Racial and Ethnic Disparities in ADHD Diagnosis and Treatment

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abstract

OBJECTIVES: We examined racial/ethnic disparities in attention-deficit/hyperactivity disorder (ADHD) diagnosis and medication use and determined whether medication disparities were more likely due to underdiagnosis or undertreatment of African-American and Latino children, or overdiagnosis or overtreatment of white children.

METHODS: We used a population-based, multisite sample of 4297 children and parents surveyed over 3 waves (fifth, seventh, and 10th grades). Multivariate logistic regression examined disparities in parent-reported ADHD diagnosis and medication use in the following analyses: (1) using the total sample; (2) limited to children with an ADHD diagnosis or symptoms; and (3) limited to children without a diagnosis or symptoms.

RESULTS: Across all waves, African-American and Latino children, compared with white children, had lower odds of having an ADHD diagnosis and of taking ADHD medication, controlling for sociodemographics, ADHD symptoms, and other potential comorbid mental health symptoms. Among children with an ADHD diagnosis or symptoms, African-American children had lower odds of medication use at fifth, seventh, and 10th grades, and Latino children had lower odds at fifth and 10th grades. Among children who had neither ADHD symptoms nor ADHD diagnosis by fifth grade (and thus would not likely meet ADHD diagnostic criteria at any age), medication use did not vary by race/ethnicity in adjusted analysis.

CONCLUSIONS: Racial/ethnic disparities in parent-reported medication use for ADHD are robust, persisting from fifth grade to 10th grade. These findings suggest that disparities may be more likely related to underdiagnosis and undertreatment of African-American and Latino children as opposed to overdiagnosis or overtreatment of white children.

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Dr Coker was responsible for study conception and design, data analysis, interpretation of findings, and writing of the manuscript; Dr Elliott contributed to study conception and survey development, obtained funding, and participated in study design, analysis, and interpretation; he also revised manuscript drafts; Dr Schwebel contributed to study conception and survey development, obtained funding, participated in study design and interpretation, and revised manuscript drafts; Drs Toomey, Tortolero Emery, Cuccaro, and Davies contributed to study conception and survey development, obtained funding, participated in study design, and revised manuscript drafts; Dr Visser contributed to study conception, study design, and revision of manuscript drafts; and Dr Schuster contributed to study conception and survey development,

WHAT'S KNOWN ON THIS SUBJECT: There are racial/ethnic disparities in medication use for attention-deficit/hyperactivity disorder (ADHD), but it is unknown if the disparity is more likely due to an underdiagnosis or undertreatment of African-American and Latino children, or an overdiagnosis or overtreatment of white children.

WHAT THIS STUDY ADDS: Racial/ethnic disparities in medication use for ADHD are robust, persist from fifth to 10th grade, and seem to be more related to underdiagnosis and undertreatment of African-American and Latino children as opposed to overdiagnosis or overtreatment of white children.

To cite: Coker TR, Elliott MN, Toomey SL, et al. Racial and Ethnic Disparities in ADHD Diagnosis and Treatment. *Pediatrics*. 2016;138(3):e20160407

Attention-deficit/hyperactivity disorder (ADHD) diagnoses have been increasing in the United States. Parent-reported rates of ever receiving a diagnosis for children aged 4 to 17 years increased from 7.8% in 2003 to 11.0% in 2011, and rates of ADHD medication use increased from 4.8% in 2007 to 6.1% in 2011.[1] Studies also describe racial/ethnic disparities in diagnosis and medical treatment of ADHD, indicating that African-American and Latino children may have lower rates of receiving a diagnosis and medication compared with white children.[2–7]

These differences in diagnosis and treatment are generally interpreted as reflecting underdiagnosis and undertreatment of African-American and Latino children.[5,6] In light of the increasing prevalence, however, researchers have recognized that overdiagnosis or overtreatment of white children is a possible alternative explanation for the disparity,[3,8] although previous studies have not examined which explanation is most likely.

The current study was conducted to help address this question: Is the disparity in ADHD diagnosis and medication treatment more likely due to an underdiagnosis or undertreatment of African-American and Latino children or an overdiagnosis or overtreatment of white children? A population-based, multisite longitudinal survey was used to examine racial/ethnic disparities in the diagnosis of ADHD and in ADHD medication treatment among children. We also examined whether the disparity and the likely main drivers of the disparity changed from fifth grade to 10th grade.

METHODS

Healthy Passages is a longitudinal study of a cohort of 5147 fifth-graders and their parents (2004–2006), with follow-up in seventh grade (2006–2008) and 10th grade (2009–2011).[9,10] Institutional review board approval was obtained at each study site and the Centers for Disease Prevention and Control.

Study Population and Sampling Procedure

Participants were recruited from public schools in the following districts: 10 contiguous public school districts in and around Birmingham, Alabama; 25 contiguous public school districts in Los Angeles County, California; and the largest public school district in Houston, Texas. Eligible schools had an enrollment of ≥25 fifth-graders, representing >99% of students enrolled in regular classrooms. To ensure adequate sample sizes of African-American, Latino, and white students, a 2-stage probability sampling procedure, detailed elsewhere,[9] was used. The sampling procedure included the following: (1) random sampling of schools using probabilities that were a function of how closely a school's racial/ethnic mix corresponded to the site's racial/ethnic target; and (2) invitation to participate to all fifth-grade students in regular classrooms of sampled schools.

The 118 sampled schools had 11 532 enrolled fifth-graders. A primary caregiver (henceforth referred to as "parent") for each student received a letter requesting permission for contact by study personnel. Of the 11 532 parents, 6663 who either agreed to be contacted or who were unsure were invited to participate; 5147 completed an interview at baseline (fifth grade), and 4297 parent–child dyads participated in all 3 waves (at fifth grade and ~2 and 5 years later, when most children were in seventh and 10th grades, respectively).

Our sample size reached the predetermined sample size targets; details of statistical power are described elsewhere.[9] Interviews were conducted at the home, a study center, or another preferred location. Parents provided informed consent for participation, and children gave assent.

Measures

ADHD Symptoms

Questions from the Diagnostic Interview Schedule for Children Predictive Scales (DPS) were used to assess the presence of parent-reported symptoms of ADHD and other mental health conditions that may be comorbidities which could affect whether a child receives a diagnosis or medication for ADHD. These comorbidities included oppositional defiant disorder, conduct disorder, and depression. The DPS is a screening tool based on the Diagnostic Interview Schedule for Children; it relies on parent-reported symptoms (reported as present or not) of ADHD (7 yes/no items), oppositional defiant disorder (12 yes/no items), and conduct disorder (8 yes/no items), as well as child-reported symptoms of depression (6 yes/no items) during the previous 12 months (sensitivities and specificities for ADHD, oppositional defiant disorder, conduct disorder, and depression, ≥0.89).[11] The 7 ADHD symptoms in the DPS align with 5 inattentive symptoms (eg, Has your child often had trouble finishing his or her homework or other things he or she is supposed to?) and 2 hyperactivity/impulsivity symptoms (eg, Has your child often left his or her seat when he or she was not supposed to?) on the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*.[12] A dichotomous variable was created for symptoms consistent with ADHD, defined by a score (sum of symptoms) above the sample 90th percentile. We used this cutoff value, which was more stringent than cutoff values used in a previously studied community sample,[11] because data on level of impairment or symptom severity were not collected. For

fifth- and seventh-grade surveys, the 90th percentile corresponds to positive responses on ≥6 of 7 possible ADHD symptoms. For the 10th-grade surveys, the 90th percentile corresponds to ≥5 of 7 possible symptoms. Of note, the *Diagnostic and Statistical Manual of Mental Disorders*, *Fifth Edition*, requires ≥6 symptoms of inattention and/or hyperactivity-impulsivity for youth aged ≤16 years or ≥5 for youth aged ≥17 years.[12] We also created a continuous variable for symptoms consistent with ADHD and each of the other mental health disorders, defined by the total symptom score for each scale. Higher symptom scores reflect more symptoms.

ADHD Diagnosis

In survey waves 1 and 3, parents were asked if a physician or health professional had ever told them that their child had hyperactivity or attention-deficit disorder (wave 1 question) or hyperactivity, attention-deficit disorder, or ADHD (wave 3 question) (response options, yes or no). This question was not asked in wave 2.

ADHD Medication Use

In waves 1 through 3, parents were asked if during the last year (wave 1) or past 12 months (waves 2 and 3) their child had taken medication for being overactive, being hyperactive, or having trouble paying attention (yes or no).

Other Variables

Data were collected on several child and parent wave 1 characteristics previously hypothesized to influence mental health care use.[13–15] Child sociodemographic covariates included study city (Birmingham, Houston, and Los Angeles), child race/ethnicity (non-Latino black [henceforth, African-American], Latino, non-Latino white, and other race/ethnicity), age at fifth grade survey (<11, 11, and ≥12 years), sex (male or female), insurance status (uninsured or insured), annual household income (less than $20 000, $20 000–$34 000, $35 000–$69 999, $70 000 or higher), and household composition (2-parent, 1-parent, or other). Parent sociodemographic covariates included highest household education level (no high school diploma, high school diploma, some college, and college degree or greater) and English language proficiency (speaks English very well versus less than very well). Because no significant differences were found in results when accounting for household size in the income variable (by using the federal poverty level), we used annual household income.

We also included child symptoms of oppositional defiant disorder, conduct disorder, and depression (each as continuous variables), and the child's school functioning, using the Pediatric Quality of Life Inventory version 4.0 at each wave. This inventory tool is a well-validated instrument designed to measure health-related quality of life in 2- to 18-year-olds.[16] It measures school functioning by using 5 child-reported items (hard to pay attention in class, forgets things, trouble keeping up with school work, missed school because not feeling well, and missed school to go to physician/hospital); respondents report how much of a problem each item has been during the past month, with 5 response options (never, almost never, sometimes, often, and almost always a problem). Items are reverse scored (ie, higher scores represent better school functioning) and linearly transformed to a 0 to 100 range.

We included a dichotomous measure of receipt of family-centered care (FCC) collected by wave 3 parental report. FCC is a key element of the medical home, is less likely to be reported by African-American and Latino parents, and may be associated with having fewer unmet medical needs.[17–19] Although FCC was only measured in wave 3, it was used as a covariate in analyses of all waves, as a general indicator of access to FCC. FCC was indicated as received if the parent reported that their child's physicians "always" or "usually" spent enough time, listened carefully, were sensitive to the family's values and customs, provided specific information that the parent needed, and helped the parent feel like a partner in their child's care; this method of assessing FCC has been used in multiple studies. FCC is included in the National Survey of Children's Health and the National Survey of Children with Special Health Care Needs,[20,21] and it has been shown to be stable over multiple waves of these national surveys.[22] However, because we cannot know whether FCC measured at wave 3 is indicative of care received at waves 1 and 2, a sensitivity analysis was conducted to determine whether inclusion of FCC as a covariate in adjusted models significantly changed our results.

Statistical Methods

All analyses use design and nonresponse weights and account for the effects of weights and clustering of children within sites by using Stata SE 10.[23–25] Our sample included 4297 parent–child dyads that participated in all 3 waves. We used χ^2 tests of homogeneity and *t* tests to describe the wave 1 characteristics of children and parents in the study sample. Bivariate analyses were also used to describe the proportion of children with symptoms consistent with ADHD, parent-reported diagnosis of ADHD, and a history of parent-reported medication for ADHD according to child race/ethnicity and survey wave. The proportion of children receiving ADHD medication was examined according to race/ethnicity at each wave, stratified according to number of ADHD symptoms (0 symptoms, 1–2 symptoms, 3–5 symptoms, and 6–7 symptoms). Logistic regression

was used to examine the unadjusted and adjusted odds of ADHD diagnosis and medication use according to race/ethnicity over the 3 survey waves. To determine the disparity in medication use among children who had received a diagnosis, odds of medication use were calculated according to race/ethnicity among children with a diagnosis of ADHD (with or without symptoms).

Finally, we looked for racial/ethnic disparities in medication use among 2 groups of children: (1) those with a presumed need for ADHD medication (either an ADHD diagnosis or symptoms suspicious for ADHD); and (2) those with no presumed need for ADHD medication (no diagnosis of or symptoms consistent with ADHD by fifth grade). Racial ethnic/ disparities in medication use that persist in this first group of children would suggest underdiagnosis or undertreatment of African-American and Latino children. Disparities that persist in the second group of children would suggest overdiagnosis or overtreatment of white children, which could be the result of multiple factors (eg, differential provider or parental expectations for medication use among children based on child race/ethnicity).

TABLE 1 Fifth Grade Characteristics

Characteristic	Unweighted *N*	Weighted % or Mean ± SD
Child race/ethnicity		
African-American	1497	29.1
Latino	1512	44.4
Other[a]	248	4.4
White	1039	22.1
Male sex	2097	51.1
Age (child age at fifth grade)		
≤10 y (most aged 10; *n* = 16 are 8–9 y)	1989	44.0
11 y	2048	48.9
≥12 y	260	7.1
Highest household education		
Some high school	755	23.5
High school graduate	850	21.8
Some college	1159	25.2
College graduate	1474	29.5
Household income, $		
<20 000	1306	35.4
20 000–34 000	865	23.0
35 000–69 000	857	20.1
≥70 000	1059	21.5
Family household composition		
Two-parent	2400	58.1
Single-parent	1685	37.7
Other (nonparent, foster)	190	4.2
Insurance type (child)		
Private	2063	42.5
Medicaid/CHIP	1664	42.3
Other insurance type (military, IHS)	80	2.0
Uninsured	472	13.2
Study site		
Birmingham, AL	1350	31.0
Houston, TX	1462	34.6
Los Angeles, CA	1485	34.4
Mental health symptoms		
Oppositional defiant disorder	329	7.8
Conduct disorder	350	8.2
Depression	307	7.5
FCC	2176	48.9
School functioning (PedsQL subscale)	—	75.0 ± 20.6

CHIP, Children's Health Insurance Program; IHS, Indian Health Service; PedsQL, Pediatric Quality of Life Inventory; —, continuous variable.

[a] The other category includes multiracial (*n* = 131), American Indian/Alaska Native (*n* = 7), and Asian or Pacific Islander (*n* = 110).

RESULTS

Table 1 describes the sample. In fifth grade, parents reported that 8% of children had symptoms of ADHD, 8% had ever received an ADHD diagnosis, and 7% had taken medication for ADHD over the past year. By 10th grade, those percentages increased to 9%, 9%, and 8%, respectively. In fifth, seventh, and 10th grades, higher percentages of African-American children compared with white children had symptoms suggestive of ADHD (fifth grade, 12% vs 7%; seventh grade, 11% vs 6%; and 10th grade, 13% vs 9%). Latino children were just as likely to have ADHD symptoms as white children at each wave (Table 2).

In fifth and 10th grades, white children were much more likely to have ever received a diagnosis of ADHD (16% in fifth grade and 19% in 10th grade) than African-American children (9% and 10%, respectively), Latino children (4% and 4%), and children of other race/ ethnicity (10% and 10%) (Tables 2 and 3). White children were also more likely to have a parental report of taking medication for ADHD in the last year at all 3 waves, compared with African-American, Latino, and other children (Table 3). Results for differences in medication use were similar when stratified according to number of ADHD symptoms. At all symptom levels above zero, a higher proportion of white children, compared with African-American and Latino children, had a parental report of ADHD medication (see Supplemental Table 6). This disparity persisted even among children at the highest symptom levels. For example, among 10th grade children at the highest symptom level, 65%

TABLE 2 ADHD Symptoms, Diagnosis, and Medication Use According to Race/Ethnicity Over 3 Waves

Variable	Fifth Grade	Seventh Grade	10th Grade
ADHD, by symptoms			
Total	8 (350)	7 (324)	9 (400)
White	7 (68)	6 (67)	9 (87)
African-American	12 (176)	11 (154)	13 (195)
Latino	6 (90)	6 (89)	6 (95)
Other	7 (16)	6 (14)	9 (23)
P	<.001	<.001	<.001
ADHD, by diagnosis			
Total	8 (368)	NA	9 (422)
White	16 (152)	NA	19 (191)
African-American	9 (131)	NA	10 (139)
Latino	4 (62)	NA	4 (69)
Other	10 (23)	NA	10 (23)
P	<.001		<.001
Took medication for ADHD (past 12 mo)			
Total	7 (314)	7 (336)	8 (341)
White	14 (132)	14 (142)	16 (155)
African-American	9 (123)	9 (124)	8 (110)
Latino	3 (44)	3 (55)	4 (60)
Other	7 (15)	6 (15)	7 (16)
P	<.001	<.001	<.001

Unless otherwise indicated, data are presented as *n* (%). NA, not applicable.

TABLE 3 Unadjusted ORs and aORs of ADHD Diagnosis and Medication Use According to Race/Ethnicity Over 3 Waves

Variable	Fifth Grade	Seventh Grade	10th Grade
ADHD, diagnosis			
White	Ref	NA	Ref
African-American			
OR (95% CI)	0.54 (0.43–0.69)***	NA	0.46 (0.36-0.60)***
aOR (95% CI)	0.40 (0.27–0.59)***	NA	0.42 (0.27–0.67)***
Latino			
OR (95% CI)	0.21 (0.15–0.30)***	NA	0.18 (0.13–0.26)***
aOR (95% CI)	0.37 (0.22–0.60)***	NA	0.46 (0.26–0.79)**
Other			
OR (95% CI)	0.63 (0.38–1.03)	NA	0.45 (0.29–0.72)**
aOR (95% CI)	0.76 (0.40–1.41)	NA	0.56 (0.30–1.03)
ADHD, medication			
White	Ref	Ref	Ref
African-American			
OR (95% CI)	0.57 (0.43–0.75)***	0.58 (0.45–0.75)***	0.48 (0.35–0.66)***
aOR (95% CI)	0.43 (0.29–0.65)***	0.41 (0.28–0.62)***	0.44 (0.28–0.71)**
Latino			
OR (95% CI)	0.18 (0.12–0.25)***	0.21 (0.15–0.29)***	0.23 (0.17–0.31)***
aOR (95% CI)	0.40 (0.23–0.70)**	0.43 (0.25–0.74)**	0.41 (0.21–0.79)**
Other			
OR (95% CI)	0.45 (0.25–0.80)**	0.39 (0.23–0.67)**	0.42 (0.22–0.79)**
aOR (95% CI)	0.60 (0.31–1.18)	0.46 (0.25–0.86)*	0.45 (0.21–0.98)*

Adjusted for child age, sex, health insurance, mental health symptoms, and school functioning; household composition, income, and highest parental educational attainment; parent English proficiency and reported receipt of FCC in child's health care; and study site. NA, not applicable.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

of white children were taking ADHD medication according to parental report, compared with 36% of African-American children and 30% of Latino children.

Across all waves, African-American children had significantly lower adjusted odds of both ever having a diagnosis of ADHD (fifth grade adjusted odds ratio [aOR], 0.40 [95% confidence interval (CI), 0.27–0.59]; 10th grade aOR, 0.42 [95% CI, 0.27–0.67]) and of taking ADHD medication in the past year (fifth grade aOR, 0.43 [95% CI, 0.29–0.65]; seventh grade aOR, 0.41 [95% CI, 0.28–0.62]; 10th grade aOR, 0.44 [95% CI, 0.28–0.71]) compared with white children. A similar pattern was observed when comparing Latino children versus white children on adjusted odds of ever having a diagnosis of ADHD (fifth grade aOR, 0.37 [95% CI, 0.22–0.60]; 10th grade aOR, 0.46 [95% CI, 0.26–0.79]) and of taking ADHD medication (fifth grade aOR, 0.40 [95% CI, 0.23–0.70]; seventh grade aOR, 0.43 [95% CI, 0.25–0.74]; 10th grade aOR, 0.41 [95% CI, 0.21–0.79]) (Table 3). Of note, male sex was consistently associated in these models with receiving an ADHD diagnosis and medication.

Disparities in Medication Rates Among Children With ADHD According to Symptoms or Diagnosis

Among children ever having a diagnosis of ADHD or past-year symptoms of ADHD, African-American children had lower adjusted odds of past-year ADHD medication, compared with white children at fifth grade (aOR, 0.33 [95% CI, 0.17–0.62]), seventh grade (aOR, 0.34 [95% CI, 0.18–0.64]), and 10th grade (aOR, 0.41 [95% CI, 0.22–0.75]). Latino children had decreased odds compared with white children at fifth grade (aOR, 0.38 [95% CI, 0.16–0.90]) and 10th grade (aOR, 0.42 [95% CI, 0.20-0.86]) only (Table 4).

When examining disparities in medication use among children who had been diagnosed with ADHD (whether they had symptoms), African-American children (fifth grade odds ratio [OR], 0.46 [95% CI, 0.22–0.97]; 10th grade OR, 0.42 [95% CI, 0.24–0.74]) and Latino children (fifth grade OR, 0.17 [95% CI, 0.07–0.39]; 10th grade OR, 0.28 [95% CI, 0.14–0.57]) had lower unadjusted

TABLE 4 aORs of ADHD Medication Use by Race/Ethnicity Over 3 Waves Among Children With a Diagnosis or Symptoms of ADHD

Child Race/Ethnicity	Fifth Grade (n = 577)		Seventh Grade (n = 721)		10th Grade (n = 645)	
	% (M)	aOR (95% CI)	% (M)	aOR (95% CI)	% (M)	aOR (95% CI)
Total	47 (270)		36 (261)		45 (282)	
White	73 (125)	Ref	61 (118)	Ref	67 (143)	Ref
African-American	41 (101)	0.33 (0.17–0.62)[a]	33 (97)	0.34 (0.18–0.64)[a]	35 (88)	0.41 (0.22–0.75)[a]
Latino	24 (31)	0.38 (0.16–0.90)[a]	19 (35)	0.51 (0.23–1.15)	29 (36)	0.42 (0.20–0.86)[a]
Other	45 (13)	0.37 (0.12–1.10)	29 (11)	0.24 (0.11–0.56)[a]	44 (15)	0.33 (0.11–0.96)[a]

Adjusted for child age, sex, health insurance, mental health symptoms, and school functioning; household composition, income, and highest parental educational attainment; parent English proficiency and reported receipt of FCC in child's health care; and study site. Significant findings are bolded. Fifth grade analysis was limited to children with ADHD symptoms or diagnosis at wave 1. Seventh grade analysis was limited to children with ADHD symptoms or diagnosis at wave 1 or with symptoms at wave 2 (diagnosis not reported at wave 2). Tenth grade analysis was limited to children with ADHD symptoms or diagnosis at wave 3.

[a] Significant findings.

TABLE 5 aORs of ADHD Medication Use According to Race/Ethnicity Over 3 Waves Among Children With No Diagnosis or Symptoms of ADHD at Wave 1

Child Race/Ethnicity	Fifth Grade (n = 3628)		Seventh Grade (n = 3628)		10th Grade (n = 3596)	
	% (M)	aOR (95% CI)	% (M)	aOR (95% CI)	% (M)	aOR (95% CI)
Total	1 (44)		2 (86)		4 (138)	
White	1 (7)	Ref	3 (25)	Ref	7 (56)	Ref
African-American	2 (22)	1.03 (0.27–3.96)	3 (33)	0.73 (0.30–1.74)	4 (39)	0.59 (0.28–1.22)
Latino	1 (13)	0.51 (0.12–2.23)	2 (23)	0.85 (0.31–2.34)	3 (38)	0.55 (0.24–1.29)
Other	1 (2)	1.23 (0.13–11.64)	2 (5)	1.08 (0.30–3.92)	4 (5)	0.70 (0.25–2.02)

Adjusted for child age, sex, health insurance, mental health symptoms, and school functioning; household composition, income, and highest parental educational attainment; parent English proficiency and reported receipt of FCC in child's health care; and study site.

odds of medication use compared with white children. This sample limited to children with a diagnosis did not have adequate numbers to support adjusted analysis (n = 328 for fifth grade; n = 368 for 10th grade); results not shown in table.

Medication Rates Among Children Without ADHD According to Symptoms or Diagnosis by Fifth Grade

Among children who had neither past-year symptoms consistent with ADHD nor an ADHD diagnosis by fifth grade (and thus would not likely meet ADHD diagnostic criteria at any age), there was no statistically significant difference in past-year medication use according to race/ethnicity (1%–2% of white, African-American, and Latino children were taking ADHD medication at fifth grade and 2%–3% at seventh grade). By 10th grade, the difference in medication use was statistically significant (P = .004); 7% of white children without ADHD according to symptoms or diagnosis in fifth grade took ADHD medication in the past year, compared with 4% for African-American children and 3% for Latino children. In adjusted analyses, however, the odds of medication use were not statistically significant for African-American and Latino children compared with white children at fifth, seventh, and 10th grades (Table 5).

Findings were not sensitive to inclusion of FCC care as a covariate.

DISCUSSION

In this longitudinal, multisite study, African-American and Latino children were less likely to have a parental report of ever receiving an ADHD diagnosis or of taking ADHD medication in the past year compared with white children; the disparity in medication use persisted among children with either a diagnosis of ADHD or with symptoms of ADHD. The disparity was not observed in adjusted analysis among children who had no history of ADHD according to diagnosis or symptoms by fifth grade.

Other large studies have found similar disparities in ADHD diagnosis for African-American and/or Latino children, including the 2003–2004 and 2007 National Survey of Children's Health,[7,26,27] the Early Childhood Longitudinal Survey–Kindergarten Cohort,[2,3] the 1997 to 2001 National Health Interview Survey,[6] and the 1997 to 2005 Medical Expenditure Panel survey.[5] Similar disparities have also been reported in medication use for ADHD, finding that African-American and/or Latino children are less likely to take a medication for ADHD.[1,3,5,6,27] Reports from 3 waves of the National Survey of Children's Health (2003, 2007, and 2011–2012) suggest that racial/ethnic disparities in diagnosis and medication treatment continued to emerge over time, reflecting the trends of increasing parent-reported ADHD diagnosis and medication use in the United States from 2003 to 2011.[1,27]

Not all studies, however, have found racial/ethnic disparities in ADHD diagnosis or medication use.[28,29] For example, Froehlich et al,[29] using 2001–2004 National Health and Nutrition Examination Survey data, found no such disparities among children meeting *Diagnostic and Statistical Manual of Mental*

Disorders, *Fourth Edition*, criteria for ADHD. Differences in study findings may relate to such factors as relative distribution of white versus nonwhite participants, or the breadth of socioeconomic covariates included in adjusted analyses.

Few previously published studies have empirically addressed the question of whether ADHD medication disparities are primarily due to underdiagnosis/undertreatment of African-American and Latino children or overdiagnosis/overtreatment of white children. One commentary addressed the question of overdiagnosis but without empirical data.[30] Another study focused on whether overdiagnosis of ADHD was a problem, based on previously published ADHD prevalence data.[8] We found that, among children with a potential need for ADHD medication (ie, ADHD symptoms or diagnosis), African-American and Latino children were less likely to take ADHD medication than white children; however, among children with no apparent need for ADHD medication (ie, no ADHD symptoms or diagnosis), white children were not significantly more likely to take medication. Our study does not have an objective measure of ADHD prevalence, and thus we are unable to directly address this question of overdiagnosis and overtreatment. However, our findings do indirectly suggest that these disparities are more likely from the underdiagnosis/undertreatment of African-American and Latino children than the overdiagnosis/overtreatment of white children. It may be that African-American and Latino children are less likely to report taking a medication for ADHD because they are less likely to receive a diagnosis of ADHD, or because when diagnosed, they are less like to receive (or accept) a medication for ADHD.

In fifth and seventh grades, only small percentages of children with neither symptoms nor a diagnosis of ADHD by fifth grade were taking ADHD medication (across all racial/ethnic groups of children); the implication of this finding is that overdiagnosis and overtreatment likely contribute only minimally to the disparity in medication treatment. This proportion increased for 10th grade, particularly among white children, and in unadjusted analysis, there was a significant difference between white children compared with African-American and Latino children. We found no statistically significant differences in adjusted odds, which may be due to the small number of children with medication use in those models.

This study has limitations. First, parent-reported data may introduce reporting bias; however, a recent study reported similarities between parent-reported ADHD estimates and administrative claims data estimates.[31] In addition, we were unable to include reports from teachers or schools on school functioning, which is an important element of ADHD symptom reporting. Our child-reported school functioning measures are limited in that they focused on behavior, were not validated against teacher ratings, and may not accurately reflect academic achievement. It is also possible that there are racial/ethnic differences in parental reporting of symptoms for which we are not able to account; these differences in reporting could potentially lead to either an underestimation or overestimation of the disparities in our findings. Data collection was limited to children in public school settings in 3 metropolitan areas, and our sample's racial/ethnic composition is different from the US composition because it was designed to have a balanced sample of African-American, Latino, and white children; thus, caution should be used in generalizing our findings to other populations. We also lacked detailed information on ADHD medication use (eg, type and dose of medication, duration of use); these data should be considered for future studies.

CONCLUSIONS

Our findings have implications for the diagnosis and treatment of ADHD. There are various improvements in care that may help in closing this gap in diagnosis and treatment. These include actively and universally eliciting parental concerns about child behavior and academic performance (at home and school) at well-visits,[32,33] providing care that is culturally relevant in families' preferred languages,[34] and linking with community resources to provide mental health education, guidance, and services to families (eg, parent training courses for parents of children with ADHD).[35–39] Pediatric clinicians also may need to consider universal behavioral health screening tools for children to improve diagnostic capabilities and recognize when a child has ADHD symptoms, even if the problem is not recognized by the parent.

Because the rates of diagnosis and treatment are rising in the general population of US children, a significant need remains to identify and treat African-American and Latino children who have ADHD and avoid a widening of these disparities.

ACKNOWLEDGMENTS

We thank the Healthy Passages team, staff, and participants for making the study possible.

ABBREVIATIONS

aOR: adjusted odds ratio
ADHD: attention-deficit/hyperactivity disorder
CI: confidence interval
DPS: Diagnostic Interview Schedule for Children Predictive Scales
OR: odds ratio

obtained funding, participated in study design and interpretation of findings, revised manuscript drafts, and contributed to overall supervision; and all authors provided final approval for the submitted manuscript.

DOI: 10.1542/peds.2016-0407

Accepted for publication Jun 30, 2016

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: The Healthy Passages Study was funded by the Centers for Disease Control and Prevention, Prevention Research Centers (Cooperative Agreements CCU409679, CCU609653, CCU915773, U48DP000046, U48DP000057, U48DP000056, U19DP002663, U19DP002664, and U19DP002665). The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

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