

THE PREDICTION OF MILITARY DELINQUENCY

by William Robert Nelson Blair

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INTRODUCTION

The understanding, prediction and control of delinquent behavior are of vital concern to society. Wherever the behavior is observed, it tends to be associated with wasted personal and social resources. Social scientists have recognized a responsibility to further understanding of the phenomenon and, throughout the past century, they have exerted considerable research effort to develop tenable explanations. Unfortunately the development of explanations or theories has outdistanced and sometimes has supplanted the rigorous, experimental testing of hypotheses. As a consequence, the literature, which is voluminous already and is still growing, is a mixture of fact and inadequately supported assumptions. Nevertheless, a great deal has been learned about delinquency and there is a good measure of agreement about its psychological correlates in the most adequate research reports. More predictive studies are needed, however, to establish whether current knowledge of the correlates of delinquent behavior really represents any fundamental understanding. In the study, upon which this report is based, common correlates of delinquency were tested in a predictive setting.

Delinquency is defined in Webster's New International Dictionary¹ as "transgression of law; failure, omission or violation of duty; quality or state of being delinquent." According to that source, also, "as distinguished from crime, delinquency usually implies a psychological rather than a judicial attitude toward the offender." The term "delinquency" will be used throughout this thesis, rather than "crime". When it is used to refer to the social phenomenon, the transgression of law will be implied. A delinquent will be so classified primarily because he has broken a law, which governs the conduct of the persons in his environment, and which is generally enforced.

Military and civilian delinquency were regarded, insofar as this study was concerned, as aspects of the same phenomenon. If delinquent behavior is conceived simply in terms of offences against generally recognized laws, which are enforced, the two are clearly analogous. The analogy can be extended to include the persons, who offend against the laws. They are similar in that their conduct is illegal and socially unacceptable, according to their laws and the conditions of law enforcement in their environments.

¹Webster's New International Dictionary of the English Language (Second Edition), Springfield, G. & C. Merriam Company, 1953, p.693.

Thus regarded, delinquent behavior is a unitary phenomenon. Research findings from the civilian field may be expected to have some application in the military field. As the surveys of the literature indicate, the expectation of concordance was realized to a considerable extent.

There are certain obvious differences, however, between military and civilian delinquency. A soldier is a citizen and he is subject to the laws, which govern the conduct of all citizens. In addition, he is subject to military law. Some military misdemeanours, like absence without leave and insubordination, would not constitute offences according to civil law. They are regarded as serious offences in the military setting and a soldier learns to appreciate that fact, beginning with his initial orientation at the time of his enrolment.

Another marked difference concerns the enforcement of laws. A soldier's behavior is rather carefully supervised and his misdemeanours tend thus to be more readily observed. In the interest of maintaining military discipline, the regulations, which govern the conduct of soldiers, are usually enforced. On the other hand, it has been suggested in some civilian studies that the element of undetected crime may account for the absence of significant differences on psychological variables between law-breakers, who are caught, and the rest of the civilian

population. Certainly the soldier lives in a more closely controlled environment than does the civilian.

The two differences, which have been discussed, between the environment of the civilian and of the soldier, suggest that it may be possible to choose a more reliable and effective criterion of delinquency in the military field. The criterion selected for the first phase of this research can be expressed as a definition. According to it, a military delinquent is a soldier, who has committed an offence against military law and has been sentenced to detention as a consequence. This criterion was broadened in the second phase of the study but discussion of it will be deferred until that phase is reported.

The reference to detention raises the practical importance of military delinquency. According to a report in Spencer's Crime and the Services, it was estimated that the annual cost of five to seven thousand problem men in 1949, whom the British Army would have preferred not to enrol, if they could have been detected early, was of the order of two million pounds.² In 1953, it was reported that twenty thousand American soldiers, sailors and airmen went absent without leave each month, and it was estimated that there were fifty thousand deserters at the time of

²John C. Spencer, Crime and the Services, London, Kegan Paul Ltd., 1954, p.56.

the report.³ A Canadian press report published in 1955 indicated that the Canadian Army shared the problem of delinquency with other military organizations.⁴ The report referred to the recruitment of men in 1950 and 1951 at the time of the Korean hostilities. Although ten thousand men were enrolled, five hundred of that number were lost through absence without leave and an additional fifteen hundred were discharged as medically unfit or as unlikely to become efficient.

Numbers of military delinquents, taken separately, do not indicate the magnitude of the problem they present to military organizations. While a soldier is absent without leave (and most Canadian Army delinquents are in that category), or in detention, he is a total loss to the Army. His apprehension, trial and confinement involve the unproductive expenditure of administrative time and effort by other men, who might otherwise make a more positive contribution. In the case of those, who repeatedly misconduct themselves and are eventually released, the money and effort devoted to their recruitment, training,

³Proceedings of the Eighty-third Annual Congress of Correction of the American Prison Association, New York, 1953, p.301.

⁴Canadian Press, "5 Percent of Soldiers Deserted", news despatch in The Ottawa Citizen, issue of February 5, 1955, p.18, col. 3.

transportation, feeding, clothing, equipping, housing and medical care may be considered largely wasted. For these reasons military services regard their misconduct rates with continuing concern and try through more efficient selection and other measures to reduce the incidence of misconduct.

Solutions to the problem of military delinquency are being sought now in several countries. Some have approached the problem by exploring the feasibility of selecting out men, who would probably become delinquent. That is the orientation of the research to be reported here. It is noteworthy that no satisfactory solution has thus far emerged from the various research efforts. A large scale research program designed to discover the feasibility of identifying delinquent-prone individuals before they are enrolled, is being conducted by the United States Navy.⁵ The appearance of two recent books, one by the Gluecks⁶ and the other by Hathaway and Monachesi⁷,

⁵Charles Hanley, An Inventory of Personal Opinions, First Technical Report on Rehabilitation Research, U.S. Naval Retraining Command, Camp Elliot, San Diego, 1954, 171 p.

⁶Sheldon and Eleanor Glueck, Unraveling Juvenile Delinquency, New York, The Commonwealth Fund, 1950, xv - 399 p.

⁷Starke R. Hathaway and Elio D. Monachesi, Analyzing and Predicting Juvenile Delinquency with the MMPI, Minneapolis, The University of Minnesota Press, 1953, vi-153 p.

indicate that the problem is still being studied in the civilian field. Thus, this research assumes considerable timeliness and importance.

Selection of men involves the prediction of behavior. If an applicant is assessed and recommended for a certain job, it follows that some estimate of the applicant's probable success on the job must have been made. If an applicant for military service is to be selected out, because he would probably become a military delinquent, a prediction is implied. Certain theorists hold misgivings regarding the possibility of predicting individual behavior from normative data, the approach of this research. A theoretical controversy concerning the subject may be found in current literature. On one side of the controversy are the exponents of the clinical, idiographic, phenomenological and dynamic theories in psychology. They are opposed by actuarial, nomothetic and dimensional or trait theorists. The former stress uniqueness and change in human behavior and motivation. The latter tend to classify men according to the consistency and similarities of their behavior and to deduce general explanations, which are often expressed mathematically. This report may be a provocative contribution to the debate through the presentation of some unequivocal experimental results with an actuarial orientation.

In a similar sense the variables chosen and the assessment of their predictive validity may be of theoretical interest. Doubts have been expressed regarding possible returns from research conducted with self-report personality inventories and biographical questionnaires. It may be of practical and theoretical value to note how such experimental variables performed in this study.

In the first two chapters of the report the research problem is oriented in current knowledge. A brief overview of related civilian research is presented, concentrating on common elements and the more significant and recent contributions. This survey is followed by an examination of research on military delinquency and an attempt is made to identify common aspects of the phenomenon. Two preliminary extreme group studies, conducted by the author in 1948 and 1949, receive special attention. In Chapter II, certain theoretical and practical aspects of prediction in psychology are discussed.

The research study proper is reported in the next two chapters. In the first of these, Chapter III, the predictive validity of the variables, from the 1948 and 1949 studies, is assessed in another extreme groups comparison. In the second section of Chapter III, the predictive validity of the surviving variables is assessed in connection with the whole recruit sample, including those classified as delinquents and as non-delinquents.

Chapter IV consists of three sections. In the first, the validity and cross-validity of the experimental variables are tested in relation to a broadened criterion. The efficiency of a prediction formula is then assessed in comparison with the base rate of delinquency in the sample. The second section of Chapter IV is devoted to the validity generalization phase of the research. Supplementary research, which was prompted by the findings of other workers in the field of civilian delinquency, is reported in the last section.

In Chapter V the research findings are collated and appraised. Implications of theoretical and practical significance are described and related to current knowledge of the delinquency phenomenon and to the problem of prediction in psychology. Suggestions are made concerning further possible studies in the same areas.

The report concludes with a brief summary and a statement of the major conclusions. Three appendices, containing material supplementary to the report proper, are provided.

CHAPTER I

SURVEY OF RELATED RESEARCH

In this Chapter current knowledge regarding the delinquency phenomenon is discussed. Section 1 is devoted to reports on civilian research. The second deals with military studies.

1. Civilian Studies

Bovet in a recent (1951) monograph of the World Health Organization described delinquency as a "bio-psycho-social phenomenon". He contended that anyone, who wished to understand the causes and consequences of the phenomenon, must not overlook any one of the three terms in the quotation.¹ Early investigators, on the other hand, were inclined to concentrate on trying to identify a single cause, or a primary cause, of delinquent behavior. Inherited biological constitution, feeble-mindedness, glandular dysfunction, and social disorganization were several of the topics investigated in that context. As more evidence was accumulated, however, single cause theories were judged untenable and the complexity of the phenomenon came to be realized.

¹Lucien Bovet, Psychiatric Aspects of Juvenile Delinquency, No. 1 of the World Health Organization Monograph Series, Geneva, 1951, p.41.

The Gluecks' Unraveling Juvenile Delinquency,² merits attention here because of the reputation of its authors, its recency and thoroughness. They are a famous team of criminologists, who have studied and reported upon delinquent behavior for over twenty-five years. In this last study they adopted a multi-disciplinary approach and were assisted by consultants from several fields, including anthropologists, a psychiatrist and a Rorschach specialist. Five hundred male delinquents in correctional schools in Massachusetts were compared with a matched group of non-delinquents selected from the public schools of Boston. The matching factors were ones, which had shown a relationship to delinquent behavior in preceding studies. They were: age, general intelligence, national origin, residence in underprivileged neighborhoods. The social backgrounds of the subjects were explored during the investigations, which led to the formation of the criterion groups. In addition, somatotype classifications were done, the subjects were interviewed by a psychiatrist and they were tested on the Wechsler-Bellevue, Stanford achievement tests in reading and arithmetic and on the Rorschach.

²Sheldon and Eleanor Glueck, Unraveling Juvenile Delinquency, New York, Commonwealth, 1950, xv - 399p.

The generalized research findings follow.

Physically the delinquents were classed as generally mesomorphic (solid, muscular); temperamentally, they were judged to be more restless, impulsive, extroverted, aggressive and even destructive; in attitude, they appeared more hostile, suspicious, unconventional and generally not submissive to authority; in mental functioning, they tended to be direct and concrete and less methodical in solving problems; their homes tended to lack control, understanding, affection, cohesion and proper parental models. The Gluecks suggested that the delinquency phenomenon is due to an interplay of conditions and forces from all of the areas named.

Their matching process had removed four variables from the study, so their association with delinquent behavior in the samples studied naturally could not be examined. The prediction tables were not tested on independently drawn samples and their generalizations were based on matched, extreme groups, examined after their members had been identified as delinquents or non-delinquents. However, there is considerable confirmatory evidence from other research and the Glueck findings serve as an introduction to that research.

There is still disagreement, usually between the various disciplines, about the correlates or causes of delinquent behavior. The recent work of the Gluecks was criticized by at least one sociologist, Reiss, on the ground that they had failed to treat adequately of such important factors as home conditions, neighborhood environment and gang membership.³ A prominent psychoanalyst, Franz Alexander, found fault with the same research because in his opinion it had failed to consider adequately the psychodynamics of each individual case.⁴ Karpman chaired a recent round table discussion of delinquency by a group of medical specialists and the discussion revealed dramatically the lack of agreement within a single discipline.⁵ One participant contended that social and economic faults are at the root of delinquency; another related it to hostility, which he regarded an ego defence; a third believe endocrine abnormality should be emphasized; and a fourth supported

³Albert J. Reiss, "Unraveling Juvenile Delinquency, II. An Appraisal of the Research Methods", in the American Journal of Sociology, Vol. 57, 1951, p.117.

⁴Franz Alexander, "Juvenile Delinquency", p.751-755, in Robert H. Gault, et al, "Unraveling Juvenile Delinquency. A Symposium of Reviews", in the Journal of Criminal Law and Criminology, Vol. 41, 1951, p.732-759.

⁵Ben Karpman, "Psychodynamics of Child Delinquency, Round Table", in the American Journal of Orthopsychiatry, Vol. 23, 1953, p. 1-69.

the view that psychological phenomena, originating largely in the period of infantile development, provide an explanation for delinquent behavior.

One major point of disagreement concerns the relative importance of heredity and environment. According to Bovet, there is today, as there was in the 19th century, a clash between the inborn criminal concept of Lombroso and the view of Victor Hugo that "the opening of a school is the closing of a prison."⁶ It is known that criminality tends to run in families but this correlate can be given either a hereditary or an environmental interpretation, or both. The studies of identical twins, which have shown that they tend to be more concordant in respect of criminality than are fraternal twins, even when raised separately, suggest that heredity as a behavioral influence cannot be ruled out. However, the relative importance of heredity and environment, in respect of delinquent behavior, has not been determined.

In connection with the heredity-environment controversy in another related field, the study of personality, Eysenck has warned that there appears to be a danger of repeating the errors and misinterpretations which "vitiating" early work on intelligence. He has

⁶Lucien Bovet, Psychiatric Aspects of Juvenile Delinquency, p. 13.

pointed out that experimental designs may not permit any conclusions regarding the influences of heredity or environment and that some authors have drawn the conclusions, notwithstanding. He purports to have produced evidence, which supports the hypothesis that heredity exerts a strong influence on the development of individual differences on the factor of neuroticism. He has urged, however, that scientific experimentation should replace debate in establishing the relative importance of the two influences.⁷ The lack of definitive evidence in the same connection, in the field of delinquency, suggests that, until considerably more experimental evidence has been obtained, statements regarding the relative influence of heredity and environment should be regarded as hypotheses.

Many other factors have been investigated as possible correlates of crime and delinquency, only some of which survive and are pertinent to this research. Age is one factor, which has been established as a correlate. Goring reported in 1913 that the modal age, at which a random sample of English prisoners had been recruited into crime, lay between 15 and 20 years.⁸ Metfessel and

⁷H.J. Eysenck, The Scientific Study of Personality, London, Kegan Paul Ltd., 1952, p. 189-190.

⁸Charles Goring, The English Convict, A Statistical Study, London, H~~er~~ Majesty's Stationery Office, 1913, p. 202.

Lovell⁹ reported in 1942 that there is an age curve of crime, which rises abruptly through adolescence, reaches its peak in young manhood and declines from the late twenties. In Canada, in 1952, 40% of indictable offences, which resulted in convictions, were committed by persons 24 years of age or less.¹⁰ In that year, only 19.8% of the population was distributed in the age range of 16 to 24.¹¹ Martin has suggested that delinquent behavior may be largely a youthful phenomenon. According to his opinion, although three-quarters of psychopaths in prisons are under twenty-one years of age, there are few old psychopaths and those that survive "seem to 'settle down'".¹²

Intelligence has been studied by a number of investigators in relation to delinquent behavior. Following their inconclusive survey of research reports on the subject, Metfessel and Lovell reported that a number of writers believed that the specific influence of

⁹Milton Metfessel and Constance Lovell, "Recent Literature on Individual Correlates of Crime", in the Psychological Bulletin, Vol. 39, 1942, p.135.

¹⁰Dominion Bureau of Statistics, The Canada Year Book, 1955, Ottawa, Queen's Printer and Controller of Stationery, p.301.

¹¹Dominion Bureau of Statistics, The Canada Year Book, 1955, p.305.

¹²John Bartlow Martin, Break Down the Walls, 1954, New York, Ballantine, p.263.

intelligence could not be delineated.¹³ The view held earlier by Goddard¹⁴ that feeble-mindedness is the most important single cause of criminal or delinquent behavior has not been supported. However, there is some evidence to suggest that delinquents and non-delinquents may differ in terms of the specificity of their intelligence, if not in its total extent. The Gluecks, using the Wechsler-Bellevue, found that the delinquents in their sample were significantly superior (at the .01 level of confidence) on the Block Design subtest. They were inferior to the non-delinquents on three verbal subtests, Vocabulary (P.01), Information (P.001), and Comprehension (P.003). Individual differences between the verbal and the performance portions of the test distinguished between delinquents and non-delinquents at the .001 level of confidence; the non-delinquents obtained the higher verbal scores. The groups were matched in terms of total intelligence.¹⁵

Although it would appear that delinquents generally are not less intelligent than non-delinquents, their progress in school tends to be retarded. The Gluecks

¹³Milton Metfessel and Constance Lovell, "Recent Literature on Individual Correlates of Crime", p.149.

¹⁴Henry Herbert Goddard, Feeble-Mindedness Its Causes and Consequences, New York, Macmillan, 1914, xii-599 p.

¹⁵Sheldon and Eleanor Glueck, Unraveling Juvenile Delinquency, p.202-204.

noted in 1930, in a study of five hundred criminals, that they tended to be retarded one or more years in comparison with the general population.¹⁶ Twenty years later, in their 1950 study, they found that delinquents were similarly retarded. Of the two samples of five hundred each, almost twice as many delinquents as non-delinquents (41%; 21.2%) were two or more years behind the proper grade for their age.¹⁷

Lombroso, an early Italian criminologist, is reported to have advanced the concept that criminal or delinquent behavior is attributable to inherited biological constitution. He conceived a criminal type from limited evidence, which was recognizable, according to him, by certain physical irregularities.¹⁸ Goring replied to Lombroso in 1913 following a thorough anthropometric study of a sample of 3,000 English prisoners, among whom he was unable to find any distinct criminal type. It is interesting to note, however, that he found all English criminals, whom he studied, except

¹⁶Sheldon and Eleanor Glueck, 500 Criminal Careers, New York, Knopf, 1930, p.133.

¹⁷Sheldon and Eleanor Glueck, Unraveling Juvenile Delinquency, p.137-138.

¹⁸Cesare Lombroso, Speech before the Congress of Criminal Anthropology at Turin, 1906, quoted by Charles Goring, The English Convict, p.13.

those technically convicted of fraud, to be markedly different from the general population in stature and body weight. Those, who had been convicted for violent acts, he found to be relatively stout, strong, healthy and thick-set. Thieves and burglars, who constituted the great majority (ninety percent) were said to be relatively puny. Goring concluded that criminal anthropology was not entirely without basis in fact but that the few facts known had been "perverted by credulity and fanaticism".¹⁹

In 1939 Hooton²⁰, a prominent American anthropologist, revived the issue on this continent with the publication of the results of a twelve year study of the relationship between physical factors and misconduct. He concluded that biological inferiority is the primary cause of delinquency. In the same year, Hrdlicka²¹ disagreed with Hooton and stated his own conclusion, which appears to be the one more generally accepted. He contended that no single physical sign or combination of signs would permit the identification of criminality.

¹⁹Charles Goring, The English Convict, A Statistical Study, p.200-201.

²⁰E.A. Hooton, Crime and the Man, Cambridge, Harvard University Press, 1939, xvi - 408p.

²¹A. Hrdlicka, "The Criminal", in the Journal of Criminal Psychopathology, Vol. 2, 1939, p.87-91.

The Gluecks applied W.H. Sheldon's system of classification according to body type in their last research. They described their delinquents as relatively more mesomorphic and stated that there were relatively more ectomorphs among the non-delinquents. However, they made no use of the anthropometric findings in the development of their prediction tables. They did report problems concerning the establishment of appropriate somatotype norms and doubts concerning the immutability of the types.²² One other physical correlate, the malfunction of the endocrine glands, has generally ceased to be emphasized as a primary cause in the literature on crime and delinquency. Wolf pointed out in 1946 that such malfunction could lead to emotional disturbances which in turn, under particular circumstances, might lead to crime.²³

Shaw has associated the incidence of delinquent behavior with place of residence. He has discussed his concept of delinquency areas in several books, among

²²Sheldon and Eleanor Glueck, Unraveling Juvenile Delinquency, p. 258.

²³W. Wolf, "The Role of the Endocrine Glands in Emotional Disturbances, Crime and Rehabilitation", in the Journal of Clinical Psychopathology and Psychotherapy, Vol. 7, 1946, p. 539-560.

which was The Natural History of a Delinquent Career.²⁴

The concept has been expanded to refer to the social disorganization of congested urban areas. Delinquency, in that context, has been related to such factors as inadequate housing, poverty, the presence of organized juvenile gangs and adult criminality in the home or community.²⁵ In 1952, 73.8% of persons convicted for indictable offences in Canada were of urban origin.²⁶ Approximately 61.5% of Canada's population was located in urban centres at that time.²⁷ It might also be noted that other factors, such as the relative number of laws and the extent and effectiveness of law enforcement programs in rural and urban areas, make comparisons difficult. Inferences are limited accordingly, but the positive relationships between urban residence and delinquent behavior and between measures of social disorganization and delinquency do appear to be consistent.

²⁴Clifford R. Shaw, The Natural History of a Delinquent Career, Chicago, University of Chicago Press, 1931, p.13-25.

²⁵Negley K. Teeters and John Otto Reinemann, The Challenge of Delinquency, New York, Prentice-Hall, 1950, p.136-139.

²⁶Dominion Bureau of Statistics, The Canada Year Book 1955, p.301.

²⁷Dominion Bureau of Statistics, The Canada Year Book 1955, p.138.

In their 1942 survey of correlates of delinquency, Metfessel and Lovell reported that delinquents had been found inferior in several studies on various aspects of personality. Emphasis on worry, high scores on tests of neurotic tendency and retardation on tests of social maturity were cited as characteristics of offenders.²⁸ The reliability of that correlate may be assessed from research reports, which have been published since the 1942 survey. Capwell, in 1945, found that, among girls, delinquents and non-delinquents could be distinguished to a highly significant extent by the Minnesota Multiphasic Personality Inventory (commonly known as the MMPI).²⁹ The Capwell study encouraged Monachesi in 1948 to try out the MMPI with both sexes. He found significant differences in both cases and some confirmation for the Capwell findings.³⁰

Personality studies with delinquents and non-delinquents generally have been "after the event" in form, with one notable exception. Hathaway and Monachesi began a longitudinal study of the delinquency phenomenon in

²⁸Milton Metfessel and Constance Lovell, "Recent Literature on Individual Correlates of Crime", p.160.

²⁹D.E. Capwell, "Personality Patterns of Adolescent Groups: II. Delinquents and Non-Delinquents", in the Journal of Applied Psychology, Vol. 29, 1945, p.289-297.

³⁰Elio D. Monachesi, "Some Personality Characteristics of Delinquents and Non-Delinquents" in the Journal of Criminal Law and Criminology, Vol.38, 1948, p.487-500.

1948. At that time they administered the MMPI to over four thousand ninth grade pupils in Minneapolis. In 1950, almost two years later, the records of probation officers and police departments were consulted. Individuals, who had become delinquent, were identified and their MMPI scale scores were compared with those, who had not become delinquent. Two of the MMPI scales, which had functioned most effectively in the earlier studies of Capwell (1945) and Monachesi (1948), continued to distinguish between delinquents and non-delinquents in the predictive study.

Thus one measure of personality (the MMPI) has been found to differentiate delinquents and non-delinquents consistently and, more important, to be somewhat predictive of delinquent behavior.³¹ The interpretation of the two scales appears to have much in common with the Gluecks' characterization of their delinquent subjects, according to temperament and attitude (restless, impulsive, aggressive, unconventional and not submissive to authority).³² High or abnormal scores on a third MMPI scale, the F scale, which was designated by the authors of the inventory as a measure of validity, also were more

³¹Starke R. Hathaway and Elio D. Monachesi, Analyzing and Predicting Juvenile Delinquency with the MMPI, Minneapolis, The University of Minnesota Press, 1953, v-153p.

³²Sheldon and Eleanor Glueck, Unraveling Juvenile Delinquency, p.275.

frequently obtained by the delinquents in the Hathaway and Monachesi study. It is noteworthy, however, that the delinquents were not characterized by emphasis on worry or neurotic tendency, as reported earlier. The more common view today appears to be that incipient delinquents tend not to differ in that connection from persons, who are later identified as non-delinquents.

Finally, the attention of several investigators has been directed toward the home environment of delinquents and non-delinquents. As the extent of the influence of other factors was delimited through research, it became apparent that interpersonal relations during the early formative years of life strongly influence subsequent behavior. Coulter, in 1948, classified homes, from which delinquents come, according to a primary characteristic, as follows: criminality in the family; unhappy interpersonal relations because of domination, favoritism, neglect; physical or mental disabilities among parents; social or moral maladjustment because of differences in race, religion or standards; and subject to economic pressures of unemployment or low income.³³ Psychoanalytic writers have emphasized the importance of parent-child

³³C.W. Coulter, "Family Disorganization as a Causal Factor in Delinquency and Crime", in Federal Probation, Vol. 3, 1948, p.13-17.

relations in the development of delinquent behavior. Their case history approach, too, has contributed significantly toward a more adequate understanding of the phenomenon. A case in point is Aichhorn's work, Wayward Youth.³⁴

Membership in delinquent gangs has been regarded a symptom of unhappy home life. The participant has been seen as seeking in the gang the satisfaction denied him in his home in the form of companionship, security and importance. More than one-half of the delinquents in the 1950 Gluecks' study had belonged to such gangs, as contrasted with less than one percent of the non-delinquents.³⁵ Possibly significant, too, in the same connection was their finding that the home discipline of the delinquents characteristically had been over-strict, erratic or lax.³⁶

Allport in a foreword to a recent book, which dealt with the prevention of delinquency, offered the concept of the emotionally broken home. He suggested that delinquent behavior may be regarded as an unwholesome

³⁴August Aichhorn, Wayward Youth, New York, Viking, 1935, p.87-116.

³⁵Sheldon and Eleanor Glueck, Unraveling Juvenile Delinquency, p.163.

³⁶Op. cit., p.131-132.

defence against home situations. He concluded that it is not the economically sub-standard home, or the location of the home in a delinquency area, but its emotional tone, which makes the difference between law-abiding citizens and criminals.³⁷ The Gluecks in their 1950 study, in which an attempt was made to hold constant residence in an underprivileged area, found some support for Allport's views. They reported that their delinquents tended to be raised in homes of little understanding, affection, stability or moral fibre; that their parents were usually unfit to be their models, guides or protectors; and that a proper home environment for the development of a well-balanced personality, therefore, was lacking.³⁸

Beginning then, with unsuccessful attempts to find single causes of crime or delinquency, research workers generally learned to regard the problem as too complex for even a single discipline to solve. Environmental influences have been identified by sociologists which, if not causal in their relationship to delinquent behavior, are at least quite generally associated with such behavior. These influences can be classed as manifestations of

³⁷Gordon W. Allport, "Foreword", in Edwin Powers and Helen Witmer, An Experiment in the Prevention of Delinquency, New York, Columbia University Press, 1941, p.xxiv.

³⁸Sheldon and Eleanor Glueck, Unraveling Juvenile Delinquency, p.280.

social disorganization and include: poverty, overcrowding, urban residence, and the incidence of criminality in the home and neighborhood.

The psychological contribution has tended to emphasize personal experience and characteristics, which are generally associated with delinquency. These include: childhood experiences, particularly at home and in terms of parental discipline and affection, and personality deviations, as measured objectively by psychological tests. Retardation at school has been found more frequently among delinquents although it has not been established that they are inferior in general intelligence to non-delinquents. It has also been noted that delinquent behavior tends to be closely associated with age, the highest incidence occurring before the age of twenty.

2. Military Research

Researchers in the field of military delinquency were able to profit from civilian experience. One of the early experimental efforts, reported by Betts in 1947, made use of personal history material, which had been developed in civilian circles to predict parole violation. He assumed that a person, who would likely violate his parole, would be a poor risk, on grounds of conduct, for army service. The experiment was undertaken out of

necessity. Detention barracks in one United States Army command were overflowing and many men were undergoing confinement in civilian jails. In the interest of making the fullest use of available men, it was necessary to decide which men should be retained in the service. There was an air of urgency about the study and it could only be "after the event" in design.

Sixty-seven items of biographical material were identified, which differentiated 1,177 serious offenders from 1,050 non-delinquent enlisted men, and a group of recidivists from a sample of first offenders, both results being significant at the .001 level of confidence.³⁹ Betts' study, although far from conclusive because of its design, is of special interest here because it stimulated the research, upon which this report is based.

A second study, by Feldman and Maleski in 1948, also assisted in the choice of material for this research. Fifty illiterate, slow-learning men, who had been absent without leave, and a matched group of non-delinquents (matched for age, marital status, religion, size of home town, learning ability and military sub-unit) were differentiated to a highly significant extent (.001 level of confidence) by an inventory which the authors developed.

³⁹G.L. Betts, "The Detection of Incipient Army Criminals", in Science, Vol. 106, 1947, p.93-96.

The items and the responses of the two groups suggested a relationship between absence without leave and the following factors: truancy, misconduct at school, lack of discipline at home, no church attendance by the subject or his parents, restless job histories, frequent arrests, excessive drinking, promiscuous sexual relationships, and unsuccessful marriages. The delinquents were reported to be generally resentful toward induction and poorly motivated toward continued service. They reported a variety of physical complaints and were judged to have responded to situations of tension by withdrawing or acting aggressively.

The announced purpose of the study was to design a selection device, which would make it easier to identify individuals who were likely to go absent without leave.⁴⁰ The Feldman and Maleski findings were certainly suggestive, but there was no cross-validation and the sample was markedly restricted in terms of mental ability and education. However, the fact that marked differences were found between the two closely matched groups was of considerable significance.

⁴⁰Harold Feldman and Alexander A. Maleski, "Factors Differentiating AWOL from Non-AWOL Trainees", in the Journal of Abnormal and Social Psychology, Vol. 43, 1948, p. 70-77.

In 1948, Clark reported a study in which he had assessed the efficacy of the MMPI in differentiating men who had gone absent without leave only once (N:45) and recidivists (N:55). He found that no one scale of the MMPI distinguished between the two sub-groups of delinquents to a statistically significant extent. However, he did identify twenty-four MMPI items which, in combination, were capable of differential discrimination at the .001 level of confidence.⁴¹ As in the other two studies mentioned, there was no cross-validation of the findings.

In the same year the first Canadian research on military delinquency was begun by the present author. The initial study, which was reported in 1950, employed extreme groups and was designed to discover whether delinquents differed from non-delinquents in the Canadian Army.⁴² Three criterion groups were compared on five psychological measures (the MMPI, Personal Inventory "B"),⁴³

⁴¹Jerry H. Clark, "Application of the MMPI in Differentiating AWOL Recidivists from Non-Recidivists", in the Journal of Psychology, Vol. 26, 1948, p. 229-234.

⁴²W.R.N. Blair, "A Comparative Study of Disciplinary Offenders and Non-Offenders in the Canadian Army, 1948", in the Canadian Journal of Psychology, Vol. 4, 1950, p. 49-62.

⁴³A psychiatric questionnaire developed by the Applied Psychology Panel for the United States Defence Department during the last war.

two attitude questionnaires referring to the treatment of criminals, a biographical questionnaire devised by the present author, and Revised Examination "M", which is the test of intelligence used by the Canadian Army). The biographical questionnaire comprised over one hundred and fifty questions regarding childhood history, school and occupational experience, personal habits and hobbies and conduct record. The criterion groups comprised: a sample representative of military delinquents (N:50), so classified because they had committed offences against military law, and had been sentenced to detention; one matched control group of non-delinquents (N:50), so classified because they had served at least one year without committing an offence (the matching factors were: age, intelligence, education, racial origin and rural-urban background); and a second control group of non-delinquents (N:75), chosen at random from the non-delinquent other rank population of the Canadian Army.

In testing the significance of the differences between the mean scores of the delinquents and the non-delinquents, it was noted that the K correction of the MMPI did not improve inter-group discrimination consistently, so it was omitted from the following comparisons. Delinquents were distinguished from non-delinquents in both random and matched control groups on

ten scales of the MMPI at a level of confidence represented by P.05.⁴⁴ Five of the inter-group differences were significant at P.001, in both comparisons, (F, Pd, Pa, Pt and Sc). A coarse item analysis, subsequently refined by the use of chi-square, indicated that it might be possible to develop a delinquency scale for the MMPI. Delinquents and non-delinquents were also differentiated by the age factor, total "M" score, education and fifty-four items from the author's questionnaire and the Personal Inventory "B", at P.05, except of course where matching had been involved. The delinquents were significantly younger, less well educated and less intelligent according to those results.

In 1949, the variables were tested by the author in a cross-validity experiment, using a new sample (gathered consecutively) of delinquents (N:50) and a random sample of non-delinquents (N:50).⁴⁵ All scales and items, which had functioned at P.05 in the 1948 study, were re-examined. The same criteria of delinquency and

⁴⁴Results at that level of confidence were accepted as significant, pending the repetition of the study with fresh samples in 1949. Because repetition was planned, it was essential that the possibility of real differences should not be overlooked through the application of a stringent test of significance.

⁴⁵W.R.N. Blair, Unpublished Research Notes, 1949, Ottawa, Personnel Selection Service, Army Headquarters, (no pagination).

non-delinquency were applied. Inter-group differences were tested for statistical significance, with and without the K scale correction. It did not improve the differentiation of the two groups; in fact, the differences between the means divided by the standard errors of the differences were consistently smaller, when the K correction was added. The results, therefore, are reported without that correction.

Seven of the MMPI variables continued to distinguish between delinquents and non-delinquents at P.05. Differences on six of them were significant at P.001, (F, Pd, Pt, Sc, Ma and K). The mean age difference was significant at P.001; the delinquents were younger. The mean educational grade difference was significant at P.05; the delinquents had less education. The Depression, Lie and Hypochondriasis scales of the MMPI ceased to distinguish between delinquents and non-delinquents, as did the total "M" test score.

Twenty-eight of the questionnaire items, identified by chi-square analysis, continued to function at P.05, (nine of them at P.001 and eight at P.01). These items were combined into a single questionnaire, which was named the Experience Scale. Because of the direct relationship of the 1948 and 1949 studies with the research project, upon which this thesis is based, a summary of the

results of the earlier studies has been included as Appendix 1.

An item analysis of the MMPI was not undertaken by the author, but Laver, an associate, was encouraged to pursue that line of development. The author chose to continue the study of the MMPI variables in their original form, together with the Experience Scale, for three reasons. First, it was understood that reliability of any prediction instrument, which might be constructed, would tend to be higher if several scales, rather than one, were used.⁴⁶ Second, it was hoped that the use of the original scales would permit a comparison of the results of the research with other studies, in particular with a predictive experiment in the civilian field, which was announced in 1951.⁴⁷ Third, the delinquent group was not assumed to be homogeneous, and it was desired to obtain as much information as possible regarding its composition. A multi-scale approach appeared to be the more promising in that connection.

On practical grounds it was desirable to find out whether delinquency could be predicted with a short scale,

⁴⁶J.P. Guilford, Fundamental Statistics in Psychology and Education, New York, McGraw-Hill, 1950, p.466-467.

⁴⁷Starke R. Hathaway and Elio D. Monachesi, "The Prediction of Juvenile Delinquency Using the MMPI", in the American Journal of Psychiatry, Vol.108, 1951, p.469-473.

which could be administered quickly and independently in an emergency. Laver analyzed the items and identified twenty-five for a delinquency scale and thirteen for a suppressor scale. Together, the two scales correlated with the criterion in the sample, from which they were derived, at $R = .56 \pm .04$.⁴⁸ Although these initial results are very promising, they require the test of cross-validation and the trial of the scales independent of the other MMPI items before any definite conclusions concerning their practicality may be drawn.

Several other reports on military delinquency, which have appeared since 1949, merit attention. Two extreme groups studies of delinquents and non-delinquents, one by McCollum⁴⁹ in 1951 and the other by Clark⁵⁰ in 1952, involved the MMPI. McCollum, whose United States Air Force subjects were serving in Alaska, found intergroup differences significant at the $P = .001$ on the F, Pa,

⁴⁸ Alfred Bryan Laver, Item Analysis of the MMPI Against an Army Misconduct Criterion, unpublished M.A. thesis presented to the Faculty of Arts, Queen's University, 1955, v-117p.

⁴⁹ Ernest L. McCollum, Survey of Human Adjustment Problems in the Northern Latitudes, A Study of Military Offenders, Report of the Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska, 1951, p.6.

⁵⁰ Jerry H. Clark, "The Relationship between MMPI Scores and Psychiatric Classification of Army General Prisoners", in the Journal of Clinical Psychology, Vol. 8, 1952, p.86-89.

Pd and Ma scales. These scales were comparably discriminative in the 1948 and 1949 Canadian studies. Clark found the Pd and Ma scales, among others, particularly discriminative, also at P.001, and suggested that a pattern with elevations on both scales might be typical of all general army prisoners. Although cross-validation was lacking, the studies indicated that personality deviations, among military delinquents and as measured by the MMPI, were not confined to Canadian Army subjects.

A report by Trenaman,⁵¹ published in 1952, although concerned primarily with describing an experiment in reclamation, provided interesting evidence concerning the pre-enrolment backgrounds of young military delinquents in the British Army during the last war. Sampling limitations, reported by Trenaman, render his comparisons of delinquents and non-delinquents somewhat inconclusive. The evidence about the delinquents themselves, however, appears to have been obtained from a reasonably representative sample. The delinquents tended to come from inadequate homes, where discipline was lax or severe and the parents generally were neglectful or, in some cases, indulgent.

⁵¹Joseph Trenaman, Out of Step, London, Methuen, 1952, xx - 223p.

Notwithstanding the inadequacy of many of their homes, the delinquents tended to be strongly attached to them and dependent upon their parents. Although they were not substantially inferior in intelligence to a recruit population, the delinquents were retarded in school. Generally, they reported unhappy memories of school years, which were marked by truancy and frequent punishment. They tended to have few hobbies and their leisure time activities, chiefly attendance at picture shows, were judged to reflect restlessness and boredom. Almost without exception, delinquents came from the poorest working-class homes. Large families, an urban location and overcrowding were typical of their homes.

In summing up his results, Trenaman noted that no one causal factor had emerged and that the reported correlates of delinquency could be found, but to a lesser extent, among the non-delinquents, too. He concluded that a delinquent's actions could be understood only with knowledge of his early years, when the pattern of his subsequent behavior was being moulded. According to him, most of his military delinquents showed symptoms of early weaknesses and deep seated troubles, some of which were: truancy, absence of any hobby, excessive job changes, wandering and frequent attendance at picture shows.

In 1953, the Personnel Research and Procedures Division of the United States Army published a report on

the development of what was termed the Army Personality Inventory. It comprised 291 MMPI items, which distinguished at P.05 between pre-tested basic trainees, who later went absent without leave or were referred to a psychiatrist, and normal trainees, matched on age and intelligence test scores. Scales were developed to predict adjustment during basic training and long-term adjustment ("favorable" or "unfavorable" release at the end of an eighteen month engagement). The latter scale, which was the more promising, when combined with age, years of civilian education and intelligence test score, had a cross-validity of R.39. It was concluded that the combination showed sufficient promise to warrant continued research.⁵²

As mentioned in the Introduction, a similar large scale study was begun in the United States Navy in 1952; an interim progress report was published in 1954; and the final report is expected in July 1956. Preliminary trials of a personality inventory (containing 200 items from the MMPI) were followed by three item analyses, based on the responses of successive samples of delinquents in confinement and non-delinquents. Preliminary results were

⁵²Personnel Research Branch, Self-Description Instruments for Classifying Enlisted Men, Washington, The Adjutant-General's Office, Department of the Army, 1953, 9p.

considered favorable to the final undertaking, the identification of the incipient offender before his offences. The inventory, which had been reduced to 143 items, was administered to approximately twenty thousand recruits at enrolment. That large sample will be split to provide cross-validation.

In an interim report the author noted that the feasibility of selecting out men, who are likely to become serious disciplinary cases, must be explored because large numbers of such men are confined and efforts made at their rehabilitation are unsuccessful in half of the cases.⁵³ The study is mentioned primarily to point up that effort along the lines of the research to be reported in this thesis continues to be directed toward the solution of the military delinquency problem.

A report by Osburn⁵⁴ on a United States Army study of delinquency is of interest for two reasons. First, it reminds research workers that environmental factors within the military services cannot be ignored. The inquiry was far from exhaustive but it did reveal that delinquents were characteristically not integrated with specific units. It

⁵³Charles Hanley, An Inventory of Personal Opinions, First Technical Report on Rehabilitation Research, U.S. Naval Retraining Command, Camp Elliot, San Diego, 1954, 17 p.

⁵⁴Hobart G. Osburn et al, A Preliminary Investigation of Delinquency in the Army, HumRRO Technical Report 5, Human Resources Research Office, The George Washington University, 1954, xii - 152 p.

was presumed that such men tended to lack whatever group supports might be afforded by integration. Second, Osburn also found a significant difference ($P < .01$) between his delinquents ($N:616$) and non-delinquents ($N:1216$), in respect of socio-economic background. The fathers' earnings and occupations were the factors chosen to classify the subjects.

With only a few notable exceptions, and two of those incomplete and another not very successful, studies of military delinquency have been conducted after the identification of delinquents and non-delinquents according to their military conduct. Generally, too, they have involved extreme group comparisons, which were not cross-validated or extended to populations. Notwithstanding those limitations, the studies have yielded remarkably consistent results. They have indicated that men, who offend against military laws in three countries and are sentenced to detention, differ on many of the same variables from men, who serve without committing offences, or whose misdemeanours result in minor punishments. The consistent inter-group differences may be summarized as follows:

a) School history.— Delinquents tend to stop school earlier. They are more likely to be retarded although, as a group, they are not significantly less intelligent.

Their behavior records are more frequently marked by truancy and other misconduct.

b) Job history.— Delinquents tend to change jobs more frequently, and for no good reason, or because of disagreements with employers.

c) Civilian conduct.— Delinquents more frequently have records of excessive drinking, arrests or jail sentences.

d) Leisure time activity.— Delinquents are less likely to have any kind of hobby.

e) Age and marital status.— Samples of delinquents almost invariably have a lower average age than non-delinquents. They tend to be single or unsuccessfully married.

f) Personality.— As indicated by objective tests, particularly the MMPI, and as confirmed by observations of behavior, delinquents are more likely to appear aggressive and defiant, impulsive, socially insensitive and unwilling or unable to face reality.

g) Home atmosphere.— Evidence of extreme or erratic disciplinary practices in their homes tends to be characteristic of military delinquents. Parental neglect of children and a less cohesive and congenial family life also tend to be associated with delinquent behavior in a military setting.

In two studies, one conducted in the United States and one in England, the socio-economic characteristics of the subjects' homes were reported to be related to delinquent behavior. This relationship was not found in the 1948 Canadian study. In the latter study subjects were asked whether their mothers were required to work outside the home, whether their fathers were regularly employed, whether their parents owned their homes or rented them and delinquents and non-delinquents were compared on the basis of their fathers' incomes. No statistically significant differences were found at the minimum level of confidence (P.05).

The consistent correlates discovered in the military research clearly resemble those found in civilian studies of delinquency. Points of similarity comprise: the youthfulness of the delinquents; their relative lack of educational achievement and their truancy during school years; their relatively erratic employment records; the inadequate discipline in their homes, which was not characteristic of the homes of non-delinquents; their misconduct after school years; and their deviations on tests of personality. Only one study, the Hathaway and Monachesi research in the civilian field, reported "before the event" differences, which could be compared with differences observed after subjects had become delinquent.

Those predictive differences were on the Psychopathic Deviate, Hypomania, and F scales of the MMPI.

The 1948 and 1949 Canadian studies were subject to the limitations of most other research, in that they were conducted after the composition of the criterion groups had been determined by conduct records. The delinquents had obtained significantly higher, or more abnormal, scores on several scales of the MMPI. However, they were serving sentences in detention at the time they were tested. The differences between the two extreme groups of delinquents and non-delinquents, might have been at least in part attributable to factors other than pre-enrolment characteristics. The status and the recent experience of the delinquents, for example, might have influenced their responses on the MMPI. (Rubin⁵⁵ raised this possibility in connection with the recent Gluecks' research, in which they compared institutionalized delinquents with non-delinquents). It was also apparent that their answers to questions in the biographical material, for example, those dealing with attitudes toward home discipline or school experience, might have been colored by their delinquent status or recent experience. Although reliable and

⁵⁵Sol Rubin, "Unraveling Juvenile Delinquency, I. Illusions in a Research Project Using Matched Pairs", in the American Journal of Sociology, Vol. 57, 1951, p.109.

statistically significant differences had been demonstrated in the two studies, it had not been discovered whether men, who later become delinquent, and men, who do not, can be distinguished at the time of enrolment. Prediction could not be contemplated until that possibility had been examined. The report to follow in the next chapter will indicate the results of that examination.

The operation of the K scale of the MMPI was mentioned earlier. The delinquents in both studies scored significantly lower on that scale. (Differences were significant at P.01 and P.001 in 1948 and 1949, respectively). A low K score, according to the authors of the MMPI, tends to be obtained by a person, who is "overly candid" in describing himself, or by one who deliberately attempts to make a bad impression.⁵⁶ Either meaning would seem consistent with an hypothesis that soldiers in detention (the delinquents in the two studies) would tend to react in a manner different from new recruits. Presumably recruits, who subsequently emerged as delinquents, might not differ significantly on the K scale from men, who were later identified as non-delinquents. The hypothesis was capable of being tested within the data of a predictive study, which will be reported upon later.

⁵⁶S.R. Hathaway and J.C. McKinley, Manual Revised 1951, Minnesota Multiphasic Personality Inventory, New York, The Psychological Corporation, 1951, p.18.

CHAPTER II

PREDICTION IN PSYCHOLOGY

The problem of prediction is important in psychology. Many decisions in selection, counselling and therapy cannot be made with confidence unless prior evidence concerning their predictive accuracy has been obtained. Many theories in the same areas are only hypotheses until they have been put to a predictive test. Notwithstanding the importance of the subject, the scientific literature contains few, thorough and significant reports on prediction. The deficiency is particularly noticeable in the field of delinquency, where theories and measures of social control have been developed generally on the basis of inconclusive extreme group, "after the event" studies. Prediction is the central problem of this thesis. Selected literature on the subject, therefore, will be discussed in this Chapter, as a preliminary to the presentation of the research.

Myers in a 1950 article¹ decried the lack of attention to prediction in psychology generally and in the field of clinical psychology in particular. The deficiency

¹C.R. Myers, "Prediction in Clinical Psychology", in the Canadian Journal of Psychology, Vol. 4, 1950, p.104-107.

was apparent to him in the paucity of published reports on the results of predictive studies. He cited MacLeod, who had said, "The goal of science as science is not prediction and control but understanding. Prediction is merely the test of understanding and control the practical reward."² Myers endorsed the view that psychologists, as scientists, have a responsibility to assess the adequacy of their understanding by trying it out in a predictive setting. He urged psychologists to predict in precise terms, check on the outcome of their predictions, study their errors and regard the process as necessary to improve their understanding.

Sarbin in 1944 had adopted a similar approach, when he reported a need for self-discipline in psychology, particularly in clinical psychology. It was his opinion that clinicians tended to use hypotheses rather than test them and, like Myers, he regarded the testing process fundamental to the growth of understanding.³ Chien, in a reply to Sarbin, pointed out that the clinician

²R.B. MacLeod, "The Phenomenological Approach to Social Psychology", in the Psychological Review, Vol. 54, 1947, p. 209 quoted by C.R. Myers, "Prediction in Clinical Psychology", p. 105.

³T.R. Sarbin, "The Logic of Prediction in Psychology", in the Psychological Review, Vol. 51, 1944, p. 210-228.

has an immediate social responsibility to try to influence or correct deviant behavior and cannot wait for the arrival of prediction tables.⁴

The argument that clinical psychologists and psychiatrists must try to help people in emotional distress, although their knowledge is very imperfect, is rarely questioned and the control, which is implied, really is not the concern of this thesis. However, Sarbin's primary point concerned the need to test hypotheses. He was opposed to the continued use of untested ones, regardless of their plausibility. Chien's introduction of the subject of control was not particularly relevant. Indeed his argument suggested that someone, other than the clinician, is responsible for the testing of predictions and for the construction of prediction tables. Myers' view was that the clinician should verify his own predictions and thus improve his knowledge and skill. His view was consistent with Sarbin's and did not appear to imply any disregard for the importance of control.

If the view expressed by McLeod, quoted above, is accepted, then it would be premature to assume an

⁴Isidor Chien, "The Logic of Prediction: Some Observations on Dr. Sarbin's Exposition," in the Psychological Review, Vol. 52, 1945, p.175-179.

understanding of psychological phenomena until that understanding had been tested and found adequate in a predictive setting. In the case of the clinician it would seem that his theoretical assumptions should be tested by an examination of the accuracy of his predictions. Yet, according to Meehl, when some clinicians are asked for such validating information, they reply that they do not work in a mechanical way and that the usual statistical procedures are not applicable to their work.⁵ Meehl's point of view is that the clinician places himself in an untenable position if he adopts that stand. He replied

Regardless of one's theory of personality or choice of data, or method of combination for predictive purposes - by intuition, table, equation, or rational hypothesis developed in a case conference - the honest clinician cannot avoid the question "Am I doing better than I could by flipping pennies?"⁶

Eysenck developed the subject further and stated it is sometimes argued that the large number of determinants of psychological phenomena, with their complex interrelationships, cannot be treated in a mathematical fashion. Support has been inferred from that

⁵Paul E. Meehl, Clinical Versus Statistical Prediction, A Theoretical Analysis and a Review of the Evidence, Minneapolis, University of Minnesota Press, 1954, p.14.

⁶Paul E. Meehl, Clinical Versus Statistical Prediction, p.136.

complexity for the use of interviews, intuitive judgements and other subjective procedures.⁷ The latter position is exemplified in Assessment of Men in the following terms:

Furthermore we would guess that no matter how substantial are the advances of scientific psychology, the best series of predictions of individual careers - apperception operating as it does - will involve the play of experienced intuitions, the clinical hunch, products of unconsciously perceived and integrated symptomatic signs.⁸

The actuarial position, on the other hand, as described by Eysenck, is that there is only one best combination of a set of measures, their interrelations and their relationships with a criterion, which will yield the highest possible predictive accuracy. That combination, according to him, "can be reached by orthodox statistical methods of multiple correlation; the intuitive brain being at best able to equal but not to excel" the predictive accuracy attained by multiple correlation.⁹

The relative validities of the clinical and the statistical propositions can be tested and, to some extent, they have been tested. In a recent book, Meehl

⁷H.J. Eysenck, The Scientific Study of Personality, London, Routledge and Kegan Paul, 1952, p.22.

⁸The OSS Assessment Staff, Assessment of Men, Selection of Personnel for the Office of Strategic Services, New York, Rinehart, p.8.

⁹H.J. Eysenck, The Scientific Study of Personality, p.22.

discussed twenty reports, in which some evidence concerning the efficiency of the two methods could be found. He reported that the clinical method was shown to be inferior in about one-half of the studies. In the remainder, he judged that the two methods were equal.¹⁰ He found only one study, in which a clinical approach excelled a more mechanical approach, and there the method of treating the variables was quite unsophisticated from a mathematical standpoint.¹¹

Even in the report of the Office of Strategic Service, which was quoted earlier in support of the clinical approach to prediction, the evidence tends to question efficiency of that approach. The authors frequently appeared to find themselves in the position of trying to explain the unimpressive results of their ambitious program. In the section of the report dealing with its evaluation they stated, "None of our statistical computations demonstrates that our system of assessment was of great value."¹²

An examination of predictive accuracy, as discussed by Meehl and Rosen (1955), must take account of

¹⁰Paul E. Meehl, Clinical Versus Statistical Prediction, p.119.

¹¹Paul E. Meehl, Clinical Versus Statistical Prediction, p.108-110.

¹²The OSS Assessment Staff, Assessment of Men, p.423.

the base rate of the phenomenon, which is predicted.¹³ For example, if it were desired to test the ability of a personality inventory to predict psychiatric casualties in military service, the general incidence of psychiatric casualties in the military population must be considered. To be judged effective, the personality inventory would have to result in a lower incidence of casualties; in other words, it would have to improve upon the base rate of psychiatric wastage. If it did not improve upon that rate, equal or greater accuracy of prediction would be achieved simply by predicting in accordance with the known incidence of psychiatric casualties, rather than by basing predictions on inventory results. The authors noted that base rates are seldom recorded in psychological literature and that, when they can be estimated, the claimed predictive accuracy of certain psychometric instruments sometimes is not supported. They suggest that information, from which base rates may be calculated, is usually available but is not often used.

Another aspect of the prediction controversy can be illustrated by reference to a paper by Snygg. His position, described as phenomenological, is that laws of normative behavior do not permit the prediction of

¹³Paul E. Meehl and Albert Rosen, "Antecedent Probability and the Efficiency of Psychometric Signs, Patterns or Cutting Scores", in the Psychological Bulletin, Vol. 52, 1955, p.194-216.

individual behavior. Referring to delinquency, he suggests that, regardless of the availability of information concerning family income, intelligence and other objective factors, a psychologist, when dealing with an individual delinquent, is almost sure to want more immediate and personal information. According to Snygg, he would want to know how the subject thinks about himself, his home, his parents and his present situation. If all such facts about the subject's individual "field" were known, "accurate prediction" of his behavior, according to Snygg, would be "theoretically possible".¹⁴

Allport also has argued that "prediction is possible only from knowledge of the individual alone".¹⁵ However, even while insisting that man must be regarded largely as functionally autonomous, Allport has recognized that the psychodynamics of a life are "continuous with early motivational formations".¹⁶ Essentially both Snygg and Allport emphasize that each man is unique and that no man is a mere slave to a statistically determined fate.

¹⁴Donald Snygg, "Predicting the Behavior of Individuals", in the Canadian Journal of Psychology, Vol. 3, 1949, p.19-29.

¹⁵Gordon W. Allport, Personality, A Psychological Interpretation, New York, Holt, 1937, p.559.

¹⁶Gordon W. Allport, "The Trend in Motivational Theory" in the American Journal of Orthopsychiatry, Vol. 23, 1953, p.117.

Meehl, in discussing Allport's point of view, stated that it is generally sensible but that Allport does not present a valid argument against drawing inferences from class membership. He stated "If nothing is rationally inferrable from membership in a class, no empirical prediction is ever possible". Meehl also makes the important point that a prediction does not have to be completely accurate to qualify as a prediction.¹⁷ Regarding the uniqueness of each person, Eysenck makes the point that being unique can imply being different from other persons; and, further, that "unique individuals cannot meaningfully be said to be different from each other unless they are being compared along some quantitative variable".¹⁸

Even if the possibility of prediction of behavior from group normative data were admitted, there would be disagreement as to what kind of measures to use. Eysenck in his search for dimensions of personality has favored what he terms "Objective behavior tests". He has argued that they appear to tap more fundamental layers of personality than do other types of tests, such as questionnaires and projective tests. He reasoned that it

¹⁷Paul E. Meehl, Clinical Versus Statistical Prediction, p.20-23.

¹⁸H.J. Eysenck, The Scientific Study of Personality, p.19.

would seem more "cogent" to draw inferences about personality from behavior rather than to try to link what a person says about his behavior or what he says about a picture or an ink blot with what he does.¹⁹ It would appear that Eysenck equates "behavior" with the pressure exerted by a person in drawing a line or a subject's tendency to sway or fall, while blindfolded and receiving suggestion, but not with responses to questions. It is suggested that the distinction may be debatable. It may also be significant that Eysenck used a questionnaire, the Maudsley Medical Questionnaire, in his major study of neuroticism. It had the highest correlation of any of the large number of variables with which he experimented.²⁰

Ellis has criticized personality inventories and questionnaires from a different position following a survey of reports dealing with them from 1946 to 1951. Although he noted that in most cases they were found to be significantly discriminative when used with neuro-psychiatric, psychosomatic, alcoholic, age, sex, ethnic and college groups, he found fault with them on other grounds. Lack of independence of traits, which they were supposed to measure, was evident to him from the high

¹⁹H.J. Eysenck, The Scientific Study of Personality, p. 3-4.

²⁰Op. Cit., p. 127-148.

intercorrelations of some of their sub-scales. Other deficiencies, according to Ellis, were lack of agreement with Rorschach and other projective tests, and ease of faking.²¹ He concluded that a clinical psychologist could, in the time required to score and interpret a test like the MMPI, get much more "pertinent, incisive and depth-centered 'personality' material from a straightforward interview technique" ²²

Calvin and McConnell then examined the record of the MMPI alone in the light of Ellis' criticism. Their observations and conclusions were: the authors did not claim independence of sub-scales; lack of correlation with Rorschach and other projective tests did not necessarily mean lack of validity to predict other criteria; deliberate distortion had been consistently detected by the special scales of the MMPI under experimental conditions; a consistent record of abnormal-normal, intergroup discrimination by the MMPI was found in the literature; and, finally, the superiority of clinical intuition over the MMPI called for "careful examination."²³

²¹Albert Ellis, "Recent Research with Personality Inventories", in the Journal of Consulting Psychology, Vol. 17, 1953, p.47.

²²Op. Cit. p.48.

²³Allen Calvin and James McConnell, "Ellis on Personality Inventories", in the Journal of Consulting Psychology, Vol. 17, 1953, p.462-464.

In summary, it has been noted that a need for predictive studies in psychology has been expressed. The objectives of such studies were seen to be the testing of hypotheses and the improvement of understanding. The practical need to do something about human distress was recognized but it was also argued that the efficacy of attempts at control should be assessed continually. The notion that psychological variables are too complex to be treated mathematically was examined briefly. Although the evidence was not conclusive, it strongly suggested that mathematical-treatment of psychological data is not only possible but generally to be preferred to clinical judgment in making predictions. Base rates of predicted phenomena were observed to require attention in establishing the predictive efficacy of any psychological instrument or method. Two opposing views that behavior can or cannot be predicted from group norms were outlined.

Answers to most of the theoretical and practical issues, described above, were sought in the research, which is reported in the following chapters. It had been discovered in two previous studies by the author that certain variables distinguished between delinquents and non-delinquents, after they had been otherwise identified. The choice of experimental variables for those studies had been made largely on the ground that they represented

current understanding of the delinquency phenomenon. The crucial phase, which remained, was to test that understanding in a predictive experiment.

The research offered a limited opportunity to compare the efficiency of clinical and statistical prediction because the experimental sample was enrolled following selection, which was based largely upon an unstructured selection interview. The operation of the experimental variables, on the other hand, and their combination to predict the criterion, were treated in a statistical manner.

The experimental variables, used in the study, comprised self-report, biographical or personality inventories. The performance of those variables was assessed in relation to criticism concerning their lack of validity, reliability and comprehensiveness.

CHAPTER III

REPORT ON RESEARCH WITH A NARROW CRITERION

The Chapter title refers to a narrow criterion. It was chosen to distinguish between two phases of the research. In the first phase, which will be reported in this Chapter, the criterion of military delinquency was a sentence to detention. The criterion was narrow in the sense that men sentenced to civilian jails, and certain other offenders, were not included. That particular criterion was applied in the 1948 and 1949 studies. It was adopted for the first phase of this research to permit a comparison of the predictive study with the earlier studies, which were "after the event" in design. The Chapter contains two sections. In the first, predictive validity of the experimental variables with extreme groups, constituted as in the 1948 and 1949 studies, is assessed. The variables are those which survived the 1948 and 1949 validity and cross-validity trials. In the second, predictive validity of the experimental variables with a complete sample of recruits is examined.

1. Predictive Validity with Extreme Groups

An experimental sample of English-speaking recruits (N:481) was gathered during the first three months of 1950. It was selected as recruits were enrolled, consecutively, at all thirteen enrolment depots in Canada from St. John's, Newfoundland to Vancouver, B.C. The sample was intended to represent the population of Canadian Army recruits enrolled during the post-war period to March 1950.

To assess its representativeness the sample was compared with large samples of the population on education and "M" score. The sample means were almost identical. Subjects in the experimental sample averaged approximately nine years of schooling, as did subjects in a larger sample (N:15,071) of the population (9.3 and 9.0, respectively). The average "M" score obtained by subjects in the experimental sample was 154.6 and, in a large sample (N:5,429), 150.0.

As might have been expected, the experimental sample, which was made up entirely of new recruits, differed from the population in terms of age. The average age of the experimental sample was 20.9 and of a large sample (N:16,193), 27.6. However, it had been established in the author's 1948 study that delinquents differed significantly on MMPI and biographical variables, even when matched on the age

variable. It was concluded, therefore, that the experimental sample (N:481) was sufficiently representative to permit generalization of results to a defined population.

Because individuals were believed to behave generally in a consistent fashion, it was hypothesized that consistency in inter-group differentiation on the experimental variables would be found in a predictive study. The K scale of the MMPI was judged to be a possible exception. As discussed in Section 2, Chapter I, if the interpretation assigned to that scale by the authors of the MMPI were correct, inconsistency in its performance appeared to be a possibility. Of course, if military misconduct were due largely to environmental stress, consistent inter-group differences on the other experimental variables would be improbable.

The following null hypothesis was constructed: There are no significant differences (P.05), at the time of their enrolment, between men who become delinquent and men who are later identified as non-delinquents, on the variables which were found to be consistently discriminative in the 1948 and 1949 studies. The K scale was treated separately for the reason noted above.

Measures of the experimental variables were obtained at the time of enrolment but, with one exception, they were

not used in any way to determine suitability for enrolment.¹ However, suitability was assessed in relation to current standards, which were quite demanding. They included: a minimum score on the "M" test, set at the mean of the distribution of scores of the general male population; a high degree of physical fitness, as determined by a medical board; suitability for some available Army employment; and, a likelihood of adjusting satisfactorily to Army service, as judged during a thorough selection interview.

Although they were not used in selection, curtailment in respect of other experimental variables also appeared probable, assuming that they were related to misconduct, because a serious effort was made to select out men, who might not adjust satisfactorily. Correction for curtailment, however, was not possible. No assessment of false negatives (men rejected following interview, who might not have become delinquent) was possible either.

The design of the study was simple. It involved, first, gathering pre-enrolment information concerning the experimental variables on a sample of new recruits. Four years after enrolment, in 1954, the military conduct records of the men were examined. Delinquents and non-delinquents were identified, according to the criteria, which were

¹Enrolment standards included upper (45) and lower (17½) age limits and age was one of the experimental variables.

applied in the 1948 and 1949 studies (sentence to detention or no misconduct). Differences between the two criterion groups on the experimental variables, which had survived the two earlier studies, were then calculated and tested for statistical significance.

Reliability of the sentence to detention criterion could not be assessed directly. It involved an administrative decision by a commanding officer, who judged each offence and made his award in relation to instructions concerning awards, his own powers, the attendant circumstances and the record of conduct before the offence. An award of detention is a serious matter, however, and it is believed safe to assume that commanding officers, as responsible men, would not make such awards without careful consideration. No contamination of the criterion through knowledge of the test results was possible.

The experimental variables were those, which had differentiated delinquents and non-delinquents consistently and significantly in the two previous studies. They were:

Seven MMPI scales (F, Pd, Pa, Pt, Sc, Ma and K)

Age

Education (Educ.)

Experience Scale (E.S.)²

²See Appendix 1.

The criterion groups consisted of 87 delinquents, who had committed offences against military law and had been sentenced to detention, and 167 non-delinquents, who had committed no offences against military law. The 227 cases remaining in the sample, which totalled 481, did not qualify by definition for membership in either criterion group. They were omitted, therefore, from this phase of the research which, for comparative purposes, had an extreme groups design.

Means and standard deviations (S.D.) were calculated on the experimental variables for each criterion group. Then the statistical significance of each mean score difference (Diff.) was computed by dividing the difference by its standard error (S.E._D). The resultant sum, termed a critical ratio (C.R.) and the measures, which led to its calculation, are shown in Table I. The significance of each difference is shown under the heading P. One difference which did not attain the minimum level, is labelled "NS".

Table I reveals that nine of the ten experimental variables continued to distinguish between the delinquents and non-delinquents. It had been hypothesized that the tenth variable, the K scale, would not perform consistently on the ground that undifferentiated recruits would not regard themselves as critically as would delinquents in

Table I.- Comparison of Samples of Delinquents (N:87) and Non-Delinquents (N:167) on Ten Experimental Variables.

Var.	Delinquents		Non-Delinquents		Diff.	S.E. _D	C.R.	P
	Mean	S.D.	Mean	S.D.				
F	5.517	5.392	3.617	2.764	1.900	.616	3.08	<.01
Pd	17.891	4.403	15.165	3.607	2.726	.548	4.97	<.001
Pa	8.540	3.043	7.635	2.634	0.905	.385	2.35	<.05
Pt	10.316	6.515	6.506	4.141	3.810	.769	4.96	<.001
Sc	10.827	7.768	8.275	6.470	2.552	.972	2.62	<.01
Ma	18.902	4.406	15.817	6.576	3.085	.694	4.44	<.001
K	14.707	5.001	15.413	4.681	-0.706	.647	1.09	N.S.
Age	19.793	2.696	21.362	3.881	-1.569	.417	3.76	<.001
Educ.	8.977	1.093	9.569	1.420	-0.592	.161	3.68	<.001
E.S.	8.592	4.035	4.796	2.768	3.733	.483	7.73	<.001

detention. The latter had obtained lower K scores than the non-delinquents in the two earlier studies. Support for the hypothesis was obtained in this predictive phase of the research.

The operation of the K scale and the support for the hypothesis concerning it, were of interest but those results were relatively unimportant. The major finding was that men, who became delinquent, and men, who were later identified as non-delinquents, differed significantly on the experimental variables at the time of their enrolment. On the basis of that evidence, which was consistent with the earlier findings (1948 and 1949), the null hypothesis was rejected. The large and consistent mean score differences suggested that the successful prediction of military delinquency was a reasonable expectation.

In the 1948 and 1949 studies, the K correction had failed to accentuate the differences between delinquents and non-delinquents. It is of incidental interest to note that the addition of K, to the appropriate variables in the 1954 comparison, again did not improve the inter-group differentiation. The critical ratios were reduced routinely as follows: Pd, 4.237; Pt, 1.654; Sc, 2.602; Ma, 2.750. Thus, it was clear that the K correction, in the proportions developed by the authors of the MMPI, is not useful in extreme groups comparisons of military delinquents and

non-delinquents. Hathaway and Monachesi discussed this subject and concluded that, if a researcher were interested only in increasing such differences, it would be desirable to omit the correction.³ It should be noted, also, that the value of K as a suppressor variable in a sample, which was representative of a population, was not tested in the study reported above.

The differences between delinquents and non-delinquents on the F, Pd and Ma scales of the MMPI recall that Hathaway and Monachesi found those measures particularly discriminative in their study of juvenile delinquents.⁴ The delinquent criterion group in this research apparently was not homogeneous, as was indicated by the other differences, notably on the Pt, Sc and Pa scales. The variety of the differences suggested that the criterion possibly could be improved by taking more adequate account of variations among the military delinquents.

2. Predictive Validity with a Complete Sample

The prediction problem was not solved by the discovery that men, who became delinquent, differed at the time of enrolment from men, who served without committing

³Starke R. Hathaway and Elio D. Monachesi, Analyzing and Predicting Juvenile Delinquency with the MMPI, p.47-48.

⁴Op. Cit., p.112, 136.

offences. The two criterion groups accounted for only 254 men in a total sample of 481. The successful prediction of military delinquency necessarily would involve differentiating the men, who would likely become delinquent, and the remainder of a recruit sample. It was necessary to find out, therefore, whether the 87 delinquents could be distinguished from the remainder of the sample of 481 recruits.

A second null hypothesis was constructed in the following form: There are no significant differences, at the time of their enrolment, between men, who become delinquent, and the rest of a recruit sample on the variables, which had survived the previous studies. As noted in the Introduction, the view has been expressed that delinquents may differ notably from the rest of the population in only one respect, in that they have been caught breaking a law. If this view had any substantial validity in the military context, the second null hypothesis would tend to be supported and the successful prediction of military delinquency would not be a reasonable expectation.

In the event that significant differences were found and the null hypothesis were rejected, it was apparent that measures of the experimental variables would have to be combined in some fashion to predict the criterion. If only mean score differences were calculated, the method of

combination would be restricted. On the other hand, if a form of correlation were calculated, account could be taken of the relationships between the variables and the criterion, and between the variables themselves. The choice of statistical method was finally reduced to the multiple regression equation, provided assumptions underlying its use could be justified. That technique was selected as most appropriate because, as stated by McNemar, "it yields the optimum weighting for combining a series of variables in predicting a criterion".⁵

As indicated in the null hypothesis, the sample was dichotomized by applying a definition of a military delinquent. On one side of the artificially imposed dividing line were the delinquents; on the other side were the remaining subjects in the recruit sample. Classification of the two groups was not based on an intrinsic characteristic but on a judgement as to what constituted a delinquent. Other dividing lines could have been chosen. The selection of a method of correlation, however, depended upon more than the knowledge that the dichotomy was artificial. It was necessary to find out whether the criterion variable was continuously or point distributed.

⁵Quinn McNemar, Psychological Statistics, New York, Wiley, 1949, p.161-162.

A classification of the sample of 481, according to their service misconduct records, is presented below. The classification suggests a continuously distributed criterion variable, ranging from no recorded misconduct, through various gradations, to serious misconduct.

a) 167 men had no record of misconduct.

b) Of 199 men, whose conduct was mediocre but not bad, 107 had received minor awards for minor offences and 92 had received minor awards for short periods of absence without leave.

c) Of 50 men, whose misconduct was more serious, 43 had been sentenced to detention once or had been awarded fines instead of detention; 4 had records of frequent (two or more) and long (twenty-one days or more) absences without leave; and 3 had records of civilian convictions with no jail sentence.

d) 65 men were judged serious offenders. Of these, 35 were recidivists; 5 had been released for misconduct; 10 were unapprehended deserters; 4 had been awarded fines by civilian courts for fighting, stealing or drunkenness; and 11 had been sentenced to civilian jails.

The classification of men according to their conduct records, and the fact that the criterion variable had been artificially dichotomized, indicated that a biserial correlation, rather than a point biserial, should

be used in the initial calculations. With approximately 35% of the men in the "no misconduct" category, however, it was apparent that the criterion variable was not normally distributed in the sample. Pre-selection, in terms of likelihood of adjusting to military service, had taken place and was considered at least partly responsible for the skewed distribution. Confirmation regarding the pre-selection was obtained from a comparative examination of base rates of delinquency in the Canadian Army. During two other periods, which were characterized by less than customary attention to selection, the base rates of delinquency in relation to another criterion were 35 and 41 percent of enrolments. The base rate in the sample, which was studied in connection with this research, was 24 percent, in relation to the same criterion. It was concluded that the facts presented in the last two paragraphs justified the assumption that the variable underlying the dichotomy was continuously and normally distributed.

Two additional problems had to be considered before the data could be analyzed. First, it was necessary to find out whether the experimental variables and the dichotomized criterion were linearly related. Second, a design had to be chosen, which would provide for cross-validation. A test for linearity of relationship,

suggested by Thorndike, was applied to the experimental variables.⁶ One of them, age, did not have a relationship which would have permitted its use in a conventional regression equation, and it was dropped from the study. The age=delinquency relationship is shown in Figure 1.

An article by Mosier provided the answer to the problem of research design. He discussed the dilemma, which faced this author, that of trying to obtain an unbiased estimate of the predictive effectiveness of a combination of variables, with only one sample. He proposed a design, which he termed "double cross-validation". It involved a division of the sample into two; the calculation of correlations with the criterion and partial regression coefficients for each sub-sample; and then the calculation of two R^2 , using the criterion correlations from one sample in combination with the regression coefficients of the other sample. If statistically significant and consistent results were obtained and a prediction formula were to be developed, Mosier recommended that its weights should be obtained from the total sample.⁷

⁶Robert L. Thorndike, Personnel Selection, Test and Measurement Techniques, New York, Wiley, 1949, p.183-184.

⁷Charles I. Mosier, "Problems and Designs of Cross-Validation", in Educational and Psychological Measurement, Vol. II, 1951, p.5-11.

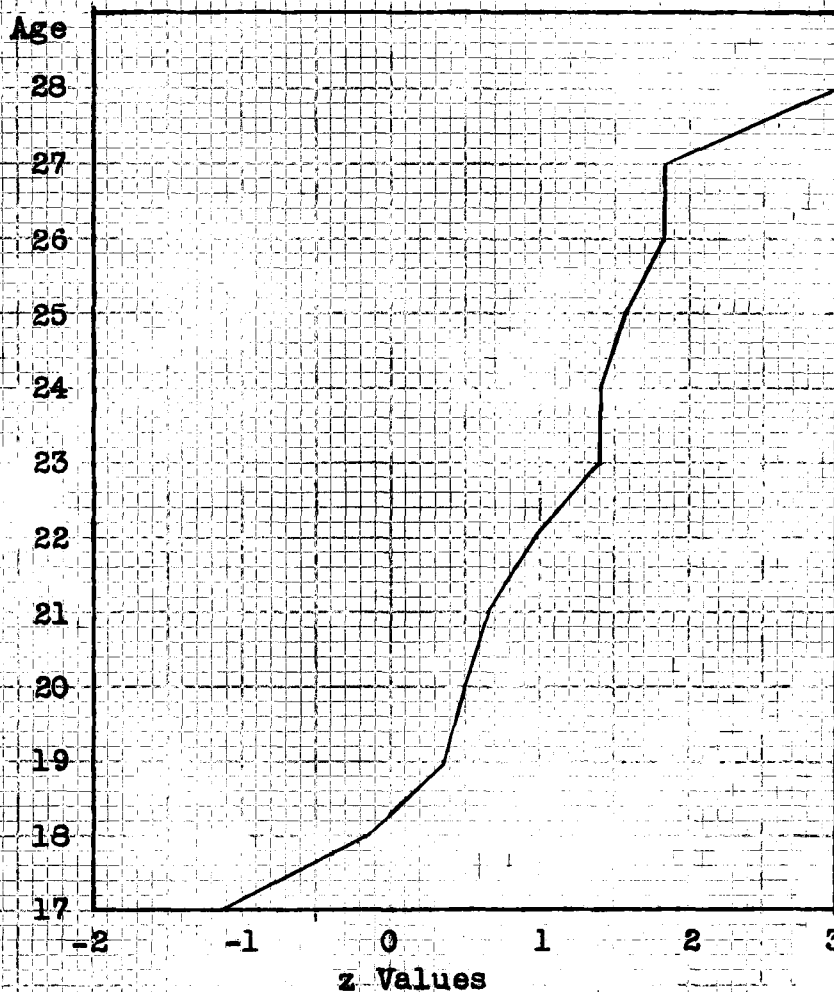


Figure 1.- Age-Delinquency Relationship¹ in Experimental Sample.

¹Calculated from cumulative percentage of delinquents at each age level translated into normal curve values.

Following the design proposed by Mosier two sub-samples were formed. The 87 delinquents and the remainder of 394 were arranged in alphabetical order. A table of random numbers was used to select the sub-samples. (One delinquent case was put aside to equalize the groups). Criterion correlations (r_{bis}) were calculated for each of the surviving variables and the statistical significance of the correlations was tested by dividing each one by its standard error (S.E.).⁸ The calculations are summarized in Table II.⁹

An examination of Table II reveals that significant ($P < .05$) correlations were found in both sub-samples on four of the eight variables which had distinguished between groups of delinquents and non-delinquents in the earlier studies. Three of the correlations (on F, Pd and E.S.) were significant in both sub-samples at $P < .001$. The fourth correlation on Ma was significant at the minimum level of confidence in both sub-samples. The correlations in those four instances indicated that the men who became delinquent differed

⁸A test for skewness was not applied. The frequency distributions appeared reasonably normal and the trait or characteristic underlying each variable was assumed to be normally distributed in the population.

⁹The K scale was included to test its efficiency as a suppressor variable in a study which was not confined to extreme groups.

Table II.- Biserial Correlations with a Sentence to Detention Criterion for Two Sub-Samples of Army Recruits.¹

Variable	Sub-Sample #1			Sub-Sample #2		
	r _{bis}	S.E.	P	r _{bis}	S.E.	P
F	.280	.089	<.01	.334	.087	<.001
K	-.045	.094	N.S.	.049	.094	N.S.
Pd	.344	.086	<.001	.349	.087	<.001
Pa	.060	.094	N.S.	.260	.090	<.01
Pt	.133	.093	N.S.	.081	.094	N.S.
Sc	.145	.093	N.S.	.199	.092	<.05
Ma	.209	.092	<.05	.206	.092	<.05
Educ.	-.235	.091	<.01	-.067	.094	N.S.
E.S.	.496	.079	<.001	.473	.080	<.001

¹Each sub-sample totalled 240 (43 delinquents and 197 non-delinquents).

significantly at the time of their enrolment from the remainder of a recruit sample. The null hypothesis advanced at the beginning of this Section, therefore, was rejected. It is noteworthy that, among the variables, the author's Experience Scale was the most highly correlated with the criterion in both sub-samples.

The K scale of the MMPI displayed one of the properties of a suppressor variable, a negligible correlation with the criterion. It remained to discover whether it would qualify fully as a useful suppressor through a substantial correlation with one or more of F, Pd, E.S. and Ma.

At the risk of throwing away a variable of some predictive value, it was decided to retain only those which were significantly correlated with the criterion in both sub-samples. Thus, although Pa and Education both had validity coefficients significant at P.01 in one sub-sample, and Sc at P.05 in one, also, those variables were excluded from subsequent calculations.

Reliability of the other experimental variables had been demonstrated in the form of consistent validity in four studies. In 1948 and 1949 the delinquents had been tested after they had committed military offences. In the third and fourth studies the tests had been administered at

the time of enrolment, before the men were subjected to any environmental stress in the military setting. The results of the four studies tend to refute the criticism that self-report inventory and biographical test material is very unreliable. The evidence is not conclusive, however, because of the operation of the K scale, which appeared to be subject to the influence of detention on the responses of the delinquents.

In addition, when the 1948 and 1949 delinquents were compared with the 87 delinquents from this phase of the research, statistically significant differences were found on each of the five measures, as follows: F ($P < .05$); K ($P < .001$); Pd ($P < .001$); Ma ($P < .01$); E.S. ($P < .001$). It is suggested that the status of the 1948 and 1949 delinquents at the time of testing could account for those differences. The non-delinquent samples in the three studies did not differ on any one of the five variables, thus lending further support to the assumption advanced earlier that the research findings probably are capable of generalization to other populations.

The next step was the calculation of inter-correlations (product moment) and partial regression coefficients¹⁰ for each sub-sample. A summary of the

¹⁰The "pivotal condensation" method of computation was adopted. It is described in Godfrey H. Thomson, The Factorial Analysis of Human Ability, London, University of London Press, 1939, p.89-94.

results is recorded in Table III, as a correlation matrix.

Multiple R^2 and R 's were then calculated according to Mosier's double cross-validation method. The results follow:

1. Regression coefficients of Sample #1 multiplied by the criterion correlations of Sample #2:

$$R^2 \quad .334258$$

$$R \quad .578$$

$$S.E._R \quad .030$$

2. Regression coefficients of Sample #2 multiplied by the criterion correlations of Sample #1:

$$R^2 \quad .362730$$

$$R \quad .602$$

$$S.E._R \quad .029$$

In Table V, it will be observed that the K scale had substantial, although not consistent, intercorrelations with the other variables. Since it was apparent that it possessed both properties of a suppressor variable, multiple correlations were worked without it, to assess its contribution further. The multiple correlations, which were obtained in the manner outlined above, were:

$R_{.524} \pm .034$; and $R_{.527} \pm .033$. The average amounts of criterion variance controlled, with and without K, were as follows: 34.8% with K and 27.5% without, as indicated by the two average R^2 , .3482 and .2761.

Table III.- Correlation Matrix and Partial Regression Coefficients with a Sentence to Detention Criterion.

	F	K	Pd	Ma	E.S.
Sample #1					
K	-.444				
Pd	.392	-.129			
Ma	.371	.025	.553		
E.S.	.481	-.335	.357	.371	
Crit.	.280	-.045	.355	.209	.496
Regr.	.089	.192	.256	-.149	.482
Sample #2					
K	-.350				
Pd	.500	-.228			
Ma	.342	-.581	.182		
E.S.	.480	-.340	.383	.190	
Crit.	.334	.094	.349	.206	.473
Regr.	.081	.483	.182	.306	.470

The four multiple correlation coefficients, reported above, were statistically significant and consistent. Both characteristics are pre-requisites to the development of a useful prediction formula. However, a formula was not calculated at this stage because of the obvious prior need to take account of those delinquents, who were not encompassed by the criterion definition. They included: deserters, men sentenced to jail and other serious offenders.

It was considered sufficient to have established the following facts at this stage of the study:

1. Men, who became delinquents (as indicated by the commission of offences against military law and sentences to detention) differed significantly at the time of their enrolment from the rest of a recruit sample on the F, ($P < .01$), Pd ($P < .001$), E.S. ($P < .001$) and Ma ($P < .05$) variables, in both sub-samples and, therefore, in the total sample.

2. The named variables, when combined at their optimum weights through multiple regression, predicted the delinquency criterion reliably and significantly ($P < .001$). The same four variables had distinguished between delinquents and non-delinquents in three previous studies.

3. Although conventional additions of the K scale did not improve the differentiation of extreme groups, as constituted in this research, the scale did function as a suppressor variable when combined at its proper weight in relation to the military misconduct criterion.

The deficiencies in the narrow criterion were recognized and remedied in the next phase of the research which is reported in Chapter V. That Chapter also deals with the construction of a prediction formula and its assessment in relation to the base rate of delinquency in the experimental sample.

CHAPTER IV

REPORT ON RESEARCH WITH A BROADENED CRITERION

Not all of the more serious delinquents in the experimental sample were sentenced to detention. Some of those, whose misconduct was of greater concern to the Army, had been classed with the remainder of the recruit sample, because of the limitations of the criterion chosen in 1948. It was decided to amend that criterion and make it more realistic. The author was by this time familiar with the sample, so the choice of the broadened criterion was made independently by two other responsible Army officers, who had knowledge of the delinquency problem. Section 1 of this Chapter deals with a study of predictive efficiency, in relation to the base rate of delinquency, against the broadened criterion. Section 2 refers to a validity generalization study and Section 3 to three other supplementary studies in relation to the same criterion.

1. Predictive Efficiency with a Broadened Criterion

The amended criterion encompassed the following classes of delinquents: those sentenced to detention (as in the previous phase); unapprehended deserters; men, who had been absent without leave for twenty-one days or more; men released for military or civilian misconduct; men convicted

by civilian courts for other than traffic violations or game law offences; and men, who had received maximum fines for military misdemeanours. The broadened criterion group comprised 115 delinquents; 366 men were classed as the remainder of the recruit sample.

The null hypothesis, which was tested during this phase of the study, follows: The application of a prediction formula, derived from a combination of the experimental variables at their optimum weights, would not have lowered the base rate of delinquency in the sample.

As pointed out by Meehl and Rosen,¹ the discovery of a statistically significant relationship between a variable or a combination of variables and a criterion does not establish the predictive efficacy of the variable or combination. The base rate of the phenomenon, which it is intended to predict, must be considered. If the use of a prediction instrument would not change the rate in the desired direction, then the instrument would lack practical value. Its adoption might mislead rather than assist the persons, who might make use of it. If it could not improve upon the base rate it might even make that rate worse, if it were taken into use.

¹Paul E. Meehl and Albert Rosen, "Antecedent Probability and the Efficiency of Psychometric Signs, Patterns or Cutting Scores", in the Psychological Bulletin, Vol. 52, 1955, p.194-216.

In the context of this study it was necessary to find out whether a prediction instrument based on the five surviving variables would have lowered the base rate of delinquency in the experimental sample. If it were found that the base rate could not be lowered, regardless of the consistent performance of the experimental variables earlier, and the highly significant multiple correlations, which had resulted from combining them, the instrument would not be useful.

The design, assumptions and method of analysis were the same as in the previous phase. The sub-samples used in the earlier study were broken up and new sub-samples were chosen from the total sample of 481, again by the use of random numbers. Each sub-sample consisted of 57 delinquents and 184 of a remainder (one delinquent case was put aside to equalize the samples). The experimental variables were: the F, Pd, Ma and K scales of the MMPI, and the author's Experience Scale.

Correlations with the broadened criterion (r_{bis}) were calculated and they are reported in Table IX at Appendix 2. Intercorrelations between the variables (product moment) and partial regression coefficients were then computed in the manner outlined in the last Chapter. Results of those calculations are recorded in Table X of Appendix 2. The double cross-validation method was used

again to obtain an unbiased estimate of R . In the first combination, using the regression coefficients of one sample with the criterion correlations of the other, the R^2 was .411597; and the R was .641, $\pm .027$. For the second combination, the R^2 was .409895, and the R , .640, $\pm .027$.

Both multiple correlations were highly significant ($P < .001$) and consistent. It is noteworthy, too, that they are somewhat higher than the two R 's obtained against the narrow criterion of delinquency (sentence to detention) and reported in the last Chapter. The latter correlations were: R .578, $\pm .030$, and .602, $\pm .029$. This result might have been hypothesized on the grounds that the twenty-eight serious offenders who were added to the delinquent criterion group, would probably resemble the other delinquents more than the remainder of the sample.

The sub-samples were then combined for the determination of the best set of weights for use in a prediction equation. Criterion correlations, inter-correlations and partial regression coefficients were calculated for each variable using the whole sample of recruits. A summary of those calculations is reported as a correlation matrix in Table XI of Appendix 2.

The calculation of the prediction formula, the next step, followed a method outlined by Johnson.² The formula, with weights rounded off to the nearest whole number, follows: $1F + 3K + 3Pd + 1Ma + 6E.S. - 32$.

The formula was then applied to the sample, upon which it was developed. A distribution of predicted criterion scores was obtained and the best cutting score was calculated, according to a formula provided by Guilford.³ At that score, forty-three, or approximately 37% of the delinquents, were identified, at a cost of twenty-one false positives, or approximately 6% of the remainder of the sample.

Thus, as shown in Table IV, at its best cutting score, the prediction instrument would have identified sixty-four recruits as incipient delinquents, if it had been applied at the time of their enrolment. Of the 417 recruits, who would have been enrolled, seventy-two (115 minus 43) would have become delinquent. The rate of delinquency, which would have been found in the sample of 417 recruits, was 17% (72/417). If the prediction formula had been applied at the time the sample was enrolled,

²Palmer O. Johnson, Statistical Methods in Research, New York, Prentice-Hall, 1949, p.341-342.

³J.P. Guilford, Fundamental Statistics in Psychology and Education, New York, McGraw-Hill, 1950, p.378.

therefore, the delinquency rate would have been lowered substantially from 24% to 17% ($P < .01$). Because of that unequivocal evidence, the null hypothesis was rejected.

As indicated in Table IV, other cutting scores might be chosen. At one, four delinquents were identified at no cost in false positives. At another score (180) sixteen delinquents were identified and only four of the remainder of recruits were falsely identified. The application of the score 160 would have reduced the delinquency rate to 18%. Thirty percent of the delinquents in the sample were identified at that score and the loss in false positives was moderate, 2.5%.

As shown in Table V, at one predicted criterion score level, the probability of a person being a delinquent was 1.00. At the score of 79, and lower, it could be said, just as confidently, that no delinquents would be found. Between the probability of .00 and of 1.00, lies a range of probabilities. At any one point, it would be possible to state the chances of a person being an incipient delinquent.

Four of the experimental variables, plus a suppressor variable, had by this time survived three extreme group comparisons and two predictive studies with different criteria of military delinquency. Differences between the incipient delinquents and men, who did not

Table IV.- Efficiency of Prediction Formula
in Terms of Proportions of Delinquents and Non-
Delinquents Above Each Score Level.

Score	Dels.	Prop.	Rem.	Prop.
200	4	.00	0	.00
190-199	7	.03	3	.00
180-189	5	.10	1	.01
170-179	9	.14	3	.01
160-169	10	.22	2	.02
150-159 ^a	8	.30	12	.02
140-149	10	.37	17	.06
130-139	20	.46	34	.11
120-129	9	.63	49	.20
110-119	13	.71	56	.33
100-109	11	.83	79	.49
90-99	8	.92	48	.70
80-89	1	.99	41	.83
0-79	0	1.00	21	.94

^aBest cutting score: 150.

Table V.- Probability¹ of Delinquency at Various Scores on the Prediction Instrument.

Score	Dels. f	Dels. Cum f	Rem f	Total Cum f	Dels Cum f/ Total Cum f	Prob. of Delinquency
200	4	115	0	481	115/481	1.00
190-199	7	111	3	477	111/477	.98
180-189	5	104	1	467	104/467	.93
170-179	9	99	3	146	99/461	.90
160-169	10	90	2	449	90/449	.84
150-159	8	80	12	437	80/437	.77
140-149	10	72	17	417	72/417	.72
130-139	20	62	34	390	62/390	.67
120-129	9	42	49	336	42/336	.52
110-119	13	33	56	278	33/278	.50
100-109	11	20	79	209	20/209	.40
90-99	8	9	48	119	9/119	.32
80-89	1	1	41	63	1/63	.07
0-79	0	0	21	21	0/21	.00

¹Calculated from the ratio of the cumulative frequency of delinquents/total cumulative frequency, divided by the base rate in the sample, (115/481).

misconduct themselves to a serious extent, had been demonstrated to exist at the time of their enrolment. The variables were not only correlated with delinquency, as defined, significantly and consistently; but, when combined in a prediction equation, they had proved capable of lowering the base rate of delinquency in the sample, upon which the equation had been developed.

It is noteworthy that these results were obtained without any reference to possible environmental influences. An examination of the cases missed by the prediction formula suggests that a knowledge of pre-enrolment experience and personal characteristics is not enough to predict military delinquent behavior. Some men, who were identified as delinquents, served with good conduct. Others, who obtained low predicted criterion scores, became delinquent. There is a real need to find tenable explanations for those inconsistencies. The answers may lie in the supports and stresses, which each individual presumably encounters during his military service.

Two other points merit attention now. First, the sample, on which the prediction formula was tried, had been enrolled after a thorough selection interview, in which an effort was made by experienced interviewers to select out those men, who might not adjust satisfactorily. In the interviews, objective facts, each subject's responses to

questions and interview impressions had been combined subjectively in what might be termed an organismic, if not clinical, fashion. The end results of the selection process, just described, were improved upon by the straightforward mathematical combination of the experimental variables.

Second, it should be noted that, although considerable confidence may be assigned to the results obtained thus far, one important test remained. It concerned the generalizing capacity of the prediction formula in relation to another population. From the evidence, which has been presented, it appeared reasonable to anticipate that the formula would work as effectively with any similarly derived sample. The unanswered question was: Would the formula work as well with a sample of different quality, drawn at a different time, when different selection standards were applied? A partial answer to that question is presented in the Section which follows.

2. Validity Generalization

Several attempts were made to select or construct an independent but similarly drawn sample to test the generalizing capacity of the prediction formula, which was described in the last Section. Difficulty was experienced

because, as noted earlier, experimentation had to be discontinued upon the outbreak of the Korean hostilities. Moreover, in 1953, the MMPI was adopted as a selection instrument by the Canadian Army. Thus, from the time of its adoption, test scores on the MMPI variables in the prediction formula probably influenced decisions to enrol or reject applicants. The extent of that influence could not be assessed because no norms for a general, Canadian male population existed. The standardizing samples, which had been used in the development of the MMPI, did not appear appropriate because previous research had shown that the normals in those samples differed substantially from the normals examined in two Canadian studies, one by the present author in 1948⁴ and the other by Howlett in 1950.⁵

The only scores and criterion information, which could be obtained, referred to the men, who had been enrolled in 1953. Because they had been selected partly on the basis of the MMPI, a prediction formula, which contained MMPI variables, presumably would be less likely to improve upon the base rate of delinquency in any sample chosen from

⁴W.R.N. Blair, "A Comparative Study of Disciplinary Offenders and Non-Offenders in the Canadian Army, 1948", in the Canadian Journal of Psychology, Vol. 4, 1950, p.56.

⁵John M. Howlett, A Psychometric Study of the Canadian Soldier in the North, unpublished Master's thesis presented to the Faculty of Arts and Science of the University of Alberta, Edmonton, Alberta, 1951, p.34-36.

them. In other words, it was considered that the choice of a sample of men enrolled in 1953 would put a prediction formula to a severe test. It was decided to select a random sample of men, who had been enrolled during the first three months of that year and had been released for any reason, including termination of their three-year engagements, during or before 1956. The sample was inadequate in the connection discussed above and also because it had not been tested on the Experience Scale. It was possible to assess the generalizing capacity of the MMPI variables only. One further limitation was related to the fact that the sample comprised releases; it was not gathered at the time of enrolment, although the MMPI was administered at that time.

A prediction formula for the MMPI variables only was constructed, following the method outlined in the previous Section. The correlations with the criterion, intercorrelations and partial regression coefficients are shown in Table VI.

A prediction formula was then developed, using the partial regression coefficients shown in Table VI, together with the following means and standard deviations of the variables and of the criterion. F: 4.133, 3.291;
K: 14.765, 4.878; Pd: 15.920, 3.937; Ma: 17.734, 4.234;
Criterion: 12.391, 4.264.

Table VI.- Correlation Matrix and Partial Regression Coefficients for MMPI Variables.

	F	K	Pd	Ma
K	-.386			
Pd	.405	-.209		
Ma	.342	-.430	.239	
Crit.	.337	.0151	.459	.198
Regr.	.229	.240	.385	.131

The formula, with weights rounded off to the nearest whole number, was: $3F + 2K + 4Pd + 1Ma = 9$, which was rounded from $.297F + .210K + .417Pd + .129Ma = .875$.

The formula was then applied to the sample, from which it had been derived, the one totalling 481 and gathered in 1950. At the best cutting score, which was calculated in the manner described in the last Section, 11 or 9.56% of 115 delinquents and 5 or 1.37% of the remainder (false positives) were identified. If those who were identified by the formula had been rejected, 465 would have been enrolled. Of that number, 104 (115-11) would have become delinquent. When that rate of delinquency, approximately 22% was compared with the rate in the sample of 481, it was apparent that the application of the formula would have lowered the rate by a small amount, from 24% to 22%.

Two incidental points are worth noting before the test of validity generalization is reported. First, it will be seen that the MMPI by itself, as represented by the four experimental variables, which had survived validity and cross-validity trials, was of only limited use in predicting the criterion. The Experience Scale had to be added before any substantial improvement in the base rate of delinquency was achieved. Second, it was possible to calculate a multiple correlation coefficient for the MMPI

variables from the correlation matrix shown in Table VI. The R, which was not cross-validated, was $.532 \pm .024$. Although the coefficient is highly significant ($P < .001$), the prediction formula effected only a modest improvement in the base rate of delinquency. This result illustrates the need to take account of the base rate of a phenomenon, which is being predicted, in assessing the predictive efficiency of psychological variables.

A test of the generalizing capacity of the prediction formula followed. It was applied to the MMPI scores of random samples of delinquents (N:150) and a remainder (N:300), all of whom had been enrolled in 1953 and released in 1956, or prior to that time. The broad criterion, described in Section 1 of this Chapter was used in selecting the cases. The base rate of delinquency among 1953 enrolments was not known, so the samples were selected according to a long-term base rate based on the average of three known rates (24%; 41%; and 35%).

Comparable percentages of positives and false positives, which were identified in the 1950 sample and in the 1953 generalizing sample at the best cutting score developed on the former, were:

1950: Positives, 9.56%; False positives, 1.37%.

1953: Positives, 11.33%; False positives, 3.67%.

If the prediction formula had been applied at the time of the enrolment of the 1953 sample, seventeen out of a total of 150 delinquents would have been identified. Eleven out of the 300 men, who did not become delinquent, would have been falsely identified as incipient delinquents. Thus, twenty-eight of the total sample of 450 would have been rejected. The delinquency rate among the 422 enrollees would have been 133 (150-17) out of 422, or 31.52%. Since the base rate in the sample was one-third, the application of the prediction formula would have reduced that rate, but only to a small extent.

Although only a minor improvement in the rate of delinquency could have been made by the use of the prediction formula, based on MMPI variables, the evidence was consistent. Similar percentages were identified in both the 1950 sample and the 1953 sample, notwithstanding the prior selection of the latter on the MMPI variables. Moreover, the fact that there was a change in rate and in the desired direction was regarded as quite significant. It was concluded from the evidence that a prediction formula, based on MMPI variables alone, may be applied to other samples of Canadian Army recruits, at the cutting score which had been established, with confidence that very similar results would be obtained. It was considered only reasonable to assume that the addition of the Experience

Scale would effect a further substantial improvement.

3. Supplementary Research

Three discrete studies, which are directly related to specific sections of this research or to other related research, are reported in this Section. The first deals with mental functioning of delinquents and non-delinquents, in terms of one verbal and one non-verbal section of the "M" test. That investigation was prompted by the results of a related civilian study. The second refers to the subject of intra-individual differences in terms of MMPI scores and, again, it was undertaken because of the results of a civilian study. The third is concerned with a limited and indirect assessment of environmental influences which might be presumed to be related to delinquent behavior.

a) Mental Functioning.— The Gluecks had found that the delinquents and non-delinquents in their 1950 civilian study differed significantly on certain scores of the Wechsler-Bellevue. Specifically, the delinquents were significantly superior (at the .01 level of confidence) on the Block Design subtest but inferior to the non-delinquents on three verbal subtests, Vocabulary (P .01), Information (P .001), and Comprehension (P .003). Non-delinquents obtained significantly higher scores when their

weighted performance scores were subtracted, in each case, from the weighted verbal scores.⁶ This result was interesting because the two groups had been matched in terms of total intelligence.

The Army "M" test is not directly comparable with the Wechsler-Bellevue test, but it does contain verbal (mechanical information, vocabulary, analogies, arithmetic) and non-verbal material (picture absurdities, picture completion and paper form board). Delinquents and non-delinquents had differed ($P < .05$) on mechanical and vocabulary subtests in the 1949 study; the non-delinquents obtained the higher scores. Because of the Gluecks' findings and the earlier suggestion from the author's own research, it was decided to compare the delinquents in the 1950 study with the remainder of a recruit sample on verbal and non-verbal material.

No significant differences emerged when mechanical and vocabulary subtest scores were compared by the critical ratio method, (C.R.'s of 1.101 and 1.426, respectively). The paper form board subtest and the vocabulary subtest scores were then compared in a manner which resembled the Glueck treatment, reported above. Each subject's form

⁶Sheldon and Eleanor Glueck, Unraveling Juvenile Delinquency, New York, The Commonwealth Fund, 1950, p. 202-204.

board score was subtracted from his vocabulary score (standard scores were used) and the resultant sums were tabulated for the delinquents and the remainder in frequency distributions. When the distributions were dichotomized, at the median of the total distribution, and the numbers of delinquents above and below the median were compared, a chi-square value of 0.505 was obtained. With one degree of freedom that result is not statistically significant (P .47).

Support for the Glueck results, therefore, was not found in this research. However, in addition to the different test, the Gluecks had used extreme groups. The Army sample comprised both the extremes in terms of conduct and a group in between. The latter had not committed offences sufficiently serious to warrant their classification as delinquents but they did not belong in a non-delinquent group either because of their records of minor offences.

b) "Inhibitory" and "Excitatory" Measures.- Hathaway and Monachesi described the Pd and Ma scales as "excitatory" and the D and Mf scales as "inhibitory" in respect of their relationship to juvenile delinquency.⁷ The data from this study permitted an examination of the concept.

⁷Starke R. Hathaway and Elio D. Monachesi, Analyzing and Predicting Juvenile Delinquency with the MMPI, Minneapolis, The University of Minnesota Press, 1953, p. 133-136.

A ratio, in terms of standard scores, was calculated for each person in two randomly selected subsamples of military delinquents (D) and the remainder of recruits (R). The ratio took the following form: $Pd + Ma$ divided by $D + Mf$.⁸ It was first calculated for each person to one decimal place and, then, the resultant sums were collated in frequency distributions. Biserial correlations were computed and the statistical significance of each was determined by dividing each coefficient by its standard error. The results are summarized in Table VII.

The failure of the ratio to perform consistently at an acceptable level of statistical significance is clearly revealed in Table VII. This result contrasts with the performance of the Pd and Ma scales in earlier phases of this research. For example, the correlations of the Pd scale alone, against the same criterion and with the subsamples used in the ratio study were: $r_{bis} .576 \pm .067$ and $r_{bis} .327 \pm .082$. Both correlations are significant at a level of confidence represented by $P .001$. On the basis of these findings it would be preferable to use the Pd scale alone, instead of the ratio of inhibitory and excitatory scales.

⁸ Admittedly the scores were combined in a form and at weights, which might not be acceptable to clinically-oriented psychologists. It was not clear, however, how Hathaway and Monachesi would combine them. The approach chosen appeared to be one way of testing the assumption advanced by the two authors.

Table VII.- Validity and Cross-Validity of an
MMPI Ratio¹ with Two Samples of Canadian Army Recruits.²

Statistic	Sample 1	Sample 2
Mean _D	11.316	10.736
Mean _R	9.934	10.027
S.D. _T	2.347	2.304
r _{bis}	.349	.181
S.E. _{r_{bis}}	.096	.102
C.R.	3.635	1.774
P	<.001	<.10

¹Pd + Ma/D + Mf (standard scores)

²Enrolled in 1950; each N equals 240.

c) Environmental Influences.— No pretense of assessing military environmental influences was made by the author, when the design of this research was chosen. Such influences were regarded as possibly important, but it was not practicable to conduct a proper study of both personal and environmental factors. The main research effort was directed toward finding out whether delinquent behavior could be predicted from knowledge of personal characteristics and experience of pre-enrolment origin.

However, it was possible to obtain a limited measure of environmental stress, simply by comparing the number of delinquents and non-delinquents found in each corps with the numbers, which could have been expected on the basis of corps representation in the total sample. It is an accepted fact in military circles that the Infantry soldier leads a more stressful life than his fellow soldiers in other corps. It was hypothesized, therefore, that a higher proportion of delinquents would be found among the Infantry portion of the sample than could have been expected.

No support for the hypothesis was found. Comparing actual numbers of delinquents (23/79) with the expected number (19/79), deduced from the proportion of Infantry soldiers in the sample (79/481), a chi-square value of 0.519 was obtained. With one degree of freedom, that value

is not significant ($P .47$). Each of the other combatant corps was studied in the same way. In not one corps did the actual number of delinquents differ significantly from the expected number.

With this Chapter the presentation of the results of the research has come to an end. Although the results were discussed briefly as they were presented it would appear essential to extend the discussion to a more thorough appraisal of the findings and their implications. Chapter V deals with those remaining subjects.

CHAPTER V

APPRAISAL AND IMPLICATIONS OF RESEARCH

In this Chapter the results of the research are collated and related to previous studies. Limitations of the research are discussed and some suggestions for further studies are offered.

Before this research was begun two preliminary extreme group studies were conducted. The first, in 1948, was a validity study. Its results indicated that delinquents and non-delinquents differed significantly ($P .05$) on ten scales of the MMPI, age, education and "M" score and on fifty-four items of biographical material. In a cross-validity study in 1949, nine of the thirteen variables and twenty-eight of the items continued to distinguish between extreme groups at the same minimum level of confidence. The delinquents were found to be younger, less well educated and they obtained higher scores on the F, Pd, Pa, Pt, Sc and Ma scales of the MMPI and lower scores on the K scale. Their responses to the biographical material revealed a relatively higher incidence of delinquent behavior in childhood, erratic job histories, jail records and excessive drinking. Significantly less delinquents reported hobbies and church

attendance. More of them felt that they had not been disciplined strictly enough as children.

Support was not found for the conclusions of some research workers that urban residence and the socio-economic conditions of homes are related to the delinquency phenomenon. Similarly, the conclusion that delinquents tend to obtain more deviant scores on tests of neurotic tendency was not supported by the results of the research. Although the delinquents were in detention at the time the tests were administered, they did not differ consistently from the non-delinquents on the D, Hy and Hs scales of the MMPI. The findings of the two preliminary studies were more in accord with the Hathaway and Monachesi¹ research, which had revealed that delinquents tend to be characterized by high Pd, Ma and F scales.

It is noteworthy, too, that similar results were obtained by Clark² and McCollum³ in their studies of

¹Starke R. Hathaway and Elio D. Monachesi, Analyzing and Predicting Juvenile Delinquency with the MMPI, Minneapolis, The University of Minnesota Press, 1953, p.133-136.

²J.H. Clark, "The Relationship between MMPI Scores and Psychiatric Classification of Army General Prisoners", in the Journal of Clinical Psychology, Vol. 8, 1952, p.86-89.

³Ernest L. McCollum, Survey of Human Adjustment Problems in the Northern Latitudes, A Study of Military Offenders, Report of the Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska, 1951, 6p.

American servicemen, in that their delinquents obtained higher scores than non-delinquents on each of the Pd, Ma and F scales. Some universality of the military delinquency phenomenon may be inferred from the results obtained in two countries under different service conditions.

Finally, it is significant that the MMPI differences and the differences on the biographical material were found in 1948 when the delinquents and non-delinquents were matched on several factors, including age, education and intelligence test score. It may be concluded, therefore, that the differences were independent of the matching factors. The Feldman and Maleski experiment⁴ revealed similar differences among illiterate subjects, who were intellectually inferior to United States Army recruits, generally, during the last war. These consistent findings indicate that military delinquents differ from non-delinquents on factors of personality and personal history, regardless of their education, intelligence or age.

⁴Harold Feldman and Alexander A. Maleski, "Factors Differentiating AWOL from Non-AWOL Trainees", in the Journal of Abnormal and Social Psychology, Vol. 43, 1948, p.70-77.

The experimental variables in the 1948 and 1949 studies had been chosen from civilian and military research to reflect common elements of understanding of the delinquency phenomenon. The performance of the variables indicated that they were capable of distinguishing between delinquents and non-delinquents consistently and significantly in the Canadian Army setting. The adequacy of understanding had not been assessed conclusively, however, because the tests had been administered when the delinquents were in detention. The status and recent experience of the delinquents might have accounted for the differences. An adequate assessment required that the variables be tested in a predictive setting.

Accordingly, this research began with the gathering of a representative sample of Canadian Army recruits (N:481), who were tested as they were enrolled at all enrolment depots in Canada over a three month period in 1950. Four years after their enrolment their conduct records were examined and related to the test results. Two criterion groups were formed for the first phase of the study. They comprised 87 delinquents and 167 non-delinquents. Two hundred and twenty cases from the sample were omitted because they did not satisfy either criterion definition. The definitions were in accord with those used in the 1948 and 1949 studies.

The null hypothesis, which was tested, took the following form: There are no significant differences (P.05) at the time of their enrolment between men, who become delinquents, and men who are later identified as non-delinquents on the variables, which were found to be consistently discriminative in the 1948 and 1949 studies. It was hypothesized further that the K scale might not behave consistently in a predictive setting.

Six of the seven scales of the MMPI, age, education and the biographical material, which had been combined into a single scale called the Experience Scale, distinguished between the two criterion groups at the minimum level of confidence. In fact the differences on all of the named variables, except Pa, were significant at P .01. The difference on the K scale was not significant but that possibility had been anticipated. On the basis of those convincing results the null hypothesis was rejected.

The results indicated that men, who become delinquent in the Canadian Army, differ from men, who do not, at the time of their enrolment. The MMPI differences, according to conventional interpretations of the scales, revealed that the delinquents tended to be more aggressive and anti-social, more restless or impulsive and more care-less or generally unstable than the non-delinquents. In addition, they were found to be more suspicious, more

inclined to harbor unreasonable compulsions and to be given to unusual behavior and tendencies to withdraw from reality. The biographical findings revealed that the delinquents tended to be younger and unmarried; and that their social histories were more frequently marked by erratic performance, misconduct, restless behavior, lack of hobbies, no church attendance and inadequate discipline at home.

The results of that phase of the research closely resembled the findings of Hathaway and Monachesi⁵ in their study of juvenile delinquency in Minneapolis. The interpretations assigned to the MMPI results compare closely with the conclusions reported by the Gluecks.⁶ The latter conclusions were based on biographical information, psychiatric interview and Rorschach protocols. The three findings indicate a striking similarity between military and civilian delinquency in different settings.

The fact that the differences between the two criterion groups were present at the time of enrolment indicates that they were not attributable to environmental

⁵Starke R. Hatheway and Elio D. Monachesi, Analyzing and Predicting Juvenile Delinquency with the MMPI, p.133-136.

⁶Sheldon and Eleanor Glueck, Unraveling Juvenile Delinquency, New York, The Commonwealth Fund, 1950, p.281-282.

influences within the military setting. Although such influences may play a part in precipitating delinquent behavior, it is clear that pre-enrolment experience and characteristics of pre-enrolment origin play an important, perhaps a critical role in the development of that behavior. That knowledge, if combined with the ability to identify incipient delinquents, conceivably could lead to attempts at social control early in military service which might forestall undesirable developments at a later time.

The next phase of the research took account of the 227 subjects, who had been omitted in the study of predictive validity with extreme groups. Using the total sample of 481 subjects and the same criterion of delinquency, the ability of the experimental variables to distinguish delinquents from the remainder of a recruit sample was tested. A null hypothesis was formed to the effect that none of the variables would survive the test. The total sample was split randomly in two to provide for cross-validation. The K scale was examined as a suppressor variable. The weights at which it is normally combined with the Pd, Pt, Sc and Ma scales had been determined against a different criterion and in a different setting. It was desired to find out whether it would improve the control of criterion variance if combined at weights determined in relation to the criterion used in this study.

Biserial correlations with the delinquency criterion were calculated and four were significant at the minimum level of confidence in two sub-samples on the F, Pd, Ma scales of the MMPI and on the Experience Scale. The correlations on F, Pd and the Experience Scale were significant at $P < .01$. Because of that evidence the null hypothesis was rejected. The K scale revealed one of the properties of a suppressor variable, a negligible correlation with the criterion.

A further indication of the predictive validity of the four experimental variables, in relation to the sentence to detention criterion, was obtained by means of a double cross-validation design and the multiple regression method of analysis. Using the validity coefficients of one sub-sample with the partial regression coefficients of the other, and then the reverse, two multiple correlations of .578, $\pm .030$, and .602, $\pm .029$, were obtained. Both correlations are significant at $P < .001$. Comparable correlations obtained without the K scale were $R .524, \pm .034$, and $R .527, \pm .033$.

In terms of criterion variance controlled, as indicated by the average R^2 , the use of the K as a suppressor improved that control from 27.5% to 34.8%. It was apparent from those results that an efficient prediction formula might be constructed to predict

delinquency and that the K scale functioned as a suppressor variable, when combined at its proper weights in relation to the military delinquency criterion. The latter result is significant in view of the failure of the K correction to improve the differentiation of delinquents and non-delinquents, when combined at the weights prescribed by the authors of the MMPI.

The results of the comparisons, with and without the K scale, indicated that a suppressor variable must be developed and weighted in relation to a specific criterion and to other variables, which are found useful in predicting that criterion. This observation does not imply any criticism of the authors of the MMPI, who developed the scale in relation to diagnostic categories, as determined by psychiatric judgement. When another criterion is substituted, in this case one of military delinquency, new and appropriate weights must be determined. It is possible that a suppressor variable developed against one criterion might not contribute to the control of criterion variance in another setting. It would appear, also, that a more effective suppressor than the K scale might be developed in relation to the military delinquency criterion. Laver's preliminary work in that connection

tends to confirm that assumption.⁷

A prediction formula was not constructed at the phase of the research, which has just been reported, because the narrow criterion did not encompass all the serious delinquents. The criterion was broadened by two judges independently and, in its revised form, it accounted for men who had been sentenced to jail, unapprehended deserters and other serious delinquents, in addition to those who had been sentenced to detention. A total of 115 delinquents constituted the broadened criterion group; 366 recruits were classed as the remainder of the sample. The research problem had become a practical one of finding out whether a combination of the surviving variables, at their optimum weights, would have improved upon the base rate of delinquency (24%) in the sample.

The full sample was divided at random into two subsamples of 240 men, each one comprising 57 delinquents and 183 of a remainder. Multiple correlations were calculated by the double cross-validation method, with the following results: $R_1 .641, \pm .027$, and $R_2 .640, \pm .027$. The broadening of the criterion increased the control of variance, in

⁷Alfred Bryan Laver, Item Analysis of the MMPI Against an Army Misconduct Criterion, unpublished M.A. thesis presented to the Faculty of Arts, Queen's University, 1955, p.76-84.

terms of R^2 , from 34.8% to 41.1%. The two multiple correlations, with and without the K scale, were highly significant ($P < .001$) and quite consistent.

A prediction formula based on the full sample of recruits (N:481) was then calculated. At its best cutting score, 37% of delinquents were identified at a cost in false positives of 6% of the remainder of the sample. If that score had been applied at the time of enrolment, the rate of delinquency in the sample would have been reduced from 24% to 17%. The percentage reduction is significant at $P < .01$. The null hypothesis, which was to the effect that the base rate would not be improved, was rejected.

The probabilities of a person being an incipient delinquent were calculated for each of fourteen intervals along the predicted criterion score distribution. They ranged from .00 to 1.00, and included both extremes. The calculations indicated that, with varying degrees of assurance, expressed in terms of probability, it would have been possible to predict individual membership in the delinquent criterion group. Those predictions could have been made at the time of enrolment.

The data, from which the predictive efficiency of the formula was assessed, were clearly normative in

character. Snygg⁸ has stated that "Individual behavior cannot be predicted from normative data", in advocating a phenomenological approach to prediction. His argument loses force in the face of the evidence discussed above. The evidence should not be interpreted, however, as a refutation of the concept that each man is unique and is motivated by factors which, in combination and emphasis, are peculiar to him. It merely supports the tenability of general classifications of people according to their similarities. Such classifications are necessary to lend order and meaning to psychological data. Within any broad classification, such as the delinquent groups in this study, however, the uniqueness of each man may be observed readily.

The performance of the experimental variables through validity and cross-validity trials, in both predictive and "after the event" studies, indicated that they are reliable instruments, in the sense that they were found to be valid, consistently. Critics of such instruments have argued that they tend to be unreliable, invalid and superficial. The first two arguments are answered in part at least by the consistent validity of the three MMPI scales and the Experience Scale. The argument

⁸Donald Snygg, "Predicting the Behavior of Individuals", in the Canadian Journal of Psychology, Vol. 3, 1949, p.26.

that they tend to be superficial is not supported by the size and significance of their correlations with the criterion.

There was a suggestion, however, that the motivation of the delinquent subjects in the early phases of the research in 1948 and 1949 influenced their scores. They differed significantly ($P < .05$) from the delinquents in the 1950 sample on each of the following variables: F, Pd, Ma, Experience Scale and K. The differences were attributed to the status and recent experience of the subjects in the earlier studies. They were in detention at the time they were tested and their F, Pd, Ma and Experience Scale scores were notably higher than were comparable scores in the case of the 1950 recruits, who later became delinquent. Their K scale scores were significantly lower than the ones obtained by the delinquents from the 1950 sample of recruits. Both results suggest that the delinquents in detention were less defensive, more candid or perhaps inclined to present an unfavorable impression.

The comparisons of the delinquent samples suggest the need for caution in the use of inventories and questionnaires, such as the ones used in this research. So long as they are applied in the same motivational atmosphere as that of the experiment, however, their

reliability would appear to be quite satisfactory. It is noteworthy that the non-delinquents in the three studies did not differ significantly on any one of the five measures, discussed above.

A test of the generalizing capacity of a prediction formula, based on the consistently discriminative MMPI variables, followed. The F, Pd, Ma and K scales were entered at their optimum weights by means of multiple regression analysis. No comparable data were available for the Experience Scale. The predictive efficiency of the formula was first assessed on the sample upon which it was developed. It was found that the formula was capable of effecting only a minor improvement over the base rate of delinquency in the sample, from 24% to 22%.

It is noteworthy that the multiple correlation obtained with the MMPI variables, named above, was $R .532, \pm .024$. Although that correlation is significant at $P < .001$, the formula was found to be of limited practical use. This result indicates the need to take account of the base rate of a phenomenon, which it is intended to predict, in any assessment of predictive efficiency. A highly significant correlation with a criterion does not ensure a practical degree of predictive efficiency.

The prediction formula was then applied to a sample, which was drawn independently from men who were enrolled in

1953 and released for any reason in early 1956 or before that time. Similar percentages of positives and false positives were identified at the same cutting score in both samples, the generalizing sample and the one selected in 1950. The subjects in the former sample had been tested at the time of enrolment on the MMPI, and the test results had been used to help decide whether the subjects should be enrolled. Notwithstanding that fact the prediction formula improved to a minor extent upon the base rate of delinquency in the sample. From that evidence it was concluded that the prediction formula had successfully survived the test of validity generalization. Because of the earlier, consistent performance of the Experience Scale it was concluded that a formula, which contained it and the MMPI variables, would be capable of application to other populations of recruits in a comparable manner.

The operation of the prediction formula warrants further comment. The generalizing sample had been enrolled following an organismic kind of interview, in which test scores (including the MMPI), biographical information and impressions had been combined subjectively. The result of the generalizing study suggests that the statement by Eysenck should be considered carefully in deciding upon the nature of a selection program. He contended that, given a set of measures, their relationships with each other and

with a criterion, the "intuitive brain" is "at best able to equal but not to excel" the predictive accuracy which would be attained by multiple correlation.⁹

The efficiency of the prediction formula reflected favorably upon the MMPI and questionnaire material and upon its mathematical treatment. The use of material of that kind ensures the systematic application of all possibly relevant questions or variables in the case of each recruit. It seems obvious that an interviewer would not explore every relevant area of inquiry with every subject in some six to ten interviews every working day every week. The mathematical combination of inventory and questionnaire results simply ensures that each result will receive its proper weight in relation to the other results and in relation to the criterion. The evidence does not lead logically to the conclusion that the interview has no place in selection. It does suggest, however, that the objectives and precise functions of the interview in a selection setting should be carefully delineated.

The experimental variables generally performed consistently in studies which were both predictive and "after the event" in design. Their performance was remarkable, also, because the samples were selected in different

⁹H.J. Eysenck, The Scientific Study of Personality, London, Routledge and Kegan Paul, 1952, p.22.

years. The results offer support for the assumption which underlies many psychological assessments of behavior and personality, that men tend to behave in a consistent fashion; and that, from a sampling of behavior taken at one time, a good working estimate of subsequent behavior can be formed.

The experimental variables comprised straightforward questions which required direct answers. No attempt was made to deal with unconscious motivation. The statistically significant results and the efficiency of the prediction formula indicate that a direct approach to the assessment of human attitudes, motivation and experience has much to commend it when dealing with subjects like the ones in the experimental samples. The results also suggest that conscious motivation, expressed in answer to straightforward questions, may answer in large part why many men behave as they do. It would appear that an effective way to find out how men feel, think and will likely behave is to ask them.

Three minor and supplementary studies were undertaken. The Gluecks' study of juvenile delinquency in 1950 suggested that delinquents might be distinguished from the remainder of a sample of recruits by the inferiority of the

former on verbal as contrasted with non-verbal intelligence tests.¹⁰ When that hypothesis was investigated, in terms of differences on parts of the Army's "M" test, no significant differences were found.

Hathaway and Monachesi had reported that the Pd and Ma scales of the MMPI might be regarded as excitatory and the D and Mf scales as inhibitory in relation to delinquency.¹¹ Their assumption was tested by forming an intra-individual ratio from the four scales, in standard scores, and examining two sub-samples of the 1950 recruit sample in terms of the ratio. The biserial correlation with the broadened delinquency criterion in the first sub-sample was significant at $P < .001$ but on cross-validation the correlation was not significant ($P < .10$). It was noted that the Pd scale alone had been correlated consistently with the same criterion at a level of confidence represented by $P < .001$. One of the components of the ratio, therefore, was demonstrably superior to the ratio itself.

The possible relationship of environmental influences within the Army and military delinquency was not

¹⁰Sheldon and Eleanor Glueck, Unraveling Juvenile Delinquency, New York, Commonwealth, 1950, p.202-204.

¹¹Starke R. Hathaway and Elio D. Monachesi, Analyzing and Predicting Juvenile Delinquency with the MMPI, Minneapolis, The University of Minnesota Press, 1953, p.133-136.

the concern of this research. However, it was possible to assess environmental stress to a limited extent in terms of corps identify. It was hypothesized that Infantry and other combatant corps would have a disproportionate number of delinquents because of the additional stress presumed to be associated with service in those corps. Numbers of delinquents in each corps were compared with the numbers which could be expected on the basis of corps representation in the total sample of recruits. No support for the hypothesis was found. The delinquency phenomenon cannot be explained, therefore, in relation to that one environmental influence.

The research was directed toward the prediction of delinquent behavior from knowledge regarding the pre-enrolment experiences and characteristics of individual recruits. The assessment of environmental influences was not germane to the research. However, civilian research has indicated that environmental factors may not be ignored, if an adequate understanding of delinquent behavior is to be attained. Thus, this research was notably deficient in that regard. Subsequent research certainly should try to take account of the relative influence of environmental and personal factors in the development of delinquent behavior.

A second deficiency is related to the experimental sample. It consisted of English speaking men, only. The research should be repeated with French speaking recruits to determine to what extent the findings are applicable to that population.

The criterion was demonstrated to be stable, but it was rather crude. No provision for recovery was made, yet some delinquents committed but one offence and recovered to serve satisfactorily after disciplinary action. Similarly, there was no attempt made to refine the criterion by recognizing variations among the delinquent group. The Sc, Pt and Pa scales distinguished between delinquents and non-delinquents before and after they were identified by their conduct. Those differences ceased to be significant in the double cross-validation study, but some differential discrimination on the basis of the three scales was still possible. Subsequent research might involve refinements in the criterion, which would take advantage of that limited discrimination. It is suggested that fairly homogeneous sub-groups, differing both in terms of their deviations from normals and in the nature of their misconduct, might be found.

Age was dismissed as an experimental variable, because of its non-linear relationship with the criterion. Justification existed for the action in the results of

studies, where delinquents and non-delinquents differed on the other variables, even when matched for age. However, its significance in relation to the other variables and the criterion was not assessed adequately in this study. It is suggested that delinquent samples might be formed according to the age-delinquency relationship, one group ranging from seventeen to nineteen and a second, twenty years of age and over. The two sub-groups could then be assessed in relation to any chosen set of experimental variables and the results could be compared.

Other research suggestions follow. The behavior of some of the delinquents was repetitive, notwithstanding the unpleasant results of that behavior in the military setting. Repeated misconduct might be regarded a manifestation of a rigid personality. Measures of rigidity might be used to help identify, and perhaps select out, from the enrolment stream, men who would become recidivists.

Delinquents in this research were not less intelligent but they achieved less in the form of advancement in school and progress at work and in the Army. Several areas of achievement could be explored by the time a person reaches the age of enrolment. Measures could be constructed and related, possibly in the form of a ratio, to measures of ability to achieve.

The delinquents in this research reported quick tempers and restless behavior during school years and erratic work histories much more frequently than the remainder of the sample. They also tended to have higher Ma scores on the MMPI. These facts suggest that it might be profitable to give more attention to a characteristic which could be termed frustration tolerance.

The discriminative items of the Experience Scale, considered in relation to the interpretations assigned to the Pd, Ma and F scales of the MMPI, provide some additional understanding of the military delinquency phenomenon. Excessive drinking, trouble at school, erratic job histories, misconduct after school years and quick tempers were more frequently found among the delinquents. Each of those items of personal history can be regarded as evidence of lack of personal control. The behavioral descriptions are consistent with the differences between delinquents and the remainder of a recruit sample on the three MMPI scales.

One other biographical item referred to discipline in the home. Delinquents in both the 1948 and 1949 studies reported that their parents did not discipline them strictly enough as children. Over sixty percent of the delinquents, as contrasted with less than twenty percent of the non-delinquents, were of that opinion in both samples.

The relationship between inadequate home discipline and delinquency was also found by several other investigators in both military and civilian settings. It would be hazardous to infer a causal relation between home discipline and the lack of personal control in childhood and later life. However, an hypothesis to that effect would appear plausible and worthy of further examination.

The adequacy of current understanding of delinquent behavior was tested in the research. The results indicated that the understanding was sufficient to permit the prediction of delinquency to a significant and useful extent. Ideally, however, the experimental sample should have comprised unselected recruits. The results of an experiment of that kind cannot be predicted, but it can be inferred, from the nature of the selection and the relationships of the variables with the criterion, that the multiple correlations derived from an unselected sample would have been higher than the ones which were obtained. With only some forty percent ($R^2 = .641$) of the criterion variance actually controlled by the best combination of variables, it would appear that current understanding is quite imperfect. It is clear that the search for a more adequate understanding must be continued.

SUMMARY AND CONCLUSIONS

The research, upon which this report is based, was a study in prediction, a subject which, although important in psychology, has received inadequate attention. Certain MMPI scales, items of personal history termed the Experience Scale, age and education had distinguished between delinquents and non-delinquents in two preliminary studies conducted by the author. The validity and cross-validity of those variables were assessed further in this research in a predictive setting.

Data concerning the variables were gathered for a representative sample of Canadian Army recruits (N:481) as they were enrolled at all recruiting depots in Canada over a three month period. Four years after their enrolment the subjects' conduct records were related to the data, which had been collected earlier.

Analysis of the data was undertaken in three phases.

a) Predictive validity with extreme groups.- Groups of delinquents and non-delinquents were formed according to the criteria applied in the earlier studies. The significance of the differences between the mean scores of the two groups was tested. With one exception, which had been anticipated, the variables performed consistently in the predictive setting.

b) Predictive validity with the whole recruit sample.-

Four of the variables, the F, Pd and Ma scales and the Experience Scale, with K included as a suppressor, predicted the sentence to detention criterion at a high level of statistical significance ($P < .001$). This trial involved tests of validity and cross-validity.

c) Predictive efficiency with a broadened criterion.-

The same variables, when combined at their optimum weights through multiple regression, predicted a broadened criterion to an extent indicated by multiple correlations of .641 and .640 \pm .027. A prediction formula based on those variables was found capable of lowering the rate of delinquency in the sample from twenty-four percent to seventeen percent. The possibility of individual predictions was expressed in terms of probabilities.

A test of validity generalization followed. A prediction formula, based upon the four MMPI scales, was applied to an independently drawn sample of Army other ranks. It indicated that the formula was capable of general application within the Canadian Army.

In addition, mental functioning, in terms of verbal and non-verbal intelligence subtests, an intra-individual ratio of MMPI scale scores and environmental influences, in terms of corps identity, were assessed. Significant differences were not found in the first case; the ratio was

a failure; and the environmental influences examined were not associated with delinquent behavior.

The conclusions follow.

a) Prediction.-- Military delinquency can be predicted to a statistically significant and practical extent. Individual delinquent behavior in the Canadian Army can be predicted from normative data in terms of probabilities, ranging from 0 to 1.00. The generalizing capacity of a prediction formula was established satisfactorily.

b) Mathematical versus interviewer predictions.-- A mathematical combination of the experimental variables resulted in a degree of predictive accuracy, which was superior to that which was attained by interviewers. It is concluded that caution should be exercised in deciding upon the manner in which interviews may be used to advantage in a selection program.

c) Nature of variables.-- The self-report questionnaire and certain of the MMPI scales distinguished consistently and to a significant extent between delinquents and the remainder of a recruit sample. The test material required direct answers to straightforward questions. It is concluded that it may not be necessary to deal with unconscious motivation to predict or understand delinquent behavior.

d) Consistency of behavior.- Delinquents and non-delinquents were differentiated in both predictive and "after the event" studies. Two inferences are drawn from the results. First, it is concluded that the subjects in this research behaved generally in a consistent fashion, making it possible to form a good working estimate of subsequent behavior from a sample of behavior taken at a given time. Second, because the differences were present before men became delinquent in the Army, they can not be attributed to environmental influences.

e) Universality of phenomenon.- Civilian juvenile delinquents and military delinquents in two countries were distinguished from non-delinquents on the same scales of the MMPI. It is concluded that the delinquency phenomenon has common characteristics, which warrant further examination.

f) Suppressor variables.- A suppressor variable should be developed and weighted in relation to a specific criterion and to other variables of useful validity.

g) Predictive efficiency.- Statistical significance is not synonymous with predictive efficiency. The base rate of a phenomenon, which it is intended to predict, must be considered in assessing predictive efficiency.

h) Understanding.-- Knowledge of the delinquency phenomenon was sufficient to result in its prediction to a statistically significant and efficient extent. However, the largest multiple correlation indicated that only approximately forty percent of the criterion variance was controlled by the combination of experimental variables. It is clear, therefore, that understanding is far from complete. It is concluded that the search for a more adequate understanding must be continued.

Limitations of the research included: inadequate treatment of the age factor; crudeness of the criterion; lack of attention to possible environmental influences; the inadequacy of the generalizing sample.

Research, which might take account of those limitations, was proposed. Other research was suggested in the areas of rigidity of behavior, underachievement, frustration tolerance and personal control.

BIBLIOGRAPHY

Aichhorn, August, Wayward Youth, New York, Viking, 1935, xiii-236 p.

A case history approach to the understanding of delinquent careers; reference was made to it as an illustration of the contribution of psychoanalytic writers.

Allport, Gordon W., Personality, A Psychological Interpretation, New York, Henry Holt, 1937, xiv-588 p.

A text, in which the autonomy and uniqueness of each person are emphasized; it was used to illustrate a theoretical position regarding prediction which, in its extreme form, does not adequately recognize the consistency of behavior.

-----, "Foreword", in Edwin Powers and Helen Witmer, An Experiment in the Prevention of Delinquency, New York, Columbia University Press, 1951, xliii- 649 p.

A statement concerning home influences in a book dealing with an experiment in control; the statement was used because it indicated one area of disagreement between sociology and psychology concerning correlates of delinquency.

-----, "The Trend in Motivational Theory", in the American Journal of Orthopsychiatry, Vol. 23, 1953, p. 107-119.

An article, in which the author stressed the importance of conscious motivation in behavior and recognized that there is continuity of motivational formations in each life; it was used as support for the assumption underlying this research that there is considerable consistency in human behavior.

Betts, G.L., "The Detection of Incipient Army Criminals", in Science, Vol. 106, 1947, p. 93-96.

One of the first studies of military delinquency, "after the event" in design and therefore inconclusive; it prompted this research and suggested that certain biographical material might be discriminative.

Blair, W.R.N., "A Comparative Study of Disciplinary Offenders and Non-Offenders in the Canadian Army, 1948", in the Canadian Journal of Psychology, Vol. 4, 1950, p. 49-62.

The first Canadian study of military delinquency, which was aimed at understanding the phenomenon and identifying correlates which might be used in prediction; it was the beginning of this research.

-----, Unpublished Research Notes, Ottawa, Personnel Selection Service, Army Headquarters, 1949, (no pagination).

A successful cross-validity study with extreme groups, which confirmed the existence of significant differences between delinquents and non-delinquents; it was a necessary preliminary to this research.

Bovet, Lucien, Psychiatric Aspects of Juvenile Delinquency, No. 1 of the World Health Organization Monograph Series, Geneva, World Health Organization, 1951, 90 p.

A survey of the literature; it was used to show the complexity of the phenomenon and to illustrate disagreement concerning its correlates.

Calvin, Allen and James McConnell, "Ellis on Personality Inventories" in the Journal of Consulting Psychology, Vol. 17, 1953, p. 462-464.

A timely and reasoned reply to Ellis' criticism concerning the MMPI; it was used to indicate that negative opinion is not universal or conclusive.

Canadian Press, "5 Percent of Soldiers Deserted", news despatch in The Ottawa Citizen, issue of February 5, 1955, p. 18, col. 3.

A report concerning the numbers of men, who were found to be ineffective, in a large sample of recruits enrolled at the time of the Korean hostilities; it was used to indicate that the Canadian Army has a delinquency problem.

Capwell, D.E., "Personality Patterns of Adolescent Groups: II. Delinquents and Non-Delinquents", in the Journal of Applied Psychology, Vol. 29, 1945, p. 289-297.

An early suggestive study of extreme groups of female delinquents and non-delinquents with the MMPI; it indicated that the instrument was worthy of trial with male groups.

Chien, Isidor, "The Logic of Prediction: Some Observations on Dr. Sarbin's Exposition", in the Psychological Review, Vol. 52, 1945, p. 175-179.

A statement, which emphasized that clinicians have a task to perform apart from prediction; it was used to illustrate a common preoccupation with the control of human behavior, at the expense of testing hypotheses concerning that behavior.

Clark, Jerry H., "Application of the MMPI in Differentiating AWOL Recidivists from Non-Recidivists", in the Journal of Psychology, Vol. 26, 1948, p. 229-234.

A research report involving scale and item analysis with sub-groups of delinquents; it suggested that further item analyses might be productive and that military delinquents are not a homogeneous group.

-----, "The Relationship between MMPI Scores and Psychiatric Classification of Army General Prisoners", in the Journal of Clinical Psychology, Vol. 8, 1952, p. 86-89.

A comparison of sub-groups of military delinquents with an accidental sample of "normal" soldiers; it was used to illustrate that the differential capacity of MMPI scales was somewhat common in two countries.

Coulter, C.W., "Family Disorganization as a Causal Factor in Delinquency and Crime", in Federal Probation, Vol. 3, 1948, p. 13-17.

A generalized description of the homes, from which delinquents come, based on research reports; it was used to illustrate the nature and extent of this important correlate.

Dominion Bureau of Statistics, The Canada Year Book 1955, Queen's Printer and Controller of Stationery, Ottawa, xvi-1374 p.

A reference which was used to obtain comparative data concerning civilian delinquents in Canada in terms of age and rural-urban residence.

Ellis, Albert, "Recent Research with Personality Inventories", in the Journal of Consulting Psychology, Vol. 17, 1953, p. 45-49.

Critical comments concerning inventories, concluding with the opinion that, in comparison, clinical interviews appear more incisive and valuable; it was reported to point up the controversy regarding the relative efficacy of clinical and objective methods.

Eysenck, H.J., The Scientific Study of Personality, London, Routledge and Kegan Paul, 1952, xiii-320 p.
A description and discussion of research directed toward the identification of dimensions of personality by means of factor analysis; it was used as an example of the statistical approach to analysis and prediction of behavior.

Feldman, Harold and Alexander A. Maleski, "Factors Differentiating AWOL from Non-AWOL Trainees", in the Journal of Abnormal and Social Psychology, Vol. 43, 1948, p. 70-77.

A report on an extreme groups study with illiterate, slow-learning inductees; it was of use in suggesting biographical material for this research.

Glueck, Eleanor and Sheldon, Unraveling Juvenile Delinquency, New York, The Commonwealth Fund, 1950, xv-399 p.

A report on a comprehensive, multi-disciplinary study of civilian delinquency; although marred by unwarranted generalizations, it was of value as an introduction to civilian research and as a basis for certain limited comparisons.

Goring, Charles, The English Convict, A Statistical Study, London, Her Majesty's Stationery Office, 1913, 440 p.

The original report on a thorough anthropometric study, which was aimed at discovering whether any distinct physical type could be found among English criminals; it was used to indicate that, as early as 1913, conclusive and positive evidence could not be found.

Hanley, Charles, An Inventory of Personal Opinions, First Technical Report on Rehabilitation Research, U.S. Naval Retraining Command, Camp Elliot, San Diego, 1954, 17 p.

The description of an unfinished long range research project aimed at the identification of incipient military delinquents; it indicated the timeliness of this research and the importance assigned to the problem in another service.

Hathaway, Starke R. and Elio D. Monachesi, Analyzing and Predicting Juvenile Delinquency with the MMPI, Minneapolis, The University of Minnesota Press, 1953, vi-153 p.

One of the few predictive studies of delinquent behavior in the scientific literature; it was used for purposes of comparison.

Howlett, John M., A Psychometric Study of the Canadian Soldier in the North, unpublished Master's Thesis presented to the Faculty of Arts of the University of Alberta, 1951, 78 p.

A report on research involving six hundred men from all corps; it was used because its data indicated that the norms presented by the authors of the MMPI might not be applicable to either Canadian civilians or soldiers.

Karpman, Ben, "Psychodynamics of Child Delinquency, Round Table, 1952", in the American Journal of Orthopsychiatry, Vol. 23, 1953, p. 1-69.

A report on a discussion of causal factors by a group of medical specialists; it was used to illustrate disagreement within one scientific discipline and to show that single cause theories continue to be advanced.

Laver, Alfred Bryan, Item Analysis of the MMPI Against an Army Misconduct Criterion, unpublished Master's Thesis presented to the Faculty of Arts of Queen's University, 1955, v-117 p.

A report on the preliminary development of an independent delinquency scale and suppressor scale from MMPI items; it was used to indicate that a practical device might be developed from items instead of scales.

MacLeod, R.B., "The Phenomenological Approach to Social Psychology", in the Psychological Review, Vol. 54, 1947, p. 193-210.

A discussion of an approach, which was not adopted in this research; it provided a succinct statement concerning the relationship of prediction to control and to understanding.

Martin, John Bartlow, Break Down the Walls, New York, Ballantine, 1954, v-310 p.

A book which deals primarily with reforms in methods of reclamation; one provocative idea was selected from it concerning the relationship of age and delinquency.

McCollum, Ernest L., Survey of Human Adjustment Problems in the Northern Latitudes, A Study of Military Offenders, Report of the Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska, 1951, 6 p.

A report on an extreme groups study with small samples of delinquents and non-delinquents; brief reference was made to it to indicate that differences, similar to the ones found in this research, were found in another service and place.

Meehl, Paul E., Clinical Versus Statistical Prediction, A Theoretical Analysis and a Review of the Evidence, Minneapolis, The University of Minnesota Press, 1954, x-149 p.

A statement of a controversy and the presentation of evidence, which indicated that clinical intuition does not compare favorably with statistical procedures in psychological prediction; it was used to illustrate the controversy.

Meehl, Paul E. and Albert Rosen, "Antecedent Probability and the Efficiency of Psychometric Signs, Patterns or Cutting Scores", in the Psychological Bulletin, Vol. 52, 1955, p. 194-216.

A well-documented reminder to psychologists that statistically significant differentiation of criterion groups is not synonymous with significant or practical efficiency of prediction instruments; it prompted proper consideration of the base rates of the delinquency phenomenon in this research.

Metfessel, Milton and Constance Lovell, "Recent Literature on Individual Correlates of Crime", in the Psychological Bulletin, Vol. 39, 1942, p. 133-164.

A survey of scientific reports over a ten year period; it helped orientate this research in its early stages.

Monachesi, Elio D., "Some Personality Characteristics of Delinquents and Non-Delinquents", in the Journal of Criminal Law and Criminology, Vol. 38, 1948, p. 487-500.

An extension of the Capwell study to male subjects; although inconclusive because of its design, the study suggested that the MMPI might be capable of distinguishing between male delinquents and non-delinquents in a military setting.

Mosier, Charles I., "Problems and Designs of Cross-Validation", in Educational and Psychological Measurement, Vol. 11, 1951, p. 5-11.

A solution to the problem of a research worker, who has only one sample and wishes to develop a stable prediction formula and obtain an unbiased estimate of its effectiveness; the proposed design was adopted.

Myers, C.R., "Prediction in Clinical Psychology", in the Canadian Journal of Psychology, Vol. 4, 1950, p. 97-108.

An article in which the author noted the lack of attention to prediction in psychology and urged psychologists to predict and learn; it was used to illustrate the principal problem of this research.

Osburn, Hobart G. et al, A Preliminary Investigation of Delinquency in the Army, HumRRO Technical Report No. 5, Human Resources Research Office, The George Washington University, 1954, xii-152 p.

A report on a study, which attempted to deal with both causes and methods of reclamation; it was used to point out that delinquent behavior may be influenced by socio-economic factors although no support for that idea was found in this research.

Personnel Research Branch, Self-Description Instruments for Classifying Enlisted Men, Washington, The Adjutant-General's Office, Department of the Army, 1953, 9 p.

A report on a large scale predictive study which was only moderately successful; it was cited to indicate that prediction remains a challenging problem.

Reiss, Albert J. Jr., "Unraveling Juvenile Delinquency. II. An Appraisal of Research Methods", in the American Journal of Sociology, Vol. 57, 1951, p. 115-120.

A criticism of the Gluecks' research, in terms of their failure to take adequate account of certain environmental factors; it was used to indicate that caution is necessary in interpreting the Gluecks' findings.

Rubin, Sol, "Unraveling Juvenile Delinquency. I. Illusions in a Research Project Using Matched Pairs", in the American Journal of Sociology, Vol. 57, 1951, p. 107-114.

Another criticism concerning the Gluecks' research; reference was made to it in support of an assumption concerning the influence of detention on military delinquents in "after the event" studies.

Sarbin, T.R., "The Logic of Prediction in Psychology", in the Psychological Review, Vol. 51, 1944, p. 210-228.

A discussion which favored the testing of hypotheses rather than their continued use; reference was made to it in discussing the nature of the research problem.

Shaw, Clifford R., The Natural History of a Delinquent Career, Chicago, University of Chicago Press, 1931, xv-230 p.

The concept of a delinquency area and its inferred relationship with the development of delinquency; it was used as an example of the contributions of sociologists.

Snygg, Donald, "Predicting the Behavior of Individuals", in the Canadian Journal of Psychology, Vol. 3, 1949, p. 19-29.

A description of the phenomenological approach to prediction and a statement of its rationale; it was used to illustrate an extreme position which was considered untenable.

Spencer, John C., Crime and the Services, London, Kegan Paul, 1954, xii-306 p.

A discursive report on possible criminogenic factors of life in the armed forces; it was used only to describe the delinquency problem in the British Army.

The OSS Assessment Staff, Assessment of Men, Selection of Personnel for the Office of Strategic Services, New York, Rinehart, 1948, xv-541 p.

An important report on a selection program, in which selection variables were combined in an organismic manner; it was used to relate a theoretical approach and associated, unimpressive results.

Trenaman, Joseph, Out of Step, London, Methuen, 1952, xx-223 p.

An excellent report on the reclamation of young delinquents in the British Army during the last war; it was used to refer to their backgrounds and to indicate common elements of the delinquency phenomenon.

Proceedings of the Eighty-third Annual Congress of the American Prison Association, 135 East 15th Street, New York, 1953, xv-331 p.

This publication was used for one reason, because it contained an authoritative, yet unclassified, reference to the military delinquency problem in the United States.

APPENDIX 1

SUMMARY OF 1948 AND 1949 RESULTS

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The results of two preliminary studies, conducted by the author in 1948 and 1949, have a direct bearing on this research. For that reason their results are summarized in this Appendix. In the first Section comparisons of a sample of delinquents with two samples of non-delinquents from the 1948 study are presented. A third comparison concerns a similar group from the 1949 study. The second Section of the Appendix is devoted to items of the Experience Scale and other items which were not useful.

1. Comparison of Delinquents and Non-Delinquents

As shown in Table VIII, delinquents and non-delinquents were differentiated to a statistically significant extent ($P < .05$) in all three comparisons on F, K, Hs (without K), Pd, Pa, Pt, Sc and the Ma scales of the MMPI. Age and education distinguished between the criterion groups, except where matching had taken place, at $P < .001$ and $P < .05$ respectively. The delinquent-matched control comparison in 1948 is of special interest because it revealed generally consistent differences on the MMPI. The K scale correction did not improve inter-group differentiation except in one comparison.

Table VIII.- Comparisons of Differences between Mean Scores of Delinquents and Non-Delinquents by Critical Ratios.

Variable	Delinquents/ Matched Controls		Delinquents/Random Controls	
	1948		1948	1949
L	3.14		4.09	1.69
F	5.35		4.90	4.59
K	2.43		2.76	3.52
Hs	0.66	(3.27) ^a	0.39	(2.95)
D	2.79		2.99	0.27
Hy	0.90		1.21	0.42
Pd	7.20	(8.08)	7.75	(9.49)
Mf	0.53		0.50	0.35
Pa	4.68		6.28	2.33
Pt	6.61	(7.15)	7.38	(6.28) ^c
Sc	4.60	(5.78)	5.01	(5.88)
Ma	1.63	(2.45)	2.82	(3.80)
M Score	NA ^b		2.25	0.62
Age	NA ^b		8.54	7.41
Education	NA ^b		2.47	2.51

^aFigures in parentheses were obtained without adding K.

^bM score, age and education were matching factors.

^cThe only case where the addition of K resulted in a larger C.R.

2. Summary of Biographical and Inventory Items

The items, which distinguished between delinquents and non-delinquents in both studies at a level of confidence indicated by P .05, were combined after the 1949 study into an instrument named the Experience Scale.¹ Those items are listed below, with an indication in parentheses of the significance of each one, first in the 1948 study and, second, in the 1949 study. The response, which was chosen more frequently by the delinquents also is recorded in the brackets.

1. My family is somewhat disappointed in me, or, My family is pleased with me. (.001; Former)
2. The few jobs I've had I've been very much interested in, or, I've worked at all kinds of things. (.001, .01; Latter)
3. Being in a small closed-in space never bothers me, or, Being in a small closed-in space makes me uneasy. (.001; Latter)
4. I prefer working my way up on a job, or, When I change jobs I like to go to another town. (.001; Latter)
5. I like to stay put, or I've gone on the bum. (.001; Latter)
6. I am reckless, or, I am calm. (.001; Former)
7. I sometimes drink because it helps me to forget. (.001; True)

¹Items 1 to 6 are from Personal Inventory "B".

8. Do you become drunk once every few months or more? (.001; Yes)
9. Have you been arrested more than once? (.001, .02; Yes)
10. Have you ever stayed drunk for a day or more? (.001, .01; Yes)
11. Have you bitten your nails since you were 15? (.001, .01; Yes)
12. I didn't waste my time hanging around after school. (.05, .02; False)
13. Do you have a hobby at which you spend at least several hours a week? (.01, .02; No)
14. Did you ever belong to a gang as a child or youth that got into trouble with the police or school authorities? (.05; Yes)
15. Were you ever fired from a job or did you ever quit a job for no particular reason? (.01, .05; Yes)
16. Have you ever been in jail? (.01; Yes)
17. Since leaving school I've averaged more than one job a year. (.001, .01; True)
18. I left school because I had enough of it. (.05, .01; True)
19. Do you ever attend church? (.01, .02; No)
20. Are you married or single? (.001; Single)
21. Did you ever run away from home during school years? (.01, .02; Yes)
22. Did you find it easy to "put things over" on your teachers? (.01, .001; Yes)
23. Did you want to start to school? (.01; No)
24. Did you find that you liked school? (.001, .02; No)

25. Did you prefer any one of the children in your family to all the others? (.001, .05; Yes)
26. Are you quick tempered? (.001, .01; Yes)
27. Has your quick temper ever got you into trouble? (.01, .001; Yes)
28. Do you think that your parents did not discipline you strictly enough as a child? (.001; Yes)

3. Non-Discriminative Items

A summary of the content of the items, which were eliminated after item analysis, follows:

a) Family history.-- Divorce or separation of parents or frequent quarrels; family income; family history of fainting spells, nervous breakdown, suicide, imprisonment, alcoholism, invalidism; parents living; mother worked outside the home; parents owned home; father regularly employed during subject's childhood; family size.

b) Childhood history.-- Type of discipline (physical, removal of privileges, etc.); raised by own parents; nursed by mother; preference for one parent over the other; got along well with parents; favored treatment in the home; "picked on" by older children; regular spending allowance; earned money as a child; enuresis after age 7; stuttering; temper tantrums; friends "tougher" than other children in the neighborhood; quick tempered as a child; felt less well dressed than friends; teased a great deal; frequent quarrels with other children at home; thought parents were "glad" when subject was born.

c) School history.-- Suspended from school; regular attendance; habitually late; retarded two or more grades; liked by most or some teachers; history of reform school.

d) Adult health history.-- Sickness interfered with work; head injuries; "troubled" with "nerves"; "nervous breakdown", despondent and unable to work; current history of fainting or dizzy spells, much backache, stomach trouble, heart trouble, rheumatism or kidney trouble, tendency to fatigue easily or to sleep poorly.

e) Personal habits and interests.- Active participation in a club or association; liked major occupation; reported daily work done well; thought work too hard for pay received; seeks excitement.

APPENDIX 2

SUMMARY OF CALCULATIONS WITH BROADENED CRITERION

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When the criterion of delinquency was broadened to include delinquents, other than those who had been sentenced to detention, a number of calculations had to be repeated. With new sub-samples, drawn at random from the total recruit sample, biserial correlations were calculated for each of the experimental variables used in the study with the narrow criterion. They are shown in Table IX.

In Table X the partial regression coefficients for each sub-sample are recorded, together with the other correlations from which they were derived.

The correlation matrix used for the determination of the weights for the prediction formula is shown in Table XI.

Table IX.- Biserial Correlations with a Broadened Criterion of Military Delinquency in Two Sub-Samples of Army Recruits.¹

Variable	Sub-Sample #1			Sub-Sample #2		
	r_{bis}	S.E. $_{rb}$	P	r_{bis}	S.E. $_{rb}$	P
F	.412	.078	<.001	.268	.084	<.003
K	.059	.088	N.S.	.001	.089	N.S.
Pd	.576	.067	<.001	.327	.082	<.001
Ma	.239	.085	<.01	.162	.087	<.10
E.S.	.708	.056	<.001	.385	.079	<.001

¹Each sample totalled 240, 57 delinquents and 183 of a remainder.

Table X.- Correlation Matrix and Partial Regression Coefficients with a Broadened Criterion.

	F	K	Pd	Ma	E.S.
Sample #1					
K	-.429				
Pd	.455	-.241			
Ma	.387	-.428	.251		
E.S.	.463	-.351	.406	.284	
Crit.	.412	.052	.576	.239	.708
Regr.	.107	.470	.345	.128	.646
Sample #2					
K	-.348				
Pd	.389	-.126			
Ma	.304	-.408	.359		
E.S.	.444	-.368	.393	.224	
Crit.	.268	.001	.327	.162	.385
Regr.	.109	.238	.138	.117	.344

Table XI.- Correlation Matrix for Determination of Weights with Total Sample of Recruits and Broadened Criterion.¹

	F	K	Pd	Ma	E.S.
K	-.386				
Pd	.405	-.209			
Ma	.342	-.430	.239		
E.S.	.451	-.356	.364	.248	
Crit.	.337	.015	.459	.198	.547
Regr.	.087	.336	.285	.122	.493

¹Total sample: 115 delinquents and 366 of a remainder.

APPENDIX 3

ABSTRACT OF

THE PREDICTION OF MILITARY DELINQUENCY

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ABSTRACT OF

THE PREDICTION OF MILITARY DELINQUENCY¹.

Many decisions and generalizations in psychology cannot be made with confidence without the prior test of prediction. The psychological literature, however, contains few reports on prediction. Not one conclusive predictive study concerning delinquency could be found when this research was begun in 1948.

Two preliminary studies were conducted to test reported correlates of delinquency. Age, education, seven scales of the MMPI and twenty-eight items of personal history, termed the Experience Scale, consistently distinguished between military delinquents and non-delinquents at a minimum level of confidence indicated by P.05.

The object of this research was to find out whether delinquent behavior could be predicted in the Canadian Army to a significant and useful extent using the variables which had survived the earlier studies. An experimental sample (N:481) was gathered from consecutive enrolments at all recruiting depots in Canada. The test results were put

¹PhD. Thesis presented by William Robert Nelson Blair, in 1956, to the School of Psychology of the University of Ottawa, xv-146 p.

aside for four years, at which time they were related to the conduct records of the subjects.

The same variables, with one exception, differentiated extreme groups of delinquents and non-delinquents at the minimum level of confidence. The exception, the K scale, had been anticipated and was attributed to a difference in defensiveness between incipient delinquents and those in detention.

The full sample was divided to provide for cross-validation and four of the variables, F, Pd, Ma and the Experience Scale, were correlated significantly with the sentence to detention criterion in both sub-samples. In combination, the four variables, plus the K scale as a suppressor, yielded multiple correlations of $R.602, \pm .029$, and $R.578, \pm .030$.

The criterion was broadened to include serious delinquents, who had not been sentenced to detention. Resultant multiple correlations were $.641, \pm .027$, and $.640, \pm .027$. A prediction formula was developed and applied. It was found that the delinquency rate in the sample could have been reduced from 24 to 17 percent, and that individual delinquent behavior could have been predicted in terms of probabilities, ranging from .00 to 1.00.

A successful validity generalization trial involving only the MMPI variables was conducted. It suggested that the prediction formula was capable of general application.