The Administrative Prevalence of Mental Retardation in 10-Year-Old Children in Metropolitan Atlanta, 1985 through 1987

ABSTRACT

Objectives. In this study, data from the Metropolitan Atlanta Developmental Disabilities Study were used to determine the administrative prevalence (i.e., the number of children previously identified for service provision) of mental retardation among 10-year-old children during the years 1985 through 1987.

Methods. Children with mental retardation (intelligence quotient [IQ] of 70 or lower) were identified by review of records from multiple sources, with the public schools as the primary source.

Results. The overall administrative prevalence of mental retardation was 12.0 per 1000 children. The rate for mild mental retardation (IQ of 50 to 70) was 8.4 per 1000 and the rate for severe mental retardation (IQ lower than 50) was 3.6 per 1000. The prevalence was higher in Black children than in White children (prevalence odds ratio [POR] = 2.7) and in boys than in girls (POR = 1.4). Children with severe mental retardation had more coexisting disabilities than did children with mild mental retardation.

Conclusions. The mental retardation prevalence rates reported here, especially the race-specific rates, may reflect social and demographic features unique to the metropolitan Atlanta area and therefore should be used with caution in making comparisons with other populations. (*Am J Public Health.* 1995;85;319–323)

Catherine C. Murphy, MPH, Marshalyn Yeargin-Allsopp, MD, Pierre Decouflé, ScD, and Carolyn D. Drews, PhD

Introduction

Prevalence estimates of mental retardation are important for determining the educational and health care needs of children with this condition. Studies of mental retardation have reported rates that vary considerably, from 3 to 97 per 1000, for children 10 to 14 years old.[1] Part of this variation is due to differences in prevalence over time and among populations.[2] In addition, the prevalence rate obtained by any one study depends on the case definition; the case identification method; and the demographic, social, and cultural characteristics of the population.

There are no recent estimates of the prevalence of mental retardation from US population-based studies. Prevalence data from earlier studies, including those done in the United States, may not be useful for current planning purposes because of secular changes in the survival rates of children with mental retardation, in etiologies, and in methods of diagnosing and ascertaining cases.[2]

The Metropolitan Atlanta Developmental Disabilities Study was the first population-based study of multiple developmental disabilities in a US school-aged population.[3] In this report, we estimate the prevalence of mental retardation in 10-year-old children and describe the occurrence of cerebral palsy, hearing impairment, visual impairment, and epilepsy in children with mental retardation.

Methods

The Metropolitan Atlanta Developmental Disabilities Study was a population-based, cross-sectional study of 10-year-old children during the years 1985 through 1987 with one or more of five developmental disabilities: mental retardation, cerebral palsy, visual impairment, hearing impairment, and epilepsy. Case ascertainment methods for the first four disabilities and a description of the study area have been reported elsewhere,[3] and the methods for epilepsy will be reported separately.

The study population included children who were born from January 1, 1975, through December 31, 1977, and who resided in the study area at 10 years of age. The denominators used to determine prevalence rates were calculated from Georgia intercensal population estimates provided by the Georgia Office of Planning and Budget.[4] These estimates were reported in 5-year age groups; we estimated the number of 10-year-old children in the years 1985 through 1987 from the percentages of 10-year-old children within the 10- to 14-year-old age group from the 1980 census data specific for county, race, and sex. There were an estimated 89 534 10-year-old children—56 082 White children and 33 452 children of other races.

We identified children with mental retardation by reviewing records at mul-

Catherine C. Murphy, Marshalyn Yeargin-Allsopp, and Pierre Decouflé are with the Division of Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, Atlanta, Ga. At the time of the study, Catherine C. Murphy was with the Office of Epidemiology, Georgia Department of Human Resources, Atlanta. Carolyn D. Drews is with the Division of Epidemiology, Emory University School of Public Health, Atlanta, Ga.

Requests for reprints should be sent to Catherine C. Murphy, MPH, Division of Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, 4770 Buford Hwy, NE, Mailstop F-15, Atlanta, GA 30341.

This paper was accepted July 26, 1994.

Editor's Note. See related editorial by Zigler (p 302) and annotation by Satcher (p 304) in this issue.

TABLE 1—Prevalence (per 1000 10-Year-Old Children) of Mental Retardation, by Race, Sex, and IQ Level

Level of Mental Retardation	Race						Sex						Total		
	White			Black			Male			Female					
	No.	Rate	95% CI	No.	Rate	95% CI	No.	Rate	95% CI	No.	Rate	95% CI	No.	Rate	95% CI
Mild (IQ = 50–70)	265	4.7	4.2, 5.3	486	14.5	13.3, 15.9	456	9.9	9.0, 10.8	295	6.8	6.0, 7.6	751	8.4	7.8, 9.0
Severe (IQ < 50)	149	2.7	2.2, 3.1	174	5.2	4.5, 6.0	180	3.9	3.4, 4.5	143	3.3	2.8, 3.9	323	3.6	3.2, 4.0
IQ = 35–49	76	1.4	1.1, 1.7	111	3.3	2.7, 4.0	106	2.3	1.9, 2.8	81	1.9	1.5, 2.3	187	2.1	1.8, 2.4
IQ = 20–34	25	0.4	0.3, 0.7	32	1.0	0.7, 1.4	29	0.6	0.4, 0.9	28	0.6	0.4, 0.9	57	0.6	0.5, 0.8
IQ < 20	48	0.9	0.6, 1.1	31	0.9	0.6, 1.3	45	1.0	0.7, 1.3	34	0.8	0.5, 1.1	79	0.9	0.7, 1.1
Total	414	7.4	6.7, 8.1	660	19.7	18.3, 21.3	636	13.8	12.7, 14.9	438	10.1	9.2, 11.1	1074	12.0	11.3, 12.7

tiple sources. This was done to estimate an administrative prevalence, which is the number of children who had previously been identified for the purpose of service provision.[5,6] Sources included public schools, hospitals, county health departments, state and county mental health service agencies, and various other public and private social service agencies. Almost all (98%) of the children were initially identified through the public schools.

Children with mental retardation were defined as having an intelligence quotient (IQ) of 70 or less on the most recent individually administered psychometric test performed by a psychometrist. Only children who had been tested (by the schools or in a private setting) and who fit the definition of mental retardation for our study were included as case children. The tests administered to the children were the Wechsler Intelligence Scale for Children or Wechsler Intelligence Scale for Children–Revised (66%), the Stanford-Binet Intelligence Scale (23%), the Bayley Scales of Infant Mental Development (5%), the Cattell Infant Intelligence Scale (3%), and various other tests (3%). Ninety-three percent of the children with mental retardation had been given an IQ test within 3 years of their ascertainment. Adaptive functioning was not consistently assessed among these children and therefore was not considered in our case definition.

We studied four levels of mental retardation: mild (IQ of 50–70), moderate (IQ of 35–49), severe (IQ of 20–34), and profound (IQ of less than 20), as defined by the *Diagnostic and Statistical Manual of Mental Disorders*.[7] For most analyses, the latter three levels were combined to form a single category of severe mental retardation (IQ of less than 50). The other four disabilities—cerebral palsy, hearing impairment, vision impairment, and epilepsy—have been defined elsewhere.[3]

All prevalence rates are reported per 1000 10-year-old children. We used the Poisson distribution[8] to calculate 95% confidence intervals (CIs) for the prevalence rates. Race-specific rates are reported for Whites and Blacks. The term "Black" will be used to refer to the "other than White" group of children, since 98% of these children in this study with mental retardation were Black and, according to the 1980 census, 96% of the children in the study area who were not White were Black. Race in the United States is associated with factors not measured in this study, which could be social, medical, cultural, or environmental.

Prevalence odds ratios (PORs) and their 95% confidence intervals were calculated to assess variations in the prevalence of mental retardation by race and sex.[9] Confidence intervals for the prevalence odds ratios were calculated by using Cornfield's approximation.[10]

Results

The prevalence rates of mental retardation by IQ level, race, and sex are presented in Table 1. The overall prevalence rate was 12.0 per 1000 10-year-old children; the rate for mild mental retardation was 8.4, and the rate for severe mental retardation was 3.6. Rates of both mild mental retardation (POR = 3.1, 95% CI = 2.7, 3.6) and severe mental retardation (POR = 2.0, 95% CI = 1.6, 2.5) were higher for Black children than for White children. At all but profound (IQ of less than 20) levels of mental retardation, Black children had a higher prevalence than did White children. Boys had a higher prevalence of mental retardation overall (POR = 1.4, 95% CI = 1.2, 1.6) and a higher rate of mild mental retardation (POR = 1.5, 95% CI = 1.3, 1.7) than did girls. This difference between boys and girls disappeared at the lowest IQ levels.

Black boys had a higher rate of mild mental retardation than Black girls (18.5 vs 10.5 per 1000; POR = 1.8, 95% CI = 1.5, 2.2), but no difference was observed between White boys and White girls. The sex-specific rates for severe mental retardation were similar for both Black and White children.

The occurrence of mental retardation coexisting with the other four study disabilities is presented in Table 2. Only 22% of the children with mental retardation had one or more of the other four disabilities (14% had one additional disability, 6% had two, and 2% had three). About 22% of both boys and girls had one or more of the other four disabilities, whereas 31% of White children and 17% of Black children had another disability.

The prevalence rates of mental retardation with cerebral palsy, with epilepsy, and with cerebral palsy and epilepsy (with or without other disabilities) were 1.5 (95% CI = 1.2, 1.7), 1.8 (95% CI = 1.5, 2.1), and 0.9 (95% CI = 0.7, 1.1) per 1000, respectively. The prevalence rate of mental retardation with a sensory impairment was 0.6 per 1000 (95% CI = 0.4, 0.7).

Twelve percent of the children with mild mental retardation and 45% of those with severe mental retardation had one or more of the other four disabilities. Cerebral palsy was present in 6% of the children with mild mental retardation and 28% of those with severe mental retardation. Epilepsy occurred in 7% of the children with mild mental retardation and 32% of those with severe mental retardation. Sensory impairments occurred in 2% of the children with mild mental retardation and 11% of the children with severe mental retardation.

Discussion

This data set is one of the few current population-based sources of information on children with developmental disabilities in the United States. Most of the previously reported data has been obtained from hospital- or clinic-based follow-up studies or from studies of populations that are not demographically comparable with US populations. We have demonstrated that records available from the public schools are a useful source of data for estimating the prevalence of mental retardation. Public Law 94-142 requires public schools to identify and provide services for children with developmental disabilities as well as to maintain appropriate records.[11] Before passage of that law in 1975 there was no readily available population-based source of information on large numbers of children who had developmental disabilities.

We used existing records to estimate the administrative prevalence of mental retardation. For severe mental retardation, administrative prevalence is believed to be close to the "true" prevalence, since almost all of these children would require some type of medical or social service.[5]

Our method is likely to underestimate the "true" prevalence of mild mental retardation in our population, since not all children with IQs from 50 to 70 are identified as mentally retarded and included in administrative data sources.[5] For example, most public schools use a definition of mental retardation that requires that a child demonstrate deficits in adaptive functioning in addition to having an IQ below a given level.[12] However, our definition of mental retardation, based only on a recorded IQ score, leads to the inclusion of some children who would not be classified as having mental retardation according to school criteria. On the other hand, we may have excluded some children with IQs in the mental retardation range who were not tested and were not receiving special services through the public schools. Data collected in Sweden in the early 1900s,[13] in Scotland in 1962,[6] and in the Netherlands between 1963 and 1965[14] show that not all children with IQs in the retarded range, based on psychometric tests, are administratively identified as retarded.

Our mental retardation prevalence rate of 12.0 per 1000 falls within the range reported by previous studies. The primary caution in comparing our rate with those from other studies is related to possible differences in the social and demographic composition of the populations. Further, our racially, economically, and socially heterogeneous study area has experienced substantial in- and out-migration. Birch et al. showed that migration patterns and the prevalence of mild mental retardation are both related to socioeconomic levels.[6] Therefore, the prevalence of mental retardation found in a community may be affected by its migration patterns.

With one exception,[15] previous US studies of the prevalence of mental retardation by race found, as we did, a higher prevalence among Blacks than among Whites.[16–21] These studies used a variety of methods, including ascertaining children who had been administratively identified and using a follow-up approach with IQ testing. Although the absolute race-specific rates found in these studies vary considerably, the ratios of the rates were similar (Black–White ratios = 3:1–5:1).[16–18,20,21] The ratio in our study (2.7:1) was slightly lower.

There are several possible explanations for the Black–White ratio of 3.1 found for the prevalence of mild mental retardation. Selective referral patterns for IQ testing and increased special education placement among Black children could cause the observed difference.[22,23] According to Mercer, additional factors that may have an impact on the differences in occurrence of mild mental retardation in Black and White children may be related to Anglocentrism in a community's institutions and in the IQ test itself.[22] Also, since the recognition of mental retardation is often dependent on deviations from the social norms of a community, children who exhibit behavior socially different from these norms may be preferentially referred for testing and thus diagnosed more often.[24] Socioeconomic factors also affect the differences in prevalence of mild mental retardation found between Black and White children, and the effects of these factors in our population are discussed in our second paper (Yeargin-Allsopp et al.[25]) in this issue.

In our study population, the prevalence rate of severe mental retardation in Blacks was twice the rate for Whites. In contrast, the investigators of the Collaborative Perinatal Project found a rate of severe mental retardation in Blacks that was about 40% higher than that for Whites.[20] This disparity in findings may be due to differences between the populations studied. Another explanation may be that Whites were underrepresented in the records available to us because they may have been more likely to use only private services or to have been placed in long-term care facilities outside Georgia. Misclassification of children based on IQ level may have caused this difference as well. We found evidence that supports the notion that an IQ of 50 is an arbitrary

TABLE 2—Percentage of Mental Retardation (MR) and Coexisting Disabilities in 10-Year-Old Children, Metropolitan Atlanta, 1985 through 1987

Disabilities	Mild MR[a] (n = 751)		Severe MR[b] (n = 323)	
	No.	%	No.	%
MR	659	87.8	178	55.1
MR, cerebral palsy	25	3.3	27	8.4
MR, cerebral palsy, epilepsy	15	2.0	42	13.0
MR, cerebral palsy, epilepsy, visual impairment	0	0.0	14	4.3
MR, cerebral palsy, epilepsy, hearing impairment	1	0.1	4	1.2
MR, cerebral palsy, visual impairment	0	0.0	3	0.9
MR, cerebral palsy, hearing impairment	1	0.1	0	0.0
MR, epilepsy	36	4.8	41	12.7
MR, epilepsy, visual impairment	1	0.1	3	0.9
MR, visual impairment	5	0.7	4	1.2
MR, visual impairment, hearing impairment	0	0.0	2	0.6
MR, hearing impairment	8	1.1	5	1.6

[a]Mild MR is defined as an IQ of 50–70.
[b]Severe MR is defined as an IQ of less than 50.

cutoff point and some children with IQs of less than 50 are similar in regard to sociodemographic factors to children in the mild mental retardation range.[26]

We recognize that an IQ test is a measure not of innate intelligence but of performance on a set of skills defined by a specific test instrument and considered relevant to intelligence by the prevailing culture.[22,24] Therefore, whatever accumulation of experiences a child brings to the testing situation will be reflected in the IQ score. Children with varying cultural or economic backgrounds will score differently simply because of these factors. Also, an important feature of an IQ score is that it is not static but can change over time, both in individuals and in groups.[27,28]

Investigators have consistently found, as we did, a higher administrative prevalence of mental retardation in boys than in girls, with male–female ratios ranging from 1.3:1 to 2.1:1.[16-19,29,30] The male–female difference in the administrative prevalence of mild mental retardation could be due to referral bias, since it has been shown that boys are referred more often than girls for psychometric testing and evaluation of adaptive functioning.[22,31] Also, it has been shown that more boys than girls fail adaptive functioning tests.[22,31] In contrast to studies that used administrative methods to identify cases, investigators who administered IQ tests to a nonreferred sample of the population found no differences between boys and girls in the rates of mild mental retardation.[21,31,32] A true male excess may be due to the occurrence of X-linked genetic disorders, such as fragile X-syndrome.[33]

Our finding of other developmental disabilities among 12% of the children with mild mental retardation and approximately 45% of the children with severe mental retardation is consistent with previous reports.[34-37]

In summary, caution should be used when comparing results across studies, since differences may arise from case definitions, case ascertainment methods, the time periods in which the studies were conducted, the age categories reported, and the social and demographic composition of the populations. Since different populations vary with respect to many factors, a description of key population characteristics assists in determining the comparability of reported mental retardation prevalence rates. The sex- and race-specific rates reported here are not adjusted for possible confounding by factors such as maternal education, family economic status, and medical or biological conditions. Therefore, the differences we found in the prevalence of mental retardation between Black and White children, as well as between boys and girls, may be confounded by other risk factors. □

Acknowledgments

This work was supported in part by funds from the Comprehensive Environmental Response, Compensation, and Liability Act trust fund through an interagency agreement with the Agency for Toxic Substances and Disease Registry, Public Health Service, US Department of Health and Human Services.

The authors especially thank Drs John Kiely, Zena Stein, and Jane Mercer for their critical review of this report and earlier work pertaining to this report. We also thank Ms Hannah Baker and Ms Rhonda Gilley for their secretarial support.

References

1. Kiely M. The prevalence of mental retardation. *Epidemiol Rev.* 1987;9:194–218.
2. Fryers T. *The Epidemiology of Severe Intellectual Impairment: The Dynamics of Prevalence.* London, England: Academic Press; 1984:32–59.
3. Yeargin-Allsopp M, Murphy CC, Oakley GP, Sikes RK, The Metropolitan Atlanta Developmental Disabilities Study Staff. A multiple-source method for studying the prevalence of developmental disabilities in children: the Metropolitan Atlanta Developmental Disabilities Study. *Pediatrics.* 1992;89:624–630. [Published erratum appears in *Pediatrics.* 1992;90:1001]
4. *Georgia Vital Statistics Reports.* Atlanta, Ga: Georgia Department of Human Resources; 1985, 1986, 1987. (Population estimates also provided by the Georgia Office of Planning and Budget, Atlanta, Ga)
5. Kushlick A, Blunden R. The epidemiology of mental subnormality. In: Clarke AM, Clarke ADB, eds. *Mental Deficiency: The Changing Outlook.* New York, NY: Macmillan; 1974:31–81.
6. Birch HG, Richardson SA, Baird D, Horobin G, Illsley R. *Mental Subnormality in the Community: A Clinical and Epidemiologic Study.* Baltimore, Md: Williams & Wilkins; 1970.
7. *Diagnostic and Statistical Manual of Mental Disorders.* 3rd ed. Washington, DC: American Psychiatric Association; 1980.
8. Pearson ES, Hartley HO, eds. *Biometrika Tables for Statisticians.* Vol. 1, 3rd ed. Cambridge, England: Cambridge University Press; 1970.
9. Rothman KJ. *Modern Epidemiology.* Boston, Mass: Little Brown & Co; 1986.
10. Cornfield J. A statistical problem arising from retrospective studies: In: Newman J, ed. *Proceedings of the Third Berkeley Symposium on Mathematical Statistics and Probability.* Berkeley, Calif: University of California Press; 1956;4:135–148.
11. The Education for All Handicapped Children Act of 1975. Pub L No. 94–145, 20 USC §1401 et seq. *Federal Register.* August 23, 1977; 42(163):42474–42518.
12. Grossman HJ, ed. *Classification in Mental Retardation.* Washington, DC: American Association on Mental Deficiency; 1983.
13. Penrose LS. *Biology of Mental Defect.* London, England: Sidgwick & Jackson Ltd; 1963.
14. Stein Z, Susser M, Saenger G. Mental retardation in a national population of young men in the Netherlands, II: prevalence of mild mental retardation. *Am J Epidemiol.* 1976;104:159–169.
15. Wishik SM. *Georgia Study of Handicapped Children.* Atlanta, Ga: Georgia Department of Public Health; 1964.
16. New York State Department of Mental Hygiene, Mental Health Research Unit. *A Special Census of Suspected Referred Mental Retardation, Onondago County, NY.* Syracuse, NY: Syracuse University Press; 1955.
17. Lemkau P, Tietze C, Cooper M. Mental hygiene problems in an urban district. *Ment Hyg.* 1941;25:279–295.
18. Lemkau P, Tietze C, Cooper M. Mental hygiene problems in an urban district. Third paper. *Ment Hyg.* 1942;26:275–288.
19. Richardson WP, Higgins AC, Ames RG. *The Handicapped Children of Alamance County, North Carolina.* Wilmington, Del: Nemours Foundation; 1965.
20. Nichols PL. Familial mental retardation. *Behav Genet.* 1984;14:161–170.
21. Reschly DJ, Jipson FJ. Ethnicity, geographic locale, age, sex, and urban-rural residence as variables in the prevalence of mild retardation. *Am J Ment Defic.* 1976;81:154–161.
22. Mercer JR. *Labeling the Mentally Retarded.* Berkeley, Calif: University of California Press; 1973.
23. Heller KA, Holtzman WH, Messick S, eds. *Placing Children in Special Education: A Strategy for Equity.* Washington, DC: National Academy Press; 1982.
24. Susser M. The mentally subnormal: population and natural history. In: *Community Psychiatry: Epidemiologic and Social Themes.* New York, NY: Random House; 1968: 275–321.
25. Yeargin-Allsopp M, Drews CD, Decouflé P, Murphy CC. Mild mental retardation in Black and White children in Atlanta: a case–control study. *Am J Public Health.* 1995;85:324–328.
26. Drews CD, Yeargin-Allsopp M, Decouflé P, Murphy CC. Variation in the influence of selected sociodemographic risk factors for mental retardation. *Am J Public Health.* 1995;85:329–334.
27. Stein Z, Susser M. Mutability of intelligence and epidemiology of mild mental retardation. *Rev Educ Res.* 1970;40:29–67.
28. Martin SL, Ramey CT, Ramey S. The prevention of intellectual impairment in children of impoverished families: findings of a randomized trial of educational day care. *Am J Public Health.* 1990;80:844–847.
29. Baird PA, Sadovnik AD. Mental retardation in over half-a-million consecutive live births: an epidemiological study. *Am J Ment Defic.* 1985;89:323–330.
30. Innes G, Kidd C, Ross HS. Mental subnormality in North East Scotland. *Br J Psychiatry.* 1968;114:35–41.
31. Richardson SA, Katz M, Koller H. Sex differences in number of children administratively classified as mildly mentally retarded: an epidemiological review. *Am J Ment Defic.* 1986;91:250–256.
32. Broman S, Nichols PL, Shaughnessy P, Kennedy W. *Retardation in Young Children:*

A Developmental Study of Cognitive Deficit. Hillsdale, NJ: Lawrence Erlbaum Associates; 1987.
33. Turner G, Opitz JM. X-linked mental retardation. *Am J Med Genet.* 1980;7:407–415. Editorial.
34. Drillien CM, Jameson S, Wilkerson EM. Studies in mental handicap, part I: prevalence and distribution by clinical type and severity of defect. *Arch Dis Child.* 1966;41:528–538.
35. Blomquist HK, Gustavson K-H, Holmgren G. Mild mental retardation in children in a northern Swedish county. *J Ment Defic Res.* 1981;25:169–186.
36. Gustavson K-H, Hagberg B, Hagberg G, Sars K. Severe mental retardation in a Swedish county, II: etiologic and pathogenetic aspects of children born 1959–1970. *Neuropaediatrie.* 1977;8:293–304.
37. Hagberg B, Haberg G, Lewerth A, Lindberg U. Mild mental retardation in Swedish school children. *Acta Paediatr Scand.* 1981;70:445–452.