Thus, our overall selected model is the latter model, and it tells us that race, family moves, pattern of juvenile offenses, and age of first admission are all needed in the model, but there are no interactions between our independent variables. It will be recalled that our selected adult model from the construction sample was FE,FM,FP,EMP. Thus, combining our two samples adds to the model from the construction sample alone the effect of FA. The table for FE,FM,FA,FP,EMAP is Table 24.

Immediately, we see that being a juvenile status offender gives one little risk of failure as an adult. We also note that except for the combination of status offender, 2 or less family moves, and white race, there are few people in our status offender groups.

Another interesting observation is that there is little difference in adult failure rates between whites and minorities for those who engage in other than just status offenses, who were 15 years of age or younger at first juvenile admission, and who had 3 or more family moves. However, there is a difference for those with the same characteristics as mentioned immediately above, but who had 2 or less family moves instead of 3 or more. The previous observation <u>may</u> suggest that there are long-term effects on individuals deriving from family instability which transcends race (if we can assume that family moves is an indicator of family instability-we have to remember that our sample does not contain lower management people who have to move frequently due to company pressures).

<u>Insert Table 24 about here</u>

TABLE 24

LOGISTIC REGRESSION TABLE: BASED ON USING RACE, FAMILY MOVES, AGE OF FIRST JUVENILE ADMISSION, PATTERN OF JUVENILE OFFENSES, AND ADULT FELONY CONVICTIONS

P	A	M	E	Felony Conviction No	Felony Conviction Yes	Failure Rate
Status	15 or younger	2 or less	White	17	2	.11
			Minority	4	2	---
		3 or more	White	9	5	---
			Minority	1	2	---
	16 or older	2 or less	White	68	8	.11
			Minority	12	1	---
		3 or more	White	27	3	.10
			Minority	6	0	---
Other	15 or younger	2 or less	White	78	44	.36
			Minority	34	36	.51
		3 or more	White	29	52	.64
			Minority	37	55	.60
	16 or older	2 or less	White	155	53	.25
			Minority	33	27	.45
		3 or more	White	48	34	.41
			Minority	23	27	.54
TOTAL				351 + 581 = 932*		

Note: *No Missing Cases.

However, if the family is more stable it appears that race is important somehow. Race may likely be an indicator of poverty, and it may be more difficult to exit from crime for a minority person who has a long history of crime dating from when they were very young than for whites with similar characteristics.

Conclusions

At some level, there appears to be long-term effects of family instability associated with continued criminal behavior into adulthood (this assertation is certainly supported by Robins, 1974, in her classic 30-year follow-up study). Family instability may be associated in some fashion with early entry into crime, an assertion supported by Nye (1958), Dentler and Monroe (1961), Andry (1960), and Glueck and Glueck (1962). However, any discussion of relationships must remain tentative.

CHAPTER 8

DISCUSSION

Introduction

This chapter begins with an introduction of our original problem. The next section discusses rates of recidivism. After characterizing our samples with bivariate relationships, we discuss multivariate relationships. The final section deals with prediction.

Problem

We started with the problem of trying to find out which adolescents, among those first admitted to a correctional school for boys, continue criminal behavior as juveniles and as adults. While delinquency theory and intervention premises predict that delinquents will continue criminal behavior into adulthood, evidence from previous studies (Boyle et al., 1974; Sharon, 1977; and, Wolfgang, 1977) has shown that the majority of delinquent adolescents do not become adult criminals.

In our study, we were not concerned with all adolescent delinquents, rather, we studied delinquents who had been institutionalized. Around 30% of our delinquents had 4 to 6 police contacts prior to their first admission and roughly 45% had 7 or more police contacts. Thus, we are talking about a subpopulation of delinquents within the total population of adolescents who may commit delinquent acts.

We are not talking about unofficial delinquency in our research, and we do not include in our study individuals who may have only committed one or two minor criminal acts (like stealing Playboy) as did Hirschi (1969; Hirschi defines delinquency to include theft on one occasion of an item worth 2 dollars). We are studying the more "hard core" delinquent (e.g., persons institutionalized for several and/or serious offenses).

We were concerned with seeing if we could combine factors associated with juvenile and adult criminal recidivism so as to classify people as failures and successes accurately. Since the criminal prediction literature is unclear about which statistical procedure gives us the best predictions (Simon, 1971), we used three different statistical procedures to categorize people into probability of failure groups. Furthermore, past studies have examined statistical procedures' predictive efficiency by comparing the expected with the observed failure rates of each identified group (which they call group predictions). However, to classify persons as failures or successes (as opposed to predicting someone is a 95% felon) is prediction in its truer sense. The usual conclusions that the simple statistical procedures do as well in prediction as the more complex have been based on examining the so-called group predictions. We were concerned with not only examining our statistical procedures for group predictions (which we label as probability predictions), but also for classifications of success versus failure (which we label as discriminant analysis predictions).

Recidivism

While many of these institutionalized delinquents (around 80%) have further police contact within a short period (by two months after release about 30% of those with contacts and by six months 65% of those with further contacts) after their first release, about 60% return to a correctional facility at least once. Of those who return, about 50% do so more than once. Clearly, the majority of male delinquents admitted to a juvenile correctional facility for the first time do continue criminal behavior as adolescents. Nearly 40% of our young people had 5 or more contacts with the police after their first admission.

We found that about 35% of these institutionalized delinquents have adult felony convictions. Of those with felony convictions, almost all receive their first conviction prior to age 21 (90%), and the modal type of offense is burglary (about 40%).

Following juvenile first admissions for ten years with regard to official criminal behavior shows that of those convicted of an adult felony about 50% have only one felony conviction (95% have three or less). Roughly, 75% of these adolescents do not have active criminal files ten years after their first release from a juvenile facility.

We found that delinquency declines from further police contacts after first juvenile institutionalization (80% with contacts) to juvenile re-institutionalization (60% return) to adult felony convictions (35% with convictions) to those who have active criminal files ten years after their first juvenile institutionalization (25% active). The foregoing recidivism rates appear to be reliable as both of our samples yielded nearly identical rates in each case.

In comparing our recidivism rates with those of other studies, we need to be aware that methodologies differ (e.g., different populations used, different follow-up periods, different criterion measures, etc.). For example, the Gluecks (1950) followed 500 boys first admitted to a school for boys. They report a recidivism rate of 77% in a 5-year follow-up. However, they were using a criterion measure of arrests, and their rate is similar to our further police contacts rate of 80%. Babst and Hubble (1964) reported a 43% rate of recommital to the same Wisconsin schools for boys within the first year of release. However, using the same methodology as used in this study, Boyle et al. (1974) found that 54% of their first admissions in 1964 were recommitted to Wisconsin schools for boys.

Wolfgang (1977), following a birth cohort, finds that 44% of his adolescents with arrest records have arrests as adults. Obviously, he is studying a different population than we are (those adolescents with at least one arrest as opposed to adolescents institutionalized), and he uses a different criterion (arrests as opposed to felony conviction).

Three independent samples in Wisconsin show that around 35% of first admissions to a school for boys have adult felony convictions (our two samples and Boyle et al., 1974).

We found that the majority of first juvenile admissions to a school for boys do continue criminal behavior during adolescence, but most discontinue criminal behavior as adults. Our task became one of seeing which factors are associated with juvenile and adult recidivism as well as one of seeing if we could accurately predict recidivism at both developmental periods. We defined juvenile recidivism as any return to a correctional school for boys and adult recidivism as any adult felony conviction.

Sample characteristics

Minority groups were disproportionately (according to their proportion of the state population) represented in our samples. The majority of our samples was of low intelligence (two-fifths below average), from southeast Wisconsin (about 65% of both samples), and around 30% came from single-headed households. Many (around 65%) came from families which changed residence frequently (had 3 or more family moves in the ten years prior to first institutionalization). About 50% of our delinquents came from families which had 6 or more siblings. Over 80% of these families were headed by someone in a less than skilled occupation or on welfare. Many of our delinquents came from families where other members of the family had been involved with the police (around 60%). A large number of these young people were behind in school (mode was 2 grades behind where their chronological age would place them).

The mean age of first police contact was 13 years of age. Most (around 80%) of these youth committed offenses other than just status offenses. Nearly 70% of our samples had a burglary offense. About two-thirds of these youth were in the presence of other delinquents when they committed the offense which brought about institutionalization. The mean age at first admission to a school for boys was 15 years of age. Almost all of these young people had experienced supervision (e.g., formal probation or social service) prior to their first admission (80% of the samples).

Single factors associated with recidivism

Briefly, we found, as did Sharon (1977) in our construction sample, that the most highly associated predictor variables (taken singularly) with juvenile recidivism in the validation sample were: 1) age variables (e.g., age at first police contact, age at admission, age at first release, and school grade level); 2) pattern of police contacts prior to first admission; 3) other family members involved with the law; 4) number of police contacts prior to first admission; 5) occupation of household head; 6) number of police contacts after first admission; 7) race; 8) region; 9) living situation; 10) alternative living arrangements; and 11) time until first police contact (see Appendix B, Sharon, 1977). We found IQ to have a Phi value of 0.21, while Sharon found it unrelated to juvenile recidivism as a single factor. All of the foregoing factors have Phi values significant at alpha=0.01 (one-tailed). (See Chapter 4).

Studies in the past find truancy and school behavior problems as well as institutional adjustment to be related to juvenile recidivism, and we noted similar findings, however, our findings are thought to be invalid due to poor recording in the files.

With regard to adult recidivism, we found the following single factors associated with it at alpha=0.01 (one-tailed): 1) IQ; 2) family moves; 3) other family members involved with the law; 4) age variables; 5) number of police contacts prior to first admission; 6) pattern of police contacts prior to first admission; 7) race; 8) occupation of household head; 9) number of police contacts after first institutional release; and 10) time until first police contact. Each of these relationships is supported by Sharon's (1977) Pearson's Chi Square tests at alpha=0.01 (see pp. 283-321).

We also see that the number of months institutionalized during the first juvenile stay is related to adult recidivism at Phi=0.140 in the validation sample, which is unsupported by Sharon's test (1977, p. 313).

Status at final discharge appeared to be highly (Phi= 0.488) related to adult recidivism (e.g., in school, fully employed, etc.), a finding supported by Sharon. However, in this writer's mind, the foregoing variable is invalid as the files were very unclear about employment (one often had to guess whether employment was full or part-time).

Discussion of factors

In terms of both juvenile and adult recidivism, it seems that we are talking about recidivists being ones who enter crime earlier and commit more crimes than non-recidivists. Recidivists appear to come from more unstable families (several family moves, other members of the family involved with the law, low occupation of household head) than non-recidivists.

Recidivists tend to commit income-producing crimes, while non-recidivists are more typically status offenders. Recidivists have more offense history than non-recidivists. Persons of lower intelligence appear to be more likely to be recidivists. Minorities seem to be recidivists with greater frequency than whites.

Basically, the same factors were related to both juvenile and adult recidivism; however, region, living arrangements (e.g., with both natural parents, single-headed households, step-parents, etc.), and number of alternative living arrangements (e.g., group homes, other institutions, etc.) were only significantly associated with juvenile recidivism.

It seems reasonable that living arrangements might become less significant as a factor in recidivism as an adolescent moves into adulthood and becomes more responsibly engaged in making a living, having a family, and so on. Single parents (many of whom may be working outside the home) may have difficulty controlling an adolescent who is going through a period of "acting out". The fact that family stability measures were significantly associated with both juvenile and adult recidivism may indicate that stresses within the family are more important with regard to long-term recidivism than the legal status of the family.

For example, socio-economic status of household heads appear to be important for juvenile and adult recidivism. While it could be argued that economic strain creates family stress which results in delinquency, more likely it adds to stresses already in existence (see Robins, 1974, for a similar argument). We also see that family involvement with the law is associated with juvenile and adult recidivism.

Robins found that controlling for socio-economic status did not reduce the relationship between family stresses of an interpersonal nature (e.g., child abuse) and recidivism, nor between parental criminal behavior and the child's recidivism. However, controlling the effects of the foregoing two factors did reduce the relationship between socio-economic status and recidivism.

While the behavior modeling perspective (Eysenck, 1964) fails to explain why some adolescents become delinquents when parents are not involved in crime, it may help to explain resistance to giving up criminal behavior. The number of family moves may be the result of inability to pay the rent, but the records also indicated that moves were often the result of desertion, spouse abuse, attempts at reconciliation between spouses, etc. In general, records indicate that family moves were primarily the result of stress (interpersonal as well as financial). It is asserted that the stress within these families is likely the result of multicausal factors rather than any single cause.

Region of residence is an important factor for juvenile recidivism, but not for adult recidivism. It is likely that there are more employment opportunities for young adults in urban areas than for juveniles. Studies in the past find that getting and maintaining a job is a factor in dropping out of crime (Glaser, 1964; Waller, 1972). Youth unemployment in urban areas is one of the most talked about and least understood topics today. Minorities are particularly noticeable among the urban unemployed (over 90% of our samples' minorities are from urban areas). It is likely that intervening variables like region and economic circumstances mediate the effect between race and recidivism. However, it appears impossible to separate economic and geographic circumstances from race, and, thus race should not be ignored as a predictor of recidivism.

Race appears important as a factor in both juvenile and adult recidivism. It may be that while white delinquent youth find jobs as they move into adulthood, minorities find it more difficult to find jobs.

With regard to age factors, we identified some adolescents who were waived to adult court (rural, older adolescents involved with alcohol-related offenses; see Appendix A), and had no chance to be counted as juvenile recidivists. However, the number waived to adult court was small (n=34). For the majority of our juveniles, we need further understanding of why the younger offender is more likely to fail. Some have explained the phenomenon that the younger people enter crime, the longer they remain in it, with labeling propositions (Schur, 1973). However, besides the fact that we found most adolescents labeled (institutionalized) do not become adult criminals, studies designed especially for testing propositions about labeling find no support for it (see Tittle, 1975; Ward, 1972) as an explanation of criminal careers. Another explanation is that early involvement in crime means that the home or personal circumstances are particularly severe (Andry, 1960; Glueck & Glueck, 1962). Another, but not necessarily competing explanation with the foregoing, is that age represents exposure to reinforcing factors (i.e., criminal associations).

Finding intelligence to be associated with recidivism may be explained in competing ways. It has been asserted that the more intelligent are more likely to escape detection. At the same time, studies have shown that the most frequent and most serious offenders are the ones most likely to be caught (Williams & Gold, 1972). There are no known studies which examine the relationship between frequency/seriousness and probability of detection while controlling for IQ. Thus, we do not know if lower intelligent people commit more crimes or are more likely to be detected. One explanation is that persons of lower intelligence do commit crimes over a longer period because they are less socializable. Another explanation may be that persons of lower intelligence are less cognitively aware of consequences of criminal behavior. Our study is not designed to test propositions about IQ.

In terms of pattern of offenses, we are likely talking about differences in motivating factors. Status offenders may likely be motivated by adolescent identity problems (e.g., role experimentation, parent/child separation stresses, etc.) more than any real criminal motivation (e.g., securing income). Thus, it is only during the adolescent period that status offenders exhibit criminal behavior.

Multivariate descriptive models

As discussed in Chapter 2, a search for interactions was conducted with the assumption that no delinquency theory can explain or predict criminal recidivism very well. This study collected information that was recorded on individuals about a considerable period of time (e.g., we collected information about whether parents had criminal histories and information about subjects' institutional adjustment) in order to see if they were criminal recidivists within ten years after their first release from a juvenile correctional facility. The assumption is that allowing for complex interactions between predictor variables that occur at different points in time will give us better predictions than predictions derived from theory.

Although our models are not based on theory, they do not contradict theory. Even though many current criminological textbooks have neglected to discuss, or argue the spuriousness of, the relationship between IQ and delinquency, theories have clearly relied on this relationship (see T. Hirschi & M. J. Hindelang, Intelligence and delinquency: A revisionist review. American Sociological Review, 1977, 42, 571-587).

Our juvenile model using PAA categorized people into groups which varied in rates of return to a juvenile institution from 23% to 100% in a sample with a base rate of 61%. This spread in recidivism rates indicates that first admissions to a school for boys are not a homogeneous group with regard to whether they will return to correctional institutions. It is interesting to note that we were much more successful in identifying a group of people very likely to fail than a group very likely to succeed. The foregoing finding probably results from a combination of not having variables which can detect successes in a sample where the majority fail and in not knowing what statistical procedure is the most appropriate for prediction.

When we examined relationships between variables, with a statistical procedure that selects, from competing models, the most parsimonious model that fits the data (expected values near the observed), we found that interactions between predictor variables are important in describing juvenile recidivism.

In terms of the adult model, we were able to identify groups which varied in recidivism rates from 10% to 68% with PAA and from 12% to 63% with logistic regression in a sample with an adult recidivism rate of 35%. While our adult logistic regression model does not pick up interactions between predictor variables, it must be kept in mind that our sample is rather small (n=432). While it is not claimed that a larger sample would have given us interactions (in Chapter 7, we combined our samples and still found no interactions between predictor variables for adult recidivism), interactions between predictor variables have been found to be important for predicting adult to adult criminal recidivism (Fuchs & Flanagan, 1979).

In addition, it should be kept in mind that we used stepwise procedures for selecting a model which considers only hierarchical models (in order for an interaction to occur all main effects of the interacting variables must be in the model).

In both the PAA and logistic regression adult models, we had difficulty in identifying a group which had near 100% failure. However, with both statistical procedures, we were able to identify a group with a very low likelihood of failure.

Factors found with multivariate procedures

In our juvenile PAA model, all factors (age at first admission, region of residence, number of police contacts prior to first admission, pattern of offenses prior to first admission, and IQ) were found to be significantly associated with juvenile return to a correctional facility as single variables. The foregoing factors were selected as the most important in our combined sample of 932 persons for describing juvenile recidivism (see Chapter 7). We also found an interaction between region and IQ with our logistic regression procedures for juvenile recidivism in the combined sample. However, the adult PAA model found that alcohol-related offenses prior to first admission were important in discriminating successes from failures when this factor was not significant as a single variable.

Other factors found to be the most important for describing adult recidivism were: 1) pattern of offenses prior to first juvenile admission; 2) age at first juvenile admission; 3) family moves; and 4) race. Logistic regression picked pattern of offenses first, family moves second, and race third. In the combined sample (n=932), age at admission was added to the model derived in the construction sample (see Chapter 7).

Thus, when we combine factors to explain the most variance in a multiway table, we find that IQ is important in describing juvenile recidivism, but not adult recidivism. And, family moves is important for describing adult recidivism, but not juvenile recidivism.

When we are trying to describe recidivism in a more parsimonious fashion (not using every significant variable singularly), IQ becomes less important than other factors in describing adult failure and family moves becomes more important for adult failure than for juveniles. Thus, while other factors overwhelm the influence of the family instability variable on juvenile recidivism, family instability would appear to have lasting effects on long-term criminal behavior. Whether the diminishing influence of IQ for adults means that people with lower intelligence take longer to become social, take longer to realize how incarceration affects their lives (i.e., diminished job opportunities, less acquisitions to show for their labors, etc.), or whether adult life is less immediately demonstrative of inability than adolescence (where school achievement is made clear and competitive) and therefore success can be perceived in activities other than in criminal achievements cannot be assessed here.

Prediction

We compared PAA, total points scores, and logistic regression to see how well we could predict juvenile recidivism. We examined these three statistical procedures for prediction by classifying persons as successes or failures, and checking our errors in both directions (predicted successes who failed and predicted failures who succeeded) in a separate sample. We also compared our expected failure rates (rates of groups identified in one sample) with our observed failure rates (rates of identical groups in a separate sample) for all three statistical procedures.

Overall, we found that all three statistical procedures gave us expected rates of failure that differed a small amount from the observed rates (whether we are predicting juvenile or adult criminal recidivism).

Juvenile recidivism

In comparing our statistical procedures for predicting juvenile recidivism as to how well we could classify persons as failure or successes, we made some rules (the same rules were used when predicting adult recidivism) about when we declared a prediction table to be useful. We declared zones around our sample's base rate of failure (base rate of juvenile failure in the construction sample was 61%) within which we did not use predictions made (we used a 10% zone on each side of the base rate and a 20% zone on each side of the base rate).

However, in our first set of comparisons, we did not declare a zone wherein the table was not used. By classifying everyone in the sample as failures or successes, we found (see Table 15, Chapter 6, p. 172), in terms of total errors, that all three procedures give us comparable errors. While there was some differences in number of errors made between the statistical procedures when we examined the direction in which the errors were made (e.g., PAA made 15% errors in predicting failure, logistic regression made 11% errors, and total points scores made 23% errors), no one procedure was clearly superior (while one procedure made less errors in one direction than another, it made more errors in the other direction, or comparable errors in both directions).

For administrative purposes, we may want to only use prediction tables to assist decision-making when classifications are more accurate (e.g., predictions as to failure or success are more accurate as we identify groups with a recidivism rate near 0 or 1). Thus, we may declare a zone around the base rate of failure in the sample (see Wilcox, 1979) wherein we do not use predictions because so many errors are made in classifying.

With such zones, we can see how many useful classifications can be made with each statistical procedure, and then how many errors are made in each direction (predicted successes who fail and predicted failures who succeed). We can use different width zones to make the above comparisons.

When we declared a 10% zone on each side of the base rate of failure in the sample wherein we do not use predictions made, we found we made 332 predictions with PAA, 305 with total points scores, and 412 with logistic regression, in predicting juvenile return to a correctional facility. When we examine the direction in which errors are made, we find that while we make more predictions of success with total points scores (130 classified) and logistic regression (160 classified) than with PAA (80 classified), we make less errors with PAA (11% errors) than with total points scores (27% errors) or logistic regression (28% errors). In predicting failure, we found that PAA and logistic regression gave us the same number of classifications (252) with the same amount of errors

(11% errors), which is more predictions of failure than total points scores (175). We made 12 errors in classifying people as failures with total points scores (7% errors).

Using a 20% zone on each side of the sample's base rate wherein we do not use predictions, we saw that our overall errors were about comparable. We used the tables for 269 persons with PAA, 305 persons with total points scores, and 252 persons with logistic regression. When we examined direction of errors, we found that logistic regression gave us no predictions of success. PAA gave us 80 classifications of success, and we made 9 errors (11% errors), while total points scores gave us 130 predictions of success with 35 errors (27% errors). In classifying people as failure, PAA predicted 189 persons to fail, and we were wrong for 18 who succeeded (10% errors). We predicted 175 would fail with total points scores (with 47 errors; 15% errors), and 252 would fail with logistic regression (with 28 errors; 11% errors).

Predicting adult recidivism

When we classify everyone in the sample as failures or successes, we found that our overall errors in predicting adult recidivism were commensurate with all three statistical procedures (40% with PAA, 40% with total points scores, and 37% with logistic regression). When we examined the direction of errors, we again noticed little difference between procedures (see Table 21, Chapter 6, p. 190). When we predicted failure, we found we make several errors (330 classified as failure with PAA with 51% errors, 319 classified as failures with total points scores with 50% errors, and 258 classified as failures with logistic regression with 47% errors). Even when we reduce the number of persons in the sample for whom we decide to use the table (e.g., using a 10% zone of useless classification and a 20% zone), we do not reduce the proportion of errors in making predictions of failure for adults much (about 10% reduction using a 20% zone) from these made using the tables for everyone in the sample.

Using a 10% zone on each side of the sample's base rate of failure (base rate of failure was 36%) wherein we do not use predictions made, we find we are able to classify 100 persons as successes with PAA, and we make 14 errors (14% errors). We classify 37 persons as successes with total points scores, and we make 3 errors (8% errors). With logistic regression we classify 58 persons as successes, and we make 7 errors (12% errors).

With a 20% zone, we reduce the number of successes we can predict from those made using a 10% zone for PAA (from 100 to 55) and logistic regression (from 58 to 38) and we make a few less errors (PAA - from 14 to 5 and logistic regression - from 7 to 3). Total points scores was not affected differently by the 20% zone than by the 10% zone.

CHAPTER 9

CONCLUSIONS AND IMPLICATIONS

General purpose

The purposes of this dissertation were to: 1) provide a description, including the frequency distribution within each variable used, bivariate, and multivariate relationships, of first admissions to Wisconsin schools for boys; 2) measure the rate of return to a juvenile correctional facility and the rate of adult felony convictions among these first admissions; 3) see if rates of recidivism within each identified group varied from one sample to the next one; and, 4) classify persons as successes or failures as juveniles and as adults and see how well we could predict in a separate sample.

We started with very general hypotheses that there might be some differences between three different statistical techniques with regard to providing expected recidivism rates that differ from observed rates (one procedure might give us smaller differences than another) for groups identified, and with regard to accuracy in classifying people as successes or failures.

Conclusions

This study leads to the conclusion that while the majority (80% of these young people have further police contact(s) after their first admission and about 60% return to an institution) of Wisconsin first admissions to a school for boys do continue criminal behavior as adolescents, a minority continue criminal behavior as adults. We found 35% of these juvenile first admissions have adult felony convictions within ten years after their first juvenile release. Only 25% of these adolescents had active criminal files at the end of the ten year follow-up period used in this study. We were successful in replicating Sharon's (1977) findings about recidivism rates. The foregoing findings should raise serious doubts about schools for boys being training schools for crime.

We found several independent variables significantly associated with juvenile and adult criminal recidivism (see Chapter 4). Our best single predictors of juvenile and adult failure are variables which have been found to be among the most highly correlated with juvenile recidivism and adult to adult criminal recidivism in previous studies (see Chapter 2). Thus, we were successful in finding variables which predict juvenile and adult recidivism.

By combining predictor variables with multivariate statistical procedures, we established relationships among the most important predictor variables which resulted in groups which vary considerably in their probability of failure. This finding of considerable between-group variance indicates that institutionalized male delinquents are not a homogeneous population with regard to further criminal behavior as adolescents or as adults.

We are unable to assert that relationships found in our model are valid. A replication of the model would be necessary to establish validity. Our purpose was not to find causal hypotheses. While these relationships may suggest hypotheses, they in no way provide any tests of them. We were concerned about whether we could identify young people who vary considerably in their rate of failure, and it appears we were quite successful for juveniles and less so for adults.

When we compared predictive attribute analysis, total points scores, and logistic regression with regard to how much total difference there was between expected failure rates and observed rates, we found no procedure to be superior to any other. In identifying risk-groups (risk of returning to a juvenile correctional facility and risk of adult felony convictions) for the juvenile period of development as well as the adult period, we found all three statistical procedures gave us around 3% to 9%

difference when we total the observed rates minus the expected rates. Thus, we can conclude that we have provided some reasonably accurate baseline data about the risk rates of various groups of juvenile offenders.

When we examine our statistical procedures as to how well they can classify <u>everyone</u> in the sample as successes or failures as juveniles, we found that no statistical procedure was superior in terms of total errors made or when we consider errors made in both directions. However, when we decided not to use predictions for individuals in groups which had recidivism rates near the base rate of failure in the sample, we found disparities between statistical procedures. Exactly the same kind of results were observed in trying to predict adult felony convictions (e.g., no differences between statistical procedures in terms of total errors when we classify everyone in the sample or when we consider errors made in both directions, and some disparities when we do not use predictions in a portion of the sample).

We also noted that in trying to predict adult failure, we were never very accurate under any circumstances (e.g., we were at least 40% in error in classifying people as having an adult felony conviction whether we classified everyone in the sample, used a 10% zone of useless classifications, or used a 20% zone).

We conclude that decision-makers should examine statistical procedures as to how well they predict along the following dimensions: 1) how many errors are made in each direction (predicting successes who fail and predicting failures who succeed); 2) how many errors are made in each direction when increasingly wider zones of useless classifications are declared; and, 3) how many classifications can be made in each direction when we look at increasingly wider zones. The fact appears to be that a statistical procedure may be favored along one dimension and not along another, and which statistical procedure is favored may change when we increase the width of a zone of useless classification. It is an administrative decision as to which dimension is the most important for a particular decision, and, thus which procedure to select.

We are able to classify some groups with reasonable (85% to 95% accuracy) accuracy (e.g., Group 1, Table 9, Chapter 6, p. 154). The foregoing group consisted of over one-fifth of our validation sample, and we were 95% correct in predicting everyone to fail. However, we were never accurate in classifying people as adult failures. It is likely that too many life forces untapped by our research are more important in determining adult failure than the variables occuring prior to first juvenile release used in this study. While we have some indicators of adult success, we do not seem to have the crucial indicators of adult failure.

Overall, we were reasonably accurate in classifying some juvenile successes and failures as juveniles and successes as adults (see prediction tables in Chapter 6), and it is concluded that social policy should reflect these findings. Currently, there is little differentiation made between juvenile first-releases with regard to risk of failure in social policy.

In the next section, we discuss the policy implications of our findings. The point to be made here is that there are some first admissions to schools for boys (see Groups 1, 2, and 3, Table 9, Chapter 6, p. 154) who are almost certain to return to a juvenile correctional facility (we correctly classified 85% of Groups 2 and 3 as failures and 95% of Group 1 as failures). Using the same prediction table (Table 9), we see that we were 90% correct in classifying all of Group 8 as successes and 86% correct in classifying all of Group 6 as successes. Referring to Table 16 (Chapter 6, p. 178), we see that we were 91% correct in classifying all of Group 8 as adult successes and 80% correct in classifying all of Group 6 as adult successes.

Policy and practice implications

It should be very clear that our findings pertain only to male first admissions to juvenile correctional facilities and *only* to the period following first release. With all three statistical procedures, we found that we could identify, with reasonable accuracy (little difference in rates of recidivism from one sample to the next sample), groups which vary considerably (e.g., from 20% to 95% for juvenile recidivism and from 10% to about 65% for adult recidivism) in their failure rates. These findings are particularly relevant to large-scale policy decisions about resource allocation, program development, and where time and money should be directed. Our study is not designed to answer questions about which juvenile first admissions need intervention (e.g., high-risk offenders, middle-risk offenders, or low-risk offenders), which involves issues concerning types of intervention (e.g., institutionalization, supervision, social services, etc.), effectiveness (e.g., there is evidence that interventions are effective for only some types of offenders, and intervention can be harmful as well as helpful), and intention (e.g., rehabilitation, punishment, and public protection - see van den Haag, 1975). Rather, our study was designed to see if we could find a handy device which could identify high and low risk groups as juveniles and as adults. Certainly, if our aim is to reduce criminal recidivism of adolescents, our findings indicate that we need to devote considerable more thought and research to finding out what are the needs, and how to meet those needs, of some (e.g., those with very high return rates) adolescents first released from correctional facilities (we will discuss the need to consider outcome other than just criminal momentarily). It appears safe to say that current social policy (institutionalization and supervision involving meager efforts at assessing personality, social circumstances, skill deficits, and outcomes in addition to criminal) is ineffective in reducing further criminal behavior of some adolescents.

At the same time, in terms of further criminal behavior as adolescents, we identified some young people who are unlikely to return to a training school. Whether the foregoing finding means institutionalization was effective, or whether these young people were experimenting with adolescent roles, and would have discontinued criminal behavior without incarceration, should be given policy-research attention. It seems evident that in terms of short-run criminal behavior, there are likely some individuals who need no further intervention after their first release.

Policy should also be concerned with longer-term criminal outcome than is true at this time. We identified some young male first admissions who have a very low likelihood (around 10% chance of adult felony convictions) of adult failure. In institutionalizing these young people, and maintaining costly and time-consuming supervision after release, we may be (just considering criminal outcome) responding to problems which are short in duration (this assertion relies on the assumption that our current interventions are not very influential in terms of long-term criminal outcome).

Our findings do indicate that considerable more work is needed in developing policy which reflects knowledge that incarcerated adolescents do vary in their likelihood of continued criminal behavior (short-term and long-term behavior).

We have also provided some baseline data about the recidivism rates for various groups of male first admissions. Especially since experimental conditions are so difficult to set up in correctional research, we have provided baseline data against which post-program rates could be compared to see if there is some evidence of program effectiveness. It should be clear, however, that our prediction tables are constructed from a sample of offenders who had received some kind of treatment (e.g., institutionalization) and so the term "prior risk" is not accurate. It is not "pre-treatment" risk but "risk for the average of all the given treatments" that we are predicting.

It should be clear that statistical prediction is only part of the answer to the question of whether to intervene. Besides the issues of effectiveness, intention, and so on, alluded to earlier, we need to realize that for some people (those for whom we make poor predictions as to failure or success) prediction tables are not very useful at this time. Until we better understand which are the best predictor variables to use, how to combine them to give us the best predictions, what criterion measures are the most important and/or give us the best predictions, and until better quality information is obtained, it appears we will make rather poor predictions for a number of people. Furthermore, even where we make less errors (e.g., groups which have recidivism rates near 0 or 1) in classifying people as failures or successes, we nevertheless make errors. Clinical interviews, psychological testing, and observation can give us a much broader picture of experiences in a person's life which affect criminal recidivism than statistical procedures. Clinical methods should be used to supplement statistical prediction tables where prediction tables are reasonably accurate.

It is the writer's opinion that criminal recidivism is only one outcome among others that should be considered when making decisions about intervention. For example, it may be that some groups of people have a very high rate of criminal recidivism and will continue to have a high rate, irrespective of the interventions we make. However, thinking of other, and more long-ranged, outcomes we might begin to think more seriously about providing high-risk offenders with skills (occupational and educational) so they will have a better competitive chance in the labor market when they discontinue criminal behavior. Another example is intervention with emotionally disturbed or retarded individuals, which should be decided by factors other than just criminal outcome.

One last example is that current policy with regard to status offenders is to deinstitutionalize them and to divert them from the juvenile justice system. However, there are only scattered and fragmented attempts to deal with status offenders in terms of other outcomes. We found that older status offenders have a very low likelihood of having adult felony convictions, however, almost all of our offenders who continued criminal behavior into adulthood began as status offenders. A consideration of outcomes other than just criminal (e.g., amount of family stress, school problems, etc.) may indicate early referral to, and intervention by, other social welfare agencies.

The above discussion indicates that we need to make another clarion call for more thorough assessment of the needs of individuals, where those needs may be met (e.g., an institution designed to handle criminally oriented people is ill-equipped to deal with emotional problems), and we need better linkages and coordination between institutions that currently operate with very narrow vision of their responsibilities to individuals.

Future work

Future needs in terms of working with, and understanding, long-term criminal behavior of adolescents are many and involve researchers, administrators, and policy-makers.

Policy-makers

There is a gross lack of utilization of research in policy decisions. Most policy makers and administrators are reticent about using prediction tables. While the writer of this dissertation thinks there is some significant limitations (e.g., previous discussion regarding supplemental data and the need to consider other outcomes) to using criminal prediction tables, it is also evident that decisions based purely on intuition and personal experience conceptions are inadequate.

The point is that decision-makers are making predictions when they make decisions (e.g., release versus non-release), and they do not keep accounts on how well they predict, and thus their personal experience and intuition are never informed of errors on any systematic basis.

Currently, policy with regard to first admissions to training schools is based on the false assumption that they are a homogeneous group with regard to further criminal behavior. Along with the preceding comment, there needs to be more consideration given to long-term outcomes in policy-making (criminal and otherwise).

Researchers, correctional administrators, and policy-makers

There is a need for more thought about variables that would give us better criminal prediction. There can be little doubt that a large limitation in this study was the inability to examine more deeply the life circumstances of our adolescents. Information about adolescents' families, school performance, peer behavior, personal adjustment, social maturity, emotional stability, is vague, unsystematic, and inconsistently recorded.

It would seem that long-term outcomes are very important when we think about the delinquency problem. Yet, while we keep relatively exact account on criminal recidivism, there is little information about other outcomes like: family adjustment, job stability, integration into the community, etc.

We must have better recorded information if we are ever to deal with the problem of delinquency effectively.

This writer has no doubt that errors are contained in all of our variables.

Future research

Our tables need to be further validated in new samples. To the extent it is possible, these tables need to be used in other states where policies may differ and thus affect what variables are relevant to prediction.

A prediction study of the recidivism of females is needed. However, evidence indicates that adult felony convictions would be an inappropriate outcome measure for females because of their low rate (Boyle et al., 1974).

We also need studies of long-term outcomes other than criminal of delinquents.

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APPENDIX A

FURTHER ANALYSIS OF THOSE WHO RETURNED TO A CORRECTIONAL SCHOOL FOR BOYS AFTER THEIR FIRST RELEASE BUT DID NOT HAVE ADULT FELONY CONVICTIONS AND THOSE WHO HAD ADULT FELONY CONVICTIONS BUT DID NOT RETURN TO A CORRECTIONAL SCHOOL FOR BOYS AFTER THEIR FIRST RELEASE

The use of Phi is seen only as an aid to describing these groups. The following factors emerged in the validation sample of first admissions, as significantly differentiating groups 2 and 3 at alpha=.01. It appears that people in group 2 more often lived with both natural parents than did people in group 3 (60% and 40%, respectively) and experienced less living arrangements outside the home. There is indication that group 2 had higher school achievement and attained a higher grade level as well as had less behavioral problems and truancy in school than did group 3. Alcohol was more frequently used by group 3 people prior to their first juvenile admission to a correctional facility, and they were younger when they were first arrested, than group 2 persons (14 years old or less--91% and 57%, respectively). Also, group 3 people were younger when they were admitted for the first time to a correctional institution (15 years old or less--69% vs. 22%) and they stayed institutionalized for a shorter period (4 months or less--57% vs. 30%) than group 2 youth.

In the construction sample, the following factors emerged (using phi and alpha set at .01) as supporting the findings in the validation sample: 1) school grade; 2) truancy; 3) age at admission; and, 4) how long they were institutionalized (relationships between variables were in the same direction as noted in the validation sample).

Those "kicked up" to the adult system

It was decided to take a further look at a subgroup within those who had adult felony convictions, but who had not been returned to a juvenile correctional institution. As mentioned earlier, the age at which people were considered to be adults at the time of our study periods was twenty-one. The majority (about three quarters) of adolescents in our samples were released from the juvenile correctional system at 18 or 19 years of age. Thus, it is possible that some of the individuals who are without juvenile recidivism, but who were convicted of adult felonies, were simply waived to adult court for various reasons when they committed further offenses prior to 21 years of age.

The issue is that we may be counting some persons as adult felons and not as juvenile recidivists, who might substantively be more accurately characterized as youthful offenders if it were not for an artifact of decision-making within the correctional system.

We decided to take a further look at people who may have been waived into adult court. We first decided that we would identify these persons by looking only at those 20 years of age or younger at the time of their first felony conviction. Further, we subtracted age of release from the juvenile system from age at the time of the first and first adult felony conviction, even though a couple of years had passed between these events, would be counter to our rationale that we wanted to look only at those who might be characterized as adolescent recidivists rather than adult felons.

For the purposes of discussion, we shall refer to the 34 people from our combined sample of 932, who met our criteria for being defined as waived into adult court, as "youthful felons." Because of their small number, characterizations of these youthful felons must remain <u>very</u> tentative.

Seventy-four percent of the youthful felons were white (a little higher proportion than in the large combined sample, but chance occurrences could account for this difference). Compared to 50% of the combined sample, only 27% were from Milwaukee. Fifty-three percent of the youthful felons came from towns of 50,000 or less compared to only 33% of the combined sample. Also, only 47% of the youthful felons were from Southeast Wisconsin, compared to about 66% of the combined sample.

The age variables (age at first police contact, age at first juvenile admission, school grade level upon first admission, age at first release from the institution) all showed the youthful felons to be almost a year older than the combined sample. All other variables showed them adult felony conviction. Taking only persons who had adult convictions for a felony within one year of release from the juvenile system and who were twenty years of age or younger at the time of their first adult felony, we analyzed frequency tables and compared them to frequencies in our sample as a whole. The decision to allow only an age difference of one year between final discharge from the juvenile system and the first adult felony was made on the rationale that offenses within a year can be characterized more adequately as a continuation of adolescent difficulties. Allowing more than a year's difference may mean we are dealing with motivations which can be characterized as more adult-like. Whether or not our rationale is correct cannot be assessed with our data.

For the analysis of those possibly waived to adult court, we combined both samples. It should be noted that only 3 people in the combined sample of 932 cases were 16 years of age at final release from the juvenile justice system. Since sixteen was the youngest age that anyone in our samples was released from the juvenile system, we are not excluding persons who may have been very young when they were finally released and who were still quite young when they committed an adult felony, even though a couple of years may have passed between these two events. Excluding people who were very young at final discharge to be very similar to the combined sample except youthful felons had alcohol offenses with greater frequency than the combined sample (62% vs. 38%). Thus, the smaller communities may be less tolerant of drinking behavior among their adolescents of 18 and 19 years of age and refer them to adult court more often than do larger urban areas.

Thus for 34, of the total 351 persons in the combined sample convicted of an adult felony, our adult recidivism rate may be an artifact of their being "kicked up to adult court".

APPENDIX B

STUDY QUESTIONNAIRE

QUESTIONNAIRE FOR THE STUDY OF INSTITUTIONALIZED ADOLESCENTS

COLUMN

1. Case study number______ ______(1 - 3)

2. File number__________

3. Name____
(last) (first) (middle)

4. Race ___ 4

1 white 3 spanish American 5 other

2 black 4 native American

(Items 5 through 30 refer to pre-first-admission periods in the adolescent's life)

5. Community size of juvenile's residence: ___ 5

1 500,000 or more
4 10,000 - 49,999

2 80,000 - 499,999
5 5,000 - 9,999

3 50,000 - 79,999
6 less than 5,000

6. Regional classification of juvenile's residence: ___ 6

1 southeast Wisconsin (e.g., Milwaukee)

2 northeast Wisconsin (e.g., Manitowoc)

3 south central Wisconsin (e.g., Madison)

4 north central Wisconsin (e.g., Wausau)

5 western Wisconsin (e.g., La Crosse)

7. Tatoo ___ 7

1 yes 2 no 3 unknown

8. Living arrangement at time of first juvenile commitment: ___ 8

1 with both natural parents
5 only with father

2 with mother and stepfather
6 with relatives

3 with father and stepmother
7 foster home

4 only with mother
8 institution

9 other

Study questionnaire
p. 2

9. If single-headed household, reason: 9

1 death

2 divorce

3 separation

4 desertion

5 never married

6 other (including one spouse in an institution)

7 unknown

8 N/A*

10. Number of family moves within last 10 years preceding first juvenile admission:** 10

__________ (0-8+) 9 N/A*

11. Number of alternative living arrangements (i.e., foster home, mental hospital) other than natural family within last 10 years prior to first juvenile admission: 11

__________ (0-8+) 9 N/A*

12. Number of siblings (including half siblings residing at home): 12

__________ (0-9+)

13. Occupation of head of household: 13

1 professional - management

2 clerical - sales

3 business/farmer (owner)

4 foreman

5 skilled worker

6 semi-skilled

7 unskilled

8 unemployed/welfare

9 unknown

<u>Note</u>: * N/A = not applicable

** N/A here is for those who have lived at some time, during the ten years preceding their first juvenile admission, outside their natural family home, or a relative's home, for a year or more.

Study questionnaire
p. 3

14. Education of household head: ___ 14

1 partial elementary/none
2 elementary
3 partial high school or below (above elementary)
4 high school graduate
5 technical or commercial high school
6 partial college
7 college graduate
8 unknown

15. Family contacts with the law in matters not involving subject: ___ 15

1 parent or parents involved
2 siblings or sibling involvement
3 parental and sibling involvement
4 no family contact
5 unknown

16. School grade level at time of first admission: ___ 16

1 unknown
2 5th
3 6th
4 7th
5 8th
6 9th
7 10th
8 11th
9 12th

17. School status at time of first admission: ___ 17

1 in school (including part-time and full-time working)
2 suspended or expelled from school and not working full-time
3 Working full-time (out of school)
4 other
5 unknown

18. Letter grades received in school: ___ 18

1	Above average (A or B)	3	Below average (D or F)
2	Average (C)	4	unknown

19. Evidence of truancy in school: ___ 19

1 yes   2 no   3 unknown

20. Evidence of serious disciplinary problems at school: ___ 20

1 yes   2 no   3 unknown

21. Committing offense by <u>court disposition</u>: ___ 21 ___ 22

1	murder	14	truancy
2	forcible rape	15	drinking
3	robbery	16	disorderly conduct
4	aggravated assualt	17	sex with a child other
5	burglary	18	vandalism
6	larceny, theft over $50	19	forgery
7	drug sale	20	use or possession of weapon
8	auto theft	21	responsibility for auto accident
9	theft under $50	22	violation of probation
10	hard drug use	23	injurious to health or safety of others
11	soft drug use	24	arson or bombing
12	runaway	25	negligent homicide
13	uncontrollable	26	unknown
		27	other

22. Description of actual offense: ___ 23 ___ 24

(Use same categories as used in item 21--shown directly above)

23. With whom at time of offense commitment: ___ 25

1 alone

2 with one other person

3 with more than one other person

4 unknown

24. Code for committing offense, by court disposition (codes refer to Flanagan & Kapture system, 1974): ___ 26

1 (1)

2 (2)

3 (3)

4 1 and 2

5 1 and 3

6 2 and 3

7 other

8 unknown

25. Number of police contacts prior to first juvenile committing offense: ___ 27

1 (0)

2 (1)

3 2 - 3

4 4 - 6

5 7- 9

6 10 - 14

7 15+

8 unknown

26. Was the consumption or possession of alcohol associated with any of these police contacts, or committing offenses prior to first juvenile institutionalization: ___ 28

1 yes

2 no

3 unknown

27. Pattern of delinquent behavior by law enforcement contact prior to first juvenile admission: ___ 29 ___ 30

1 (1)	7 (23)	13 (231)
2 (2)	8 (31)	14 (312)
3 (3)	9 (32)	15 (321)
4 (12)	10 (123)	16 other
5 (13)	11 (132)	17 unknown
6 (21)	12 (213)	

28. Age at first police contact in years (nearest year): __ __ 31 32

____

29. Age at first admission to a juvenile correctional institution in years (nearest year): ________ __ __ 33 34

30. Prior probation experience (Indicate most serious): __ 35

1 by social service agency
2 informal probation
3 formal probation
4 none
5 unknown

31. Length of first juvenile institutional stay in months: __ __ 36 37

____

32. Institution where time spent during first stay: __ 38

1 Wales
2 Kettle Moraine
3 Wales and Kettle Moraine
4 Wales and/or Kettle Moraine + treatment
5 Wales and/or Kettle Moraine + camp
6 Wales and/or Kettle Moraine + Green Bay (WSR)
7 other
8 unknown

33. Intelligence Level (IQ): __ 39

1 superior (120 and above)
2 above average/bright normal (111-119)
3 average (91-110)
4 below average/dull normal (71-90)
5 retarded (70 and less)
6 unknown

34. Peer adjustment at the institution during first stay: __ 40

1 good
2 fair
3 poor
4 unknown

35. Pattern of social interaction at the institution during first stay: 41

1 Heavy peer involvement
2 Some peer involvement
3 Isolate, loner
4 Unknown

36. Indication of serious disciplinary problems in the institution (serious fights, assualts, abscondings, etc.) during the first stay: 42

1 serious problems
2 some problems
3 few problems
4 no indication of problems
5 unknown

37. Age at first release from the juvenile correctional institution (nearest year):_______ 43 44

38. Where released to the first time: 45

1 home with parent or parents
2 relatives
3 foster home
4 group home
5 any other full time institution
6 armed services
7 other
8 unknown

39. Total number of police contacts from first release from a juvenile correctional institution to final discharge from the juvenile justice system:__________ (0 - 9+) 46

40. Was the consumption or possession of alcohol associated with any of these police contacts (from first juvenile institutional release to final discharge from the juvenile justice system): 47

1 yes   2 no   3 unknown   0 N/A

41. Amount of time in months between first release from a juvenile correctional facility and first police contact, or revocation of parole if there were such contacts or revocations while in the juvenile justice system: 48

1 (1)   3 (3)   5 (5)   7 (7 - 9)   9 (12+)

2 (2)   4 (4)   6 (6)   8 (10 - 12)   0 no contact

42. Number of recommittals to a juvenile correctional institution (not including replacements)________ 49

43. Age at final juvenile discharge from the juvenile justice system (nearest year);________ 50 51

44. Marital status at final discharge from the juvenile justice system: 52

1 single	4 divorced
2 married	5 widowed
3 separated	6 unknown

45. Status at final discharge from the juvenile justice system: 53

 1 in school including part-time and full-time employment

 2 full-time employment and out of school

 3 part-time employment and out of school

 4 unemployed and out of school

 5 in military service or about to join service

 6 other institution

 7 deceased

 8 other

 9 unknown

46. Current adult active file: 54

 1 yes 2 no 3 deceased

47. Any convictions for adult misdemeanor or very serious traffic violation: 55

 1 yes 2 no

48. If item 47 is yes, how many:_______ (0 - 9+) 56

49. Any convictions for adult felony: 1) yes 2) no ___ 57

50. If item 49 is yes, how many:______ (0 - 9+) ___ 58

51. Age at first adult felony in years (nearest year): ___ 59 ___ 60

____

52. Pattern of adult felony offenses (again, codes based on Flanagan and Kapture's system, 1974): ___ 61 ___ 62

1	(1)	7	(23)	13	(231)
2	(2)	8	(31)	14	(312)
3	(3)	9	(32)	15	(321)
4	(12)	10	(123)	16	other
5	(13)	11	(132)	0	N/A
6	(21)	12	(213)		

53. Description of first adult felony: ___ 63 ___ 64

0 N/A
1 1st degree murder
2 2nd or 3rd degree murder
3 other homicide
4 aggravated battery
5 mayhem
6 child abuse
7 battery
8 kidnapping & abduction
9 robbery
10 arson & bombing
11 burglary & theft
12 receiving & passing stolen property
13 operating a vehicle without owner consent
14 issuing worthless checks
15 forgery & credit card crimes
16 rape
17 sexual intercourse with minors
18 lewd & lascivious behavior
19 operating a place of prostitution or pimping
20 gambling
21 possession or use of weapon
22 hard drug sale
23 soft drug sale
24 contributing to the delinquency of a minor
25 other
26 unknown

54. Educational level when committing first adult felony: 65

1 partial elementary
2 elementary
3 partial high school and below (above elementary)
4 high school graduate
5 technical or commercial school
6 partial college
7 college graduate
8 unknown
0 N/A

55. Marital status when committing first adult felony: 66

1 single
2 married
3 separated
4 divorced
5 widowed
6 unknown
0 N/A

56. Did subject have children at time of first adult felony: 67
1 yes 2 no 3 unknown 0 N/A

57. Employment status when committing first adult felony: 68

1 full-time employment and out of school
2 Part-time employment and out of school
3 unemployed and out of school
4 in school or in training (including part-time and full-time employment)
5 in military
6 other institution
7 unknown
0 N/A

58. How long since subject's last active file status: ___ 69

1	still active	6	13 - 18 months
2	1 - 3 months	7	19 - 24 months
3	4 - 6 months	8	25 - 36 months
4	7 - 9 months	9	37+ months
5	10 - 12 months		

59. High school diploma at final discharge from the <u>juvenile</u> justice system: ___ 70

1 yes   2 no   3 unknown

APPENDIX C

READER RELIABILITIES

READER RELIABILITIES *

(Variable numbers correspond to the number on the questionnaire.)

#	Variable	Percent Agreement	Pearson's r
4	Race	100%	
5	Community size	100%	
6	Region	96%	
8	Living Arrangement	96%	
9	Reason single-headed	100%	
10	Family Moves	100%	1.00
11	Alternative Living	80%	
12	Siblings	92%	
13	Occupation of household Head	84%	
14	Education of Household Head	96%	
15	Family Law Contacts	92%	
16	School Grade	100%	
17	Status at Admission	96%	
18	School Achievement	92%	
19	Truancy	96%	
20	Disciplinary Problems	92%	
21	Committing Offense	96%	
22	Actual Offense	96%	
23	With others During Offense	92%	
24	Code for Offense	100%	
25	Number of Police Contacts	92%	
26	Consumption of Alcohol	92%	
27	Pattern of Offenses	100%	

Note:* Two readers read 25 cases jointly.

READER RELIABILITIES page 2
(continued from page 1)

#	Variable	Percent Agreement	Pearson's r
28	Age at first police contact	96%	0.985
29	Age at Admission	100%	1.000
30	Prior Probation Experience	88%	
31	Length of Frist Stay	100%	1.000
32	Institution Where Time Spent	100%	
33	Intelligence	100%	
34	Peer Adjustment at Institution	84%	
35	Social Interaction at Institution	80%	
36	Disciplinary Problems at Institution	88%	
37	Age at Release	96%	0.991
38	Where Released to	92%	
39	Number of Police Contacts on Parole	92%	0.995
40	Consumption of Alcohol on Parole	76%	
41	Time until First Police Contact	92%	
42	Number of Juvenile Recommittals	100%	1.000
43	Age at Final Discharge	96%	0.985
44	Marital Status	92%	
45	Employment Status	84%	
46	Current Active File	100%	
47	Adult Misdemeanor	92%	
48	How Many Misdemeanors	92%	0.902
49	Any Adult Felony Convictions	100%	

READER RELIABILITIES page 3
(continued from page 2)

#	Variable	Percent Agreement	Pearson's r
50	How Many Adult Felonies	100%	1.000
51	Age at First Felony	100%	1.000
52	Pattern of Adult Felonies	100%	
53	Description of Felony	100%	
54	Educational Level When First Felony Committed	84%	
55	Marital Status When First Felony Committed	92%	
56	Did Subject have Children	100%	
57	Employment At Time of First Felony	88%	
58	How Long Since Last Active File	100%	
59	High School Diploma	88%	

APPENDIX D

DICHOTOMIES

How Variables were Dichotomized for all Statistical Analyses
(Item number corresponds to item number on the questionnaire)

4.	Race	(white vs other)
5.	Community size	(500,000 or more vs others)
6.	Region	(southeast Wisconsin vs others)
7.	not used	
8.	Living arrangement*	(both parents vs other)
9.	Single-headed, Why	(N/A vs others)
10.	Family moves	(2 or less vs 3 or more)
11.	Alternative living	(0 vs 1 through 8)
12.	Siblings	(4 or less vs 5 or more)
13.	Occupation	(codes 1 through 6 vs codes 7 and 8)**
14.	Education	(below high school graduate vs high school graduate or above)
15.	Law contacts	(sibling and/or parent contacts vs no family contacts)
16.	School grade level	(codes 1 through 5 vs 6 through 9)
17.	School status	(codes 1 and 3 vs codes 2 and 4)
18.	Letter Grades	(average or above vs below average)
19.	Truancy	(yes vs no)
20.	School Problems	(yes vs no)

* also used codes 1 through 3 vs other codes
** see questionnaire codes

21.	not used	
22.	not used	
23.	With whom*	(codes 1 and 2 vs code 3)
24.	Offense code**	(code 1 vs codes 2 through 7)
25.	Police contacts	(codes 1 through 4 vs codes 5 through 8)
26.	Alcohol	(yes vs no)
27.	Pattern of offenses***	(code 1 vs codes 2 through 16)
28.	Age at first police contact	(14 or less vs 15 or more)
29.	Age at first admission	(15 or less vs 16 or more)
30.	Probation experience*a	(code 3 vs Codes 1, 2, and 4)
31.	Lenght of stay	(4 or less vs 5 or more)
32.	Where stayed	(Wales vs Kettle Moraine)
33.	IQ	(average or above vs below average)
34.	Peer adjustment	(good or fair vs poor)
35.	Social interaction	(heavy vs some or isolate)
36.	Disciplinary problems	(serious or some vs few or none)
37.	Age at release	(16 or younger vs 17 or older)
38.	Where released	(code 1 vs codes 2 through 7)

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* also used code 1 vs codes 2 and 3.

** also used code 2 vs codes 1, 3 through 7; as well as code 3 vs codes 1, 2 and 4 through 7; as well as codes 1 through 3 vs codes 4 through 7.

*** also used code 2 vs codes 1 and 3 through 16; as well as code 3 vs codes 1, 2 and 4 through 16; as well as codes 1 through 3 vs codes 4 through 16.

*a also used codes 1 through 3 vs code 4.

APPENDIX E

OVERLAPPING VARIABLES ANALYSES

ANALYSIS FOR OVERLAPPING VARIABLES

1. (Variables dichotomized and Phi coefficients used)
2. (Variable numbers correspond to their number on the questionnaire)

	Variable 1	By	Variable 2	Phi
I.	Age at First Admission (29)	by	Age at First Police Contact (28)	0.471
II.	Age at First Admission (29)	by	Age at First Release (37)	0.633
III.	Age at First Admission (29)	by	Number of Police Contacts Prior to First Admission (25)	0.035
IV.	Family Moves (10)	by	Region (6)	0.145
V.	Age at First Admission (29)	by	School Grade Level (16)	0.522
VI.	Race (4)	by	Number of Siblings (12)	0.215
VII.	Race (4)	by	Family Moves (10)	0.120
VIII.	Race (4)	by	Region (6)	0.327
IX.	Region (6)	by	Number of Police Contacts Prior to First Admission (25)	0.174
XI.	Pattern of Offenses (27)	by	Region (6)	0.035
XII.	Age at First Admission (29)	by	Pattern of Offenses (27)	0.115
XIII.	Pattern of Offenses (27)	by	Race (4)	0.196
XIV.	Number of Police Contacts Prior to First Admission (25)	by	Pattern of Offenses (27)	0.253
XV.	Consumption of Alcohol (26)	by	Age at First Admission (29)	0.146

APPENDIX F

FLANAGAN AND KAPTURE'S SYSTEM

CLASSIFICATION OF JUVENILE OFFENSES
(FLANAGAN AND KAPTURE'S SYSTEM, 1974)

Income Producing Offenses(1)	Violent Offenses(2)	Status-Victimless Offenses(3)	Other
Robbery	Murder	Running Away	Arson
Burglary	Other Homicide	Uncontrol-lability	Sexual Perver-sion
Grand Theft-Larceny (over $50)	Assault	Truancy	Leaving the Scene of an Accident
Petty Theft-Shop Lifting (under $50)	Battery	Drinking	Dealing in Drugs
Forgery-Credit Cards-Worthless Checks	Rape	Vandalism	Possession of Hard Drugs
	Carrying a Concealed Weapon	Disorderly Conduct	
	Conduct Regardless of Life	Fornication	
	Injurious to the Health of Others	Operating Vehicle without Owner's Consent	
		Operating Vehicle with-out a License	
		Involvement in an Accident	

CLASSIFICATION OF JUVENILE OFFENSES

Income Producing Offenses(1)	Violent Offenses(2)	Status-Victimless Offenses(3)	Other
		Possession of Soft Drugs (Marijuana, L.S.D.)	
		Contributing to the Delinquency of Others	
		Probation Violation	

CLASSIFICATION OF ADULT FELONIES
(FLANAGAN AND KAPTURE'S SYSTEM, 1974)

Income Producing Offenses(1)	Violent Offenses(2)	Victimless Offenses(3)	Other
Robbery	Murder (First, Second, Third Degree)	Operating an Automobile Without Owner's Consent (Joy Ride)	Lewd and Lascivious Behavior
Burglary	Other Homicide	Sexual Relations with Minors (Not Rape)	Non-support of Child(ren)
Grand Theft-Larceny	Battery to Police Officer	Gambling	Leaving the scene of an Accident
Receiving and Passing Stolen Goods	Other Battery or Assault	Possession of Drugs	
Forgery	Mayhem		
Credit Card Crimes	Child Abuse		
Issuing Worthless Checks	Conduct Regardless of Life		
Operating a Place of Prostitution	False Imprisonment Kidnapping		
Dealing in Drugs	Arson or Bombing		
Contributing to the Delinquency of Others			

APPENDIX G

LETTER OF APPROVAL TO CONDUCT PROJECT FROM DIVISION OF CORRECTIONS

State of Wisconsin \ DEPARTMENT OF HEALTH AND SOCIAL SERVICES

DIVISION OF CORRECTIONS
1 WEST WILSON STREET
P.O. BOX 669
MADISON, WISCONSIN 53701

July 31, 1978

Brent Benda
2404 Independence Lane #204
Madison, Wisconsin 53704

Dear Brent:

The Administrator of the Division of Corrections has approved your research study, "Criminal Patterns: From Adolescence to Adulthood."

As part of our project identification system, we have assigned No. 196 to your proposal. When you have completed your work, please send a copy of your written report to enable us to make it available on a loan basis to others who may be interested in your findings. Also, we would like you to prepare and send a brief summary of your findings for use in acquainting others of your research and your report.

Thank you for your cooperation.

Sincerely yours,

Chuck Brassington

Chuck Brassington, Research Projects Coordinator
Division of Corrections

CB:gs
Attachment
c: Mr. Perry Baker
James Cowden, Ph.D.

P.S. On July 24, I initiated the procedures to create the listing needed for your research.

TITLE OF THESIS CRIMINAL RECIDIVISM: FROM ADOLESCENCE TO ADULTHOOD

Major Professor John J. Flanagan

Major Department Social Welfare

Minor(s)

Full Name Brent Bruce Benda

Place and Date of Birth Winslow, Arizona, March 2, 1945

Colleges and Universities: Years attended and degrees

Southwest Missouri State University, 1963-1968, B.S.

University of Wisconsin-Madison, 1970-1972, M.S.S.W.

University of Wisconsin-Madison, 1975-1979, Ph.D.

Membership in Learned or Honorary Societies

Publications

Date July 29, 1979

END