



HEALTH STATUS AND DELINQUENT BEHAVIOR
OF DETAINED CHILDREN

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Vera Institute

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I. BACKGROUND

The Vera Institute Health and Delinquency Project, funded by the Ford Foundation, was designed to pursue two objectives: to explore associations between the health status and delinquent behavior of children detained at Spofford Juvenile Center and to review the programmatic implications of project findings.

Deficits in neurological and neuropsychological functioning among groups of delinquents have been discovered in a number of recent studies. Dr. Peter Wolff et al. (1978) conducted comprehensive health assessments of 67 boys incarcerated in a Massachusetts detention center and of two control groups consisting of lower class and middle class nondelinquent youth matched for age and race with the delinquent group. It was found that the delinquents had a significantly higher prevalence of minor neurological signs than either control group. The delinquent group also displayed severe and significantly greater impairments in a variety of tests of linguistic abilities. Multiple regression analysis disclosed that these neurological soft signs accounted for a significant proportion of the variance in many of the neuropsychological measures for the delinquent group, suggesting a biological basis for neuropsychological impairment. (The strength of these correlations was not reported.) The research design and characteristics of the delinquent group (few were detained for violent offenses) did not permit a systematic exploration of correlations between violent behavior and impairments in neurological or neuropsychological functioning.

Dr. Dorothy Lewis et al. (1979) studied 97 boys incarcerated in a Connecticut correctional facility to determine associations between severity of delinquent behavior and evaluation of psychiatric, neurological, and psychoeducational status. The juveniles were rated subjectively on a violence scale using both institutional records and results of interviews

with the subjects. Significant differences between the more and less violent groups were found in each of the three areas — psychiatric, neurological, and psychoeducational. Significantly higher prevalence of paranoid symptoms, of both one or more major and minor neurological signs, and of symptoms of psychomotor epilepsy distinguished the more from the less violent groups. In addition, those rated more violent showed significantly greater deficits in reading than those rated less violent. Degree of violence on the rating scale was found to be significantly correlated with self-reported experience of serious physical abuse ($r = 0.373$, $p < .001$).

The hypothesized causal pathways leading from neurological and neuropsychological dysfunction to delinquent behavior remain obscure. Wolff's study was based on the assumption "...that there are psychobiological characteristics which render some children more vulnerable than others to become delinquent when the social environment is unfavorable." The authors suggest that school failure may be an intervening variable linking minor neurological impairment and associated deficits in linguistic abilities to delinquent behavior. Lewis suggests that paranoid ideation combined with neurological dysfunction may lead to heightened aggressiveness and poor impulse control, which in turn may cause violent behavior. In addition, the severe verbal deficiencies of more violent children is identified as a possible contributing factor to their violent conduct, because of reduced ability to channel aggressive thoughts into verbal behavior rather than action.

These two hypothesized causal networks resemble the two rationales linking learning disabilities to delinquency discussed by Murray (1976): the school failure and the susceptibility rationales. In accord with the first rationale, neurologically based learning difficulties result in poor

academic performance, which causes frustration or negative self-image leading to an increased probability of delinquent behavior. The second rationale identifies the learning-disabled child as more susceptible to delinquency because of associated personality characteristics such as impulsiveness and poor ability to learn from experience.

Both these hypotheses linking learning disabilities to delinquency are challenged by Keilitz et al. (1979) on the basis of preliminary findings from a large-scale research effort funded by the federal Office of Juvenile Justice and Delinquency Prevention. A higher prevalence of diagnosed learning disability (LD) was found in a group of 397 adjudicated juvenile delinquents (32 percent) than in a nondelinquent group of 984 high school youth (16 percent). An investigation of self-reported behavior, however, indicated that in both groups, LD and not-LD youth engaged in similar types of delinquent conduct. Furthermore, amongst the adjudicated delinquents, the LD children were no more likely than the not-LD children to be adjudicated for violent offenses. The diagnosis of LD used in this study did not include neurological examination. It thus may have little direct bearing on the issue of whether violent conduct is associated with neurological abnormality.

The implications of research in this area for delinquency prevention and remediation and the lack of conclusive findings concerning the relationship between signs of neurological and neuropsychological impairment and delinquent behavior underscore the need for further investigation. The Health and Delinquency Project was designed to contribute to the research in this field by studying connections between the health status, with particular emphasis on neurological and psychoeducational functioning, and officially-recorded delinquent behavior of children held in secure detention at Spofford Juvenile Center.

II. METHOD

A. Setting

Spofford Juvenile Center is New York City's secure detention facility for children, which is certified by the New York State Division for Youth and operated by the New York City Department of Juvenile Justice. The Juvenile Center has the responsibility of maintaining custody of children admitted to secure detention (by court remand or after police "arrest"* outside court hours) and transporting them safely to court. Spofford houses both male and female detainees and has a certified capacity of 212 residents. No child less than 10 years of age can be admitted to Spofford and the majority are aged 14 and 15 years. Some data on the characteristics of detained New York Children are provided in Appendix A.

B. Health Assessment

The health assessment for this study was conducted by physicians from Montefiore Hospital's Division of Adolescent Medicine, which provides medical services to Spofford detainees. It was based, in large part, on the regular process of health screening at Spofford, which covers a standard medical history and physical examination. (Dental examination and hearing, vision, and laboratory tests are also performed routinely, but data were not collected in these areas.) For this study, several items, chiefly in the neurological area, were added to the health screening instrument used by Montefiore physicians. In addition, a psychologist on the Vera Institute research staff administered a brief neuropsychological screening battery.

The medical history section of the health assessment consisted of questions concerning (1) current health, (2) childhood diseases,

* Children subject to the jurisdiction of Family Court are "taken into custody" rather than arrested. For convenience, however, the term "arrest" is used in this report.

(3) hospitalization (including serious accidents or injuries), (4) a standard review of systems (including detailed probing of neurological and psychiatric symptoms), (5) sexual history, (6) drug use, and (7) family background. The standard physical examination for research subjects included a brief pediatric neurological examination. The neurological examination is described in some detail below, as the focus of this study was the relationship between neurological functioning and delinquent behavior.

The neurological examination consisted of two parts: (1) standard inspection for hard signs of neurological abnormality, which are associated with specific lesions in the nervous system, and (2) screening for soft signs, considered to be indicative of "minimal brain dysfunction." The first part included an inspection of the skin for signs of neurocutaneous diseases; measurement of head size (head circumferences that are two standard deviations below or above the mean are often associated with intellectual deficits); inspection of cranial nerves, including routine evaluation of pupils, visual fields, extraocular movements, and facial and acoustic nerves; a brief examination of motor function to screen for hemiparesis; testing of reflexes, including the Babinski response; and the finger-to-nose test for coordination.

The examination of soft neurologic signs was composed of the following tests: right-left confusions, which have been found to be associated with reading disabilities; associated movements in the performance of tandem walking and hopping; lack of coordination and mirror movements (involuntary movements of the contralateral extremity) in rapid alternating movements of each hand (diadochokinesis) and finger-thumb opposition movements; choreiform movements (involuntary, rapid, irregular movements of the face or upper extremities observed in patients directed to extend their arms in front of them); and asteroagnosia (inability to recognize

objects placed in the hand with eyes closed).

The neuropsychological screening consisted of the Purdue Pegboard, a test of fine motor skill; the Benton Visual Retention Test (Administration C), a test of graphomotor functioning; a confrontational naming test, which asks subjects to name presented objects; and the reading subtest of the Wide Range Achievement Test.

The full screening required approximately 45 minutes to administer: 30 minutes for the medical screening (including five to ten minutes for the neurological examination) and 15 minutes for the neuropsychological screening.

C. Protection of Human Subjects

The project received intensive scrutiny by Institutional Review Boards at the Vera Institute of Justice and Montefiore Hospital in order to assure the protection of human subjects. As a result of these reviews, the project adopted the following protection measures: (1) informed, written assent was obtained from each participant in the study (this included permission to examine Spofford medical and admissions records); (2) an advocate was appointed who advised project staff on the involvement of children in the research and observed the process of obtaining children's assent at the facility; (3) written permission to proceed with the project was obtained from the Commissioner of Juvenile Justice, who is responsible for the operation of the detention center, and from the New York City Department of Health, which monitors health services at Spofford. Both IRBs determined that parental consent was not required for the participation of the detained children in the research project.

D. Measures of Delinquent Behavior

Data concerning delinquent behavior were extracted from records maintained in the Admissions Office at Spofford. The information derived

from this source has a number of limitations. First, it covers data only on the charges or reasons for custody for which juveniles are brought to secure detention. A given child may have been arrested several times before being remanded to detention and incarcerated at Spofford; and one or more arrests not resulting in detention may intervene between subsequent detention admissions. In addition, the Spofford admissions records do not consistently contain information on adjudications and dispositions. Given these limitations, it was decided to collect data only on the entering charges of juveniles in the sample.

Spofford Admissions records have additional qualitative limitations. Generally, information descriptive of the incident leading to arrest is not recorded. Consequently, information is often unavailable covering the number of associates of the arrested juvenile, the relationship between juvenile and victim, the occurrence or extent of a victim's injury, and the presence or use of a weapon. In view of these limitations, the principal delinquency variables to be analyzed by this study consist of the seriousness of the current entering charge, the seriousness of past entering charges, and the number of admissions to Spofford.

In the design of this study, consideration was given to asking research subjects to describe their delinquent behavior. This option was rejected for two reasons. First, it was judged that the time required to obtain reliable self-reported delinquency information would unduly interfere with Spofford operations. Second, and more importantly, this option was rejected on grounds of protection of human research subjects. Most Spofford detainees have court cases in an interim status. Accordingly, information on current or past delinquent behavior would be especially sensitive. To question these juveniles regarding delinquent behavior might have created an unreasonable risk.

The definition of violent offense adopted by this study is the same as that used by Paul Strasburg in his report, Violent Delinquents (1978). Entering charges of homicide, forcible rape or sodomy, assault, and robbery, plus attempts at any of these crimes, were classified as violent. Two measures of violence were available for analysis: a violent current entering charge and one or more previous admissions to the facility on violent charges ("ever violent"). The latter was determined to be the more useful category for purposes of analysis, since it covers a more extensive sample of behavior.

E. Sample Composition

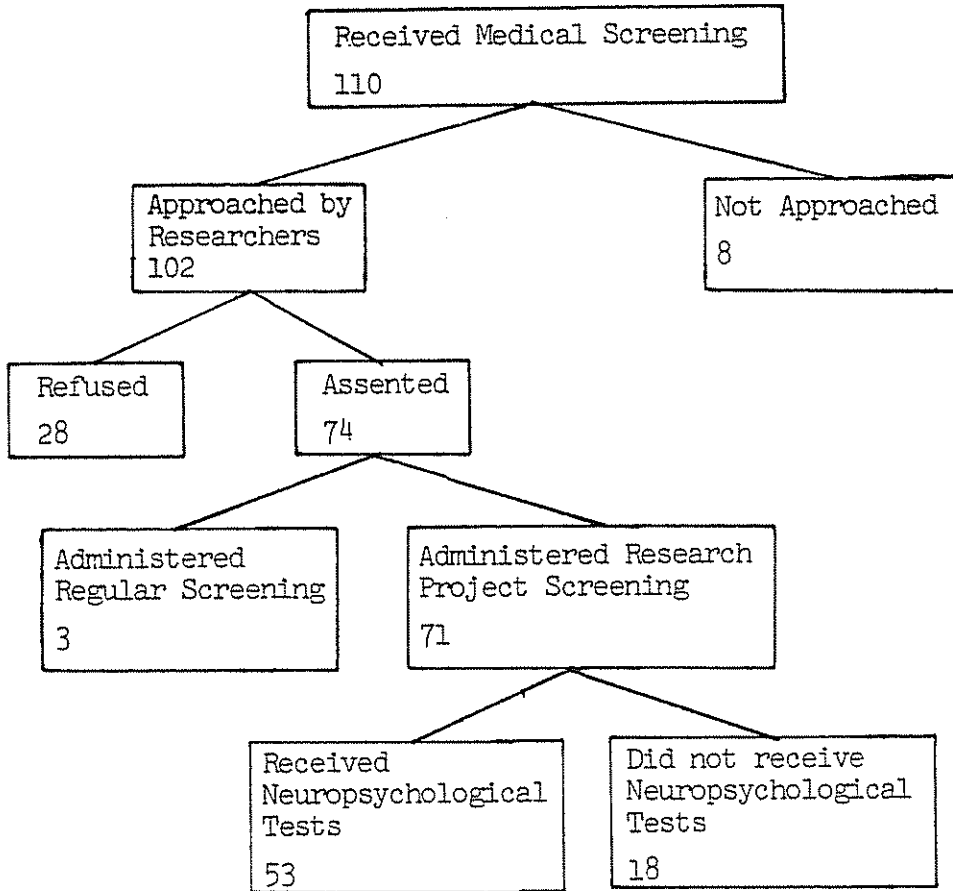
The research project was conducted at Spofford on weekdays for a three week period (one day was missed, since it was a holiday). The aim of the project was to approach all children scheduled to receive an intake medical screening examination in order to obtain their formal assent to participate in the research. Only those who assented were to receive the augmented, research health assessment; the others would receive the routine Spofford medical screening. As Figure 1 illustrates, considerable sample attrition occurred. Out of 110 children scheduled for medical screening during this fourteen day period, eight were not approached because they had received routine medical screening before the researchers had an opportunity to request assent. Twenty-eight of the juveniles approached by the researchers refused to participate. This constitutes a refusal rate of 27 percent.* Of the 74 juveniles who assented, three received the routine medical screening rather than the

* It was not possible to request assent of individual residents in complete privacy. On several occasions, the vocal refusal of one resident appeared to trigger refusal in others. The group dynamics of children detained together thus appeared to influence the rate of participation in the research project.

research project screening owing to physicians' time constraints. In all, 71 children participated in the research project, nearly two-thirds of those who received medical screening during the health data collection phase of the project. The constraint of staff availability reduced the sample size for neuropsychological screening to 53 subjects.

The extent of sample attrition raises the issue of bias. Unfortunately, the researchers were unable to compare the participating with the non-participating group. The policy of Montefiore Hospital's Institutional Review Board dictated obtaining explicit assent from the research subjects to examine their Spofford records. Accordingly, the researchers did not review admissions and health records to compare the research participants with those who refused to participate. Conducting this comparison was also hindered by the fact that only the participants received the more extended neurological examination, which formed a principal component of the research. The representativeness of the sample with respect to all children detained at Spofford is discussed in Appendix A.

Figure 1 Sample Attrition



III. FINDINGS

A. Demographic and Legal Characteristics of the Sample Children

The research project health assessment was administered to 71 children detained at Spofford Juvenile Center, 62 boys and 9 girls. The children ranged in age from 12 to 17, with more than three-quarters aged 14 and 15 years (Table 1).* Two-thirds of the children were black, 23 percent Hispanic, and 9 percent white.**

The sample children were detained for a variety of reasons. The most frequent entering charge was robbery, which accounted for 39 percent of the admissions. Ten children were detained on outstanding Juvenile Delinquency bench warrants, three on Division for Youth warrants issued for children who have absconded from New York State juvenile correctional facilities, and three were held as runaways from other jurisdictions. The remainder were detained on charges ranging from homicide (one case) and rape (four cases) to grand larceny and criminal trespass. Twenty-nine children (41%) were detained on Juvenile Offender charges (a range of violent offenses for children aged 14 or 15 and Murder 2° for children aged 13 years) and subject to adjudication in Criminal Court. Overall, 53 percent of the children were classified as entering secure detention on a violent charge.

B. Relationship Between Minor Neurological Impairment and Delinquent Behavior

Since the examined children showed little evidence of major neurological impairment that might lead to a diagnosis of brain damage (the prevalence of hard signs is illustrated in Table 14), the analysis of

* Children over 15 years of age are detained at Spofford because they have cases pending in Family Court from prior to their 16th birthday (when the jurisdiction of Family Court in juvenile delinquency cases normally ends) or they have absconded from New York State Division for Youth facilities, to which children can be committed until age 18.

** Ethnic status was unknown in two cases.

neurological findings concentrated on signs of minor neurological abnormality. The individual tests of neurological soft signs administered to the sample were grouped into six individual soft signs:

- (1) right-left confusion;
- (2) gross motor abnormality -- difficulty in hopping or excessive movements in tandem gait or hopping;
- (3) fine motor abnormality -- lack of coordination in rapid alternating movements of hands (dysdiadochokinesis) or in the finger-thumb opposition test;
- (4) mirror movements -- overflow movements on either of the two fine motor tasks;
- (5) choreiform movements; and
- (6) astereognosis.

Seventy-four percent of the examined children manifested one or more soft signs, and 51 percent had two or more. Table 2 details the prevalence of these soft signs in the sample children. Although exact comparison of these prevalence rates with those of other studies of juvenile delinquents is not possible, owing to differences in measurement and in sample composition, they seem roughly in accord with the findings of Wolff (1978) and Lewis (1979).

1. Violent Behavior

In order to test the hypothesis that minor neurological abnormality is associated with violent behavior, the proportion of children with each neurological soft sign was measured in two sub-groups of the sample: those admitted to the detention center one or more times for a violent offense ("ever violent") and those with no admission for violent offenses ("never violent").# The results are shown in Table 3. With the exception

Two-thirds of the children were ever violent and one-third never violent.

of mirror movements, the findings were in the predicted direction: i.e., the group of children with an official record of violent behavior exhibited a higher proportion of each minor neurological sign than the group of children with no record of violent behavior.

Over all, 57 percent of the ever violent children were found to show two or more soft signs as compared with 41 percent of the never violent. None of these differences, however, were statistically significant. The findings, therefore, provide no firm support for the hypothesis that the violent behavior of incarcerated juvenile delinquents is related to signs of minor neurological impairment.

2. Recidivism

A similar pattern of findings emerged when recidivists at the detention center (54%) were compared with children admitted for the first time (46%). With the exception of fine motor abnormality, a higher proportion of children in the recidivist group were found to show each soft sign (Table 4). Once again, the differences were not dramatic, and none reached statistical significance.

C. Family Background

Data on the family background of the subjects, gathered in the course of a medical history, were analyzed to explore associations with measures of delinquent behavior. As expected, the detained children showed a number of indicators of family dysfunction. Only four percent of the children reported living with both of their parents. More than one half of the children (57%) reported that a family member had been in jail or prison; for 18 percent of the sample this family member was a parent or stepparent. Forty-two percent of the children stated that their parents or caretakers

had punished them by beatings with an object.* (Belts and extension cords were used most frequently according to the children.) Nearly 20 percent of the children reported suffering serious injury as a result of being beaten by their parents or caretakers.

No significant relationships were found between family background variables and admission to the detention center for violent behavior. The ever violent group of children were somewhat more likely than the never violent group to have family members who had been in jail or prison (63% v. 50%). As Table 5 illustrates, children never admitted for a violent offense were more likely to have experienced physical punishment; however, injury suffered in physical punishment was reported by a higher proportion of the ever violent group.

Recidivist children were no more likely to have incarcerated family members than those admitted to secure detention for the first time. Somewhat higher proportions of the recidivists indicated experiencing physical punishment with an object and injury from physical punishment (Table 6). None of these differences reached statistical significance.

Although signs of family dysfunction were common in this sample of detained juveniles, they did not markedly distinguish the ever violent from the never violent group or the recidivists from those admitted to the detention center for the first time.

D. Psychoeducational Findings

Fifty-three of the 71 subjects received a brief neuropsychological screening. Five children scored in the borderline abnormal range on the Benton graphomotor test and eight had one or more errors in naming

* Gelles (1978) reported the results of an extensive household survey concerning family violence. In twenty percent of the families (N=1146), a parent indicated that a child in that family had been "hit with something" one or more times.

common objects. The mean reading grade level on the Wide Range Achievement Test (WRAT) was 5.5, which is, on the average, three grades below what would be expected according to the ages of the children.*

Reading percentiles (based on the scores of the normative sample for the WRAT) were determined for 50 of the 53 subjects who were administered the reading test. As Table 7 illustrates, the reading scores clustered in the first quartile. The mean standard score for all 50 subjects was 80.7; and 12 subjects (24%) scored at or below a standard score of 70, which is two standard deviations below the normative mean for the WRAT.

None of the psychoeducational measures were significantly related to detention for violent behavior or Spofford recidivism. Neither the ever violent nor the recidivist groups had significantly lower reading scores than the never violent or the first admission groups. Six out of seven children who made errors in naming presented objects had been admitted to the detention center for violent offenses. Although these children were not significantly more likely to be violent than those who had no errors on the naming test, the direction of this finding is consistent with the view that language difficulties may contribute to violent behavior (Lewis 1979).

On the assumption that minor neurological impairment may contribute to reading retardation in this population, it was hypothesized that children showing soft signs would perform, on the average, at a lower level on the WRAT reading test than children found to be neurologically

* The reading section of the WRAT is a test of word recognition, not reading comprehension. Scores on this test, therefore, probably yield an over-estimate of reading capability.

intact. A test of the difference between means* indicated that those children with two or more neurological soft signs had a significantly lower mean standard reading score than those with zero or one soft sign ($p = .036$). Those children showing choreiform movements also had a significantly lower mean reading score than those without this sign ($p = .039$). Children who displayed right-left confusion scored below those without this soft sign on the reading test, but the difference in means did not reach statistical significance ($p = 0.96$).

A correlational analysis of the relationship between reading scores and number of neurological soft signs indicated a significant negative association ($r = -0.2975$, $p = .018$). The relationship is not particularly strong, however, since the number of neurological soft signs accounts for only nine percent of the variation in reading scores. Many other reasons may help explain the poor reading performance of the detained children in the sample, including insufficient exposure to school, inadequate teaching, lack of encouragement at home for academic performance, general intellectual retardation, psychiatric disturbance, etc. These findings suggest that minor neurological impairment may be a contributing factor.

* A one-tailed T-test was used to measure significance.

Table 1

Age of Subjects

<u>Age</u>	<u>N</u>	<u>%</u>
12	2	3
13	2	3
14	26	37
15	30	42
16	10	14
17	<u>1</u>	<u>1</u>
	71	100

Table 2

Prevalence of Neurological Soft Signs

	<u>N</u>	<u>%</u>
Right-Left Confusion	15	21
Gross Motor Abnormality	21	30
Fine Motor Abnormality	24	34
Mirror Movements	45	63
Choreiform Movements	20	28
Astereognosis	1	1
Two or more soft signs	35	51

Table 3

Prevalence of Neurological Soft Signs in
Children Admitted for Violent Offenses as Compared with
Children Never Admitted for a Violent Offense

	<u>Ever Violent</u>		<u>Never Violent</u>		<u>X²</u>	<u>P Value</u>
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>		
Right-Left Confusion	12	26	3	14	1.34	.25
Gross Motor Abnormality	16	35	5	23	1.01	.31
Fine Motor Abnormality	18	39	6	27	.92	.34
Mirror Movements	29	63	14	64	0.0	.96
Choreiform Movements	15	33	5	23	.69	.40
Two or More Soft Signs	26	57	9	41	1.45	.23

Table 4

Spofford Recidivism and Prevalence of Neurological Soft Signs

	<u>First Admission</u>		<u>More Than One Admission</u>		<u>X²</u>	<u>P Value</u>
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>		
Right-Left Confusion	6	19	9	24	.31	.58
Gross Motor Abnormality	8	25	13	35	.83	.36
Fine Motor Abnormality	13	41	11	30	.90	.34
Mirror Movements	17	53	26	70	2.15	.14
Choreiform Movements	7	22	13	35	1.47	.23
Two or More Soft Signs	15	47	20	54	.82	.66

Table 5

Physical Punishment and Violence

	<u>Ever Violent</u>		<u>Never Violent</u>		<u>X²</u>	<u>P Value</u>
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>		
Punishment with Object	19	48	10	59	.61	.43
Injury in Physical Punishment	11	24	3	14	.88	.35

Table 6

Physical Punishment and Spofford Recidivism

	<u>First Admission</u>		<u>More Than One Admission</u>		<u>X²</u>	<u>P Value</u>
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>		
Punishment with Object	13	46	17	57	.61	.44
Injury in Physical Punishment	5	16	9	25	.79	.37

Table 7

Distribution of Reading Percentile Ranks

<u>Percentile</u>	<u>N</u>	<u>%</u>
25 or below	39	78
26 - 50	9	18
51 - 100	<u>2</u>	<u>4</u>
Total	50	100

E. General Health Status

Selected findings derived from the medical history and physical examination of the 71 sample children are described below.*

1. Accidents and Injuries

Three-fourths of the children reported experiencing serious accidents or injuries. Head trauma was involved in the case of 41 percent of the children, and thirty percent reported being knocked unconscious one or more times.

2. Review of Systems

Positive findings from the review of systems are indicated in Table 8. Thirty-nine percent of the children cited one or more health problems, and 23 percent cited two or more. Respiratory problems was the most common category (20%).

The frequencies of reported neurological symptoms are displayed in Table 9. One-third of the children noted one or more symptoms and 14 percent two or more.

3. Psychiatric Symptoms

The children were asked a series of questions aimed at eliciting their experience of a range of psychiatric symptoms. The results are shown in Table 10. Approximately 10 to 15 percent of the children reported that they had experienced auditory or visual hallucinations, were often depressed, or had thought about harming themselves. The reliability of these findings from a brief psychiatric screening, as in the case of other results from the medical history, are open to question; however, they suggest a substantial prevalence of psychiatric disturbance in

* For a description of health data of children detained in New York City covering five years of experience in health screening (31,323 patients) see Litt and Cohen (1974).

children held in the detention center. Children admitted to the detention center for a violent offense did not report visual or auditory hallucinations significantly more often than children detained for nonviolent offenses.

4. Sexual History

Ninety percent of the subjects reported engaging in sexual intercourse; and of these children, 83 percent stated that they did not use any means of contraception. Four children (three girls and one boy) reported that they had been raped; in each case the perpetrator was a stranger.

5. Drug Use

The reported drug use of the sample children and mean age of onset are shown in Table 11. Marijuana was noted most frequently (78%), with one half of the children indicating that they had begun use before age 12. Nearly three-quarters of the children stated that they smoke cigarettes, and more than one-half reported that they consume alcohol.* These findings on drug use, coupled with the lack of use of contraception noted above, suggest the need for effective health education as a service component for juvenile delinquents.

6. Physical Examination

The examining physicians recorded one or more medical problems on a routine physical examination for 62 percent of the sample children. These identified problems ranged from typical adolescent acne to congenital heart disease. Twenty-one percent of the children were found to have two or more problems. The frequencies of children with findings in specific physical categories are shown in Tables 12 and 13. Problems with skin,

* Brunswick and Tarica (1974) found in a survey of 659 black youths aged 12-17 years, who lived in Harlem, that 24 percent reported some alcohol consumption.

hair, or nails were the most frequently identified (37%). Table 14 details the positive findings on the neurological screening for hard signs.

Are children detained at Spofford more or less healthy in the aggregate than New York City children from similar ethnic and socioeconomic backgrounds? Litt and Cohen (1974) surveyed the health status of 31,323 children who received health screening in New York City detention facilities over a five year period. Forty-six percent were found to have one or more medical problems. This compares favorably with the results of a study of the health of adolescents living in Harlem (Brunswick and Josephson, 1972), which found that two-thirds of the 419 youths who received a medical examination had one or more significant medical problems. Although health problems are common in detained New York City juvenile delinquents, these children overall are probably no less healthy than other children who come from families with a similar socioeconomic status.

Table 8

Positive Findings in Review of Systems

	<u>N</u>	<u>%</u>
Head	7	10
Ear	4	6
Eye	7	10
Nose	1	1
Throat	3	4
Respiratory	14	20
Cardiac	6	9
Gastro-Intestinal	2	3
Endocrine	1	1
Musculoskeletal	7	10
Dermatological	8	11
Genito-Urinary	7	10

Table 9

Reported Neurological Symptoms

	<u>N</u>	<u>%</u>
Frequent headaches	14	20
Blurred vision	9	13
Dizziness	9	13
Blackouts/fainting	5	7
Seizures/convulsions	2	3

Table 10

Reported Psychiatric Symptoms

	<u>N</u>	<u>%</u>
Auditory hallucinations	8	11
Visual hallucinations	10	14
Often depressed	10	14
Thought of hurting self	13	18
Tried to hurt self	6	9
Thought about killing self	11	16

Table 11

Reported Drug Use

	<u>N</u>	<u>%</u>	<u>Mean Age Onset*</u>
Tobacco	52	73	12 (N=47)
Alcohol	41	58	13 (N=32)
Marijuana	55	78	12 (N=46)
Hallucinogens	10	14	14 (N=8)
Stimulants	15	21	13 (N=12)
Inhalants	5	7	12 (N=5)
Depressants	2	3	
Opiates	1	1	

* Data on age of onset of drug use were missing in several cases. The number of cases used to compute the mean age of onset is indicated in parentheses. Means were not computed for depressants or opiates, owing to the small frequency of reported use.

Table 12

Positive Findings on Physical Examinations

	<u>N</u>	<u>%</u>
Skin, hair, nails	26	37
HEENT	6	9
Nodes	7	10
Chest	2	3
Heart	9	13
Abdomen	5	7
Musculoskeletal	3	4
Penis	4	6*
Testes	1	2*

* Percentage based on 62 boys in the sample.

Table 13

Positive Findings on Pelvic Examination*

	<u>N</u>
Vagina	1
Cervix	2
Uterus	2
Rectovaginal	1

* Performed for five of the nine girls in the sample.

Table 14

Positive Findings on Neurological Screening for Hard Signs

	<u>N</u>	<u>%</u>
Depigmented Lesions	9	13
Fundi	1	1
Cranial Nerve	3	4
Hemiparesis	1	1
Deep Tendon Reflexes		
Knees	2	3
Biceps	1	1

IV. DISCUSSION

A. Violence and Neurological Abnormality

The principal aim of this research project was to explore the relationships between neurological impairment and delinquent behavior in a sample of detained juvenile delinquents. The findings are inconclusive. Signs of minor neurological abnormality were common in the group of examined children, with 51 percent exhibiting two or more soft signs. As predicted, children admitted to detention for a violent offense and those who were recidivists manifested a higher proportion of signs of minor neurological impairment than children admitted for non-violent offenses and those admitted for the first time. The differences, however, were not dramatic and failed to reach statistical significance. Similar findings resulted when psychosocial variables were related to measures of delinquent behavior.

A number of reasons may explain the absence of statistically significant findings relating health status variables to measures of delinquent behavior in the sample children. First, contrary to the findings of other investigators (Lewis 1979), children showing signs of minor neurological impairment may be no more likely to engage in violent behavior than neurologically intact children. Second, the instruments used to measure either neurological status or delinquent behavior may have been unreliable or invalid. Issues of measurement are addressed below.

The reliability of the neurological findings was not evaluated systematically. Follow-up examination of seven children (see Appendix B) indicated a relatively low rate of confirmation of the initial screening for a number of tests of soft signs; however, there was a substantial agreement between the initial and the follow-up examination in identifying children with two or more soft signs. In sum, this reliability check suggests the occurrence of some over-recording of minor neurological signs by the pediatric

house staff, which may conceivably have had an important impact on the project findings. More accurate screening might have shown a significant relationship between minor neurological impairment and violent behavior. This appears unlikely, however, since those children identified as manifesting two or more soft signs -- confirmation was obtained for this category in six out of seven cases in the follow-up examinations -- were not significantly more likely to be ever violent than those who were found to have no soft signs.

The validity of the adopted measures of delinquent behavior may be subject to challenge. The definition of "violent offense" spanned a considerable range of behavior, from participation in a minor robbery to rape and murder. It may not have discriminated the "truly violent" group from the less violent or nonviolent group of children. On the other hand, there may have been little true variation in the delinquent behavior of the sample children. Nearly all of the children may have engaged in serious, violent behavior in the past, which in some but not all cases led to arrest and detention. In either case, the lack of discriminating power of the measures of delinquent behavior may have contributed to the inconclusive findings.

A definitive study of the relationship between neurological impairment and violent behavior would require a "violence scale" with tested reliability and validity. Two approaches might be merged in developing such a violence scale. The seriousness scale devised by Wolfgang and Sellin (1964) is a well-tested measurement of the community harm produced by officially-recorded acts of delinquency. (It is not limited to violent offenses.) Dorothy Lewis et al. (1979) constructed a subjective rating scale, based on the judgment of investigators, that places children in one of four categories ranging from non-violent to extremely violent. Official records and interview data are both used to rate children on this scale.

Building on these two efforts and other relevant literature, a comprehensive scale of criminal violence could be developed, which should reflect both the degree of injury and intimidation suffered by victims as well as relevant characteristics of the violent actor — impulsiveness or brutality. The violence scale should be thoroughly tested for reliability and validity on a suitable subject population before use in research relating violent behavior to neurological impairment.

B. Labelling and Neurological Impairment

Research concerning juvenile delinquency inevitably raises issues of labelling. Findings of signs of possible neurological abnormality in juvenile delinquents reported by cautious investigators may be taken by journalists or public officials as evidence that delinquents are brain damaged. It becomes important, therefore, to state clearly what can and cannot be inferred from research findings concerning the mental status of groups of juvenile delinquents.

Approximately one-half of the 71 incarcerated juvenile delinquents examined in this study were found to have two or more neurological soft signs. Does it follow that a large proportion of this population have minimal brain dysfunction (MBD)? The diagnostic category of minimal brain dysfunction or minimal brain damage, although widely used, has been subject to considerable criticism (Schain, 1972; Wolff and Hurwitz, 1973). Most soft signs are normal phenomena in children below a certain age but are regarded as abnormal when they persist beyond the relevant age cut-off. Rutter et al. (1970) argue for a distinction between these neurologic signs of developmental delay and clear evidence of brain damage:

The presence of these developmental delays cannot be taken as sufficient evidence for disease or damage to the brain because:
(a) the characteristics are entirely normal in younger children

and in children of lower mental age; (b) the characteristics often occur without there being any other evidence of structural abnormality of the brain, as judged from history or examinations; (c) the defect may clear up completely as the child grows older (references omitted).

Although signs of minor neurological abnormality were common in the children studied, there are no grounds for inferring the prevalence of brain damage in this population on the basis of project findings.

The generally low reading scores of sample children indicate serious learning difficulties in this group -- a common finding of research on juvenile delinquents. Are most of these detained juvenile delinquents, therefore, learning disabled (LD)? The concept of learning disability is the educational counterpart of minimal brain dysfunction and is subject to similar definitional controversy and conflicting diagnostic standards. In the most general sense, it signifies a discrepancy between academic achievement and intellectual ability (Keilitz et al. 1979). This research project did not include tests of general intelligence and therefore does not permit assessment of the prevalence of learning disabilities as distinct from general intellectual retardation.

The diagnostic labels of minimal brain dysfunction and learning disabilities are not only subject to conflicting and confusing definitions but are not tied to specific prescriptions for intervention with demonstrated effectiveness. Because of the potential for misuse of labels attached to exceptional children, it is suggested that researchers adopt descriptive categories such as minor neurological abnormality or learning difficulty, which do not entail the presence of a specific pathological syndrome.

V. RECOMMENDATIONS FOR INTERVENTION: NEUROLOGICAL/NEUROPSYCHOLOGICAL
DIAGNOSIS FOR JUVENILE DELINQUENTS

Significant negative associations were found between certain measures of minor neurological abnormality (choreiform movements and two or more soft signs) and standard reading scores on the Wide Range Achievement Test. This suggests that, for some of the sample children, neurological impairment may have contributed to learning difficulties. Accordingly, should incarcerated juvenile delinquents routinely receive a comprehensive neurological screening, in the context of an intake diagnostic assessment, in order to identify those children who might have neurologically-based learning difficulties?

One of the aims of this research project was to develop and test items for a routine health assessment that would have practical utility for routine screening of institutionalized adolescents. Neurological testing was perceived as a neglected area that might warrant inclusion in routine adolescent health assessments in juvenile justice institutions. During the course of implementing the project, consultation with medical professionals indicated that no effective medical treatment currently exists for children in this age group who manifest signs of minor neurological abnormality. It was thought, however, that neurological screening would be useful for educational diagnosis and remediation. This assumption is questioned below.

Even if minor neurological abnormality is implicated in the etiology of learning problems, screening for its manifestations is of no practical value for designing a child's remedial program unless knowledge of neurological dysfunction can lead to an effective, differential intervention. Many juvenile delinquents with learning difficulties could benefit from intensive tutoring one-on-one or in small groups. It is not clear, however, that those children manifesting signs of minor neurological dysfunction

need a special type of remedial program, one that differs significantly from that provided to neurologically intact children who also have serious learning problems.

Experts express conflicting opinions on the educational value of neurological diagnosis. For example, Schain, a pediatric neurologist, argues:

...Neurological diagnosis (or psychiatric, psychological and other medical diagnoses) have often been of little value to the teacher or parent of a child with a learning disorder. Nevertheless, experience with therapeutics of all types suggests that ultimately treatment programs are most efficient when based upon recognition of the origins of the problem at hand. The management of children with learning disorders requires a careful assessment of neurological factors that may be genuinely affecting learning processes. (Schain, 1972)

In contrast, Rourke, a neuropsychologist, contends:

The cognitive abilities of children with marked reading disorders but without demonstrable neurological dysfunction appear to be very similar to those exhibited by reading-retarded children with well-documented neurological dysfunction. When subjects are equated for chronological age and level of psychometric intelligence, there appears to be no significant relationship between the nonacademic symptoms of MBD (based on a pediatric neurological evaluation and/or visuomotor impairment as measured by the Bender-Gestalt test) and low academic achievement. More generally, it would appear that the "medical evaluation" (consisting of the history, neurological examination, and EEG) plays a minimal part in the diagnosis and treatment of children with reading problems. In a recent paper, it has been suggested that the diagnosis of MBD is no more than marginally necessary for most purposes and may, in fact, be somewhat counterproductive in many contexts. (Rourke, 1978, references omitted.)

In sum, the educational merit of neurological diagnosis is not apparent.

A neuropsychological assessment of the strengths and weaknesses of children with respect to intellectual, linguistic, and perceptual-motor abilities would appear to hold out more promise for individualized, remedial programming than a standard neurological examination. This "diagnostic-prescriptive" approach prevails in the field of special

education; however, it has been criticized by a number of investigators as lacking demonstrated effectiveness (Ysseldyke, 1973; Ysseldyke and Salvia, 1977; Haring and Bateman, 1977, chap. 5; Zigmond, 1978). In addition, neuropsychological testing is time consuming and consequently expensive. Many children involved in the juvenile justice system are subjected to repeated screening examinations and consequently may be poorly motivated or resistant in an involved testing situation. Psychological testing and consultation is most likely to be useful to remedial teachers when it follows upon referral of a child who is not responding to a teacher's educational efforts. In other words, it is contended that routine intake work-ups will not be as valuable as teacher-initiated assessments.

Although neurological and neuropsychological testing may have little or doubtful therapeutic value in an intake screening program for juvenile delinquents, they may have a rather different pragmatic value in providing services for these children. Special education services for "handicapped" children are tied to specific categories of eligibility (Education for all Handicapped Children Act of 1975, Public Law 94-142). "Specific learning disability," which includes "minimal brain dysfunction," is one category designated in the statutory definition of "handicapped." Professional diagnosis of a child as handicapped is a prerequisite for receiving special education services. Accordingly, neurological or neuropsychological diagnosis may be valuable in the effort to obtain needed remedial services for genuinely impaired juvenile delinquents. It is recommended that juvenile institutions secure the professional diagnostic services required to certify children as handicapped, where appropriate, and develop the advocacy services needed to link children with available programs that can meet their needs.

Appendix A

REPRESENTATIVENESS OF THE HEALTH AND DELINQUENCY PROJECT SAMPLE

A. Comparison with All Children Admitted to Spofford

The issue of sample bias was discussed in Section II in connection with the substantial rate of refusal to participate in this study. Even if no sample attrition had occurred, the sample would not have been representative of all children admitted to Spofford. Most children admitted to Spofford after arrest by the police outside court hours (approximately 60 percent of all admissions) are released subsequently in court without having obtained a medical examination at Spofford. It is estimated that approximately 30 percent of children admitted to Spofford do not receive the full-scale medical examination. At best, therefore, the research sample could be representative of the 70 percent of admitted children who receive medical examination.

A rough comparison between the research sample and the larger population from which it was drawn can be obtained by examination of the relevant monthly report of Detention Admission/Release Statistics for Spofford issued by New York State Division for Youth. As Table A-1 shows, the sample did not differ from all admissions in sex distribution and differed slightly in ethnic composition, with a somewhat higher proportion of blacks and lower proportions of whites and Hispanics in the sample. The two groups differed substantially in the related categories of legal status (Family Court vs. Criminal Court cases) and violence. The proportion of Juvenile Offenders processed in Criminal Court (children aged 14 or 15 arrested for a range of violent offenses and 13-year olds arrested for murder) was nearly twice as high in the research sample as in the population of all admissions during the month in which data collection

occurred. The majority of children in the sample (51 percent) entered Spofford on violent charges, as compared with 38 percent of all admissions. These differences are expected, since the population includes children brought to Spofford by the police and released at court (without obtaining a medical examination), who are less likely to be charged with violent offenses.

Table A-1

Comparison of Health and Delinquency Sample
and All Admissions to Spofford in the Month of Data Collection

	<u>Sample</u>	<u>All Admissions*</u>
	<u>%</u>	<u>%</u>
<u>Sex</u>		
M	87	88
F	13	12
<u>Ethnicity</u>		
Black	67	60
Hispanic	23	28
White	9	11
Other/Unkonwn	1	1
Juvenile Offender	41	22
Violent Charge	51	38
Number of cases	(71)	(307)

* Source: New York State Division for Youth, Detention System Admission Release Statistics.

B. Comparison with New York City Juvenile Delinquents

Children detained at Spofford Juvenile Center are not representative of the population of children processed by the New York City Family Court for allegations of delinquent conduct. Preliminary findings from Vera's Family Court Disposition Study (FCDS), which surveyed a sizeable random sample of delinquency and PINS cases processed by the Family Court from April 1977 through March 1978, shed some light on differences between detained and nondetained children. Thirty-two percent of the sample children for whom delinquency petitions were filed were detained during the time of court processing. Detained children were considerably more likely than those not detained to have a record of prior contacts with the court. As Table A-2 illustrates, 86 percent of the detained children in the FCDS juvenile delinquent sample had one or more prior contacts with Probation Intake for delinquency cases, as compared with 49 percent of those not detained; and 61 percent of the former had three or more such prior contacts in contrast with 17 percent of the latter. According to FCDS data, however, detained children did not differ substantially from non-detained children in arrest charge severity (Table A-3).

Detained children tended to be older than nondetained children (Table A-4). The two groups differed with respect to sex and ethnicity, with females and whites proportionally underrepresented in the detention group (Tables A-4 and A-5). These data have not been analyzed with respect to variables such as number of prior court contacts and the existence of outstanding bench warrants, which might be related to the ethnic and sex differences. In sum, children detained at Spofford Juvenile Center are somewhat older and more persistent offenders than the majority of alleged juvenile delinquents who are not detained during the process of adjudication and disposition.

Table A-2
Record of Prior Intake Contacts of Detained
and Not Detained Children

<u>Record</u>	<u>Detained</u>	<u>Not Detained</u>
None	10%	46%
PINS	4	5
1JD	12	18
1JD, 1 or more PINS	3	3
2JD	6	8
2JD, 1 or more PINS	4	3
3 or more JD	43	12
3 or more JD, 1 or more PINS	<u>18</u>	<u>5</u>
TOTAL	100%	100%
Number of cases	(250)	(519)

Source: Vera Institute Family Court Disposition Study

Table A-3

Arrest Charge Severity of Detained
and Not Detained Children

<u>Charge</u>	<u>Detained</u>	<u>Not Detained</u>
Fel A1	2%	1%
Fel A2	-	—*
Fel A3	-	1
Fel B	14	8
Fel C	18	18
Fel D	37	42
Fel E	18	12
Misd A	11	17
Misd B	<u>1</u>	<u>1</u>
TOTAL	101%	100%
Number of cases	(241)	(512)

* Less than 0.5%

Source: Vera Institute Family Court Disposition Study

Table A-4

Age of Detained and Not Detained Children

<u>Age</u>	<u>Detained</u>	<u>Not Detained</u>
Under 12	2%	5%
12	4	6
13	15	20
14	29	30
15	48	39
16-21	<u>2</u>	<u>—*</u>
TOTAL ..	100%	100%
Number of cases (251)		(525)

* Less than 0.5%

Source: Vera Institute Family Court Disposition Study

Table A-5

Sex of Detained and Not Detained Children

<u>Sex</u>	<u>Detained</u>	<u>Not Detained</u>
Male	94%	89%
Female	<u>6</u>	<u>11</u>
Total	100%	100%
Number of Cases	(252)	(525)

Source: Vera Institute Family Court Disposition Study

Table A-6

Ethnicity of Detained and Not Detained Children

<u>Ethnicity</u>	<u>Detained</u>	<u>Not Detained</u>
Black	59%	53%
Hispanic	33	28
White	<u>8</u>	<u>19</u>
Total	100%	100%
Number of cases	(246)	(499)

Source: Vera Institute Family Court Disposition Study

Appendix B

RELIABILITY OF NEUROLOGICAL EXAMINATION

Neurologic soft signs are so called in part because of their unreliability: i.e., they do not appear consistently on repeated examination. As a partial check of the reliability of the neurological component of the health screening by Montefiore physicians, a second examination by a pediatric neurologist was scheduled in the case of seven subjects. Each of these subjects was identified on initial screening as manifesting two or more soft signs. The number of children examined a second time is too small to draw any firm conclusions on the overall reliability of the data in this area. The findings, however, are indicated below.

With respect to individual soft signs, the level of agreement was not high. The Montefiore physicians noted 32 instances of soft signs for the seven subjects on the initial examinations of which only 12 were confirmed by the pediatric neurologist.* (This constitutes a confirmation rate of 38 percent.) There were 20 false positives -- instances of soft signs noted on the first but not confirmed on the second examination -- and two false negatives -- instances of soft signs found on the second but not on the first examination. As Table B-1 illustrates, some tests of soft signs were confirmed with greater frequency than others: lack of coordination in diadochokinesis, mirror movements on finger-thumb opposition, and choreiform movements.

The reasons for the discrepancies between the two examinations are unknown. Three possible factors could have contributed. First, the same tests when repeated might have produced different responses in the subjects.

* Right-left confusions were not tested in the follow-up examinations.

Second, the Montefiore physicians, who are not specialists in neurology, might have misinterpreted the subjects' responses. Third, the lack of confirmation might have reflected the difference between a general screening approach in which determination of possible findings is emphasized and a specialist's examination in which the focus is on a clear and unequivocal manifestation of abnormality.

When the results of the initial and subsequent examinations are aggregated, there is considerably greater agreement. All of the subjects were identified as showing two or more soft signs on the initial screening. For six of the seven subjects, the presence of two or more soft signs was confirmed on second examination. These findings suggest that if the category of minor neurological abnormality is defined operationally for the purposes of this study as the presence of two or more soft signs, then use of this category is reasonably reliable.

Table B-1

Confirmation of Soft Signs

	<u>False Positives</u>	<u>False Negatives</u>	<u>Confirmed</u>
Tandem Gait			
Excessive movements	2		1
Hopping			
Excessive movements	2		
Diadochokinesis			
smoothness	1		3
mirror movements	4		1
Finger-thumb opposition			
smoothness	5		
mirror movements	2	1	4
Choreiform movements	3	1	3
Astereognosis	<u>1</u>	—	—
TOTAL	20	2	12

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