

Childhood Characteristics as Indicators of Adult Health Status

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SOME years ago studies by Ciocco and co-workers (1, 2) concerning physical measurements of children in relation to subsequent results of medical examinations in the Selective Service System pointed to the possibility of identifying children very early in life who were likely to have adult health problems. He concluded that school health programs had not sufficiently appreciated that the roots of many adult diseases were already present in the child population being served. If the indicators could be located and remedial measures taken, he suggested, school health programs could have considerable impact on the health status of future adults as well as on the current health of school children.

This study was undertaken to determine which characteristics, if any, among those noted on academic and health records of New York City school children could serve as pointers to physical or behavioral disabilities in the early adult ages. The index of adult health status, as in the studies of Ciocco and co-workers, was the classification of registrants after selective

service qualifying examinations. The need to consider the whole range of information in school records, behavioral and scholastic as well as physical, and its relationship to draft status was made apparent by previous findings that more than one-fifth (21.3 percent) of the 29,000 young men undergoing preinduction examinations in New York City in 1960 were disqualified for medical reasons; and in a 2-year period, October 1962 through September 1964, more than one-third (37.7 percent) of those disqualified for medical reasons were rejected for psychiatric reasons(3). Clearly, one must look beyond the results of physical examinations in school to identify the early signs of behavioral disorders.

Method of Study

To determine the predictiveness of information on the characteristics recorded for children during their school years, it was necessary to identify a cohort of school children and trace them forward to draft registration and qualifying examination. A study sample of 6,000 to 6,500 children was considered adequate for the analysis and manageable within the time allotted for locating and abstracting information. Other considerations were necessary in selecting the sample:

1. The cohort had to be identified far enough in the past to have been processed for selective service by the time the data were collected (through 1966).
2. The cohort had to be identified early enough in school to avoid major bias resulting

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from omission of high school dropouts, but as late as possible to minimize loss of information to the study because of moves from the area.

3. The sample had to be as representative as possible of the public school population in New York City with respect to ascertainable socio-demographic factors.

Ethnic group was considered important among sociodemographic factors because of known differences in rejection rates for white and Negro men (4). Furthermore, ethnic distribution of the population in different areas in New York City is related to the distribution with respect to socioeconomic factors generally. A rank correlation coefficient of 0.78 was obtained between the percentage of white students in New York City school registers and a socioeconomic index for schools based on characteristics of the health area of their location, stated inversely as the percentage of children receiving Aid to Dependent Children, infant mortality, percent overcrowding, and percent annual income in the \$2,000-\$4,000 range.

In the process of selecting a sample, the 227 public elementary schools in New York City in 1955 were classified as to percentage of white students enrolled. Proportionate numbers of schools were picked from three categories: three from 34 with fewer than 40 percent white students, three from 42 with 40 through 79 percent white students, and 11 from 151 with 80 percent or more white students.

The roll books of the 17 schools selected yielded names of 7,400 boys either in terminal eighth grades in 1953-55 or terminal ninth grades in 1954-56. This number was randomly reduced to 6,425 names, which were searched for in the registration files of junior and senior high schools. Registrations were identified for 5,916 boys; not located were registrations of 509, or 7.9 percent, who had been in eighth or ninth grades. Excluded were 53 boys with major defects (for example, gross skeletal deformities), which would automatically disqualify them for service in the Armed Forces. The study sample was then defined as comprising 5,863 boys whose junior and senior high school registrations were located and who did not then have major defects incompatible with selective service acceptance.

Sources of data from the school system, as

Table 1. Selective service category of boys in study sample

Selective service category	Number	Percent
Total.....	5,863	100.0
Examined ¹	3,511	59.9
Accepted.....	2,329	39.7
Rejected.....	1,182	20.2
Not examined.....	2,352	40.1
Deferred.....	890	15.2
Unknown ²	1,447	24.7
Dead.....	15	.3

¹ Includes all boys examined regardless of results; some examinees were subsequently deferred.

² Boys not registered with draft boards in New York City nor in Westchester, Suffolk, Nassau, Putnam, or Rockland Counties of New York State.

mentioned before, included both health and academic records. The rule of the system is that records move with the children. The records traced into junior and senior high schools therefore were cumulative and included information on all school medical examinations, school nurses' notes, academic ratings, teachers' notes about behavior and adjustment, attendance records, home addresses, and number of children in the family. Whenever possible race was ascertained from miscellaneous notations and other items. A search of New York City's vital records for birth certificates of boys in the study sample yielded additional information on race and also data on birth order, birth weight, and father's occupation at time of birth. Birth certificates were identified for 3,963 of the 5,863 boys (67.6 percent) in the sample.

Selective service classifications were obtained through the cooperation of the Selective Service System for New York City, whose registration area included the five boroughs of the city and Nassau, Putnam, Rockland, Suffolk, and Westchester Counties in New York State. Examination records were found for 3,511 boys (59.9 percent) in the study sample. In addition, 890 boys had been deferred without medical examination, and 15 boys had died; no selective service classification was available for 1,447, or 24.7 percent (table 1). Names of boys not included in the local draft board files were sent for possible identification to draft board offices in neighboring States and Puerto Rico, but only 64 names were added to those found locally. Reasons for

the sample attrition are not known; it is supposed that many boys not located in selective service files in the New York City registration area had moved to other areas.

Since the general plan for analysis of the data was comparison of selective service rejection rates among schoolboys with different characteristics noted on their school records, it was important to know if the findings might be biased by variations among the selective service categories in availability of information on school records. Table 2 shows that the percentage of boys for whom school records were located was similar for those examined and for those not examined by the New York City Selective Service boards, and that there was almost no difference in availability of information on records for those accepted and those rejected. Thus selection of the cohort of school children was independent of subsequent selective service classification. For the study sample of 5,863 boys, medical records were located for 78 percent and academic records for 93 percent; for 2.4 percent of boys identified in school registers, neither type of school record was found.

Results

Childhood characteristics of the boys. The items of information abstracted from school health and academic records are listed in table 3. In this table the percentage of boys with the

specified characteristics among the 3,511 who were identified as selective service examinees was compared with available data from other sources about the school child population of New York City. Where it was possible to make these crude comparisons, the study sample appeared to be generally similar in individual items present, with one major exception, to the citywide population. The percentage of nonwhite children in the study sample was markedly lower than the percentage of nonwhite children in the New York City Board of Education's 1958 census of school population. Negroes and Puerto Ricans probably were under-represented for the study group as a whole and over-represented in the subgroup with unknown race. However, even if all the examinees of unknown race (148) were nonwhite, the percentage of nonwhite boys in the study group would still be lower than in the city as a whole.

The higher percentage of boys in the study group with certain physical defects, as compared with the city boys, can be explained by differences in data collection methods. The data for the study sample are cumulative or "ever present" figures, while the prevalence percentages for the city were derived from the results of school physical examinations in a single 2-week period.

Selective service status of examinees. Among the boys in the study sample who were examined

Table 2. Percentage of boys in each selective service category with school records, by type of record

Selective service category	Number in study sample	Both medical and academic records		Academic records only		Medical records only		Neither medical nor academic records ¹	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total.....	5, 863	4, 343	74. 1	1, 127	19. 2	252	4. 3	141	2. 4
Examined ²	3, 511	2, 622	74. 7	670	19. 1	139	4. 0	80	2. 3
Accepted.....	2, 329	1, 745	74. 9	441	18. 9	93	4. 0	50	2. 1
Rejected.....	1, 182	877	74. 2	229	19. 4	46	3. 9	30	2. 5
Not examined.....	2, 352	1, 721	73. 2	457	19. 4	113	4. 8	61	2. 6
Deferred.....	890	694	78. 0	135	15. 2	42	4. 7	19	2. 1
Unknown ³	1, 447	1, 018	70. 4	317	21. 9	70	4. 8	42	2. 9
Dead.....	15	9	60. 0	5	33. 3	1	6. 7	-----	-----

¹ Boys' names appeared on registers of schools included in sample, but neither medical nor academic records could be found for them.

² Includes all boys examined regardless of results; some examinees were subsequently deferred.

³ Boys not registered with draft boards in New York City nor in Westchester, Suffolk, Nassau, Putnam, and Rockland Counties of New York State.

Table 3. Percentage of 3,511 examinees with specified childhood characteristics noted in school records or birth certificates, and percentage of New York City population with similar characteristics

Childhood characteristic	Examinees in study			Percent with characteristic in New York City
	Number classified as to the characteristic ¹	Number with characteristic	Percent with characteristic	
Physical defects and behavioral problems:				
Uncorrected vision score of 20/50 or worse in better eye.....	2, 674	323	12. 1	(²)
Eye diseases, such as strabismus.....	2, 760	92	3. 3	³ 1. 1
Hearing loss or severe chronic otitis.....	2, 692	44	1. 6	³ . 9
Cardiac condition.....	2, 757	110	4. 0	³ 4. 2
Allergy (asthma, hay fever).....	2, 755	177	6. 4	³ 2. 5
Orthopedic defect.....	2, 757	165	6. 0	³ 2. 6
Accidental injury (major).....	2, 767	147	5. 3	(²)
Nutritional problem:				
Overweight.....	2, 761	299	10. 8	³ 9. 6
Underweight.....	2, 761	147	5. 3	³ 4. 5
Under par.....	2, 758	159	5. 8	(²)
Hernia.....	2, 757	55	2. 0	³ 1. 0
Certain diseases (scarlet fever, poliomyelitis, parasites).....	2, 762	203	7. 3	(²)
Respiratory conditions (colds, sore throats, tonsillitis, if chronic).....	2, 758	986	35. 8	(²)
Birth weight under 2,501 gm.....	2, 443	136	5. 6	⁴ 4. 9
Health class placement.....	2, 973	145	4. 9	⁵ 4. 4
Behavioral problem.....	2, 799	1, 080	38. 6	(²)
Academic deficiencies and related problems:				
IQ below 85 in grade 5.....	2, 411	476	19. 7	⁶ 16. 0
Reading achievement below grade 5 in grade 8.....	3, 199	610	19. 1	⁷ 21. 4
Mathematics achievement below grade 5 in grade 8.....	3, 164	618	19. 5	⁷ 17. 2
Poor average English mark, grades 1-9.....	3, 282	223	6. 8	(²)
Poor average mathematics mark.....	3, 282	212	6. 5	(²)
Dropout before 12th school year.....	3, 173	690	21. 7	⁵ 24. 2
Placement in a remedial academic class or repeat.....	2, 989	393	13. 1	⁵ 10. 0
Average annual absence of 30 days or more, grades 1-9.....	3, 283	310	9. 4	(²)
Demographic and socioeconomic characteristics:				
Negro or Puerto Rican ⁸	3, 363	373	11. 1	⁹ 28. 1
Family with 4 or more children.....	3, 082	693	22. 5	¹⁰ 27. 2
Use of school physician for regular complete physical examinations.....	2, 180	296	13. 6	(²)
More than 2 home addresses, grades 1-9.....	3, 349	616	18. 4	(²)
More than 2 extra school changes above usual, grades 1-9.....	3, 244	407	12. 5	(²)
Occupation of father: professional or managerial.....	2, 533	569	22. 5	¹¹ 22. 9
Birth order: first-born or only child.....	2, 879	1, 319	45. 8	¹² 43. 5

¹ 3,511 examinees minus those for whom data on specified characteristics were missing.

² No estimate.

³ New York City health department findings (unpublished) on examinations by school physicians of 12,340 children reporting for examination in 2 weeks of April 1959.

⁴ Figure compiled by the statistical division, bureau of records and statistics, New York City health department, for white boys surviving first year of life.

⁵ Fifty-eighth annual report of the superintendent of schools, City of New York, school year 1955-56. New York City Board of Education, 1957.

⁶ Estimate based on normal distribution: the IQ is normally distributed with about 15 points representing a standard deviation; hence about 16 percent would be expected to fall below a score of 85. Among the white boys 16.6 percent fell below this score, while more than 50 percent of the minority group children did not

achieve a score greater than 85. The test was standardized on white children.

⁷ Unpublished data of the bureau of education research, New York City Board of Education, 1954-55.

⁸ Puerto Rican defined as being born in Puerto Rico or having 1 or both parents born there.

⁹ 1958 census of school population (unpublished), New York City Board of Education.

¹⁰ 1960 census of New York City; data for families with head of family over age 35, adjusted for male children only.

¹¹ 1940 census of New York City; data for married men aged 25-44.

¹² Derived from 1960 census data for New York City on distribution of families by number of children, assuming that birth order position of individual boys was random within families of a given size and sex composition.

by local boards in the New York City area, 66.3 percent were accepted for military service and 33.7 percent were rejected (table 4). These rates were similar to acceptance and rejection rates for the United States as a whole, although the rejection rates by cause differed slightly for New York City and the United States. Causes for rejection were classified as medical, mental, or administrative or combinations of the three.

Medical rejections included both physical and psychiatric diagnoses. Mental rejections were based on failure of the selectee to pass the Armed Forces Qualifying Test, a general aptitude test. The category of administrative rejection includes primarily young men with criminal records. Rejection rates by cause cannot be used as measures of prevalence of medical or mental defects in the populations examined, however, because of the way the examination procedure is carried out. Identification of a single cause for rejection of an examinee may terminate the examination process, leaving information on other possible causes incomplete. Also because of this situation the proportion of examinees that would be rejected for more than one cause is not known.

Childhood characteristics associated with rejection. Childhood characteristics noted on

Table 4. Selective service acceptance and rejection rates, by cause of rejection, among 3,511 examinees with school records and among all U.S. examinees

Selective service category	Number of New York City boys with school records	Percent of examinees	
		In New York City school record study	In United States ¹
Accepted.....	2, 329	66. 3	68. 3
Rejected, all causes, including unknown reasons.....	1, 182	33. 7	31. 7
Medical ²	697	19. 9	16. 3
Mental ²	262	7. 5	13. 0
Administrative ²	72	2. 1	3. 9

¹ U.S. data are based on all enlistees, draftees, and reservists examined from August 1958 through June 1960.

² Subgroups are not mutually exclusive since rejections for two causes are counted in both categories.

school records significantly associated with selective service rejection are shown in table 5. Significance was defined as being at the 1 percent level ($P<0.01$) in a chi-square test of the frequencies of rejections among boys with and without the specified characteristics. The data on percentages rejected are shown for boys with and without the characteristic so that comparisons can be made between these two groups. Data also are given for boys not classified as to the characteristic for consideration of possible bias resulting from the information deficit for each characteristic.

Five physical defects or characteristics (uncorrected vision score of 20/50 or worse, cardiac condition, asthma or hay fever, major accidental injury, and health class placement) were found to be significantly associated with rejection. In other words, to use one category as an example, boys with an uncorrected vision score of 20/50 or worse in the "better" eye were much more likely to be disqualified for military service than boys without a visual defect of this kind.

Rejection rates for components of the physical defect categories significantly associated with rejection are given in table 6. The rates were very high, for example, for boys whose corrected vision score was not 20/20 and who also had an eye disease, such as strabismus, or who had the visual defect noted before they reached the fifth grade. Other very high risk categories pinpointed by table 6 were boys with organic heart disease or hypertension, boys with asthma or hay fever first mentioned in or after grade 5, and boys who had incurred head injuries or multiple injuries during the school years.

Physical defects or characteristics not associated significantly with rejection were:

Eye disease without visual defect

Hearing loss or chronic otitis

Nutritional problems: overweight or underweight

Orthopedic defects such as flat feet and curvature of the spine

Hernia

Certain diseases like scarlet fever, poliomyelitis, and intestinal parasites

Respiratory conditions including chronic tonsillitis

Heights and weights at ages 6 and 14
Birth weight under 2,501 grams.

Demographic and socioeconomic characteristics not associated significantly with rejection were:

Number of home addresses in grades 1 through 9
Number of school changes above the requirements of the system in grades 1 through 9
Occupation of father on birth certificate
Birth order position.

The physical defects not significantly associated with rejection, in a statistical sense, were generally remediable or transitory conditions even though some may have been viewed as chronic when school health examinations were

made. The lack of statistical significance may be due also to the small numbers involved, as for aural conditions, which were recorded for only 44 examinees with information on hearing and otitis media in school records.

Contrasted with the small number of boys in the detailed categories of physical defects, a large group of boys in the study sample were classified as having a behavioral problem (38.6 percent of those for whom the information was available). The rejection rate of 41.2 percent among these boys was significantly higher than the rejection rate of 29.0 percent among the boys classified as not having such problems. Behavioral problems included misconduct; habit disturbances (speech defects or enuresis); and behavior described as shy, immature, very

Table 5. Selective service rejection rates for 3,511 examinees with and without childhood characteristics associated significantly with rejection

Childhood characteristic associated significantly with rejection ¹	Boys with characteristic		Boys without characteristic		Total boys classified		Total boys not classified ²	
	Number in group	Percent rejected	Number in group	Percent rejected	Number in group	Percent rejected	Number in group	Percent rejected
Physical defects and behavioral problems:								
Uncorrected vision score of 20/50 or worse in better eye.....	323	41.2	2,351	29.0	2,674	32.8	837	35.7
Cardiac condition.....	110	54.5	2,647	32.4	2,757	33.3	754	33.0
Asthma, hay fever.....	177	43.5	2,578	32.6	2,755	33.3	756	34.4
Accidental injury (major).....	147	43.5	2,620	32.6	2,767	33.2	744	35.5
Health class placement.....	145	50.3	2,828	31.0	2,937	31.9	538	42.5
Behavioral problem ³	1,080	41.2	1,719	29.0	2,799	33.7	712	32.8
Academic deficiencies and related problems:								
IQ below 85 in grade 5.....	476	42.3	1,935	27.4	2,411	30.3	1,100	41.1
Reading achievement below grade 5 in grade 8.....	610	52.8	2,589	27.2	3,199	32.1	312	48.7
Mathematics achievement below grade 5 in grade 8.....	618	49.3	2,546	27.6	3,164	31.9	347	49.0
Poor average English mark.....	223	59.0	3,059	31.2	3,282	33.1	229	39.8
Poor average mathematics mark.....	212	59.7	3,070	31.2	3,282	33.1	229	39.8
Dropout before 12th year.....	690	51.4	2,483	27.9	3,173	32.9	338	39.3
Placement in remedial academic class.....	393	52.1	2,596	29.0	2,989	32.0	522	42.3
Average annual absences of 30 days or more in grades 1-9.....	310	52.3	2,973	31.5	3,283	33.4	228	37.2
Demographic and socioeconomic characteristics:								
Negro or Puerto Rican.....	373	52.1	2,990	31.0	3,363	33.5	148	39.3
Family with 5 or more children.....	372	47.3	2,710	31.0	3,082	33.6	429	30.7
Use of school physician for regular physical examinations.....	296	40.6	1,884	30.6	2,180	32.0	1,331	36.0

¹ Significant at 1 percent level ($P < .01$) in a chi-square test of the difference between boys rejected among those with and without the characteristic.

² Not classified because of incomplete records.

³ Defined as misconduct, habit disturbance (speech defect, enuresis), or behavior described as shy, immature, very nervous, or restless.

nervous, or restless. The information was taken from both health and academic records. Because of the size of this group of examinees, it would have been useful to study the association between psychiatric diagnoses in medical rejections and behavioral characteristics noted on school records. Unfortunately, the data on cause of rejection made available by the Selective Service System did not include a detailed diagnosis; it was therefore impossible to sort medical rejections into physical and psychiatric causes.

Every characteristic in the category of academic deficiency was significantly associated with rejection. Also, the differences in rejection rates for boys with and without specified academic characteristics generally were greater than the differences in rejection rates for physical defects and behavioral problems. The question arising immediately was whether these differences were accounted for entirely by mental rejection. This question will be considered later. One also wonders about relationships be-

tween academic deficiency, physical defects, and behavioral problems, particularly excessive absenteeism, that could have been classified just as well as a health-related variable. It is true that overlapping can occur across all the categories of childhood characteristics. Presented in this way, however, the data nevertheless indicate the different criteria by which groups of children at relatively high risk of developing adult health problems may be identified.

Among the sociodemographic factors associated significantly with selective service status were ethnic group, family size, and use of school physician to conduct the required physical examination. Negro or Puerto Rican boys, boys in families with five or more children, and boys examined by school physicians were at higher risk of rejection than other examinees. Factors not associated with selective service status were two indexes of mobility (number of home addresses and number of school changes), occupation of father, and birth-order position.

Table 6. Selective service rejection rates for examinees with specified conditions included in categories of physical defects associated significantly with rejection

Conditions noted in category of physical defect associated significantly with rejection ¹	Number of boys with specified defect or condition	Percent rejected among those with defect or condition
Total examined.....	3, 511	33. 7
Uncorrected vision score of 20/50 or worse in better eye.....	323	41. 2
Corrected score worse than 20/20, no eye disease:		
Noted before grade 5.....	60	60. 0
Noted in or after grade 5.....	81	28. 3
Corrected score worse than 20/20, with eye disease.....	21	71. 4
Corrected score better than 20/20.....	129	34. 9
Corrected score unknown.....	32	25. 0
Cardiac defect.....	110	54. 5
Organic heart disease or hypertension.....	38	73. 7
History of rheumatic fever.....	72	44. 4
Asthma and hay fever.....	177	41. 8
Asthma with or without hay fever.....	119	42. 9
Noted before grade 5.....	89	34. 8
Noted in or after grade 5.....	25	68. 0
Time of onset unknown.....	5	60. 0
Hay fever and allergic eczema, without asthma.....	58	40. 4
Accidental injury.....	147	43. 5
Limb fracture.....	117	39. 3
Head injury or multiple injuries.....	30	60. 0

¹ Significant at 1 percent level ($P < .01$) in a chi-square test of difference between boys rejected among those with and without the defect.

Rejection rates for boys who were not classified as to the characteristics listed in table 5 were, in the case of physical defects and behavioral problems, generally similar to rejection rates for boys who were classified. It can be concluded, therefore, that the observed differences in rejection rates between boys with and without the specified physical and behavioral characteristics would not be materially changed if the characteristics of all boys were known. In the one instance in which the rejection rate for boys not classified was appreciably higher than the rate for those classified (health class placement), reallocation of all unknowns to either comparison group still resulted in a significantly higher rejection rate for boys with the characteristic. If all the unknowns were in fact boys with special health class placement, the rejection rate for this group would be 44.2 percent as compared with the observed rate of 31.0 percent for those without placement; conversely, if all the unknowns were without health class placement, the rate for the group without placement would be increased to only 32.9 percent.

Boys not classified as to academic deficiencies had higher rejection rates than boys classified as to such deficiencies; sometimes the rates were similar to those for boys with the deficiencies. Inspection of the numbers in various groups

revealed that little change would be made in the highly significant association between rejection and poor reading achievement, poor mathematics achievement, school dropout, remedial class placement, or excessive absenteeism if the unknowns were reallocated to either of the known categories. The possible effect of the unknowns on the other categories of academic characteristics is less clear.

Childhood characteristics and causes of rejection. In order to look at the relationship between characteristics noted on school records and rejection rates by cause, the examinees in the study were regrouped into the broad categories shown in table 7. As in previous tables, the categories are not mutually exclusive since some boys may have been classified in more than one. The first notable observation was that the rejection rate for all causes was twice as high among boys with any one type of problem (40.1 percent) as for boys with no problem (20.1 percent). The medical rejection rate was 37 percent greater for boys with problems (23.1 percent disqualified) than for boys without problems (16.9 percent disqualified), and this rate was highest in the group of boys with one or more of the physical defects described (30.1 percent rejected). The medical rejection rate, however, was also high (25.1 percent) for boys with behavioral problems in school.

Table 7. Selective service acceptance and rejection rates, by cause of rejection, for examinees with certain physical defects, behavioral problems, or academic problems noted on school records

Type of problem	Number of examinees with problem	Percent rejected		
		All causes ¹	Medical causes ²	Mental causes ²
Total.....	3, 511	33. 7	19. 9	7. 5
Examinees with one or more specified problems.....	2, 193	40. 1	23. 1	12. 3
Physical: uncorrected vision of 20/50 or worse in better eye, eye disease, cardiac defect, asthma, hay fever, orthopedic defect, major injury (external causes).....	851	40. 7	30. 1	7. 6
Behavioral: misconduct, habit disturbance (speech defect, enuresis), or behavior described as shy, immature, very nervous, or restless....	1, 080	41. 2	25. 1	12. 3
Academic or related: reading achievement below 5th grade level in 8th grade standard test, dropout before 12th year of school, or average annual absences of 30 or more days in grades 1-9.....	1, 192	48. 0	17. 8	20. 2
Unknown as to one or more types (but no problem otherwise).....	608	26. 2	19. 4	3. 1
No problem.....	710	20. 1	16. 9	. 7

¹ Includes boys rejected for administrative reasons (2.1 percent) and those rejected for unknown reasons.

² Rejections for both causes counted in both columns.

Table 8. Percentage of boys with specified problem having more than one type of problem noted on school records

Type of problem	Number of boys with specified problem ¹	Boys with two or more problems	
		Number	Percent
Examinees classified.....	2, 429	743	30. 6
Physical: uncorrected vision of 20/50 or worse in better eye, eye disease, cardiac defect, asthma, hay fever, orthopedic defect, major injury (external causes).....	780	447	57. 3
Behavioral: misconduct, habit disturbance (speech defect, enuresis), or behavior described as shy, immature, very nervous, or restless.....	930	567	61. 0
Academic: reading achievement below 5th grade level in 8th grade standard test, dropout before 12th year of school.....	727	474	65. 2
Excessive absence: average annual absence of 30 or more days in grades 1-9...	215	188	87. 4

¹ Excludes boys for whom information was missing on one or more types of problems.

The association between mental rejection and academic deficiency in school years was very marked; 20.2 percent of the boys with one or more characteristics failed to pass the Armed Forces Qualifying Test as compared with a failure rate of 7.5 percent among the whole group of examinees and only 0.7 percent among those with no academic deficiency nor other such characteristic noted on school records. Boys with behavioral problems also had a higher than average rate of mental rejection (12.3 percent).

From the standpoint of detecting problem groups in early school years, then, boys with either physical, behavioral, or academic problems are at relatively high risk of having defects in these functional areas in young adult life also. The highest risk appears to be for those having academic deficiency, with a large part of the adult problem also definable as academic deficiency. The group having physical defects are most likely to have adult health conditions resulting in medical disqualification for military service. Boys identified as having behavioral problems during school years, however, are at relatively high risk of deficiency in both health and learning in early adult life.

Effect of multiple problems. The analysis thus far has dealt with categories of schoolboys defined according to a single characteristic or type of problem. This is a convenient way of looking at the magnitude of specific problems and at the relative position of these problems with respect to subsequent Armed Forces rejection rates. For educators and school health personnel in oper-

ating programs, however, the unit of study is a single schoolboy who may have not one but multiple types of problems. In fact, nearly one-third (30.6 percent) of the examinees in this study were classified as having two or more

Table 9. Selective service rejection rate for examinees, by number of types of problems noted on school records

Number of types of problems ¹	Number of examinees in each group	Percent rejected in each group
Total.....	3, 511	33. 7
Examinees classified with respect to all types of problems.....	2, 429	32. 9
No problem.....	710	20. 1
1 type of problem.....	976	29. 6
1 or more types of problems...	1, 719	38. 2
2 types of problems.....	572	47. 2
2 or more types of problems...	743	49. 4
3 or more types of problems...	171	66. 7
Examinees for whom information was missing on 1 or more types of problems.....	1, 082	35. 4

¹ Defined as follows:

Physical: uncorrected vision of 20/50 or worse in better eye, eye disease, cardiac defect, asthma, hay fever, orthopedic defect, major injury (external causes).

Behavioral: misconduct, habit disturbance (speech defect, enuresis), or behavior described as shy, immature, very nervous, or restless.

Academic: reading achievement below 5th grade level in 8th grade standard test; dropout before 12th year of school.

Excessive absence: average annual absence of 30 or more days in grades 1-9.

NOTE: Italicized figures represent cumulative data.

types of problems noted on their school records. Table 8 shows the percentage of boys with each broad type of problem who were classified as having more than one type. The totals in this table differ from those in previous tables because of the exclusion of boys for whom information was missing on one or more types of problems.

Regardless of problem type, if boys are identified as having one type, more will also have another type than will not. The percentage with multiple types of problems was slightly higher for boys with behavioral problems than for boys with a physical defect, and slightly higher yet for boys with academic deficiency. Because the characteristic of excessive absenteeism is a measurement different from the others in table 8, but expected to be closely related to the others, it was removed from the category of academic deficiency in which it was listed. As expected, a very high percentage (87.4 percent) of boys who were absent 30 days or more per year

through the ninth grade were identified as having one or more physical, behavioral, or other academic problems.

The effect on rejection rates of accumulated types of problems is shown in table 9. The rejection rate for boys with no problem, as noted earlier, was 20.1 percent. Those having one or more types of problems experienced a rejection rate that was almost twice as high (38.2 percent). Nearly half (49.4 percent) of the boys with two or more types of problems were rejected, and 56.7 percent of those with three or more types were rejected. Thus the risk for young men of having health or academic defects in early adult life, as indicated by disqualification for military service, increases with the increasing number of problems identified in school records.

Relationships between characteristics: behavioral problems. Earlier in this report 38.6 percent of the examinees were shown to have a behavioral problem of one kind or other during

Table 10. Percentage of examinees with specified childhood characteristics, classified as to behavioral problems

Childhood characteristic	Number classified as to behavioral problem	With behavioral problem		Without behavioral problem	
		Number	Percent	Number	Percent
White.....	2, 408	933	38. 7	1, 475	61. 3
Negro.....	76	34	44. 7	42	55. 3
Puerto Rican.....	205	68	33. 2	137	66. 8
0-2 extra school moves.....	2, 537	977	38. 5	1, 560	61. 5
3 or more extra school moves.....	120	56	46. 7	64	53. 3
High school graduate.....	1, 832	637	34. 8	1, 195	65. 2
12th year dropout.....	228	108	47. 4	120	52. 6
9th-11th year dropout.....	561	266	47. 4	295	52. 6
Normal class placement.....	2, 146	785	36. 6	1, 361	63. 4
Repeated grade.....	107	62	57. 9	45	42. 1
Remedial class placement.....	225	139	61. 8	86	38. 2
Reading at grade level or better.....	1, 480	500	33. 8	980	66. 2
Reading 1-3 years retarded.....	608	257	42. 3	351	57. 7
Reading more than 3 years retarded.....	490	251	51. 2	239	48. 8
No nutrition problem.....	2, 274	826	36. 3	1, 448	63. 7
Underweight.....	142	69	48. 6	73	51. 4
Overweight.....	293	119	40. 6	174	59. 4
No orthopedic problem.....	2, 545	931	36. 6	1, 614	63. 4
Orthopedic problem.....	162	81	50. 0	81	50. 0
Annual average absence under 30 days.....	2, 415	923	38. 2	1, 492	61. 8
Annual average absence 30 days or more.....	242	108	44. 6	134	55. 4

school years, and examinees with such problems were at higher than average risk of selective service rejection for both medical and mental causes. Also, 61.0 percent of the examinees identified as having behavioral problems in school were identified as having, in addition, either a physical defect, an academic deficiency, or excessive absenteeism. Because of the initial size of this group and because of its relatively poor prognosis in terms of the standards for military service, it is of interest to look at the association of behavioral problems and other childhood characteristics noted on the school records.

Information on certain of these characteristics is given in table 10. An example will help to clarify the data. Of the 2,408 white examinees for whom the information was available in school records 933, or 38.7 percent, had a behavioral problem as defined previously and 1,475, or 61.3 percent, did not have such problems. Among the 76 examinees known to be Negro, the comparable percentages were 44.7 percent with behavioral problems and 55.3 percent without. Among 205 Puerto Ricans, there were 33.2 percent with and 66.8 percent without behavioral problems. The differences among the three ethnic groups in percentages with behavioral problems were not statistically significant. Comparing percentages in other categories

of childhood characteristics, however, showed that significantly more high school dropouts than high school graduates had behavioral problems and differences of this degree also appeared between examinees with remedial class placement and those with normal class placement, between those more than 3 years retarded in reading achievement and those reading at grade levels, between those who were underweight and those with no nutritional problem, and between those with an orthopedic defect and those with none.

Behavioral problems thus seem to be associated with both academic and physical deficiencies. In thinking about these associations it is important to remember the nature of the characteristics and also the context in which the information is recorded. All the conditions defined as problems of behavior, such as misconduct, habit disturbances, nervousness, and restlessness, could be described as characteristics that make it difficult to control or manipulate a group of children in a classroom setting. The data in table 10 evoke the image of the misfit in the school system who has insufficient reading skill, cannot be carried in regular classes, and who leaves the system before graduation. Another association calls to mind skinny little boys with nervous energy which, unfortunately for the teacher, is not pent up. Other

Table 11. Prevalence of selected childhood characteristics among all boys in sample, categorized as to average annual days absent

Selected childhood characteristic	Average days absent less than 30 days		Average days absent 30 days or more	
	Number with charac- teristic	Percent with charac- teristic ¹	Number with charac- teristic	Percent with charac- teristic ¹
Physical defects and behavioral problems:				
Cardiac condition.....	125	3. 2	30	7. 7
Allergy (asthma, hay fever).....	219	5. 6	61	15. 1
Accidental injury (major).....	188	5. 0	32	9. 0
Underweight or under par.....	396	10. 1	66	17. 0
Behavioral problem.....	1, 405	35. 3	182	45. 5
Academic deficiencies:				
Dropout before 12th year.....	937	21. 2	216	49. 1
Reading achievement below grade 5 in grade 8.....	846	17. 4	154	32. 8
Demographic and socioeconomic characteristics:				
Negro or Puerto Rican.....	673	12. 1	83	17. 0
Family of 5 or more children.....	655	12. 7	104	22. 9
Three or more home addresses in grades 1-9.....	862	17. 9	151	29. 8

¹ Percentages were based on number of boys classified as to characteristic among those with specified absence

experience. Of 5,863 in sample, absence experience was unknown for 7 percent.

types of atypical behavior may have escaped notice entirely, such as conformity that masks lack of understanding or a sense of inferiority. Early recognition of characteristics pointing to adult deficiencies depends on careful definition of the indicators.

Other relationships: absenteeism. Excessive absenteeism (an average of 30 days or more per year in the first nine grades of school), to a greater extent even than behavioral problems, was associated with other childhood characteristics selected for study; 87.4 percent of the examinees with excessive absenteeism were found to have another type or other types of problems. Another way of looking at the association is to compare the percentages of boys having specified characteristics among those with excessive absence rates and those without (table 11).

It should be noted that the data in table 11 refer to the entire study sample of 5,863 schoolboys and not just to those identified as selective service examinees. Again, as in other tables, the percentages are based on records that were considered complete as to the items of information specified. All the childhood characteristics listed in table 11 were more frequently noted for children with excessive absenteeism than for other children. Differences in frequencies were particularly marked for cardiac condition, allergy, dropout before the 12th grade, and reading achievement retarded more than 3 years.

The importance of excessive absenteeism as an indicator of future trouble is further shown by its effect on rejection rates among boys with specified characteristics. For example, among selective service examinees, boys with a cardiac condition were identified as a high-risk group;

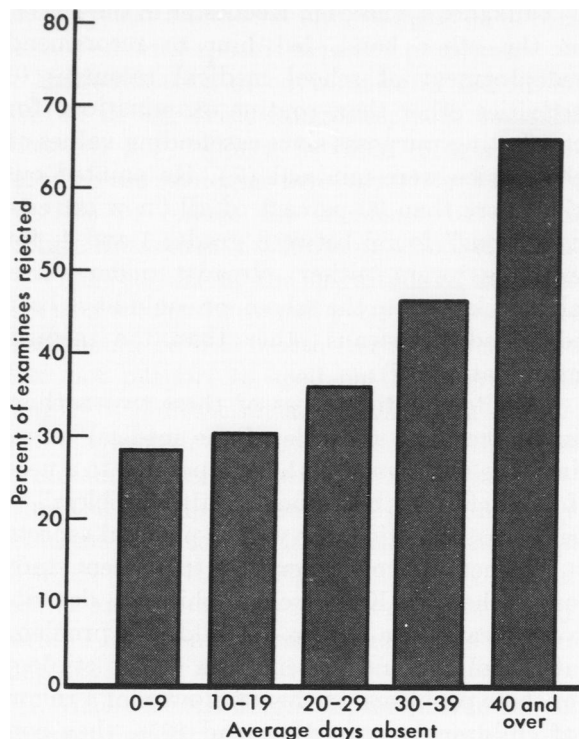
Table 12. Percentage of examinees within each ethnic group with specified characteristics in school records

Childhood characteristic	Percentage of boys with characteristic noted ¹		
	White (N=2,990)	Negro (N=99)	Puerto Rican (N=274)
Physical defects and behavioral problems:			
Uncorrected vision score of 20/50 or worse in better eye.....	12.5	9.4	7.8
Cardiac condition.....	4.0	5.8	3.9
Allergy.....	6.7	7.2	3.4
Orthopedic defect.....	6.3	5.8	2.9
Accidental injury.....	5.2	1.4	7.2
Nutritional problem:			
Overweight.....	11.8	5.8	3.9
Underweight.....	5.3	5.8	6.8
Under par.....	5.9	0	5.8
Selected communicable diseases.....	6.7	7.2	15.0
Chronic tonsillitis including tonsillectomy.....	31.6	26.1	15.9
Special health class placement.....	4.4	6.3	11.4
Behavioral problem.....	38.7	44.7	33.2
Academic deficiencies and related problems:			
IQ below 85.....	16.6	50.0	57.4
Reading achievement below grade 5 in grade 8.....	14.1	50.6	63.1
Mathematics achievement below grade 5 in grade 8.....	14.2	50.0	67.6
Poor English mark.....	5.2	15.5	16.6
Poor mathematics mark.....	4.8	15.5	17.9
Dropout years 9-11.....	17.4	31.4	52.2
Remedial class placement.....	11.1	15.2	29.9
Average annual absence of 30 days or more, grades 1-9.....	8.9	14.1	12.5
Demographic and socioeconomic characteristics:			
Family of 5 or more children.....	8.6	28.4	38.8
Use of school physician for regular physical examinations.....	10.3	22.6	52.8
More than 2 home addresses by grade 10.....	9.9	44.6	40.0
More than 2 extra school changes by grade 10.....	3.7	14.6	8.8
Father's occupation in service or labor category.....	15.5	56.3	75.0

¹Of the 3,511 examinees, information as to ethnic group was missing for 148. These percentages with

specific characteristics were based on numbers of boys classified as to characteristics.

**Selective service rejection rates for examinees,
by average annual number of days absent
from school, grades 1-9**



when these boys were further categorized as to absenteeism, it was seen that those with an average absenteeism rate of 30 or more days per year were an especially high-risk group, as follows (boys for whom information was missing were again excluded from the calculation):

Boys having cardiac condition	Number in group	Percent rejected
With excessive absence.....	18	72.2
Without excessive absence.....	84	50.0

The overall effect of absenteeism on the rejection rate is shown in the chart. The rate increased from a low of 28.4 percent among examinees with fewer than 10 days of absence per year in grades 1 through 9, over successive 10-day increments, to a rate of 67.0 percent for those absent 40 days or more per year. Thus the risk of rejection in this group of schoolboys was clearly related to the time lost from school.

Reading level and ethnic group. The difficulties in comparing academic ratings among different racial or cultural groups are well known, and the data collected for this study do not resolve them. Poor achievers and nonwhite boys were identified separately as being at higher than average risk of rejection by the military services. Also, much higher percentages of Negro and Puerto Rican boys than white boys among the examinees in the study had academic problems in school (table 12). One questions the extent to which the difference in selective service rejection rates for white and nonwhite examinees is attributable to the difference in academic achievement.

The data in table 13 show that among examinees who were reading at least at fifth grade level in grade 8, the percentages rejected were almost the same for white boys as for Negro or Puerto Rican boys. Among examinees with a reading level more than 3 years retarded, however, the rejection rate was still significantly higher for Negro and Puerto Rican boys than for white boys. The meaning of this difference is not clear. Since there is no differential in rejection rates among the ethnic groups reading at grade 5 level or above, the factors may be environmental in nature. The high rejection

Table 13. Selective service rejection rates for examinees, by ethnic group and reading achievement level

Reading level in grade 8, standard achievement test	All examinees ¹		White		Negro or Puerto Rican	
	Number in group	Percent rejected	Number in group	Percent rejected	Number in group	Percent rejected
Total.....	3,511	33.7	2,990	31.0	373	52.8
Fifth-grade level or above.....	2,589	27.2	2,395	27.3	119	26.9
Below fifth-grade level.....	610	52.8	393	48.3	172	62.2
Unknown.....	312	48.7	202	41.7	82	70.7

¹ Ethnic group unknown for 148 examinees.

rate among nonwhite examinees for whom reading level was unknown also suggests that the availability of information on this item may have been biased with respect to other variables studied, such as absenteeism.

Discussion

If indicators of future functional impairment can be identified in populations of young children, as seems clear from the results of this study, what are the implications of this fact for school health programs? How can these findings be taken into account when planning services aimed at reducing the rate of failure, either physical or social? In short, do the relationships shown here give further insights into what should be the goals and directions for health services in school-age children?

These results can be added to the evidence accumulated by others of the need for refocusing school health programs on those situations in which children are experiencing problems in the school system, whether the principal manifestations appear to be physical, behavioral, or academic. In the history of the development of school health services in the United States, emphasis has changed from daily medical inspections for exclusion of contagion from the schoolroom (around the turn of the century) to medical examination of every child for detection of defects (prevailing through the 1920's) to selective screening or examination of children most in need of care, as proposed in the Astoria Plan starting in 1936 (5, 6).

The Astoria Plan embodied concepts that are adhered to in many school systems, such as the importance of parental participation, the teacher-nurse conference, public health nurse followup, and referral of children to private physicians or other treatment agencies for correction of defects. Jacobziner (6), in commenting on the plan, felt that even though it represented a better program than had previously been available it still failed to identify health problems in their incipiency, particularly early emotional disturbances, which were common. His general recommendation for further improvement was to enlarge the role of the school physician in all phases of the program includ-

ing casefinding, counseling, consulting, and liaison with private physicians in the community.

Yankauer's studies in Rochester in the 1950's, on the other hand, led him to recommend redeployment of school medical resources to activities other than routine examinations for casefinding purposes since casefinding values of the service were minimal (7). He pointed out that more than 90 percent of all "new adverse conditions" found between grades 1 and 4, for example, were either already under care, already known to the school, or could have been identified by means other than the medical examination (8).

Despite the differences of these two authors in emphasis on the role of the medical examiner, the findings of both have pointed to a need for redefining the "school health problem" to encompass emotional as well as physical aspects.

Werner and co-workers (9), in a recent study of a cohort of Kauai school children, describe very clearly the nature of children's problems at school age and present data on the etiology of these problems. In their followup of a cohort of children born in 1955 and 1956, they concluded that at age 10 most survivors of severe perinatal stress had responded well to medical and other supporting services, but that they were a minority of the children who really needed help. The majority in need of help were described as "environmental casualties" in contrast with the smaller number of "reproductive casualties." Specifically, environmental ratings (socioeconomic status, educational stimulation, and emotional support) were significantly associated with achievement and intellectual and emotional difficulties at age 10.

Werner and associates' study, particularly, and the results of the study reported here lead to the following generalizations:

1. School health problems of consequence in the social functioning of the individual are emotional and academic in content as well as physical.

2. Groups of children at relatively high risk of societal "failure" in later life can be identified by several measures of physical, academic, and behavioral status already used in the educational system.

3. The etiologies of many problem areas in school health are environmental rather than biological in nature; specific characteristics in the physical and social environment have been identified with specific types of problems.

4. Modification of environmental factors involved in high-risk categories, with remedial measures for children in those categories tailored to the etiologies involved, should make it possible to reduce the incidence of societal failure in successive cohorts of school children.

When considering the magnitude of the problem as a whole, the fourth generalization is one that should be well worth testing. This report does not purport to spell out a program but simply to indicate an approach based on epidemiologic observations and to suggest the types of measurements that would be useful in evaluating the accomplishments of a program. Many problems that can be identified in school age children have their origins in deeply rooted family and community situations. Others may parallel iatrogenic disease in medicine in that they have their origins in the school system itself. Whatever the diagnosis, the prevention of further disabilities stemming from them will require a major effort on the part of all community resources. The sooner school health personnel understand what many educators have believed all along, that problem school children are likely to become problem adults, the sooner the skills of the public health and medical profession can be applied creatively to one of society's most important tasks.

Summary

Characteristics of a cohort of 3,511 boys in New York City public schools were studied in relation to their subsequent selective service classification. Acceptance rates (66.3 percent) and rejection rates (33.7 percent) for the group as a whole were similar to national rates, although rejection rates by cause for New York City differed slightly from the U.S. rates. With selective service rejection, by cause, as an index, groups of boys with certain physical, behavioral, or academic problems noted on their school records were shown to be at relatively high risk of having defects in these areas of

function in young adult life also. The highest risk (48.0 percent rejected) appeared to be for those having academic deficiency, with a large part of the adult problem also definable as academic deficiency.

Boys having physical defects had a rejection rate of 40.7 percent from all causes; this group was the one most likely to have adult health conditions resulting in medical disqualification for military service. Boys identified as having behavioral problems during school years had a rejection rate of 41.2 percent and were at relatively high risk of deficiency in both health and learning in early adult life.

Increased risk of rejection was associated with increasing numbers of types of problems, and, in some instances, with measures of severity. For example, in the case of absenteeism the risk of rejection was clearly related to the amount of time lost from school. Since indicators of future functional impairment can be identified in populations of school children, these findings have implications for school health programs, suggesting an epidemiologic approach to planning school health services and types of measurements useful in evaluating program accomplishments.

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Teensheet Requests

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Central Processing Dysfunctions in Children

Many children who seem normal in most respects have real trouble assimilating new information. Such children may be struggling to cope with learning problems which might severely handicap their development over the years. They may have average or even above average intelligence but suffer from any of a number of conditions referred to as "central processing dysfunctions." These children are not mentally retarded, brain damaged, emotionally disturbed, deaf, or blind, but nonetheless they experience unusual difficulties in learning.

Parents and teachers of children with central processing dysfunctions generally suspect something is wrong, but so little is known about effective diagnosis and treatment of such dysfunctions that, at present, chances are poor that these youngsters will be guided into educational programs appropriate to their special needs.

An estimated 5 percent of U.S. school children may suffer from symptoms thought to result from central processing dysfunctions. Early signs frequently include hyperactivity, slow or awkward movement, poor auditory discrimination, lack of a sense of direction, or difficulty learning to speak. Later, these children often have unusual problems with reading, writing, spelling, and arithmetic.

Although much is yet unknown about the causes of central processing dysfunctions, considerable research is underway, and these children can be helped through improved under-

standing, special education, and treatment.

A new monograph, "Central Processing Dysfunctions in Children: A Review of Research," has been published by the National Institute of Neurological Diseases and Stroke in collaboration with the National Society for Crippled Children and Adults, Inc.

This report, third in a three-phase project, summarizes the diversity of current knowledge on the subject and points up gaps in the scientific understanding of brain dysfunctions. The bulk of the 148-page document explores disparate findings from experimental and clinical research in child psychology, education, and medicine; however, significant issues, definitions, research criteria, and recommendations also emerge to establish the work as an early milestone in a budding field.

The first report of the project presented working definitions of the subject intended to draw together the knowledge and efforts of psychiatrists, psychologists, educators, neurologists, pediatricians, legislators, social workers, and researchers, so that a broad interdisciplinary assault can be launched against central processing dysfunctions in children.

The second report analyzes the kinds of medical and educational services needed to provide such children opportunities to develop fully their capabilities.

This recent monograph is available from the Information Office, National Institute of Neurological Diseases and Stroke, National Institutes of Health, Bethesda, Md. 20014.