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NEUROPSYCHOLOGICAL DISCRIMINATION BETWEEN VIOLENT AND NONVIOLENT
YOUNG OFFENDERS: A STEP TOWARD THE PREDICTION OF VIOLENCE

by

Anne Maura Smylie

B.A.(Hon), Simon Fraser University, 1984

THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
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of
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Neuropsychological Discrimination Between Violent and Nonviolent

Young Offenders: A Step Toward the Prediction of Violence

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ABSTRACT

Sixty-four juvenile male offenders were administered the Halstead-Reitan Battery in order to investigate the relationship between neuropsychological deficits and violence. Degree of violence was assessed by reference to peer nominations, institutional behaviour, and official criminal histories. Factor analysis produced four factors suggesting that sexual offenders were more impaired neuropsychologically than other violent (but not sexual) offenders, although the latter group received a small loading for impairment. Multivariate analysis of variance showed that the violent offenders, in general, produced more impaired mean scores on tests included in the Halstead-Reitan Battery than nonviolent offenders. However, the within group variability amongst the violent offenders suggests that further subclassifications of violence are needed. Violent offenders appear to be a heterogeneous group. Discriminability may be improved if more homogeneous subtypes, such as murderers and rapists are used. Finally, a global measure of impairment was more successful in differentiating the violent and nonviolent groups than either multivariate or univariate analyses of the individual tests included in the neuropsychological battery.

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INTRODUCTION

For decades, researchers have been attempting to identify the causes and correlates of crime and delinquency. Sociological and psychological theories abound, yet the prediction of criminal offenses remains at virtually chance levels (Hall, 1984; Menzies et al., 1985; Mulvey & Lidz, 1984; Schlesinger, 1978; Wettstein, 1984). Correlates of crime and delinquency, such as broken and/or disorganized homes, physical punishment and abuse, and lower intelligence or learning disabilities (Conger, 1977; Gove and Crutchfield, 1982; Karniski et al., 1982; Koerin, 1978; Konopka, 1966; Reid, 1976), have been found to be predictive of poor psychosocial adjustment, but they do not discriminate offenders from other maladjusted individuals (Koerin, 1978; Robins, 1966).

In general, prediction accuracy is limited by the breadth of the criterion of interest. Delinquency is a very broad concept. For example, criminal offenses for this age group range from truancy and drinking under age to premeditated murder. These acts are subsumed under the common label of delinquency because they have a single characteristic in common: the behaviours are prohibited by law. Obviously, delinquency denotes a very heterogeneous class of behaviours. This diversity renders accurate prediction extremely difficult to obtain. In order to increase prediction accuracy, it is necessary to restrict the range of behaviour that one is attempting to predict. This study

will focus on the more serious end of the continuum of delinquent offenses; namely, violent offenses. Psychologists, particularly those working within the criminal justice system, are frequently asked to make predictions of the future violence-potential or dangerousness of individuals. Although this undertaking may pose considerable difficulties, the social, economic, and emotional costs of violence are high. Understanding and accurate prediction of violent behaviour has many benefits both for the public, and potentially for the violent individual.

However, even with the restriction of the topic to the category of violence, problems abound. There is disagreement regarding the definition of violence, and difficulty in obtaining adequate measures of violence once a definition has been chosen. Also, violence is a low base rate phenomenon, creating statistical difficulties for prediction.

Definitions of Violence

First, regarding the definition of violence, considerable differences are evident. Many researchers simply state that they are contrasting violent and nonviolent offenders without making a definition of violence explicit. Although it is likely that given a description of an act, most individuals would agree on its classification as nonviolent or violent, the failure to explicitly define the concept (or describe the characteristics

of the subjects), renders comparison of subject characteristics across studies difficult; if not impossible.

Others may classify acts as violent if the acts have a high probability of resulting in harm to others, self, or property. This definition tends to be vague and overinclusive. Dangerous driving may result in harm to others. Vandalism results in harm to property. Drug usage may result in harm to one's self. Certainly these acts may have some peripheral association with implicit concepts of violence, but they fail to tap the core of the construct.

Finally, some authors classify specific offenses as violent or nonviolent. Incidents that are usually classified as violent include acts of murder, assault, robbery, rape, and arson. Although this definition may reflect an improvement over those previously mentioned, disagreement still exists. For example, Hollin and Wheeler (1982) suggest that rape and arson may not be purely violent offenses.

Measures of Violence

Even if agreement existed regarding which offenses are violent in nature, research problems remain. Violence may be difficult to measure accurately. Frequently, official records have been utilized to ascertain offense incidence. However, it is well known that the vast majority of crime goes unreported, particularly if it occurs within the family (Gibbons, 1979; Gove

& Crutchfield, 1982; Hall et al., 1984; Reid, 1976; Spreen, 1981; Tepperman, 1977; Zimmerman & Broder, 1980). For example, Hall et al. (1984) found that only two of ninety-four arrestable offenses committed during the period of their study were recorded in the official records. They go on to cite the National Victimization Panel report (1978), wherein it was found that only about one-half of violent crimes are reported. Of those, one-third result in arrest, and only about 2% of all complaints culminate in conviction. Hall et al. suggest, therefore, that arrest information is essentially useless in accurately reflecting the nature and extent of an individual's violent behaviour.

Although underestimating the degree of violence manifest, official criminal histories may be useful in determining the presence or absence of violence, and may give some indication of degree. Errors in classification of individuals will occur in that some individuals who are violent will be classified as nonviolent, because they have not received a charge for a violent offense. However, extremely violent and repetitively assaultive individuals are likely to be detected.

Detection of aggressive or violent behaviour may be increased when records of behaviour are available, or when information from significant others is obtained. When individuals are incarcerated, records of daily living unit behaviour, or specific untoward incidents (often referred to as 'critical incident reports'), may be kept. Aggression against

peers or staff will appear in these records regardless of whether the incident resulted in the laying of a criminal charge. Furthermore, staff and peers come to know individuals, and can, therefore, provide judgments regarding their violent or nonviolent nature.

As noted by Pekarik et al. (1976), ratings made by peers have shown substantial convergent validity when compared to the ratings of teachers, clinicians, and parents. Peer evaluations also correlate well with behavioural observation, and are effective predictors of future maladjustment. Cowen et al. (1973) found peer judgments to be sensitive predictors of later psychiatric difficulty. Peer evaluations of aggressive behaviour have consistently been found to correlate well with teachers' ratings (Lesser, 1959; Pekarik et al., 1976; West & Farrington, 1973), and to show consistency over time (Cairns & Cairns, 1984; Olweus, 1977).

The Problem of Low Base Rates

Given an adequate definition of violence, and appropriate methods of measuring this variable, the problem of low base rates remains. Most violent offenses are committed by a small number of individuals (Hall, 1984; Hanson et al., 1984; Loeber, 1982). This creates difficulties for prediction in that an essentially perfect predictor is required in order to reduce error rates to an acceptable level. As aggression has been found

to be a relatively stable characteristic of individuals (Clarizio, 1968; Loeber 1982; Spellacy, 1977), the base rate for violence amongst aggressive individuals is much higher than that in the general population (Hall, 1984). This situation led Hall et al. (1984) to conclude that predictions of violence should never be made in the absence of a past history of violence. Although this consideration circumvents the problem of low base rates, it renders early intervention and prevention virtually impossible. If early identification of violence-prone individuals is desired, it is imperative that one search for predictor variables that are independent¹ of the criteria to be predicted. The first step in this process is to identify variables that reliably discriminate between violent and nonviolent offenders.

Discriminating Variables

Past research on factors that discriminate between violent and nonviolent offenders has been plagued with inconsistent results, and discriminators that explain too little of the variance to be of practical utility. Whether studying a broad range of demographic, behavioural, and environmental factors, individual personality characteristics, psychopathological symptoms, or neurological and neuropsychological functioning, failure to replicate the findings of others appears to be the

¹ Use of the word independence in the context of predictor variables is meant to imply the absence of criterion contamination, rather than statistical independence.

rule rather than the exception.

Comprehensive Studies

Heller and Ehrlich (1984) conducted a comprehensive actuarial study of 245 demographic, developmental, clinical, socioeconomic, and criminal/legal variables gleaned from 1525 presentence reports. Thirty of the variables statistically discriminated between violent offenders, violent recidivists, and nonviolent offenders. Twelve would be expected to be statistically significant by chance, if all of the variables were independent.² It is obvious from the variables reported that independence was not achieved. For example, three of the variables that discriminated were socioeconomic status, adequate housing, and incidence of neighbourhood crime. It is very probable that these variables are correlated. Furthermore, previous convictions regarding weapons, another discriminating variable, is so highly related to violent crime as to be useless as a predictor, independent of the behaviour being predicted.

Perusal of the tables presented by Heller and Ehrlich (1984) suggested that there was considerable overlap between the groups on all of the variables identified as significant discriminators. In order to determine the actual magnitude of the associations, this author worked the statistical tests backward. It was found that all of the correlations tended to be

² In this instance, independence refers to a lack of statistical association between the variables.

of zero-order magnitude. Obviously, the statistical significance of the variables was a function of the sample size (N=1525).

Schlesinger (1978) studied thirty variables that had previously been identified as correlating significantly with violence in samples of children. He conducted 124 analyses utilizing these variables. None of his analyses produced statistically significant results.

Personality Variables

Research utilizing the MMPI to identify violent offenders has been inconclusive. Mungas (1984) found that scales F and 9 discriminated between nonincarcerated violent and nonviolent offenders at the .01 level. However, only 51 per cent of the classifications were correct. Valliant et al. (1984) found that an 8-4-6 profile discriminated between offenders and nonoffenders, but failed to differentiate by type of offense within a criminal psychiatric facility. Violent inmates were found to score substantially higher on scales F, 6, 7, and 8 by Jones et al. (1981). Whereas, Persons and Marks (1971) found that inmates with a 4-3 high-point pair significantly exceeded the institutional base rate for both current and past violent offenses. They also found that those inmates with 4-8 code types had significantly fewer current violent offenses than the institutional base rate. In contrast, Lothstein and Jones (1978) suggest that an 8-4 high-point pair describes the violent

offender, and that the 4-3 code type does not. These authors also suggest that elevations on scales F, 4, 8, 9, 7, and 6 may describe the criminal population in general. Further, they warn that considerable overlap between violent and nonviolent offenders on scales 4, 8, and 9 prevents accurate prediction.

Finally, Spellacy found that multivariate analyses of MMPI profiles failed to differentiate between violent and nonviolent adolescents (1977), but did significantly discriminate in adults (1978). Univariate analyses produced significant differences on four scales for the adults (F, 6, K, and 5), and six scales for the adolescents (F, 1, 2, 3, 6, and 8). However, all of the mean code types are similar. Violent and nonviolent adolescents both produced mean code types of 8-4-9, and the adults were described as 9-8-4, and 4-9-8, for the violent and nonviolent offenders respectively. As can be seen from the above, almost every scale on the MMPI has successfully discriminated between violent and nonviolent offenders in some sample, but none have consistently discriminated between these groups.

While rejecting the use of the MMPI for the differentiation of violent and nonviolent offenders, Lothstein and Jones (1978) suggest that the Buss-Durkey Hostility Inventory (BDHI) might be useful. However, Syverson and Romney (1985) found that the BDHI failed to discriminate between violent and nonviolent youth whether utilized individually, or in combination with other measures (Romney & Syverson, 1984).³

³ In fact, they obtained an F essentially equal to zero between

Personality factors were also included as a component of the assessment device designed by Menzies et al. (1985) to differentiate violent and nonviolent offenders. Although successful, their instrument only accounted for 12 per cent of the variance.

In summary, personality tests and measures, in general, have not as yet been shown to reliably discriminate between violent and nonviolent offenders. Does psychopathological symptomatology fare any better?

Psychopathological Symptomatology

Hollander and Turner (1985) attempted to discriminate violent and nonviolent youth by virtue of psychiatric diagnosis. They found that the diagnosis of conduct disorder (undersocialized type) was highly associated with aggression. Considering that this diagnosis is largely based on a past history of violence (Lewis et al., 1984), and that the social and criminal history was incorporated into the diagnosis, their results are somewhat less than enlightening. This methodological shortcoming renders the predictive utility of their findings questionable. As stated above, it is necessary that predictor variables be independent of the criteria to be predicted. Obviously, the diagnosis of conduct disorder fails to meet this requirement.

3(cont'd) groups on the hostility factor produced by their measures.

Yates et al. (1983) attempted to discriminate between murderers, other violent offenders (against persons), and property offenders. Discriminant analysis resulted in correct classification rates of 60%, 49%, and 71% respectively. The authors note that there was considerable overlap between the murderers and other person offenders. However, discrimination between violent and property offenders was achieved. The researchers found that the person offenders were psychologically healthier than the property offenders.

In contrast to the results of Yates et al. (1983), it does not appear unreasonable to suggest that individuals who are acutely psychotic, particularly if they are paranoid, might be at risk of committing violent offenses. Cases of violence during psychotic episodes have been documented (for example, see Pontius, 1984). However, the question is not whether these individuals are potentially violent, but whether these symptoms are characteristic of violent individuals in general. Again, the results are inconclusive. Heller and Ehrlich (1984) found that a diagnosis of psychosis failed to discriminate between violent offenders, violent recidivists, and nonviolent offenders, although some of the presenting symptoms of this disorder did. However, when the magnitude of the associations was assessed, it was found that they tended to be zero-order correlations.

In contrast to the results of Heller and Ehrlich (1984), Lewis et al. (1980) found that 29.3 per cent of the variance in their multiple regression analysis was accounted for by paranoid

symptomatology. Interestingly, symptoms such as loose associations, which had discriminated significantly between more and less violent youth, failed to add significantly to the predictive accuracy. Psychotic and paranoid symptomatology may not contribute very much to the discrimination between violent and nonviolent individuals when groups are considered. However, the presence of these symptoms may increase the probability that a violent offense will be committed. Certainly reviewers in the field tend to believe that these symptoms do contribute to violence potential (Hall, 1984; Mulvey & Lidz, 1984; Wettstein, 1984). Furthermore, psychotic symptomatology may be associated with neurological and neuropsychological impairment, another area which has been investigated in regard to the prediction of violence.

Neuropsychological Studies

Bryant et al. (1984) successfully discriminated between violent and nonviolent groups using the Luria-Nebraska Neuropsychological Battery (LNNB). Utilizing Golden et al.'s criterion (1980) of deficits on three or more scales as being indicative of brain impairment, these authors found that 73 per cent of the impaired group had committed violent offenses, whereas only 28 per cent of the nonimpaired group had. Furthermore, violent and nonviolent groups were found to be significantly different on every scale and summary score included in the LNNB. Although visual inspection of Brickman et

al.'s (1984) data suggests that their results agree with those of Bryant et al., these authors found that only two scales on the LNNB significantly discriminated between violent and nonviolent groups. More violent youth were impaired on the expressive speech scale, and the violent adolescents obtained a worse mean score on the memory scale than the nonviolent group.

In studying both adolescent and adult offenders, Spellacy (1977, 1978) found that with multivariate analyses, neuropsychological tests significantly discriminated between violent and nonviolent offenders. However, the multivariate Fs tended to be small (2.3 and 2.85 respectively), and appear to be discrepant with the stepwise discriminant analyses. The latter analyses are reported as accounting for 86.3 and 83 per cent of the variance respectively. Univariate analyses indicated that of 31 neuropsychological variables, 12 discriminated in the adolescent sample, and 21 in the adult group. However, in both cases some of these variables were redundant. For example, Full Scale, Verbal, and Performance IQs are included in the analysis in addition to the subtests from which they were estimated.

In addition to assessing psychotic symptomatology, Lewis et al. (1980, also reported in Lewis' book, 1981), conducted neurological and neuropsychological assessments of their subjects. Although able to discriminate more and less violent youth on the basis of neurological signs, many neuropsychological measures did not significantly discriminate between the groups. However, visual inspection of the mean

performance of these groups on neuropsychological measures suggests that these tests should also be discriminating between the groups. Furthermore, when the sexual offenders are separated from the other more violent offenders (Lewis et al., 1981b), it appears that they are more impaired neuropsychologically than the remainder of the group from which they were drawn, although they were not significantly different.⁴ However, the sexual offenders were found to be significantly more impaired neuropsychologically than the less violent subjects.⁵

Although the Lewis et al. (1980) data suggests that the more violent offenders may be less intelligent than the less violent offenders, this could in part be the result of including the sexual offenders with the other more violent offenders. A subsequent analysis (Lewis et al., 1981b) suggests that the more

⁴ Older studies of heterogeneous groups of sexual offenders found that they were more likely to be mentally defective than other offenders. Clemmer (1958) reports that 29% of the sexual offenders in his study were mentally defective, and a further 22% were borderline, compared to an incidence of 15% in the total prison population. Atcheson and Williams (1954) also found that juvenile male sexual offenders were twice as likely as nonsexual offenders to have IQs less than 80 (an incidence of 25.2% in the sexual offender group). Their sample included a few subjects charged with exhibitionism, immorality, promiscuity, etc. The incidence in those charged with indecent or sexual assault, or indecent acts could have been higher, but cannot be determined from the information given. In contrast to the above results, Abrahamsen (1960) found that adult sexual offenders were of average intelligence. However, he notes that the prison where the study was conducted did not accept mentally defective criminals. He did find that all of these subjects were suffering from mental or emotional disorders.

⁵ On many of the measures the difference in means between the sexual and less violent offenders is at least 1.5 times the difference between the means of the other more violent and the less violent offenders. However, the authors emphasize the similarity between the sexual and other more violent offenders.

severe impairment in the sexual offenders is acting to 'pull down' the mean for the overall group of more violent offenders. The suggestion of more severe impairment amongst the sexual offenders may partially explain the discrepant findings of Hollin and Wheeler (1982). These authors found violent offenders to be more intelligent than nonviolent offenders, but they excluded sexual offenders from their violent sample.

Krynicky (1978) compared repetitively assaultive, nonpsychotic adolescents to an infrequently assaultive group, and to subjects suffering from organic brain syndromes (OBS). The frequently assaultive and OBS subjects tended to show evidence of brain impairment on either electroencephalograms (EEGs), or on the Bender Visual-Motor Gestalt test. Furthermore, both of these groups tended to be more perseverative than the infrequently assaultive group.

Taking a different approach to the problem, Spreen (1981) conducted a prospective study of subjects who had received extensive neurological and neuropsychological assessments when they had been referred for learning difficulties. He followed-up subjects who had been classified as definitely evidencing brain impairment, those manifesting signs suggestive of brain impairment, and those with learning disabilities in the absence of neurological and neuropsychological signs. He contrasted these groups with a group of normal learning controls. In comparing the groups on type of first offense, he found that the impaired groups were more involved in the more serious offenses

(which included one person offense), whereas the nonimpaired groups were more likely to have committed vehicle driving offenses. However, he stresses that the control group was similar to the neurologically impaired groups. In addition, he found a trend for the more serious crimes to have been committed by those with lower IQs, but dropped from his analysis all subjects with IQs less than 70, thereby restricting his range.

Although the results of the neuropsychological studies do not show perfect consistency, they appear to be more consistent than the studies of personality characteristics. The consistency is apparent in that neuropsychological deficits do appear more frequently in violent than in nonviolent groups. At least some of the inconsistencies may be a function of methodological differences and/or shortcomings in the studies.

Methodological Issues

First, many of the studies have not been conducted blindly. Although neuropsychological testing may not be as prone to reactivity as some other assessment techniques, it is still possible that the experimenter may influence the subject's motivation to perform well. Apparent deficits could be created where they do not actually exist, or impairment that exists could be exaggerated. However, Brickman et al. (1984) did find differences between violent and nonviolent groups when assessments were conducted blindly. In fact, even more

impairment might have been found in their violent group if educational adjustments had not been made, as this procedure would result in a conservative estimate of impairment in the youth.

A second difficulty in many of these studies is the problem of highly discrepant sample sizes. Large differences in group sizes will result in a loss of power to detect differences that exist, and may help to explain the lack of expected significant differences in the Lewis et al. studies (1980, 1981b). In the former study more and less violent groups were composed of 78 and 19 cases respectively, and in the latter study, 17 sexual offenders were compared to 61 other more violent offenders.

Third, sample sizes may be small, which also results in a lack of statistical power. For example, Krynicki (1978) studied only 21 subjects, that were then separated into three groups. The small sample studied leads to questions regarding the results. Was the failure to reliably discriminate between the violent and OBS subjects a function of the lack of power? On the other hand, were the differences between the former groups and the less frequently violent group of such magnitude that these differences were detected even in the face of low power?

Finally, sample characteristics differ across studies. For example, Krynicki (1978) restricts the repetitively assaultive group to those who are not psychotic, then assesses neuropsychological functioning. Whereas, Lewis et al. (1980,

1981b) study psychotic symptomatology as a possible discriminating variable between violent and nonviolent youth, in addition to neuropsychological and neurological factors. Comparability of the samples is in question.

These methodological and statistical differences or difficulties are not restricted to the neuropsychological studies. Yates et al. (1983) indicate that their sample included mostly gang youth, to whom violence may be considered acceptable, if not expected, behaviour. Their sample may not be comparable to incarcerated populations in general. Nor would Hollin and Wheeler's (1982) sample taken from a psychiatric facility be comparable to the aforementioned groups. These studies also suffer from further difficulties in that Yates et al. have highly discrepant sample sizes (murderers = 46, other person offenders = 262, and property offenders = 31); Hollin and Wheeler only studied 20 subjects in total. Schlesinger's (1978) research may also have suffered from a lack of power due to discrepant sample sizes. Out of a sample of 122 youth, only 19 had been referred for violent offenses.

Conclusions

Regardless of the difficulties, overall, review of the literature suggests that neurological and neuropsychological variables may be potentially useful in the discrimination of violent and nonviolent offenders. There is also some suggestion

that psychotic and paranoid symptomatology may be more frequent in violent groups. However, some disagreement still exists regarding which specific deficits may discriminate between these groups (Brickman et al., 1984; Karniski, (1982). Finally, many of the deficits identified do not have an obvious clinical or theoretical relationship with violence. For example, how would ambidexterity (Krynicky, 1978) contribute to the potential for violence? In what manner would difficulties in arithmetic (Bryant et al., 1984) increase the dangerousness of an individual?

One possible explanation for such deficits appearing to be more common to violent offenders is that any type of deficit requires compensation. As the number of deficits increases, the coping abilities of the individual may be overtaxed. This could result in frustration, which could then potentiate violence. This suggestion is certainly not new. In the 1930s, Dollard et al. (1939), in their extension of Freudian theory, suggested that frustration could lead to aggression. Similarly, Cohen (1955) has theorized that the frustration experienced by lower class youth when they entered the middle class institution of the school could result in delinquency. And various authors (Fitzhugh, 1973; Karniski et al., 1982; Reid, 1976; Spreen, 1981; Tarnopol, 1970; Vetter & Silverman, 1978) have noted that learning disabilities may result in frustration, which culminates in delinquent behaviour.

Learning disability has been shown to occur more frequently in delinquent populations (Fitzhugh, 1973; Hollander & Turner, 1985; Hurwitz et al., 1972; Karniski et al., 1982; Spreen, 1981; Tarnopol, 1970; Voorhees, 1981; Wolff et al., 1982; vs. Shañok et al., 1983). However, it may not discriminate between violent and nonviolent offenders (Bryant et al., 1984). For these reasons, it would appear that violent and nonviolent youth may be better discriminated by global measures of neuropsychological deficit, than by the specific deficits that the groups display.

The present study will investigate whether neuropsychological functioning and admission of paranoid and psychotic symptomatology will discriminate between violent and nonviolent young offenders. Discriminability of specific deficits between groups will be compared to a global measure of neuropsychological impairment. Furthermore, in an effort to identify possible sources of impairment, subjects will be interviewed regarding adverse life events.⁶

⁶ There is some evidence suggesting a higher incidence of adverse events in the histories of violent than in nonviolent youth (Lewis & Shanok, 1977; Lewis et al., 1981a; Lewis et al., 1982).

Subjects

The current study was conducted as part of a comprehensive project studying violent young offenders. Seventy adolescent males¹ at the Willingdon Youth Detention Centre (YDC) took part in this portion of the research project. All subjects were at least 15 years of age. Those subjects selected,² were asked to undergo neuropsychological testing. Five subjects refused. Four of these five 'refusers' had a positive history for violent offenses; one for murder, and one for sexual assault. One subject was dropped from the study because of incomplete data.³

The overall project included one hundred and twenty-five male youth. The average age of the subjects in the overall study was 16 years, 9 months ($M = 201.3$ months, $s = 12.2$). The mean age of the subgroup receiving the neuropsychological testing was 17 years, 0 months ($M = 204.0$ months, $s = 10.4$). The average age is slightly higher in the subgroup as no subjects under the age

¹ No females were included in the study due to the small number who are incarcerated at any given time.

² Selection was based primarily upon availability. Some subjects had left the institution before they could be tested. Furthermore, the author attempted to avoid interference with institutional programs as much as possible.

³ This subject terminated a test in the Halstead-Reitan Battery which made it impossible to calculate an Average Impairment Index as this test contributes three of the seven scores.

of 15 years may be tested with the adult version of the Halstead-Reitan Battery (see Table 1).

Subjects included both contained youth and those on remand.⁴ Sixty-two per cent of the overall sample were contained, whereas sixty-nine per cent of the subgroup were contained. Due to the length of time required for the neuropsychological testing, many of the remand youth had left the institution before they could be asked to participate in the study. Also, since recidivists are more likely to be sentenced, and contained youth remain in the institution longer than remand youth, there is a tendency for the subjects in the subgroup to have been detained more frequently, and therefore, to have been in detention more days in total. This is also reflected in the higher means for the subgroup for both number of shifts for which information was available, and the number of other youth who indicated that they knew the subject⁵ (see Table 1).

Three subjects in the subgroup were receiving psychotropic medication,⁶ and three were receiving antibiotics.

Forty-eight subjects in the subgroup were Caucasian, ten were Native Indian, and one was black. Information regarding

⁴ Youth who have received sentences to the detention centre are referred to as 'contained'. Those who are awaiting trial or sentencing are 'remanded' into custody.

⁵ Youth who have been in the institution for longer periods of time would be expected to be better known.

⁶ One subject was receiving chlorpromazine, one was receiving alprazolam, and the final subject was receiving desipramine.

Table 1: Comparison of Subsample and Remainder of Entire Sample

	Subsample		Remainder		t	p
	Mean	sd	Mean	sd		
Age (in months)	204.0	10.4	198.5	13.4	2.55	p<.01
N	64		60			
Number of times at YDC	4.25	2.98	3.33	2.47	1.85	p<.10
N	63		57			
Total days spent at YDC	142.6	156.3	98.6	117.8	1.75	p<.10
N	63		57			
Continuous days (current)	61.9	48.9	53.5	79.6	.69	p<.50
N	63		57			
Number of shifts (on file)	104.7	61.3	79.2	59.6	2.13	p<.05
N	60		44			
Number of peers known by	44.8	15.7	37.4	15.5	2.63	p<.01
N	64		61			

race was not on file for five subjects.

Setting

The Willingdon Youth Detention Centre is a medium to maximum security correctional institution for adolescents. It provides a remand and containment facility for the province of British Columbia. Currently, there are one hundred to one hundred and forty residents at the facility, who reside in 'closed' and 'open' custody settings. Approximately 10% of the residents are female. Two-thirds of the residents are contained and one-third are on remand.

The institution has various units providing different levels of security. Unit security ranges from individual cells, similar to those found in adult prisons, to an 'open custody' cottage, where considerable freedom of movement is allowed.

Most residents have the option of attending school within the institution. Other programs and activities include indoor and outdoor recreation, living skills, church, cooking, crafts, games and movies.

Finally, a token economy system is in place. Residents earn points which they may trade for cigarettes, candy, and other goods. 'Movement to' and placement in more privileged and less secure units also is determined by performance within this system.

Instruments

Measures of violence included peer nominations, official criminal histories, and institutional records of living unit behaviour. Neuropsychological assessments utilized the Halstead-Reitan Battery, and the Vocabulary and Block Design subtests from either the WAIS-R or the WISC-R, depending upon the subject's age. Paranoid and psychotic symptomatology were assessed with the SCL-90-R, and reports of adverse life events were elicited through interviews.

Peer nomination items were taken from Milich and Landau (1984) and Mitchell (1956), and additional items were added by the researchers (see Appendix A). Sociometric ratings have been shown to be highly reliable (Olweus, 1977), valid (Lesser, 1959; Milich et al., 1982; Pekarik et al., 1976), and predictive (Janes et al., 1979; West & Farrington, 1973).

Although expected to be an underestimation of actual offenses, official criminal records for each youth were obtained. In an effort to derive the most accurate criminal history for the individual, all charges, rather than just convictions, were recorded,

Daily records of living unit behaviour were also recorded. For each shift, staff are required to indicate the prominent behaviours displayed by each incarcerate on their unit during that time period. These records supply a much more accurate picture of the adolescent's behaviour than critical incident reports (reports submitted to the administration when especially untoward events occur), as the latter may be as much influenced by the staff member's mood as the adolescent's behaviour.⁷ Furthermore, critical incident reports are only filed for particular types of behaviour such as aggression or self-mutilation, whereas daily behavioural reports span the range of possible behaviours from model to uncontrollable.

⁷ Garrison (1984) suggests that staff may also be more likely to report aggression if they themselves are the victims of the act.

The above measures were obtained for all possible subjects (up to 125 individuals), whereas the following measures were administered only to the subgroup (64 individuals): the Halstead-Reitan Battery, the Vocabulary and Block Design subtests, the head trauma interview, and the SCL-90-R.

The Booklet Category Test, Tactual Performance Test, Seashore Rhythm Test, Finger-tapping, and Trail-Making tests (Parts A and B), from the Halstead-Reitan Battery (HRB) were administered. These tests produce seven scores which enter into the Average Impairment Index (AII), which is the ratio of impaired test scores to the number of tests administered. Ratios reflecting impairment on one-half or more of the subtests suggest brain damage.⁸ The HRB is a frequently used and reliable instrument for assessing brain damage. For example, in a study comparing the usefulness of the HRB, the LNNB, and the WAIS-R, in identifying impaired individuals, the HRB correctly classified 82.5% of the impaired individuals and 77.4% of the overall sample (Goldstein & Shelly, 1984).⁹ Furthermore, Heaton et al. (1978) found that the majority of the tests in the HRB are not particularly susceptible to faking amongst traumatic head injury patients. As Spellacy (1978) states, the "effectiveness of psychological tests of cognitive, motor and

⁸ High AII ratios suggest that some form of neuropsychological impairment may be present. However, use of the term global measure, when referring to this index, should not be interpreted as inferring that diffuse damage to the brain, or global impairment, is present.

⁹ See also Yeudall (1977) for a short review of the success of this instrument in the identification of brain damage.

perceptual abilities in the identification of brain injury typically equals or exceeds medical techniques such as the EEG" (p.50).

The Vocabulary and Block Design subtests of the WAIS-R or the WISC-R, as appropriate, were administered. These subtests correlate most highly with Verbal and Performance IQs respectively. Furthermore, both correlate substantially with Full Scale IQ.¹⁰ In addition, the Block Design subtest is quite sensitive to brain damage (Blatt & Allison, 1981; Maloney & Ward, 1976).

Subjects were also interviewed regarding incidents that may have resulted in neurological trauma (see Appendix B). Although the reliability of this self-report information is unknown, medical histories could not be accessed.

Finally, subjects were given the SCL-90-R. This self-report inventory lists 90 symptoms, and requires that the individual indicate how much distress each symptom has caused him/her in the past week. Distress ratings are made on a 5 point scale. Although the factor structure of this instrument is statistically questionable (the scree test might suggest one factor), the factors tend to be replicable (Derogatis & Cleary, 1977; Evenson et al., 1980; vs. Hoffman & Overall, 1978), and appropriately disappear depending upon the degree of homogeneity

¹⁰ The average correlations across age groups for the WAIS-R and WISC-R are respectively: Voc and VIQ, $r=.85$ and $r=.78$; BD and PIQ, $r=.70$ and $r=.68$; Voc and FSIQ, $r=.81$ and $r=.74$; BD and FISQ, $r=.68$ and $r=.68$.

and composition of the sample (e.g. Holcomb et al., 1983).¹¹ Convergent validity has also been shown (Derogatis, 1983; Dinning & Evans, 1977).

The scales of interest from the SCL-90-R are Paranoid Ideation and Psychoticism. As the Psychoticism scale contains both Schneiderian first rank symptoms, and items reflective of a schizoid lifestyle, and since the former tend to be more replicable than the latter (Clark & Friedman, 1983; Derogatis & Cleary, 1977), only the first rank symptoms were utilized in the analysis.

Procedure

Permission to conduct the study at the YDC was obtained from the Administrative Judge of the Youth Court and the institutional administration. In addition, subjects signed individual consent forms to participate in the overall study, as did the subgroup, for the neuropsychological testing. Subjects were assured of confidentiality, and that their agreement to participate, or refusal of the same, would have no effect on their status or privileges at the institution.

¹¹ Also, it should be noted that in all of the above studies only patients have been included. The inclusion of nonpatients (normals) might increase the heterogeneity of the sample sufficiently to overcome what may be considered a single psychic distress factor. Although Derogatis (1983) reports inclusion of nonpatients in the normative sample, it does not appear that they were included in any of the factorial validity studies.

Peer nominations were conducted in institutional offices or on the living units. Each subject was first asked to identify all those incarcerated youth who were known to him from a list of all male youth detained at the institution over a three day period. He was then asked to name as many of these youth as he felt fit the description for each item (see Appendix A). All nominations received by a youth were divided by the number of individuals who had indicated that they knew the subject, in order to place the scores on the same scale.

Official criminal histories were obtained from the Corrections Branch. Charges for each type of offense were summed, regardless of the outcome of adjudication. It is unlikely that this would result in an overestimation of criminal behaviour, as failure to obtain a conviction can result from a number of factors quite independent of the behaviour itself. Furthermore, it is well known that the number of charges laid, and convictions obtained, are far surpassed by the amount of criminal behaviour that is actually committed. Total number of offenses within the categories of automobile, property, person, sexual, and order (e.g. disturbance of the peace) were also calculated (see Appendix C for a list of those offenses included in each category).

Daily records of institutional behaviour were recorded and coded for for the type of behaviour displayed, such as physical assault, verbal aggression, and victimization (see Appendix D). Incidents for each type of behaviour were summed and divided by

the number of shifts for which information on the youth was available. This placed all of the behavioural scores on the same scale.

The author administered the HRB, the SCL-90-R, as well as the Vocabulary and Block Design subtests, and also conducted the head trauma interview with the subgroup of subjects. At the time of testing, she was blind to all of the previously mentioned measures, and remained blind until all scoring and coding of the latter measures was completed.

Youth in the institution earn access to more desirable units by virtue of their performance in a token economy system. Regardless of the youth's offense, appropriate behaviour within the institution results in his progression through the levels. Therefore, unit placement in no way suggests the offenses of the individual.

The subgroup of subjects were seen in offices at the detention centre. Twelve subjects were seen in the morning, twenty-eight in the afternoon, and twenty-four in the evening. More subjects were seen later in the day due to their availability. More activities, such as school, occur in the morning, and blocks of available time sufficiently large to complete the battery are more frequent later in the day.

About an hour and a half was required for administration of the neuropsychological battery and associated measures ($M = 83$ minutes, $s = 13$). The HRB, Vocabulary and Block Design subtests

were administered under standard procedures (DeFilippis & McCampbell, 1979; Reitan, 1959; Wechsler, 1974 & 1981). The choice between the WAIS-R and the WISC-R subtests was based on age. As the WISC-R provides more precise age norms, all subjects under the age of 17 years received the subtests from this version. All scale scores for both the WAIS-R and the WISC-R were taken from specific age norms in order to maximize the comparability of the scores across ages and instruments. Thirty-one subjects were administered subscales from the WISC-R and thirty-three from the WAIS-R.

In approximately one-half of the cases, the items from the SCL-90-R were read to the subject, due to the subject's limited reading skills. Responses did not appear to differ between those who were read to and those who read the items themselves.¹²

Each incident reported during the head trauma interview was given a score from 0 to 5 based on severity (see Appendix E). These scores were summed. Although it appears that even minimal head injuries are cumulative in effect (Gronwall & Wrightson, 1975; see also Boll & Barth, 1983), it is not known whether, and it is unlikely, that they are linearly additive. However, as the true function is unknown, and a linear model is probably conservative, this method was utilized.

As it was not known in what manner symptoms such as dizziness, birth complications, and seizures, would contribute

¹² Derogatis (1983) reports that no consistent biases were found for this change in the administration procedures.

to the head injury score, these variables were simply coded for presence or absence. This tabulation procedure produced five scores; frequent faintness/dizziness, derealization, birth complications, family history of epilepsy, and history of seizures.

The final question in the interview, regarding parental disciplinary methods, provided information regarding physical abuse. Spankings were not coded as abuse, but suggestion of punching, throwing the child, or otherwise beating the child was coded 1 for possible abuse. When information in the files indicated that allegations of abuse had been corroborated by outside sources, the subject received a score of 2.¹³

One subject received an estimated score for the Booklet Category Test (as per the formula supplied in the addendum to the manual), as he terminated this test prior to completion. One item response was estimated for the Paranoia scale of the SCL-90-R, as the subject skipped an item. The response that least altered the mean for this scale was utilized.¹⁴

¹³ Note that abuse was corroborated in 9% of the sample, which is essentially equal to the incidence of 8.6% found in the hospital records of delinquents by Lewis and Shanok (1977).

¹⁴ In total twelve item responses were estimated for the SCL-90-R, eight for a missed item, and four for more than one response to an item. However, only the single item mentioned above affected a score which was entered into the analysis.

RESULTS

Descriptive analyses were conducted to assess the distributional properties of the variables. These analyses were followed by data reduction through factor analyses of specific groups of data. The reduced number of variables were entered into a further factor analysis to assess the association between the violence measures, neuropsychological impairment, paranoid and psychotic symptomatology, and adverse life events in the histories of the subjects.

Subjects were then classified as violent or nonviolent. This grouping was done in order to compare the results of the present study to those of previous studies, as well as allowing a comparison of the discriminability of specific deficits to that of a global measure of impairment. Both multivariate and univariate analyses were conducted.

Preliminary descriptive analyses indicated that the peer nomination scores, daily behaviour scores, and official criminal records all produced skewed distributions. Therefore, square roots were taken for each of these variables in order to normalize the distributions.

In order to reduce the number of variables to a manageable quantity, each subgroup of data (behavioural, peer nomination, and official criminal histories) was factor analysed. Trial runs indicated that the resultant factors did not differ depending

upon whether Pearson correlation coefficients or Kendall's taus were utilized as input. Furthermore, changing from principal components analysis to common factor analysis failed to produce any significant changes in the factors, nor did a change from orthogonal to oblique rotations.

As the primary reason for conducting the above analyses was to reduce data, the factor solutions adopted utilized a principal components analysis with an oblique rotation (direct quartimin). This choice retained as much of the original variance as possible, and did not restrict the solutions to uncorrelated factors.

The analysis of the official criminal histories utilizing individual offense types failed to produce a clear scree, and did not appear to produce a gain in clarity over the total scores for each offense category. Therefore, the factor analysis of the individual criminal offenses was abandoned, and the totals mentioned above were utilized. These totals produced scores suggesting the degree of involvement in the various offense categories, rather than a dichotomization of subjects into violent and nonviolent groups.

Utilizing the scree test to determine the number of factors to retain for the peer nomination data and the daily behaviour data resulted in two factors being kept for each of these subgroups. The intercorrelations obtained between the factors were .06 for the peer nominations and .09 for the behaviour

measures.

The peer nominations produced two factors. The first factor described the fighter, and the second factor described the odd, withdrawn, and generally disliked individual. These factors accounted for approximately 56% of the original variance (30% and 26% respectively, see Table 2).

Table 2: Peer nomination factor loadings

Variable	Factor 1	Factor
Like most	.662	-.284
Don't like	.357	.738
Mean	.700	.290
Keeps to himself	-.169	.330
Fights/punches	.769	.256
Bossy	.845	.107
Gets mad easily	.663	.366
Too shy to make friends	-.382	.472
Especially nice	.430	-.409
Helps others	.559	-.275
Never has a good time	-.093	.720
Everybody likes	.760	-.345
Gets <u>so</u> mad	.593	.440
Starts fights	.702	.336
Threatens	.836	.210
Goof	.246	.816
Whiner	-.011	.800
Toughest	.765	-.172
Had a fight with	.353	.486
Would like to beat up	.347	.710
Strange	.007	.706
Has lots of problems	.008	.805
Variance accounted for:	6.494	5.721

The daily behaviour measures also produced 2 factors, accounting for approximately 36% of the original variance. The

first factor described the aggressive, disruptive individual (23%) and the second factor described the victim (13%, see Table 3).

Table 3: Intrainstitutional behaviour factor loadings

Variable	Factor 1	Factor 2
Assault - staff	.495	.039
- resident	.476	-.055
Resistance of staff	.340	-.093
Mutual combat	.394	.318
Threatens staff	.608	-.156
Threatens residents	.507	-.258
Agg. verb. exchange	.504	.015
Verbal outbursts - staff	.621	-.057
Verb. outbursts - res.	.384	.557
Verb. outbursts	.794	.049
Dominance	.358	-.304
Irritable, bad tempered	.555	.193
Manipulative, scheming	.532	-.171
Disruptive	.609	.164
Demanding, immature	.446	.411
Restless, hyperactive	.606	.244
Withdrawn	-.164	.077
Unusualness	.325	.239
Property offenses	.645	.078
Self-inflicted injury	.222	.181
Victim of physical agg.	.003	.870
Victim of threats	-.039	.767
Victim (non-specific)	-.028	.884
AWOL	.138	-.159
Good behaviour	-.687	-.454
Incident Reports	.702	.144
Variance accounted for:	6.028	3.416

Factor analyses for the above were conducted using all subjects for which the data in question were available. Therefore, the peer nomination factors were based on a sample size of 125, and the daily behaviour factors on 105 cases.

Measures of subjects' behaviour, neuropsychological functioning, intelligence, admission of psychological distress, and adverse life events, were entered into a further factor analysis.¹ Behaviour measures included the factor scores from the peer nominations (fighter and disliked), factor scores from the intrainstitutional behaviour records (aggressive and victim), and total scores from the five classes of offenses.² Neuropsychological functioning level was reflected in the AII of the HRB, and the Vocabulary and Block Design subtest scale scores were used as measures of intellectual functioning. The Paranoid-Ideation and Psychoticism (Schneiderian symptoms only) scales of the SCL-90-R measured admission of psychological distress in these areas. The seven scores derived from the interview provided data reflecting the occurrence of adverse life events.³

A principal components analysis with varimax rotation produced four factors which accounted for 47-48% of the variance depending upon whether those youth who were receiving psychotropic medication were included. Individually, the factors accounted for 10 to 13% of the variance (see Table 4).

¹ Complete data was only available for 55 to 57 subjects for this analysis. Daily behaviour data was missing for four subjects (one of whom also did not complete the SCL-90-R), the official criminal history for one, and two were missing portions of the interview (one of whom was receiving psychotropic medication).

² Each offense type total was square rooted due to skewed distributions.

³ Square roots were also taken of the head injury score as the distribution was skewed.

Table 4: Factor loadings for behaviour and neuropsychological variables

Variable	Factor 1	Factor 2	Factor 3	Factor 4
Aggressive	.824	.255	.093	-.005
Victim	-.194	.776	-.064	-.030
Fighter	.583	-.229	.437	-.145
Disliked	.158	.788	-.070	-.093
Vocabulary	-.204	-.405	.514	-.256
Block Design	-.380	-.309	.335	.104
AIJ	.255	.518	-.377	-.169
Abuse	.397	.341	.262	.151
Head injury	.196	.033	.629	.029
Faint/dizzy	-.015	.096	.626	.091
Derealization	-.000	-.079	.445	.332
Birth Comp.s	-.115	-.002	.376	-.125
Epilepsy (family)	-.138	.036	.048	-.449
Seizures	.153	.368	.550	-.057
Paranoia	-.065	-.089	.073	.858
Psychoticism	.048	-.087	.127	.825
Property off.	.663	-.264	-.224	.079
Sexual off.	-.173	.700	.186	.061
Automobile off.	-.071	.111	-.294	-.059
Order off.	.819	-.043	.073	.026
Person off.	.207	-.187	.056	-.426
Variance accounted for:	2.778	2.762	2.429	2.111

*The above factor results include 2 subjects who were receiving psychotropic medication.

The first factor described the aggressive individual.⁴ The aggressiveness was evident from peer and behaviour data, and from official offenses.⁵ Although some deficits were evident,

⁴ The attribution of characteristics to individuals should only be read as reflecting the expectation that high scorers on a factor would be characterized by the traits and behaviours that define that factor. Factors are defined by both high positive (trait present) and high negative (trait absent) loadings.

⁵ This is the only factor on which person offenses loaded positively to any degree.

the amount of variance on this factor accounted for by neuropsychological deficits and low IQ was only one-half of that on the second factor.

The second factor described the individual, who was disliked, considered unusual by peers, was victimized in the institution, and manifested neuropsychological deficits, as reflected in the AII, and low IQ. Sexual offenses also loaded on this factor. This pattern could indicate that the sexual offenders were more impaired neuropsychologically than the other juvenile incarcerates. On the other hand, this variable may be loading on this factor because sexual offenders are rejected by their peers. Perusal of the AII's of the sexual offenders suggests that, on average, they appear to be neuropsychologically impaired.

The third factor to emerge from this analysis describes an individual who is considered aggressive by his peers. He may have committed sexual offenses. This individual is not identified as impaired by the AII, but he does report a significant history of head injuries, frequent faintness or dizziness, feelings of derealization, and a history of seizures. Although it was expected that report of these symptoms and adverse incidents would correlate with neuropsychological impairment, the expected association was not obtained. This individual may be suffering from difficulties to which the HRB is insensitive. On the other hand, this pattern of results could suggest a lack of any impairment in this individual as the

self-report head injury scores tend to correlate positively with the Vocabulary subtest. Paradoxically, self-reported head injuries may be a measure of good memory, or willingness to self-disclose physical symptoms.⁶ Subjects that report numerous adverse events in their lives may have better recall than those who report fewer incidents. If a severe head injury had occurred, it could result in a subject manifesting memory difficulties, which could culminate in fewer incidents being reported. On the other hand, the offenders receiving high scores on this factor may be separated from the sexual offenders on the second factor because they are not disliked by their peers.⁷ They may be less disliked because they are not neuropsychologically impaired.

The final factor from this analysis describes the individual that reports considerable psychological distress.⁸ He is impaired on verbal tasks, which suggests a verbal-performance

⁶ Note that Lewis and Shanok (1979) found that violent offenders tended to minimize head trauma events and severity. Higher incidence and greater severity of injury were recorded in the subjects' medical charts. It remains debateable whether the discrepancy between the self-report information and the medical records occurs because of an unwillingness to self-disclose, or because of difficulties with memory processes.

⁷ Note that Clemmer (1958) found a difference in the acceptance of sexual offenders by their peers depending upon the particular offense committed. As he states, "Men who have raped little girls are universally viewed with disgust, while men who have raped adult females are tolerated. Abnormal behavior with boys is condoned by many inmates." (p.254)

⁸ Although only paranoia and psychoticism items were entered into the analysis, subjects with high scores on this factor also tended to have high scores on many other SCL-90-R scales.

discrepancy⁹ (often found in juvenile delinquents, or with left hemisphere damage), and he appears to be nonviolent. This factor appears to be describing the maladjusted, nonviolent (or less violent) offender.

It should be noted that physical abuse loads positively on all four factors, although accounting for more of the variance for the aggressive (sexual or otherwise) types than for the psychologically distressed. Note that Tarter et al. (1984b) found that 44% of abused delinquents were violent, whereas only 16% of the nonabused were.

The self-report interview data does not have an established degree of reliability and has questionable validity. Dropping these variables (except abuse) from the analysis does not change the pattern of results. Furthermore, utilizing Kendall's tau rather than Pearson's correlation coefficients does not produce any significant change in the pattern. Factor loadings for the AII with Vocabulary (as the best estimate of Full Scale IQ) partialled out were also estimated¹⁰ to insure that the results were not simply a function of low IQ. This partialing resulted in new AII loadings for the four factors of .187, .385, -.180, and -.303, respectively. Again, there was no change in the pattern of results.

⁹ Perusal of the differences between the Vocabulary and Block Design scale scores for those subjects who obtained very high or very low scores on this factor confirmed this suggestion.

¹⁰ The formula used was $l'_1 = \frac{l_1 - l_2 r_{12}}{\sqrt{1 - r_{12}^2}}$

In order to compare the results of this study to previous work, a multivariate analysis of variance (MANOVA) was conducted, using the Vocabulary and Block Design subtests, and all tests from the HRB.¹¹ Subjects were classified as violent or nonviolent on the basis of person offense charges included in the official criminal histories.¹² No distinction was made between sexual and other violent offenses for this analysis.

Although three of the subtests in the HRB produce discrete values, the range was considered sufficient to conceptualize them as essentially continuous. The Multivariate F was less than one ($p=.568$). This pattern was also obtained for many of the univariate Fs (see Table 5). Although the assaultive group obtained more impaired means on all of the scales of the HRB, the differences between means were so small that they were overcome by the variability within groups. The assaultive group tended to do as well or better than the nonviolent subjects on the Vocabulary and Block Design subtests. However, one F obtained was again less than one. Due to this difficulty, nonparametric tests were attempted. Mann-Whitney U tests produced essentially the same pattern of results. However, with the nonparametric analysis, the violent subjects appear more

¹¹ Square roots were taken for the times for Trail B as the distribution was skewed in the violent group. This transformation reduced the heterogeneity of the variances, and helped to normalize the distribution in the violent group, although it remained somewhat skewed.

¹² Note that the violent group is considerably larger than the nonviolent group (see Table 5). However, the discrepancy in sample sizes is much smaller than that seen in many other studies.

Table 5: Multivariate comparison of violent and nonviolent youth

Variable	Violent		Nonviolent		F	p
	Mean	sd	Mean	sd		
Vocabulary	7.10	2.55	6.39	2.61	1.11	.30
Block Design	10.35	2.98	10.48	3.00	.03	.87
Category	61.78	27.73	52.78	22.58	1.75	.19
TPT - time	721.9	296.5	653.6	181.4	1.00	.32
- memory	6.63	1.58	6.96	2.16	.49	.49
- location	3.58	2.47	4.22	2.88	.88	.35
Rhythm	7.13	3.28	5.91	2.78	2.22	.14
Finger-tapping	45.45	5.69	46.41	4.37	.48	.49
Trail B (sqrt)	9.48	2.59	8.74	1.24	1.67	.20

N

40

23

Multivariate F = .857 p = .568

impaired, on average, than the nonviolent subjects, on the Block Design subtest (see Table 6).

In order to address the question of whether a global score would have as much or more discriminability than the full pattern analysis, the AII was tested between groups (see Table 7). It can be seen that this scale discriminated better than the full pattern analysis (as reflected in the Multivariate F), better than all but one of the individual tests (as shown by the univariate Fs), and better than all but two of the individual tests (as reflected in the Mann-Whitney U tests). When the AII is tested between groups using the Mann Whitney U test, the pattern is similar.

Table 6: Comparison of violent and nonviolent youth utilizing Mann-Whitney U Tests

Variable	Violent		Nonviolent	
	Mean rank	Mean rank	U	p
Vocabulary	33.71	29.02	391.5	.32
Block Design	31.14	33.50	425.5	.62
Category	34.40	27.83	364.0	.17
TPT - time	33.22	29.87	411.0	.48
- memory	30.46	34.67	398.5	.37
- location	30.65	34.35	406.0	.44
Rhythm	34.7	27.24	350.5	.11
Finger - tapping	30.6	34.39	405.0	.43
Trail B	33.52	29.35	399.0	.38
N	40	23		

Table 7: Comparison of violent and nonviolent youth using the Average Impairment Index

Violent		Nonviolent		F	p
Mean	sd	Mean	sd		
.53	.25	.44	.21	2.09	.15
Mean rank		Mean rank		U	p
34.29		28.02			

Discrepancies between the factor analysis and the MANOVA or Mann-Whitney U tests, are more apparent than real. It must be recalled that the latter analyses used only official criminal offenses in determining violent status, whereas the former

utilized this measure in addition to institutional behaviour and sociometric ratings. The former analysis treats all violence measures as continuous, whereas the latter dichotomizes on violence, and combines sexual and other violent offenders.

DISCUSSION

The results of this study tend to agree with previous studies that have attempted to discriminate violent and nonviolent offenders on the basis of neuropsychological functioning. The mean scores of the violent subjects on most of the neuropsychological tests appear, when visually inspected, to show more impairment than in the nonviolent group. However, the groups are not reliably different. One possible explanation for these results is that the violent offenders do not represent a homogeneous group.

If violent offenders are as similar to each other as nonviolent offenders are to each other, the standard deviations within these groups would be expected to reflect equivalent degrees of homogeneity. However, it was found that the standard deviations for numerous variables were considerably larger in the violent group. Reviewing studies wherein standard deviations were reported suggested that this pattern was frequently obtained. In 68 per cent of the studies reviewed, the violent groups obtained larger standard deviations than the nonviolent groups. In one third of these, the standard deviations in the violent groups were at least 1.5 times greater than those in the nonviolent groups. An exception to this pattern is the study by

' Comparison of delinquents, in general, to controls may aggravate this problem. For example, standard deviations reported by Voorhees (1981) indicate that the delinquent group obtained larger standard deviations than the controls on seven of ten measures derived from the LNNB. In six of these cases the variability in the delinquent group was at least twice that of

Hollin and Wheeler (1982). However, these authors excluded sexual offenders from their violent sample, possibly increasing the homogeneity in the violent group.

Separating the sexual and other violent offenders in the present study produced a pattern of results that suggested that the sexual offenders were more impaired neuropsychologically than the other violent offenders. Not only do these groups appear to differ neuropsychologically, they also appear to differ in their behaviour within the institution, and in their relationships with others. Sexual offenders tend to be victimized and disliked, whereas other violent offenders are documented as behaving in an aggressive manner, and are considered aggressive by their peers. The violent, but not sexual, offenders are not necessarily disliked. Although these conclusions must be considered tentative due to the small number of sexual offenders included in the study (N = 10), the pattern suggests that violent offenders are heterogeneous on numerous dimensions.

In contrast to other research, but in agreement with Hollin and Wheeler (1982), the violent subjects, in general, appeared to be more intelligent than the nonviolent offenders. The average scale score for Block Design was equivalent between the groups, but the violent group obtained a less impaired mean

(cont'd) the controls, and in one exceptional case, twenty-five times larger (namely, reading and writing).

Vocabulary scale score.² It was suggested above that the results of Hollin and Wheeler might be explained by their exclusion of sexual offenders from their violent group. Perusal of the Vocabulary scale scores of the sexual and other violent offenders in the present study suggests that the sexual offenders served to reduce the overall mean for the violent group in general. It is possible that if other studies included a larger proportion of sexual offenders in their violent groups that these subjects could 'pull down' the means sufficiently to reverse the direction of the findings.

However, such an outcome would not explain the pattern of results obtained by Lewis et al. (1981b), wherein the mean Verbal IQ for the more violent offenders fell between the means of the sexual offenders and the less violent subjects. Two possible explanations for this discrepancy exist. First, the sample studied by Lewis et al. were described as 'less violent' rather than nonviolent. The eight subjects who were considered to be absolutely nonviolent may not have been representative of nonviolent offenders in general. Second, it is possible that the separation of sexual offenders from the other violent offenders in the present study was not sufficient to produce a homogeneous group of violent offenders.

² This is not to say that no deficits were present, as the mean Vocabulary scale score for the entire sample was 6.9, consistent with other studies of juvenile incarcerates (Lewis et al., 1979; Tarter et al., 1984a; Tarter et al., 1984b).

Another subgroup of violent offenders that may need to be considered separately are those charged with attempted murder or murder. Although there were only four subjects in the current study who were charged with these offenses, it is interesting to note that none would be classified as neuropsychologically impaired using the Average Impairment Index (AII) of the Halstead-Reitan Battery. Furthermore, these subjects tended to be brighter on average than any other type of offender studied. They obtained better mean scale scores on both the Vocabulary and Block Design subtests than the other violent offenders and the nonviolent group. Although it cannot be determined whether or not these subjects are representative of murderers, or adolescent murderers, in general, they may be comparable to the murderers studied by Pontius (1984) and those studied by Yeudall (1977).

Pontius only mentions the level of intellectual functioning for four of her eight subjects. All of these subjects were considered to be functioning in the normal range. Yeudall separates his sample of psychopaths into those who were homicidal, otherwise assaultive, and rapists. Mean Full Scale IQs for these groups are reported as 98.8, 95.9, and 94.8 respectively. This pattern of results parallels that found in the current study. Although in the current study and those of Pontius and Yeudall, the sample sizes are small, the consistency of the results is intriguing. This pattern strongly suggests that violent offenders are a very heterogenous group of

individuals.

The lack of homogeneity in the violent group was discovered serendipitously while investigating the question of whether a global index of impairment would discriminate between violent and nonviolent offenders more reliably than individual measures of neuropsychological functions, or multivariate patterns amongst these variables. The results of this study suggest that a global measure may be more appropriate. Although one subscale surpassed this measure in lowering the probability that the groups were indistinguishable using an ANOVA, and two when utilizing nonparametric statistics, the trend in the literature is for the particular discriminating variables to change from study to study.

The rhythm scale, which obtained the lowest probability of evidencing equivalence between the groups in the current study, has itself been the subject of conflicting results. Berman and Seigal (1976, cited in Brickman et al., 1984) found that virtually every test on the HRB significantly discriminated between delinquent and nondelinquent youth. Rhythmic processes, however, were one of the few that were unimpaired in delinquents. In contrast, Hurwitz et al. (1982) found delinquents to be worse than normal controls on rhythmical skills. Brickman et al. (1984) found impairment on rhythm in their violent group, whereas Bryant et al. (1984) found that their violent subjects functioned in the nonpathological range on this measure. Deficits in rhythmical abilities have not been

found consistently amongst violent offenders, nor even amongst delinquents.

The AII not only surpasses the individual measures in discriminating between the groups, it discriminates better than the full pattern analysis, as reflected in the low Multivariate F. Furthermore, the standard deviations for the violent and nonviolent groups are much more similar for this variable than they are for many of the individual neuropsychological tests. However, given the substantial indications, noted above, that the violent group is not homogeneous, one might suggest that the investigation of individual deficits may procede if violent offenders are first subtyped.³ This may be possible. Certainly Pontius' study (1984) of eight men who had committed or attempted murder, suggests a considerable degree of homogeneity within her well defined group. All of her subjects manifested signs of frontal lobe dysfunction. However, Yeudall (1977) states that impairments suggestive of temporal and frontal lobe dysfunction, particularly of the dominant hemisphere, were common to many of his psychopaths (including murderers, other assaultive subjects, and rapists). In the present study, none of the murderers manifested significant deficits on the Trail Making Test - Part B, a test which Pontius (1972) recommends because it is particularly sensitive in detecting difficulties in the ability to switch between principles during ongoing

³ This argument could also be applied to the continued study of personality characteristics of violent offenders. More consistent personality profiles might be obtained for more homogeneous subgroups of violent offenders.

activity (a frontal lobe function). These results suggest that the global index of neuropsychological impairment may be preferable, at the current state of research, regardless of the homogeneity of the group being studied.

In addition to hypothesizing that the violent group would be more impaired neuropsychologically than the nonviolent group, it was suggested that the violent offenders might also manifest more paranoid and psychotic symptomatology, as indicated by admission of distress. Exactly the opposite pattern of results was obtained. The nonviolent group admitted to more psychological distress than the violent group.⁴ Two explanations are possible for this result. First, paranoid individuals may find the items on the SCL-90-R too obvious in their content, and therefore, deny that they are distressed by these symptoms.⁵ Second, nonviolent offenders may be less psychologically healthy than the violent youth. Yates et al. (1983) suggested the latter explanation for their results. Why might this pattern occur?

A concerted effort is made to keep juveniles out of detention facilities. If they are violent, it is in the public interest to remove them from society. However, if they are nonviolent, decisions regarding sentencing options may be based

⁴ As noted earlier, in addition to admitting distress on the paranoia and psychoticism scales of the SCL-90-R, subjects obtaining high scores on the fourth factor (the nonviolent offenders), also tended to admit significant distress on the other scales of this inventory.

⁵ Unlike the MMPI, wherein excessive denial can be assessed, and the differential endorsement of obvious and subtle items can be checked, the SCL-90-R has no validity checks.

on factors such as the degree of stability or discord of relations in the youth's home. As was noted earlier, factors such as broken and/or disorganized homes (which may be the result of psychopathology within the family) may be predictive of poor psychosocial adjustment. It is possible that the maladjustment of the youth, manifest at least partially in criminal behaviour, combined with an unsuitable home situation, culminates in his receiving a sentence to a detention facility.

In summary, the suggested relationship of paranoid and psychotic symptomatology with violence was not supported, in that admission of psychological distress was more common to the nonviolent than to the violent group. Neuropsychological impairment did appear to be related to violent offenses, particularly when they were of a sexual nature. However, this was overshadowed by considerable evidence suggesting that violence is a heterogeneous class of behaviour.

Regardless of the definition or subclassification of violence that is adopted, it is suggested that future studies include less delinquent or nondelinquent youth, as juvenile incarcerates may present far too homogeneous a group of subjects, both in terms of the number that are violent, and the incidence of neuropsychological deficit. It appears that efforts to keep juveniles out of detention facilities may result in an overrepresentation of violent youth amongst youthful incarcerates. Furthermore, the judicial process may also create an overrepresentation of neuropsychologically impaired

individuals within these same facilities. As Yates et al. (1984) suggest, "organic disorders may not be characteristics of violence as much as they are contributors to being apprehended." (p.138). In agreement with other studies of young offenders, approximately one-half of the present sample evidenced significant deficits (Brickman et al., 1984; Karniski et al., 1982; Tarnopol, 1970). Although including nondelinquent and less delinquent youth would reintroduce the difficulty of low base rates for violence, it would remove the difficulty of restriction of range inherent in this study. However, the more immediate task may be to begin utilizing subclassifications of violent offenses within our research.

In conclusion, this author concurs with Garrison's (1984) suggestion that "prediction will be maximized only through continued efforts to identify more homogeneous subtypes of violent persons, and by a more general abandonment of the popular conception that all forms of clinical aggression can be explained by a single theory" (p.237).

APPENDICES

Appendix A: Peer Nominations

1. Who are the residents that you know?
2. Who is the resident that you like the most?
3. Who don't you like?
4. Who is mean?
5. Who seems to keep to himself?
6. Who fights, punches, or hits a lot?
7. Who is bossy and tells others what to do?
8. Who gets mad easily?
9. Who is too shy to make friends?
10. Who is especially nice?
11. Who helps other residents?
12. Who never seems to be having a good time?
13. Who does everybody like?
14. Who gets so mad at times that he doesn't know what he's doing?
15. Who starts fights over nothing, or is always looking for a fight?
16. Who threatens other residents?
17. Who is a goof?
18. Who is a whiner?
19. Who is the toughest?
20. Who have you had a fight with?
21. Who would you like to beat up?

22. Who is strange?

23. Who seems to be having a lot of problems?

Items 2 to 13 are derived from Milich and Landau (1984), items 14 to 16 from Mitchell (1956), and items 17 to 23 were added by the researchers.

Appendix B: Head Trauma Interview

1. Have you ever been in a serious accident?
 - a. Describe the accident.
 - b. What injuries did you receive?
2. Have you ever been in a MVA?
 - a. What happened?
 - b. What injuries did you receive?
3. Have you ever had to see a doctor or gone to the hospital after an accident?
 - a. Why were you hospitalized?
 - b. How long were you there?
4. Have you received any other injuries?
 - a. Injuries to your head or face?
5. Have you experienced any fainting spells or dizziness?
 - a. How did you feel afterward?
6. Have you ever been knocked out, blacked out or lost consciousness?
 - a. What happened?
 - b. How long were you unconscious?
 - c. Did you notice any changes in your thinking, mood, speech, memory, or coordination?
7. Have you ever had a concussion?
8. Have you experienced any periods when things did not seem real to you, as if you weren't there? (Not on drugs or alcohol)
9. Do you know if there were any problems/complications with

your birth?

a. What were they?

b. Were you premature?

10. Are you on any medication?

a. What is it for?

11. Has anyone in your family had epilepsy?

a. Have you ever had a seizure?

12. How did you parents/guardians punish you?

Appendix C: Specific offenses included in each offense classification

1. Property offenses

- a. break and enter
- b. theft under 200
- c. theft over 200
- d. theft under 1000
- e. theft over 1000
- f. possession of stolen property
- g. possession of a break and enter instrument
- h. forgery
- i. fraud
- j. other property offenses (unspecified)

2. Person offenses

- a. assault
- b. aggravated assault
- c. harrass and threaten
- d. kidnapping, unlawful confinement
- e. robbery
- f. assault with a weapon
- g. attempted murder
- h. manslaughter
- i. murder
- j. use or possession of a weapon
- k. arson
- l. other person offenses (unspecified)

3. Sexual offenses

- a. indecent assault
- b. indecent act
- c. gross indecency
- d. sex with a female under 14
- e. sexual assault
- f. other sexual offenses (unspecified)

4. Automobile offenses

- a. take automobile without consent
- b. failure to stop
- c. negligence
- d. impaired driving
- e. dangerous driving
- f. other automobile offenses (unspecified)

5. Order offenses

- a. mischief, willful damage
- b. causing a disturbance
- c. breach
- d. escape, at large
- e. other peace and order (unspecified)

Appendix D: Coding for intrainstitutional behaviour

1. Assault

- a. against staff
- b. against residents
- c. physical resistance of staff ('had to be escorted to his room', 'forcibly restrained', etc.)
- d. mutual physical combat, instigator not noted

2. Verbal Aggression

- a. threatens staff
- b. threatens other resident (specific incident, other resident is usually named, also includes 'picks on ..')
- c. aggressive verbal exchanges (includes 'had words with', 'had a run-in with', 'almost in a fight with', etc.)
- d. verbal outbursts or remarks to staff ('swore at staff', 'verbal abuse of staff'----threats are excluded, see 2.a----'mouthy to staff')
- e. verbal outbursts directed at other residents
- f. non-specific verbal outbursts ('mouthy', 'loud', 'foul mouth')

3. Dominance

- a. look for terms such as 'plays the heavy', 'thinks he owns the place', 'unit heavy', 'picks on younger (smaller) residents' (specific residents not mentioned, see 1.b or 2.b), 'plays the role', etc.

4. Irritable, bad tempered

- a. 'bad temper', 'needs to control his temper',

- 'short-fuse', 'irritable', 'got out of the wrong side of the bed', 'bothered by other residents', etc.
5. Manipulative, scheming
 - a. 'scams' (esp. smokes), 'plays head games', 'instigates other residents', 'devious', 'sneaky'
 6. Disruptive of routines (usually passive aggressive)
 - a. 'slow to respond', 'fails to do chores', 'has to be told over and over', 'fails to cooperate', 'fails to attend programs or school', 'poor attitude'
 7. Demanding, immature
 - a. 'demanding at times', 'always bothering (or asking) staff for ...', 'a real pest at times', 'whiney', 'a whiner', 'complains a lot', etc.
 8. Restless, hyperactive
 - a. 'hyper', 'too much horseplay', 'horseplay at times', 'zeroes for horseplay', 'wouldn't settle down', etc.
 9. Withdrawn
 - a. 'appears depressed', 'kept to himself', 'very quiet all shift', etc.
 10. Unusualness (usually the kinds of things associated with more severe psychopathology)
 - a. 'bizarre at times', 'says odd things', 'strange', 'weird', 'inappropriate sexual behaviour', 'arson', 'flipped out', 'pronounced problems with personal hygiene', etc.
 11. Property offenses
 - a. 'damage to property', 'writing on walls or desks', 'in

possession of contraband' (contraband includes drugs),
'arson' (note that arson is triple coded---1.a, 1.b,
10.a, 11.a), 'smoking when not allowed to' <

12. Self-inflicted injury

a. slashing, head-banging, suicide attempt

13. Victim

a. victim of physical aggression

b. victim of verbal threats and verbal abuse

c. non-specific {'victimized by ...', 'received peer
pressure', 'poor peer relations' (where it is clear that
this refers to victimization)}

14. AWOL

a. AWOL, attempted AWOL

15. Good behaviour

a. 'good shift', etc.

16. Incident reports (summed)

Appendix E: Scoring criteria for head injuries

1. Very Mild = 1
 - a. Loss of consciousness < 1 min.
 - b. alcohol/drug blackout
 - c. slight headache/dizziness
 - d. lacerations
2. Mild = 2
 - a. Loss of consciousness 1 - 15 min.
 - b. headache, dizziness, nausea
 - c. hanging (short time), short fall, or minor moving vehicle incidents
3. Moderate = 3
 - a. Loss of consciousness 16 - 60 min.
 - b. concussion
 - c. high fall
 - d. hospital - overnight
4. Severe = 4
 - a. Loss of consciousness > 1 hour
 - b. hospital - weeks
 - c. numerous sequelae
5. Very Severe = 5
 - a. Loss of consciousness - many hours
 - b. hospital - months
 - c. numerous sustained sequelae

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