

Racial and Ethnic Differences in ADHD and LD in Young School-Age Children: Parental Reports in the National Health Interview Survey

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SYNOPSIS

Objectives. Racial and ethnic disparities have been documented for many physical health outcomes in children. Less is known, however, about disparities in behavioral and learning disorders in children. This study uses data from a national health survey to examine racial and ethnic differences in identified attention deficit hyperactivity disorder (ADHD) and learning disability (LD).

Methods. The 1997–2001 National Health Interview Surveys obtained information from parents about the health and sociodemographic characteristics of children. Using these data, prevalence rates of identified ADHD and/or LD were estimated for Hispanic, African American, and white children 6–11 years of age. Racial and ethnic differences in health conditions, income, and insurance coverage were examined as possible explanations for disparities in parental reports of ADHD and LD, as well as the use of any prescription medication among children with ADHD.

Results. Hispanic and African American children, compared to white children, had parental reports of identified ADHD without LD less often, and adjustments for the confounding variables—birthweight, income, and insurance coverage—did not eliminate these differences. Hispanic and African American children, compared to white children, also had parental reports of ADHD with LD less often after adjustments for the effects of confounding variables. By contrast, after adjustments for confounding variables, Hispanic and African American children were as likely as white children to have LD without ADHD. Among children with ADHD, use of any prescription medication was reported less often for Hispanic and African American children than white children. These disparities in medication use persisted after adjustments for confounding variables.

Conclusions. The prevalence of ADHD and the use of any prescription medication among children with ADHD differed among Hispanic, African American, and white children. These disparities could not be explained by racial and ethnic differences in other health conditions and sociodemographic variables.

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Substantial racial and ethnic disparities continue to exist for many health outcomes in children. Research about perceived health status, disability, and specific medical conditions document worse health in African American and Hispanic children than white children.¹ Less is known, however, about differences in the prevalence, diagnosis, and treatment of behavioral and learning disorders in children of different racial and ethnic backgrounds.² National data on children receiving special education services indicate that African American students are overrepresented among children with cognitive and emotional problems, while Hispanic children are underrepresented.^{3,4} Results from studies of children in pediatric ambulatory care have reported less consistent racial and ethnic differences. Two investigations of ambulatory care have shown that Hispanic and African American children, as compared to white children, are less likely to receive mental health services.^{5,6} Another study of children seen in general pediatric ambulatory care, however, has reported a lack of racial and ethnic differences in the recognition and treatment of psychosocial problems.^{7,8}

Studies of physical health outcomes in children have shown that racial and ethnic disparities are often reduced when differences in family income are taken into account.^{9,10} By contrast, few analyses of racial and ethnic disparities in learning and behavioral disorders have considered whether sociodemographic factors such as family income and health insurance coverage might account for these disparities. The dissimilar percentages of African American and Hispanic children in special education programs have been cited as evidence that socioeconomic factors do not account for most of the racial and ethnic differences in behavioral and learning disorders. As Losen and Orfield note, “. . . the theory that poverty and socioeconomic factors can explain all or most of the observed racial disparities fails to account for the extreme differences between black overrepresentation and Hispanic underrepresentation, differences that are even more significant in many states than disparities between blacks and whites.”¹¹ Further, a survey of parents with elementary school-age children in special education has shown that variations in family income did not account for all the racial and ethnic differences observed in the use of special education.¹² An analysis of family medical expenditures also noted that racial and ethnic disparities in children’s use of ambulatory mental health services persisted even after adjustment for insurance coverage and family income.⁶

Whether racial and ethnic disparities in behavioral and learning disorders primarily reflect sociodemographic differences may vary for specific types of disorders. For some disorders, controlling for sociodemographic factors such as family income and health insurance coverage may largely eliminate racial and ethnic disparities. For other disorders, controlling for these factors may accentuate racial and ethnic differences. Finally, it is possible that disparities in some disorders may primarily be influenced by factors that are associated with race and ethnicity, but not socioeconomic status. For these disorders, controlling for income and insurance coverage may have little effect on the pattern of racial and ethnic differences.

The present study used parental reports in a large national health survey to investigate two prevalent disorders in school-age children: attention deficit hyperactivity disorder

(ADHD) and learning disability (LD). The analysis considered the following questions:

1. Are there significant racial and ethnic differences in the percentage of children reported by parents to have identified ADHD and/or LD?
2. Can racial and ethnic differences in parental reports of these disorders be explained by a child’s other health conditions and sociodemographic characteristics?
3. Finally, are there racial and ethnic differences in the use of any type of prescription medication among children with identified ADHD? Can these differences be explained by other health conditions and sociodemographic characteristics?

METHODS

The National Health Interview Survey (NHIS) is a cross-sectional household survey conducted by the National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention (CDC). Households in the NHIS constitute a nationally representative sample of the civilian, noninstitutionalized population of the United States.¹³ In-person interviews are conducted to collect information on sociodemographic characteristics, health status, use of health care services, and a variety of health-related topics from approximately 40,000 households and 100,000 persons each year.

In 1997, the questionnaire for the NHIS was extensively redesigned and questions were added to collect more information about the health status of a randomly selected sample child from each family.¹⁴ A knowledgeable adult provided information about the sample child’s health conditions, use of health care services, and sociodemographic characteristics. Because more than 90% of the respondents for sample children were parents, respondents are hereafter described as parents. Between 1997 and 2001, the annual response rates for sample children ranged from 78% to 84%, resulting in a combined sample over the five years of 21,294 children 6–11 years of age.

Race and ethnicity were determined by two questions. Parents were first asked about a child’s Hispanic origin or ancestry and then about a child’s race or races. In this analysis, children of multiple races were not identified and the racial and ethnic categories used are based on a child’s Hispanic ethnicity and main race. Results are presented for Hispanic, non-Hispanic white, and non-Hispanic African American or black children. Children of other races were excluded from the analysis because of the diversity and small sample size of the “other race” category. Non-Hispanic white and non-Hispanic African American or black children are described hereafter as white and African American.

In regard to health conditions, parents were asked about a child’s birthweight and whether the child currently had any of the following conditions: colitis or frequent diarrhea, anemia, seizures, allergies, or ear infections. Parents were also questioned about diagnoses by health professionals of mental retardation and other developmental delays, vision and hearing problems, asthma, and other chronic health conditions such as cerebral palsy, muscular dystrophy, cystic

fibrosis, sickle cell anemia, and diabetes. Use of any prescription medication was determined by asking if a child now had a condition for which he or she regularly had taken some type of prescription medication for at least three months. Information about the use of medication specifically for the treatment of ADHD was not obtained.

The socioeconomic status of families was measured by family income as a percentage of the threshold defining poverty for families of a given size and composition. Four categories of family income were defined: poverty (less than 100%), near poverty (100%–199%), low to middle income (200%–399%), and high income (400% or more). A fifth category was included for children with missing data on family income, approximately 17% of the sample. Insurance coverage at the time of interview was classified as follows: Medicaid (children with only insurance coverage under Medicaid, State Children's Health Insurance Programs [SCHIP], or other state-sponsored plans), private and other insurance (children with private coverage, those with other types of government-sponsored insurance, such as plans for military dependents, and those with a combination of private and public insurance), and uninsured (children without private or public insurance). Because item nonresponse rates for sociodemographic and health characteristics were in most cases less than 1%, results for children with missing data on these items is not reported, with the exception of children with missing data on family income.

A history of identified ADHD and/or LD was determined by responses to the following questions:

- Has a doctor or health professional ever told you that (sample child) had Attention Deficit Hyperactivity Disorder (ADHD) or Attention Deficit Disorder (ADD)?
- Has a representative from a school or a health professional ever told you that (sample child) had a learning disability?

Before 2000, parents were asked only if they had been told that their child had ADD. Beginning in 2000, the wording of the question was changed to include both ADD and ADHD. Children with missing information for either ADHD or LD ($n=94$) were excluded, resulting in a sample of 20,401 Hispanic, African American, and white children 6 to 11 years of age.

Disparities in the prevalence of identified ADHD and LD were gauged by differences in the percent of children in various racial and ethnic groups with parental reports of these diagnoses. The effect of sociodemographic characteristics on racial and ethnic disparities in ADHD and LD was assessed by comparing results from a series of multinomial logistic regression models, including a model estimating the effects of race and ethnicity without adjustments for any other variables; then a series of models estimating the effects of race and ethnicity with adjustments for each of the following confounding variables: birthweight, family income, and health insurance coverage; and finally, a model estimating the effects of race and ethnicity with adjustments for all the confounding variables.

In the second part of the analysis, regular use of any prescription medication was examined. This analysis focused on children with ADHD because medication use is widely

accepted as a treatment for ADHD, but not LD.¹⁵ The effect of race and ethnicity on medication use among children with ADHD was estimated in a series of logistic regressions, including a model estimating the effects of race and ethnicity without adjustments for any other variables; and a series of models with adjustments for confounding variables.

Data from the NHIS were weighted to produce nationally representative estimates and SUDAAN, a statistical program for the analysis of surveys with complex sampling designs, was used to generate appropriate variances for these estimates.¹⁶ Between 1997 and 2001, the year-to-year variation was on average less than 0.5% for both ADHD with LD and LD without ADHD, and less than 1.0% for ADHD without LD. The multi-year sample design of the NHIS and the lack of a consistent upward or downward trend in the prevalence of ADHD and LD made it feasible to pool data from several years. The level of statistical significance used throughout the analyses was $p<0.05$.

RESULTS

Parental reports of ADHD and LD

Nearly 7% of children 6–11 years of age were reported by parents to have identified ADHD, with one-half having ADHD without LD and the other half having ADHD with LD (Table 1). About 5% of children 6–11 years of age were reported to have LD without ADHD. The percent of children with these diagnoses increased with age. Among 6–7 year olds, approximately 2% had ADHD without LD, 2% had ADHD with LD, and 3% had LD without ADHD. Among 10–11 year olds, about 4% had ADHD without LD, 4% had ADHD with LD, and 5% had LD without ADHD. All three diagnoses were reported more often for boys than girls. ADHD without LD was 2.9 times more prevalent among boys, ADHD with LD was 2.6 times more prevalent among boys, and LD without ADHD was 1.4 times more prevalent among boys.

Hispanic children compared to white children were less likely to have a parental report of ADHD, either with or without LD (Table 1). Approximately 1% of Hispanic children had parental reports of ADHD without LD compared to 4% of white children. By contrast, the percent of Hispanic children having LD without ADHD was similar to the percent of white children having this diagnosis. African American children compared to white children were also less likely to have a parental report of ADHD without LD (2% vs. 4%). Among African American children, the percent having ADHD with LD was similar to the percent of white children having this diagnosis, and the percent of African American children having LD without ADHD was greater than the percent of white children having this diagnosis (6% vs. 4%).

Often, health-related differences observed among Hispanic, African American, and white children are attributed to the effect of other factors associated with race and ethnicity. Table 1 shows the prevalence of the three diagnoses (ADHD with LD, ADHD without LD, and LD without ADHD) by birthweight, family income, and health insurance coverage. Children with low birthweight, for example, were more likely to have LD (either with or without ADHD) than children without low birthweight. Children from families with incomes less than 200% of the poverty threshold were also

Table 1. Identified attention deficit hyperactivity disorder (ADHD) and learning disability (LD) among children 6–11 years of age by selected sociodemographic characteristics, United States, 1997–2001^a

	Sample size (number)	ADHD/no LD ^b (percent)	ADHD and LD ^c (percent)	LD/no ADHD ^d (percent)
All children	20,401	3.4	3.4	4.6
Race/ethnicity				
Hispanic	5,552	1.4	2.2	4.8
African American (non-Hispanic)	3,562	2.2	4.0	5.6
White (non-Hispanic)	11,287	4.1	3.5	4.3
		$p<0.001^e$	$p<0.001$	$p=0.05$
Low birthweight				
Yes (<2500 grams)	1,384	3.7	4.8	8.5
No (2500+ grams)	17,720	3.3	3.2	4.4
		$p=0.49$	$p=0.02$	$p<0.001$
Income as a percentage of the poverty threshold				
<100%	3,149	3.1	5.5	7.5
100–199%	3,789	3.1	4.2	5.9
200–399%	5,580	3.6	2.9	4.1
400%+	4,167	4.0	2.6	3.3
Unknown	3,716	2.8	2.6	3.0
		$p=0.16$	$p<0.001$	$p<0.001$
Health insurance coverage				
Uninsured	2,870	2.4	2.2	4.7
Medicaid	3,746	4.3	7.2	8.6
Private and other insurance	13,684	3.3	2.7	3.6
		$p=0.005$	$p<0.001$	$p<0.001$

^aIncludes only Hispanic, non-Hispanic African American, and non-Hispanic white children; excludes children with missing data for ADHD or LD.

^bADHD/no LD includes children ever identified as having ADHD, but not LD.

^cADHD and LD includes children ever identified as having both ADHD and LD.

^dLD/no ADHD includes children ever identified as having LD, but not ADHD.

^e p values for chi square tests

more likely to have identified LD (either with or without ADHD) than children from families with higher incomes. Neither low birthweight nor income was significantly related to reports of ADHD without LD. By contrast, a child's insurance coverage was associated with the prevalence of all three diagnoses. Children covered by Medicaid were reported more often to have ADHD without LD, ADHD with LD, and LD without ADHD than privately insured or uninsured children. Uninsured children were less often reported to have ADHD without LD than children with either Medicaid or private insurance.

Birthweight, family income, and health insurance coverage varied markedly for children in different racial and ethnic groups (Table 2). African American children were more than twice as likely as white children to have low birthweight (12% vs. 5%). Hispanic and African American children were more than three times as likely to be poor as white children (28% and 32% vs. 8%). Hispanic children were more than twice as likely to be uninsured as white or African American children (26% vs. 12% and 8%), and Hispanic and African American children were more often reported to have Medicaid coverage than white children (26% and 38% vs. 10%). Differences among the sociodemographic characteristics of Hispanic, African American, and

white children suggest the possibility that racial and ethnic variation in identified ADHD and LD may reflect the effect of these factors. Results from a series of multinomial logistic regression models were used to assess the extent to which sociodemographic characteristics accounted for racial and ethnic differences in ADHD and LD.

For the diagnosis of ADHD without LD, adjusting for the individual and combined effect of potential confounders (birthweight, income, and insurance coverage) had little effect on the association between Hispanic ethnicity and reports of this diagnosis. The less frequent parental reports of ADHD without LD for Hispanic children compared to white children could not be attributed to the effects of sociodemographic factors (Table 3, Model 5: $OR_{\text{Hispanic}} = 0.32$ [0.23, 0.43]). The relationship between African American race and parental reports of ADHD without LD also was not modified by adjustments for birthweight, income, or insurance coverage. After adjustment for all the sociodemographic factors, African American children were less likely to have a parental report of ADHD without LD than white children (Table 3, Model 5: $OR_{\text{African American}} = 0.40$ [0.28, 0.56]).

For the diagnosis of ADHD with LD, adjusting for a child's birthweight had little effect on the association between this diagnosis and Hispanic ethnicity or African American race.

Table 2. Selected sociodemographic characteristics of Hispanic, African American, and white children 6–11 years of age, United States, 1997–2001^a

	Hispanic (percent)	African American (non-Hispanic) (percent)	White (non-Hispanic) (percent)	p value
Low birthweight (<2500 grams)	7.7	11.5	5.2	$p<0.001^b$
Income as a percentage of the poverty threshold				
<100%	27.6	31.7	7.9	$p<0.001$
100–199%	26.3	20.5	15.5	
200–399%	19.4	20.4	32.8	
400%+	8.9	8.3	27.4	
Unknown	17.8	19.0	16.4	
Health insurance coverage				
Uninsured	26.4	11.9	8.4	$p<0.001$
Medicaid	26.2	38.0	9.7	
Private and other insurance	47.5	50.2	81.9	

^aIncludes only Hispanic, non-Hispanic African American, and non-Hispanic white children; excludes children with missing data for ADHD and LD.

^bp values for chi square tests

Table 3. Association between race/ethnicity and identified attention deficit hyperactivity disorder (ADHD) and learning disability (LD) among children 6–11 years of age: results of multinomial logistic regression analysis, United States, 1997–2001^a

	Model 1 OR (95% CI) Unadjusted	Model 2 OR (95% CI) Adjusted for birthweight	Model 3 OR (95% CI) Adjusted for income	Model 4 OR (95% CI) Adjusted for insurance coverage	Model 5 OR (95% CI) Adjusted for variables in Models 2–4 ^b
ADHD/no LD ^c					
Race/ethnicity					
Hispanic	0.35 (0.27, 0.47)	0.35 (0.27, 0.46)	0.33 (0.25, 0.45)	0.31 (0.23, 0.42)	0.32 (0.23, 0.43)
African American (non-Hispanic)	0.49 (0.36, 0.66)	0.48 (0.36, 0.65)	0.46 (0.33, 0.64)	0.39 (0.28, 0.54)	0.40 (0.28, 0.56)
White (non-Hispanic)	1.00	1.00	1.00	1.00	1.00
ADHD and LD ^d					
Race/ethnicity					
Hispanic	0.59 (0.46, 0.75)	0.58 (0.46, 0.74)	0.43 (0.33, 0.57)	0.43 (0.33, 0.57)	0.41 (0.31, 0.53)
African American (non-Hispanic)	1.15 (0.90, 1.48)	1.11 (0.86, 1.43)	0.83 (0.62, 1.10)	0.73 (0.55, 0.97)	0.67 (0.50, 0.90)
White (non-Hispanic)	1.00	1.00	1.00	1.00	1.00
LD/no ADHD ^e					
Race/ethnicity					
Hispanic	1.13 (0.92, 1.40)	1.11 (0.89, 1.37)	0.89 (0.71, 1.10)	0.87 (0.70, 1.09)	0.82 (0.65, 1.02)
African American (non-Hispanic)	1.35 (1.08, 1.69)	1.28 (1.02, 1.60)	1.05 (0.83, 1.32)	0.96 (0.76, 1.21)	0.88 (0.69, 1.11)
White (non-Hispanic)	1.00	1.00	1.00	1.00	1.00

^aIncludes only Hispanic, non-Hispanic African American, and non-Hispanic white children; excludes children with missing data for ADHD, LD, or any of the predictors.

^bAdding age and sex to Model 5 resulted in very small changes in the adjusted odds ratios for race and ethnicity.

^cADHD/no LD includes children ever identified as having ADHD, but not LD.

^dADH and LD includes children ever identified as having both ADHD and LD.

^eLD/no ADHD includes children ever identified as having LD, but not ADHD.

OR = odds ratio

CI = confidence interval

Table 4. Use of any prescription medication among children 6–11 years of age with and without identified attention deficit hyperactivity disorder (ADHD) and learning disability (LD) by selected sociodemographic characteristics, United States, 1997–2001^a

	ADHD ^b (percent)	LD/no ADHD ^c (percent)	Neither ^d (percent)
All children	58.4	16.4	7.2
Race/ethnicity			
Hispanic	48.1	10.9	5.2
African American (non-Hispanic)	48.6	20.9	8.0
White (non-Hispanic)	61.4	16.1	7.7
	$p=0.001^e$	$p=0.07$	$p<0.001$
Learning disability			
Yes	62.5	16.4	...
No	54.2	...	7.2
	$p=0.01$	n/a	n/a
Chronic health condition other than ADHD or LD			
Yes	61.6	23.1	18.4
No	54.2	4.7	1.4
	$p=0.02$	$p<0.001$	$p<0.001$
Income as a percentage of the poverty threshold			
<100%	51.7	18.5	7.0
100–199%	57.1	16.8	6.1
200–399%	56.4	12.3	8.1
400%+	68.9	16.5	8.7
Unknown	57.2	18.0	6.1
	$p=0.01$	$p=0.52$	$p<0.001$
Health insurance coverage			
Uninsured	43.8	6.0 ^f	4.4
Medicaid	56.6	23.7	9.0
Private and other insurance	61.2	14.1	7.5
	$p=0.008$	$p<0.001$	$p<0.001$

^aIncludes only Hispanic, non-Hispanic African American, and non-Hispanic white children; excludes children with missing data for ADHD, LD, or use of prescription medication.

^bADHD includes children ever identified as having ADHD with or without LD.

^cLD/no ADHD includes children ever identified as having LD, but not ADHD.

^d"Neither" includes children identified with neither ADHD nor LD.

^e p values for chi square tests

^fRelative standard error is more than 30%.

Adjusting for family income and insurance coverage, though, had the effect of increasing the differences between white children and Hispanic and African American children. After adjustment for all the sociodemographic factors, both Hispanic and African American children compared to white children were less likely to have parental reports of ADHD with LD (Table 3, Model 5: $OR_{\text{Hispanic}}=0.41$ [0.31, 0.53], $OR_{\text{African American}}=0.67$ [0.50, 0.90]).

Finally, for the diagnosis of LD without ADHD, neither the unadjusted nor any of the adjusted odds ratios indicated a significant association between Hispanic ethnicity and this diagnosis. Adjusting for income, insurance coverage, or all the confounders eliminated the positive association between African American race and this diagnosis. After these adjustments, African American children compared to white chil-

dren were as likely to have a parental report of LD without ADHD.

USE OF ANY PRESCRIPTION MEDICATION FOR A CHRONIC CONDITION

Although information was not collected on the use of medication specifically for the treatment of ADHD, parents were asked about the regular use of any type of prescription medication. As Table 4 shows, medication use was greater among children with ADHD (58%) than among children without ADHD (16% among children with LD and no ADHD and 7% of children with neither ADHD nor LD). The relationship between medication use and a child's race and ethnicity varied among the diagnostic categories. Among

Table 5. Association between race/ethnicity and use of any prescription medication among children 6–11 years of age with identified attention deficit hyperactivity disorder (ADHD): results of logistic regression analysis, United States, 1997–2001^a

	Model 1 OR (95% CI) Unadjusted	Model 2 OR (95% CI) Adjusted for LD	Model 3 OR (95% CI) Adjusted for health condition other than ADHD or LD	Model 4 OR (95% CI) Adjusted for income	Model 5 OR (95% CI) Adjusted for insurance coverage	Model 6 OR (95% CI) Adjusted for variables in Models 2–5
Race/ethnicity						
Hispanic	0.58 (0.41, 0.84)	0.55 (0.38, 0.79)	0.56 (0.39, 0.81)	0.61 (0.42, 0.89)	0.62 (0.43, 0.89)	0.59 (0.40, 0.87)
African American (non-Hispanic)	0.60 (0.42, 0.86)	0.55 (0.39, 0.80)	0.60 (0.42, 0.85)	0.67 (0.47, 0.96)	0.64 (0.44, 0.92)	0.63 (0.43, 0.93)
White (non-Hispanic)	1.00	1.00	1.00	1.00	1.00	1.00

^aIncludes Hispanic, non-Hispanic African American, and non-Hispanic white children; excludes children with missing data for ADHD, use of any prescription medication, or any of the predictors.

^bAdding age and sex to Model 6 resulted in very small changes in the adjusted odds ratios for race and ethnicity.

LD = Learning Disability

OR = odds ratio

CI = confidence interval

children with ADHD, Hispanic and African American children were less often reported to use medication than white children (48% and 49% vs. 61%). By contrast, among children having LD without ADHD, medication use was unrelated to race and ethnicity. Among children with neither ADHD nor LD, Hispanic children were less often reported to use medication than African American or white children.

Among children with ADHD, having a diagnosis of LD was associated with more frequent reports of medication use (Table 4). Having a chronic health condition other than ADHD or LD was associated with more frequent reports of medication use among children in all the diagnostic categories. However, the effect of chronic health conditions on medication use was greater for children without ADHD than those with ADHD. Among children having LD without ADHD, the percentage using medication was nearly five times greater if another chronic health condition was present (23% vs. 5%). Among children having neither ADHD nor LD, the percentage using medication was more than 13 times greater if a chronic health condition was present (18% vs. 1%). By contrast, among children having ADHD, the percentage using medication was only slightly greater if another chronic health condition (other than LD) was present (62% vs. 54%).

The percentage using medication also varied with family income among children with ADHD and children with neither ADHD nor LD (Table 4). The percentage using medication among children with ADHD ranged from slightly over 50% among poor children to nearly 70% among children in affluent families (400% or more of the poverty threshold). Having health insurance coverage was also strongly associated with the use of medication. Uninsured children compared to insured children in all the diagnostic categories were less likely to use medication. Among children having ADHD and those having neither ADHD nor LD, Medicaid insured children were as likely to use medication as privately insured children. Among children having LD without ADHD, Medicaid insured children were more likely to use medication than privately insured children.

Results from a series of logistic regressions (Table 5, Models 1–6) show the effects of adjustments for potential confounders on racial and ethnic disparities in medication use among children with ADHD. Adjusting for any of the sociodemographic factors or health conditions had only small effects on the association between race and ethnicity and use of medication. After adjustment for all the confounders, Hispanic children and African American children, compared to white children, were less likely to use medication (Table 5, Model 6: $OR_{\text{Hispanic}}=0.59$ [0.40, 0.87], $OR_{\text{African American}}=0.63$ [0.43, 0.93]).

DISCUSSION AND CONCLUSIONS

National estimates of the prevalence of identified ADHD and LD, based on parental reports in the 1997–2001 NHIS, show marked differences by race and ethnicity. Using the broad range of sociodemographic and health data collected in the NHIS, our analysis was able to gauge whether racial and ethnic differences in other health conditions, family income, and health insurance coverage accounted for, obscured, or left unaffected, racial and ethnic disparities in

identified ADHD and LD. The association between parental reports of ADHD and a child's race and ethnicity was not explained by racial and ethnic differences in birthweight, family income, and health insurance coverage. Only in the case of LD without ADHD could the more frequent reports for African American children, compared to white children, be explained by racial differences in income and insurance coverage.

Comparing the current findings with previous epidemiologic analyses of ADHD and LD in the United States is difficult, because few studies have explored racial and ethnic differences in parental reports of these disorders. One other national study, an investigation of mental disorders causing disability in children, described racial and ethnic differences in parental reports of ADHD and LD.¹⁷ Using data from the 1992–1994 NHIS, Halfon and Newacheck observed that ADHD, and to a lesser extent LD, was more prevalent among non-Hispanic white children than children in other racial and ethnic groups.¹⁷ These racial and ethnic differences in ADHD and LD persisted even after adjustments for children's socioeconomic status. However, the general relevance of Halfon and Newacheck's findings for all school-age children is uncertain since the analysis only examined reports of ADHD and LD in disabled children.

Population-based studies of ADHD in specific regions and communities have not consistently reported racial and ethnic differences. In a study of children with Medicaid coverage in a mid-Atlantic suburban county, dosReis and colleagues reported that white children were twice as likely to have a diagnosis of ADHD as African American children.¹⁸ By contrast, a school-based study in a rural North Carolina county documented similar rates of identified ADHD for white and African American children.¹⁹ The pattern of racial and ethnic differences in studies of LD has also varied. In the 1988 National Health Interview Survey of Child Health, parental reports of LD were similar for African American and white children.²⁰ However, in the first wave of the Special Education Elementary Longitudinal Study, LD was reported more frequently by parents of African American students than by the parents of students in other racial and ethnic groups.²¹

Our findings of less frequently reported medication use among Hispanic and African American children with ADHD parallel results from previous research. Two national studies of prescription medication use have reported less use among African American children than white children.^{22,23} The lower level of use among African American children was not attributed to differences in children's insurance coverage, income, health status, or medical conditions. A national study of family medical expenditures also reported that African American and Hispanic children were nearly half as likely as white children to receive medication treatment for ADHD.²⁴ School-based studies in Maryland, Northern Virginia, and North Carolina, as well as studies of children with Medicaid coverage in a mid-Atlantic and a Midwestern state, have reported less medication use for ADHD among African American and Hispanic children than white children.^{25–28}

While the results of this analysis are consistent with the findings from a number of previous studies, several limitations should be considered. Measures of ADHD and LD were based on parental reports of identified cases rather

than on psychiatric, psychological, or educational assessments of children. Moreover, parents were not asked to provide detailed information about disorders such as ADHD subtypes, specific types of learning disabilities, or symptoms associated with either ADHD or LD. Since information about prescription medication specifically for the treatment of ADHD was not obtained, it was not possible to assess how often reports of medication use among children with ADHD indicated medication for the treatment of ADHD. Finally, because information from children's medical and school records was not available, inaccuracies and biases in parental reporting of ADHD, LD, and medication use could not be determined.

Limitations in the measurement of a child's race, ethnicity, and other sociodemographic characteristics may also have influenced the findings of this analysis. Broad categories of race and ethnicity were used to describe children. An analysis using more narrowly defined categories of race and ethnicity might have revealed differences among culturally distinct subgroups of children within the three major racial and ethnic groups. In this study, sample size considerations precluded an analysis of differences among children in various Hispanic subgroups. Studies with large and diverse samples of Hispanic children, however, have reported substantial differences in health outcomes for children of Mexican, Puerto Rican, and Cuban background.^{29,30} Further, an analysis using more detailed information about health insurance plans, such as coverage for the diagnosis and treatment of behavioral disorders, might show that these specific aspects of insurance coverage account for more of the racial and ethnic differences in identified ADHD and prescription medication use.

Many aspects of health care and educational systems influence the identification of behavioral and learning disorders in Hispanic, African American, and white children.³¹⁻³⁵ As the recent report, *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*, notes, "The sources of these disparities are complex, are rooted in historic and contemporary inequities, and involve many participants at several levels, including health systems, their administrative and bureaucratic processes, utilization managers, healthcare professionals, and patients."³⁶ Results from the 1997-2001 NHIS show that sociodemographic factors do not provide a simple explanation of the racial and ethnic disparities observed in parental reports of ADHD or in parental reports of medication use among children with ADHD. Additional research is needed to determine the characteristics of health care providers, educators, parents, and children that account for racial and ethnic disparities in the diagnosis and treatment of ADHD.

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