# A multidisciplinary study of 400 children referred to a developmental clinic in an urban ghetto area

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There is increasing emphasis at present on community support and care for children with abnormal development or learning difficulties. Despite this, there have been few studies of such children evaluated in nonresidential facilities, and little attempt has been made to record and analyze systematically the information obtained during their evaluation. Most available studies have focused on one specific form of abnormality such as minimal brain dysfunction,[1, 2] learning disabilities (LD),[3–5] or mental retardation.[6–8] Although most reports have concentrated on white, middle-class children, there is evidence that patterns of referral to diagnostic centers are changing with a trend toward greater utilization of such facilities by low socioeconomic families.[7, 8] Kappelman et al[9–11] have discussed their findings in disadvantaged black school-age children, and Kenny and Clemmens[12] included black children in their report on school children referred because of learning disorders. No study could be found that reported the findings in developmentally disabled, disadvantaged preschool and school-age children, including large numbers of children of Puerto Rican background.

The Center for Child Development, a multidisciplinary clinic located in a low socioeconomic area of the Bronx, New York, studied 400 children between August 1972 and January 1975.

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Preschool children were studied because of slow development; school-age children were studied because they were not achieving in school at a level or rate comparable with that of their classmates.

The following report analyzes the background data and the examination results obtained during the study. All information was recorded on forms that provided for transfer of data to computer punch cards. Computer-assisted analysis was then possible at a relatively low cost.

## Background and methods

Children with developmental or learning problems were seen if they lived within a defined area around the Center and were younger than age 16. The record of each child referred was individually screened by the same intake worker before acceptance into the Center. Applications were rejected if the children lived outside the catchment area or if the primary problem was thought to be on the basis of an emotional or psychiatric disorder. Children with behavior problems, however, were accepted if these problems were associated with possible mental retardation or LD.

The goal of the Center was to perform a complete multidisciplinary evaluation in as brief a time as possible and was usually completed in 5 hours, divided into two sessions. The minimum evaluation consisted of a medical history, interview by a social worker, vision and hearing screening, complete pediatric and neurological examinations, and complete psychological testing. Some children were also examined by the nurse, speech pathologist, and child psychiatrist.

In addition to the standard neurological examination, all cooperative and testable children were examined for abnormalities of gross and fine motor coordination, and other soft neurological signs. Ten items were tested: hopping, skipping, forward and backward tandem gait, rapid alternating finger movements, serial opposition of fingers to thumb, arm pronation-supination, simultaneous alternating of the two hands, overflow movements, choreiform movements of the outstretched hands, and dystonic posturing on lateral foot walking.

The psychological examination began with a test of general intelligence including the Wechsler Intelligence Scale for Children (WISC), Wechsler Preschool and Primary Scale of Intelligence (WPPSI), Merrill-Palmer Scale of Mental Tests, Stanford-Binet Intelligence Scale, and/or the Bayley Scales of Infant Development. All children were given the Beery-Buktenica Developmental Test of Visual-Motor Integration. School-age children, whenever possible on the basis of cognitive abilities, were also given the Raven Coloured Progressive Matrices, Benton Revised Visual Retention Test, Spreen-Benton Sentence Repetition Test, Spreen-Benton Token Test, sound-blending subtest of the Illinois Test of Psycholinguistic Abilities (ITPA), Mattis naming test,[13] and Wide Range Achievement Test (WRAT).

Standardized check-off forms were designed by one of the authors (G.E.) to record information to be transferred to a computer tape for future retrieval and analysis. A paraprofessional person was trained to conduct detailed interviews based on these forms, and the information obtained was then supplemented by the physician and social worker during their interviews. Other standardized forms recorded the results of the medi-

cal, psychological, and speech and language examinations as well as diagnoses. Completed forms were processed by a commercial computer firm, and the average cost per patient for the direct computer services was $8.00.

Upon completion of the study, each child was assigned to one of five categories of intellectual function. These categories included mental retardation, which was defined as an IQ below 70 on a test of general intelligence with no areas of testable function significantly above this level. For the purposes of our current analysis the retarded group was divided into two groups: those with IQs below 50 (moderate, severe, profound) who were listed as trainable mental retardation (TMR), and those with IQs between 50 and 70 (mild) who were listed as educable mental retardation (EMR).

Borderline intelligence was diagnosed if the IQ was between 70 and 80 with no areas of testable function significantly above this level. A diagnosis of LD was made if a child had near average, average, or above average intelligence, but was learning at less than expected rates in the presence of abnormalities of language, perception, memory, or conceptualization. Children were listed as having normal intelligence if they had IQs above 80 and had no documentable LD. Most of the children in this last category had considerable behavior problems and were not learning at expected rates in school.

## Results

**Demographic background.** The *Table* describes the children and their family

**Table.** Demographic background

| | | |
|---|---|---|
| Sex | Male: female = 3:1 | |
| Age | Preschool (5 years or less) | 25% |
| | School age (6 years or more) | 75% |
| Referral source | Preschool—54% by physician | |
| | School age—80% by schools | |
| Ethnic and racial background | Puerto Rican | 53% |
| | Black | 36% |
| | Other | 11% |
| Economic background | Welfare assistance | 64% |
| Maternal educational level | <9 years schooling | 34% |
| | <12 years schooling | 72% |
| Head of household | Natural mother | 56% |
| | Natural father | 37% |
| | Grandparent | 4% |
| | Foster parent | 2% |
| Family size | 0–2 siblings | 55% |
| | 3–4 siblings | 30% |
| | >4 siblings | 15% |

backgrounds.* Since the Puerto Rican and black groups represented 89% of all the children studied, only these two groups were analyzed when comparisons were made between children or families of different ethnic and racial backgrounds. No significant differences were present between these two groups in male to female ratio, age or grade when evaluated, referral source, economic background, number of single adult families, or family size. Significant differences were found in the percentage of working mothers. More black mothers (37%) were working outside the home than were Puerto Rican mothers (10%) ($p < 0.01$). In addition, the black mothers had attended school longer. Only 17% had less than a ninth grade education, but this was true of 43% of the Puerto Rican mothers ($p < 0.05$). On the basis of occupational and educational background, more than 90% of the families corresponded to classes IV and V on the Hollingshead index of social position and class.[14]

**Intellectual function.** Each child was assigned to one of five groups based on intellectual ability. The mean IQs for these groups were TMR, 47 (SD ± 3); EMR, 61 (SD ± 6); borderline intelligence, 72 (SD ± 5); LD, 81 (SD ± 10); normal intelligence, 92 (SD ± 14). The mean IQ score of the TMR group is not an accurate reflection of their overall level of function, because the more severely retarded children in this group were not formally testable and their IQ scores are not included in the group mean. Since all the children studied had been accepted because of probable abnormality of intellectual function, these five groups were further analyzed.

**Frequency and sex distribution.** The largest number of children (188) were found to have LD. The second largest group (118) consisted of children who were retarded, including 78 in the mildly retarded group (EMR) and 40 in the severely retarded group (TMR). Twenty-six children had borderline intelligence, and 44 children had normal intelligence with no documentable LD. The ratio of male to female ranged from 1.1 to 1 in the TMR group to 6.3 to 1 in the normal intelligence group.

**Ethnic and racial backgrounds.** Although 60% of the Puerto Rican children were diagnosed as having LD, such a diagnosis was made in only 35% of the black children ($p < 0.01$). The percentage of Puerto Rican and black children in the TMR group was the same, but more black children were found in the other three groups ($p > 0.05$) (*Figure*).

**Medical history.** The histories in 37% of the cases contained reports of one or more events that had the potential for causing organic impairment of brain function. Children with borderline and normal intelligence were included in the analysis for comparison with the three other groups. Potentially encephalopathic events had occurred most frequently in the TMR and EMR groups (57% and 50%). Such events had occurred in 34% of the LD group and even less frequently in the borderline and

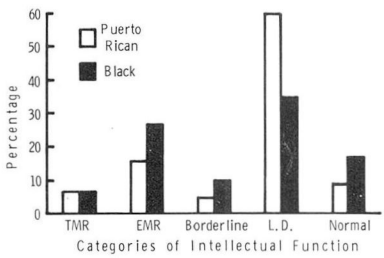


**Figure.** Intellectual levels of Puerto Rican and black children.

* *Further details are available from the authors upon request.*

normal intelligence groups (12% and 13%). The difference between the Puerto Rican and black groups was not significant.

**Family history.** A history of mental retardation, mental illness, and seizures was found in 20% to 40% of all the families, and only slight differences were found between the categories of intellectual function or between the Puerto Rican and black groups. Although certain forms of LD are thought to be linked with inheritance,[15] a family history of LD could not be adequately judged because of the overall low level of formal education that characterized the families.

**General medical examination.** Short stature was present in 30% and microcephaly was present in 31% of the TMR group, but neither abnormality was present in any child in the borderline or normal intelligence group. Severe system or organ abnormalities were rarely present, although varying numbers of minor anomalies were found. Strabismus, the most common finding, was present in 16% of the children, ranging from 33% of the TMR group to 9% of the normal intelligence group.

Children who were known to have isolated difficulties in hearing or vision were not accepted for evaluation. During the evaluation, however, eight children were discovered to have significantly impaired hearing. Six children had bilateral hearing loss severe enough to consider their receiving amplification. Three children had considerably decreased, uncorrectable vision bilaterally.

**Neurological examination.** Patterns of motor abnormalities compatible with a diagnosis of cerebral palsy were found in 13 cases. Ten of these were in the TMR group (25% of the TMR group), and no cases of cerebral palsy were found in the borderline or normal intelligence groups.

Three or more soft neurological signs were found in almost all testable children in the TMR and EMR groups (90% and 75%). Sixty percent of the borderline intelligence and 55% of the LD groups also had three or more soft signs, but this was found in only 24% of the group with normal intelligence.

Twenty-two percent of the children were left hand dominant. This included 40% of the TMR group, 28% of the EMR group, 25% of the borderline group, 21% of the LD group, and 13% of the normal intelligence group.

**Seizures.** One or more seizures had occurred in 15% of the cases. Six percent had an active seizure problem defined as still having seizures or being seizure-free but still receiving anticonvulsant therapy. Sixty-four percent of those with an active seizure problem had grand mal seizures, 32% had psychomotor seizures, and 5% had focal seizures. An active seizure problem was present in 8% of the Puerto Rican children and only 2% of the black children ($p < 0.05$).

**Behavior problems.** Behavior that was disturbed enough to be considered a major problem in the child's daily life was diagnosed in 58% of the cases. Autistic or psychotic behavior was diagnosed in seven children.

A child was said to have a primary or organic hyperkinetic syndrome if he came from a stable home and had the behavioral characteristics of this syndrome from an early age. Similar characteristics beginning after the child had started school and had encountered learning difficulties were usually attributed as a response to failure and frustration. In many cases, however, it was extremely difficult to differentiate ab-

normal behavior due to a primary or organic hyperkinetic syndrome from abnormal behavior due to repeated failure and frustration, to a chaotic home environment, to poor parental management, or to a multitude of other causes. A variety of personality disorders, neurotic disorders, or adjustment reactions of childhood were diagnosed in other children.

Primary hyperkinesis was thought to be present in 22% of the TMR group, 13% of the EMR group, 15% of the LD group, 3% of the borderline intelligence group, and 17% of the normal intelligence group. Seven children represented cases of hyperactive children with normal intelligence and no learning disabilities.

Abnormal behavior was diagnosed in 85% of the normal intelligence group, and in most cases the level of academic achievement was below expectancy even though intellectual capacity was normal. No significant differences were present between the Puerto Rican and black children in the overall frequency of behavior problems.

## Discussion

Although the ability to make diagnoses such as mild mental retardation and LD in disadvantaged, minority group children has been questioned, we and others believe that such disorders can be diagnosed in inner city children as well as in suburban children.[10, 11, 16, 17] Attempts were made to minimize the effects of social and cultural biases in the psychological tests used, and the results were always interpreted in the context of the overall evaluation results. Whenever necessary, Puerto Rican children were tested by a Spanish-speaking psychologist so that all or portions of the psychological testing could be performed in Spanish or with Spanish instructions.

A diagnosis of EMR was rarely made unless the verbal and performance portions of the general intelligence test were below an IQ of 70, and the diagnosis could also be made on the basis of less culturally biased tests such as the Raven Coloured Progressive Matrices and the Beery-Buktenica test. The diagnosis of LD was made utilizing the same interpretation of test data as in a previous study that had been performed on predominantly white, middle-class children who had also been studied because of learning difficulties.[13] In a cross validation study, the findings of syndromes or patterns of LD in our current cases were found to be the same as in the earlier report.[18]

School-age children were accepted for evaluation only if their performance level differed significantly from that of their peers who resided in the same area and attended the same schools. If children had been accepted only because they performed below an arbitrarily defined absolute academic standard, the majority of the school children in our catchment area would have required an evaluation.[19] Since all children studied were individually referred to us, no conclusions could be made regarding the frequency of these disabilities within the community or whether they occur more or less frequently in this group than in other socioeconomic groups.

It is often difficult to separate completely the biological factors that cause mental retardation from the sociocultural factors that may primarily cause or secondarily accentuate retardation.[20, 21] Our data would seem to indicate that biological factors were of greater significance in our TMR and EMR cases. The findings in both groups

were different from the findings in the other three diagnostic categories. There was a high incidence of possible etiological events, and parents became concerned about these children at an early age. Other evidence of organic abnormalities included the highest incidence of seizures, short stature, microcephaly, strabismus, and hard and soft neurological signs.

There were notable differences between the EMR group and the borderline intelligence group, the group in which greatest difficulty in differentiation should be present. As expected, the borderline intelligence group shared many characteristics with the normal intelligence group. Both groups had very low incidences of possible etiological events, short stature, microcephaly, strabismus, or hard motor signs.

The group with normal intelligence had the highest incidence of specific behavior problems, and it was these problems that were responsible for their difficulties in learning. A minority of this group had no specific behavior problems and were normal children who had not been screened out during the intake process.

The importance of organic factors in the causation of LD is difficult to determine from our data. Generally, the LD group in our series shared more similarities with the borderline and normal intelligence groups than with the TMR and EMR groups. Short stature, family history of retardation, history of having had at least one seizure, and history of a possible etiological event occurred more frequently in the LD group than in the borderline and normal intelligence groups, but the majority of the LD group still did not have a history of any known encephalopathic event.

The male to female ratio in the LD group was below that found in the normal intelligence group but was higher than that found in the other groups. Left hand dominance was present more often in the LD group than in the normal intelligence group, but was found even more frequently in the other groups. The same was true of soft neurological signs. Although three or more soft signs were present more often in the LD group than in the normal intelligence group, such findings were again found even more often in the borderline intelligence, EMR, and TMR groups. Soft signs were therefore of some use in differentiating all other groups from the normal intelligence group, but the presence or absence of soft signs was not of use in making decisions about individual children. A negative correlation existed between the percentage of children in each group with three or more soft signs (TMR > EMR > borderline > LD > normal intelligence) and the mean IQ of each group (TMR < EMR < borderline < LD < normal intelligence).

The ratio of Puerto Rican and black children seen at our Center corresponded to their ratio in the community as a whole. Although a diagnosis of severe retardation (TMR) was made with equal frequency, a diagnosis of LD was made with much greater frequency in the Puerto Rican children than in the black children ($p < 0.01$). The reasons for these differences are unclear. Although the groups do not share a common culture, they do share such factors as poverty, minority group status, life in an urban ghetto, and education in inner city schools where most children are reading below the national average. Both groups were tested in a similar fashion, but it is possible that the tests were biased differently against the two

groups. Another possibility is that English-speaking teachers used different criteria for deciding which children from each group should be referred for evaluation.

The majority of Puerto Rican children with LD were found to have abnormalities in the processing of language, and this finding may in some way be related to bilingualism. This was not a matter of greater competency in Spanish rather than English, since each bilingual child was found to have the same disorder in central communication processing in both languages. It is possible, however, that the need to switch from Spanish to English upon entering the school system may have caused difficulties in some vulnerable children. Such children, with unstable or borderline capacities for handling language functions, might not have come to clinical attention if the extra stress of attempting to master a new language had not been imposed upon them. The end result may be partial familiarity with two languages rather than a more thorough knowledge of one.[22] This possibility would not, however, explain the problem for the entire group, since preschool Spanish-speaking children were found with this disorder as were recent arrivals to New York who had experienced similar learning difficulties in Puerto Rican schools.

Several other studies of minority-group children referred to diagnostic centers have been reported, although none could be found that described findings in children of Puerto Rican background. Kenny and Clemmens[12] described a group of school-age children referred because of problems in learning, development, and behavior. As in our study, the mean IQ was 80, hard neurological signs were rare, and soft neurological signs were more common, but did not aid in differentiating the individual child's basic learning problem. Intellectual subnormality (IQ under 80) was diagnosed in 47% of the children and was similar to our diagnoses of EMR and borderline intelligence in 37% of our black children and 21% of our Puerto Rican children. Minimal brain dysfunction was diagnosed in 42% of children and was similar to our diagnosis of LD, which was made in 35% of black children and 60% of Puerto Rican children. The frequency of learning problems thought to be primarily due to psychiatric problems was similar in the two groups.

Kappelman et al[9, 10] have also reported on LD in disadvantaged school-age black children. Although the diagnostic categories utilized were not exactly the same, the findings in this current report are in overall agreement with the findings from the Baltimore series. Their finding of a 33% incidence of perceptual disorders (equal to LD in our series) is almost exactly the same as in our series of black children. Their incidence of mild retardation and borderline intelligence is more difficult to compare because of differences in terminology. In both series, however, the percentage of children with an IQ score of 50 to 90 was approximately the same (74% and 77%) as was the mean IQ (80 and 77).

The systematic manner in which the data were collected and analyzed has enabled us to compare children with differing developmental or learning difficulties. Although the lack of a control group limits some of the conclusions that can be reached, the concept of recording information obtained during diagnostic evaluations in a way that allows for future analysis has been found to be useful and implementable. The monetary cost for such a system is rela-

tively small. At present, it is not possible to compare the data accumulated from this community with data similarly collected from other communities. Such comparisons would become possible in the future with more widespread use of systematic data collection. This would afford a greater understanding of the natural history of many developmental disorders and would allow for more rational planning to meet the needs of developmentally disabled children.

The difficulties associated with poverty and living conditions in the inner city should not be underestimated. It is inadequate, however, to assume automatically that these difficulties are always sufficient to explain fully why a given child from such an environment is developing or learning abnormally. To do this would deny such children the individual attention and help they require.

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