

# DISPARITIES IN ADHD DIAGNOSIS AND TREATMENT BY RACE/ETHNICITY IN YOUTH RECEIVING KENTUCKY MEDICAID IN 2017

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**Background:** Kentucky has among the highest rate of attention deficit/hyperactivity disorder (ADHD) and stimulant use in the United States. Little is known about this use by race/ethnicity and geography. This article describes patterns of diagnosis of ADHD and receipt of stimulants and psychosocial interventions for children aged 6-17 years receiving Kentucky Medicaid in 2017 and identifies factors associated with diagnosis and treatment.

**Methods:** Using Medicaid claims, children with and without ADHD (ICD-10 codes F90.0, F90.1, F90.2, F90.8, and F90.9) were compared and predictors of diagnosis and treatment type were examined. Psychosocial interventions were defined as having at least one relevant CPT code. Chi-squared tests and logistic regression models were used for univariate and multivariable analysis, respectively.

**Results:** The rates of ADHD, stimulant use, and psychosocial interventions in our study population exceeded the national average (14% vs 9%; 75% vs 65.5%; and 51% vs 46.5%, respectively). The distributions varied by sex, race/ethnicity, sex among race/ethnicities, and population density. In general, race/ethnicity predicted ADHD diagnosis, stimulant use, and receipt of psychosocial interventions with non-Hispanic White children being more likely to receive diagnosis and medication, but less likely to receive psychosocial therapy than other children. Differences were also shown for rural compared with urban residence, sex, and sex within racial/ethnic groups.

**Conclusions:** Diagnosis and treatment modalities differed for children by race/ethnicity, population density, and sex.

## INTRODUCTION

In 2016, more than 6 million US children (9.4%) had ever had the diagnosis of attention deficit/hyperactivity disorder (ADHD).<sup>1</sup> Rates vary across states and by demographics. Some have suggested that the rate of diagnosis,<sup>2,3</sup> different treatment types,<sup>4</sup> and treatment quality may be associated with socioeconomic status and/or race/ethnicity.<sup>5</sup> However, there have been conflicting findings,<sup>4</sup> which may be partially attributed to differences in methodologies. In one recent study, it was suggested that the gap in receiving diagnosis and treatment between Black and White children was

lessening, but there may be an increasing trend for Hispanic children.<sup>4</sup> One additional complexity in understanding these potential health disparities is the interrelatedness between race/ethnicity and socioeconomic status.

Kentucky ranks among the highest in the United States for children with the diagnosis of ADHD and for the treatment of ADHD with stimulants.<sup>1,6</sup> Kentucky is also a relatively poor state; Kentucky Medicaid covers more than half of the children. Examining the racial/ethnic differences in diagnosing and treating ADHD in children receiving Kentucky Medicaid reduces the risk of confusing race/ethnicity with poverty as all of

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More data are needed to better understand whether differences are due to provider bias, child characteristics, or cultural variations impacting the utilization of different treatment options. *Ethn Dis.* 2021;31(1):67-76; doi:10.18865/ed.31.1.67

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the children are from low-income families. In a 2017 study using Medicaid data from 2008-2011 from nine states, Cummins and colleagues found racial/ethnic differences in rates of medication and treatment discontinuation.<sup>5</sup> No other studies were found using Medicaid data or datasets that are more recent. Treatment of ADHD is highly successful; it is important to identify and address racial/ethnic disparities in the diagnosis and treatment of the disorder.<sup>7</sup>

The purpose of this study was to describe patterns of ADHD diagnosis and treatment types for children aged 6-17 years receiving Kentucky Medicaid in 2017 and to identify factors associated with diagnosis and treatment types. We hypothesized that children from racial/ethnic minority backgrounds, those living in rural areas, and females will differ in terms of receiving an ADHD diagnosis and receipt of different treatment types when compared with non-Hispanic White children, those living in rural and suburban areas, and males.

## METHODS

### Study Population

This cross-sectional analysis of diagnostic and treatment patterns for ADHD across child race and ethnicity used comprehensive billing information from Kentucky Medicaid medical and pharmacy claims with a date of service between 1/1/2017 and 12/31/2017 (N= 693,942) and enrollment information for the years 2012-2017. The Kentucky Cabinet for Health and Family Services, Department of Medicaid Services pro-

vided the Kentucky Medicaid data. These data include children's demographic information (ie, age, sex, self-identified race, and residence zip code), patient-level diagnostic information, procedure code, prescription data, provider information, and billing information. Included in our sample were children aged 6 to 17 years who had valid zip codes (n = 343,389). Children in the foster care system were excluded (n = 6,283; 1.8%) because of potential underestimation of the receipt of psychosocial interventions. For some of these children, payments are "bundled" for some services. In the case of a "bundled" payment, no claim is filed for the services provided. Finally, children with incomplete records of race/ethnicity were excluded from the analysis (n = 32,155; 9.5%), resulting in our 2017 analytic sample of children (n = 304,951). Children with a diagnosis of ADHD (n = 43,597; 14%) were compared with those without ADHD (n = 261,354; 86%).

### Definitions and Covariates

ADHD was defined by ICD-10 codes F90.0, F90.1, F90.2, F90.8, and F90.9. The list of stimulant medications, based on the NDC description found in Medicaid pharmacy data and verified by two child psychiatrists, is presented in Appendix A (available from corresponding author). Psychosocial therapy was defined as a child having received a behavioral health intervention at least five times within the year as indicated by a medical claim for one of the following CPT codes: 90832-34, 90836-40, 90840, 90845-49, 90853, 90875-76, and 90880. These codes include

both outpatient and inpatient visits for individual and/or group therapy. Race and ethnicity were provided in the Kentucky Medicaid enrollment data for the years 2012-2017. Efforts were made to supplement missing race and ethnicity data in 2017 with information from previous years for the same child. Nonetheless, 32,155 children in our sample had missing information in that variable. Race and ethnicity were stratified into a single categorical variable as follows: non-Hispanic White, non-Hispanic Black, non-Hispanic Asian, non-Hispanic other (including American Indian, Native Hawaiian, and other race), and Hispanic. The child's sex and age came from 2017 Kentucky Medicaid enrollment data. Geography of child residence was determined by mapping individual postal zip codes to the 2013 Rural Urban Continuum Codes (RUCC) as defined by the United States Department of Agriculture (USDA). Individuals' geographic variables were categorized as urban (RUCC code of 1 to 3), suburban (RUCC code of 4 to 6), or rural (RUCC code of 7 to 9).

### Statistical Analysis

We first summarized the counts and percentages stratified by demographic variables and race/ethnicity. Chi-squared tests were used to test the association between each demographic variable and characteristics of children with ADHD to those without the diagnosis of ADHD, as well as the associations between race/ethnicity and each outcome variable within each stratified variable. Our primary outcomes of interest were prevalence of ADHD among chil-

**Table 1. Demographics and characteristics for children aged 6-17 years with ADHD vs controls for 2017 Kentucky Medicaid enrollees**

Parameters	Overall n (%)	ADHD n (%)	Control n (%)	P <sup>a</sup>
Overall	304,951	43,597 (14.3)	261,354 (85.7)	
Sex				<.0001
Female	149,841 (49.1)	13,105 (30.1)	136,736 (52.3)	
Male	155,110 (50.9)	30,492 (69.9)	124,618 (47.7)	
Race/ethnicity				<.0001
White	231,851 (76.0)	35,402 (81.2)	196,449 (75.2)	
Black	43,407 (14.2)	5,946 (13.6)	37,461 (14.3)	
Hispanic	20,370 (6.7)	1,238 (2.8)	19,132 (7.3)	
Asian	3,246 (1.1)	43 (0.1)	3,203 (1.2)	
Other <sup>b</sup>	6,077 (2.0)	968 (2.2)	5,109 (2.0)	
Patient residence				<.0001
Urban	153,299 (50.3)	11,488 (26.4)	79,823 (30.6)	
Suburban	60,013 (19.7)	8,760 (20.1)	51,253 (19.6)	
Rural	91,311 (30.0)	23,298 (53.5)	130,001 (49.8)	
Age group				<.0001
6-11 years	166,135 (54.5)	25,187 (57.8)	140,948 (53.9)	
12-17 years	138,816 (45.5)	18,410 (42.2)	120,406 (46.1)	
Prescribed stimulant medication	35,273 (11.6)	32,676 (75.0)	2,597 (1.0)	<.0001
Receiving psychosocial therapy	33,995 (11.2)	16,221 (37.2)	17,774 (6.8)	<.0001

a. P of chi-square test for the association between each variable and disease status (ADHD or control).

b. Other race included American Indian, Native Hawaiian, and other race subjects.

dren, stimulant use among children with ADHD, and psychosocial therapy among children with ADHD.

Multiple logistic regression modeling was applied to investigate the effect of race/ethnicity on each of the above outcomes, adjusting individual and environmental covariates. Covariates included categorized age (ie, aged 6-11 years or 12-17 years), sex, and residential areas (urban, suburban, or rural). Understanding that the potential inter-relatedness of the child's race/ethnicity and residential area, an interaction was included between the two variables. An additional interaction between race/ethnicity and age category was also included, along with adjusted odds ratios and their 95% CIs. A 2-tailed P of <.05 was considered statistically significant. Data preparation and analyses were performed with

SAS software version 9.4 (SAS Institute, Cary NC). Informed consent was not required for this secondary data analysis study. The institutional review board at the University of Louisville approved the study protocol.

## RESULTS

### Demographic Characteristics

The population of children aged 6-17 years on Kentucky Medicaid were predominately non-Hispanic White (76%) and living in an urban area (50%). Forty-nine percent of the population were female, while only 30% of the children with ADHD were female (Table 1). Half of the study group lived in an urban setting and slightly more than half (55%) were between ages 6-11 years.

## PREVALENCE OF ADHD DIAGNOSIS

The overall prevalence of ADHD diagnosis was 14% (Table 2). The prevalence of ADHD diagnosis for males was more than twice that for females (20% vs 9%). The prevalence of ADHD diagnosis was similar for children who were non-Hispanic Black (14%) and non-Hispanic White (15%), but significantly lower among Hispanic (6%) and Asian (1%) children. Children classified as "other" race/ethnicities had a prevalence of ADHD diagnosis of 16%. The prevalence of ADHD diagnosis among children living in urban and suburban areas was 15% (Table 2) and 13% in rural areas. See Table 2 for additional breakdowns of prevalence by child residence and race/

**Table 2. Prevalence (%) of ADHD among children, aged 6-17 years, enrolled in 2017 Kentucky Medicaid; stratified by demographic variables**

	Total	White	Black	Hispanic	Asian	Other	P <sup>a</sup>
Overall	14	15	14	6	1	16	<.0001
Sex							
Female	9	9	8	3	1	11	<.0001
Male	20	21	19	9	2	21	<.0001
Patient residence							
Urban	15	18	14	6	1	16	<.0001
Suburban	15	15	14	8	1	17	<.0001
Rural	13	13	14	7	3	15	<.0001
Age							
6-11 years	15	16	15	6	1	16	<.0001
12-17 years	13	14	13	5	1	15	<.0001
Prescribed stimulant medication	93	93	94	92	89	92	.027
Receiving psychosocial therapy	48	47	56	42	30	50	<.0001

a. P of chi-square test for race disparities.

ethnicity. The prevalence of ADHD diagnosis was slightly higher among elementary school-aged children (aged 6-11 years) compared with older children (aged 12-17 years; 15% vs 13%) and across all race/ethnicity categories. Among children prescribed stimulant medication, 93% had a diagnosis of ADHD. Among children receiving at least five psychosocial therapy interventions within the year, 48% had a diagnosis of ADHD.

### Prevalence of Receipt of a Stimulant and Psychosocial Therapy

As shown in Table 3, the overall prevalence of stimulant medication use in children with ADHD was 75%. The prevalence rates ranged from 77% for children categorized as “other” race/ethnicity to 56% for children classified as Asian. In children across all race/ethnicities, males received stimulant medications at a

rate higher than females. There was variability across child residence type and among various race/ethnicities. Younger children (aged 6 to 11 years) have a slightly higher prevalence rate across all race/ethnicities except for Asian children for which the rate was the same in each age group. The prevalence of receiving a stimulant medication among children with ADHD who received at least five psychosocial interventions was 70%

**Table 3. Prevalence (%) using at least 1 stimulant medication among children, aged 6-17 years, with ADHD and enrolled in 2017 Kentucky Medicaid; stratified by demographic variables**

	Totals	White	Black	Hispanic	Asian	Other	P <sup>a</sup>
Overall	75	76	72	67	56	77	<.001
Sex							
Female	71	72	69	65	54	71	.005
Male	76	77	73	68	57	81	<.001
Patient Residence							
Urban	76	77	71	67	57	76	<.001
Suburban	76	76	75	70	33	80	.093
Rural	73	73	83	62	60	78	<.001
Age							
6-11 years	76	77	73	68	56	79	<.001
12-17 years	73	74	71	66	56	73	<.001
Receiving psychosocial therapy <sup>b</sup>	70	70	68	63	47	69	<.001

a. P of chi-square test for race disparities.

b. Received psychosocial therapy 5 or more times.

**Table 4. Prevalence (%) using at least 5 psychosocial therapy interventions among children, aged 6-17 years, with ADHD and enrolled in 2017 Kentucky Medicaid; stratified by demographic variables**

	Totals	White	Black	Hispanic	Asian	Other	P <sup>a</sup>
Overall	37	36	41	40	35	37	<.001
Sex							
Female	39	38	42	38	31	39	.109
Male	37	36	41	41	37	35	<.001
Patient Residence							
Urban	38	35	43	42	40	36	<.001
Suburban	33	33	27	32	0	35	.026
Rural	40	40	35	40	20	38	.282
Age							
6-11 years	38	37	46	41	37	39	<.001
12-17 years	36	36	35	39	31	32	.366
Prescribed stimulant medication	35	34	39	38	29	33	<.001

a. P of chi-square test for race disparities.

for children who were non-Hispanic White, 68% for non-Hispanic Black, 63% for Hispanic, 47% for Asian, and 69% for other races/ethnicities. The prevalence rates of ADHD medication use for children with ADHD were significantly different across race categories by age category, sex, and child residence, except for children living in a suburban area.

The overall prevalence of receiving psychosocial therapy intervention among children with ADHD was 37% (Table 4). The prevalence of receiving psychosocial therapy among children with ADHD was higher for children who were non-Hispanic Black and Hispanic. The prevalence of receiving psychosocial therapy among children with ADHD across all races/ethnicities was not significantly different for girls, children living in rural areas or for those aged 12-17 years of age (Table 4).

### Predictive Models

Table 5 presents the findings from our multiple logistic regres-

sion models where we examined the odds ratios of receiving the diagnosis, a stimulant, or psychosocial therapy after adjusting for age, sex, child residence, the interaction between age category and race, and the interaction between residence and race (Table 5).

The adjusted odds of receiving an ADHD diagnosis were lower among non-Hispanic Black (29% less), Hispanic (73% less), Asian (95% less), and other races/ethnicities (15% less) compared with non-Hispanic White children. The adjusted odds were 16% lower among children aged 12-17 years compared with children aged 6-11 years, and they were 2.6 times higher among boys. Additionally, children living in suburban (OR: .81; 95%CI: .78, .83) and rural areas (OR: .67; 95%CI: .65, .68) compared with children living in urban areas, had lower odds of being diagnosed with ADHD. Non-White children living in rural and suburban areas have increased odds of being diagnosed with ADHD.

The adjusted odds of receiving stimulant medication in children with ADHD was lower among non-Hispanic Black (32% less), Hispanic (44% less), and Asian (65% less) compared with non-Hispanic White children. While being male was associated with 31% higher odds of receiving stimulant medication, the adjusted odds were 15% lower among children aged 12-17 years compared with those aged 6-11 years. The adjusted odds of receiving an ADHD medication in children with ADHD were lower among children living in suburban (7% less) and rural areas (23% less) compared with children living in an urban area. Black children with ADHD living in rural and suburban areas have higher odds of receiving stimulant medication (2.6 times and 31% higher, respectively) than their non-Hispanic White counterparts.

Lastly, Table 5 presents the findings related to the predictors of receiving psychosocial therapy. The adjusted odds of receiving at least

Table 5. The associations between covariates and each outcome using multiple logistic regression models

Covariates	Outcome		
	ADHD	Stimulant Medication	Psychosocial Therapy
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age: (12-17 years) vs (6-11 years)	.84 (.82, .86) <sup>a</sup>	.85 (.81, .89) <sup>a</sup>	1.00 (.95, 1.04)
Sex: male vs female	2.58 (2.52, 2.64) <sup>a</sup>	1.31 (1.25, 1.37) <sup>a</sup>	.90 (.87, .94) <sup>a</sup>
Race/ethnicity: Black vs White	.71 (.68, .74) <sup>a</sup>	.68 (.62, .74) <sup>a</sup>	1.68 (1.55, 1.82) <sup>a</sup>
Race/ethnicity: Hispanic	.27 (.25, .29) <sup>a</sup>	.56 (.47, .67) <sup>a</sup>	1.37 (1.16, 1.61) <sup>a</sup>
Race/ethnicity: Asian	.05 (.04, .08) <sup>a</sup>	.35 (.15, .78) <sup>a</sup>	1.36 (.59, 3.13)
Race/ethnicity: Other	.85 (.76, .94) <sup>a</sup>	1.02 (.81, 1.28)	1.14 (.94, 1.39)
Residence: suburban vs urban	.81 (.78, .83) <sup>a</sup>	.93 (.88, 1.00) <sup>a</sup>	.89 (.84, .94) <sup>a</sup>
Residence: rural vs urban	.67 (.65, .68) <sup>a</sup>	.77 (.73, .82) <sup>a</sup>	1.24 (1.18, 1.30) <sup>a</sup>
Race*Residence: Black*Suburban	1.29 (1.17, 1.42) <sup>a</sup>	1.31 (1.06, 1.61) <sup>a</sup>	.53 (.43, .65) <sup>a</sup>
Race*Residence: Black*Rural	1.55 (1.37, 1.75) <sup>a</sup>	2.56 (1.91, 3.42) <sup>a</sup>	.56 (.45, .71) <sup>a</sup>
Race*Residence: Hispanic*Suburban	1.83 (1.55, 2.16) <sup>a</sup>	1.27 (.90, 1.79)	.74 (.53, 1.03)
Race*Residence: Hispanic*Rural	1.77 (1.47, 2.12) <sup>a</sup>	1.03 (.72, 1.48)	.73 (.51, 1.04)
Race*Residence: Asian*Suburban	1.59 (.48, 5.23)	.41 (.03, 4.95)	NA
Race*Residence: Asian*Rural	3.50 (1.35, 9.08) <sup>a</sup>	1.50 (.22, 1.2)	.30 (.03, 3.00)
Race*Residence: Other*Suburban	1.34 (1.11, 1.61) <sup>a</sup>	1.29 (.86, 1.94)	1.07 (.76, 1.52)
Race*Residence: Other*Rural	1.39 (1.15, 1.69) <sup>a</sup>	1.35 (.88, 2.07)	.88 (.61, 1.27)
Age*Race: (12-17 years)* Black	1.07 (1.00, 1.13) <sup>a</sup>	1.10 (.97, 1.25)	.65 (.58, .72) <sup>a</sup>
Age*Race: (12-17 years)*Hispanic	.99 (.88, 1.12)	1.11 (.86, 1.43)	.90 (.71, 1.15)
Age*Race: (12-17 years)*Asian	.97 (.52, 1.81)	1.30 (.37, 4.58)	.73 (.19, 2.83)
Age*Race: (12-17 years)*Other	1.06 (.92, 1.23)	.83 (.61, 1.13)	.77 (.58, 1.02)

a. P&lt;.05.

OR, adjusted odds ratio; CI: confident interval.

five psychosocial therapy interventions in children with ADHD was higher among Black (68%) and Hispanic (37%) children compared with non-Hispanic White children. Black children in suburban areas (OR: .53; 95%CI: .43, .65), and rural areas (OR: .56; 95%CI: .45, .71), and adolescents who were Black (OR: .65; 95%CI: .58, .72) had lower odds of receiving psychosocial therapy. Residence in a suburban area was associated with lower odds of receiving psychosocial therapy in children with ADHD when compared with urban residence (OR: .89; 95%CI: .84, .94), while residence in a rural area was associated with higher odds (OR: 1.24; 95%CI: 1.18, 1.30).

## DISCUSSION

The current study demonstrates that racial/ethnic differences persist in 2017 Kentucky Medicaid data for the diagnosis of and treatment for ADHD for children aged 6-17 years. These differences exist even though all of the children qualified for Medicaid. This sample decreases the likelihood that the differences are directly related to difference in socioeconomic status, which has been a confounding factor in some previous studies. However, much remains unknown regarding the underlying reasons for these differences.

In summary, Kentucky's rates of receiving an ADHD diagnosis and a stimulant for children aged 6-17

years exceeds the national average (14% vs 9% and 75% vs 65.5%, respectively);<sup>1,7</sup> while 51% of these children received at least one psychosocial therapy intervention and 37% received at least five, compared with the national average of 46.5%.<sup>1,7</sup> The American Academy of Pediatrics' (AAP) 2019 clinical guidelines for the diagnosis and treatment of ADHD in children and adolescents suggest that FDA-approved medication for ADHD and parent training in behavior management should be routinely recommended for school-aged children with ADHD.<sup>8</sup> Therefore, these data suggest inadequate treatment of the disorder, which tends to be magnified in certain subpopulations.

We found differences in the rates

of diagnosis and treatment types for children by race/ethnicity, sex, geography, and interactions between race/ethnicity and geography. The rates for receipt of an ADHD diagnosis were lowest for Hispanic and Asian children. Among children diagnosed with ADHD, racial/ethnic minority children had lower rates of receiving a stimulant medication, with Hispanic and Asian children having the lowest rates. Non-Hispanic Black and Hispanic children had the highest rates of receiving psychosocial therapy interventions.

In the predictive models, which controlled for confounding factors, males were more likely than females to receive the diagnosis, a stimulant, and were less likely to receive psychosocial therapy intervention. All minority races/ethnicities were less likely to receive the diagnosis and a stimulant compared with non-Hispanic White children, but more likely to receive psychosocial therapy although the difference in receipt of psychosocial therapy was not significant for children identifying as Asian or "other." Children living in rural and suburban areas were less likely to receive the diagnosis or a stimulant than children living in urban areas, which may reflect the paucity of mental health professionals in Kentucky. However, children living in rural areas were more likely to receive psychosocial therapy than those living in urban areas, while children living in suburban areas were less likely.

The reasons for this finding are unclear. The majority of counties in Kentucky are deemed Health Professional Shortage Areas for Mental Health (HPSA-MH).<sup>9</sup> However, that

designation primarily refers to psychiatrists. The number of psychologists and allied health professionals with expertise in mental health is unknown. Perhaps there are fewer barriers to access for other mental health professionals. It is unknown whether these professionals have training in child and adolescent mental health issues and the current study was unable to determine whether evidence-based practices were employed, the quality of the treatments received, and the degree to which culturally appropriate care was delivered.

The finding of racial, ethnic, and sex disparities in ADHD diagnosis and the use of different treatment modalities is not new.<sup>4, 10-13</sup> Moody proposed several potential explanations to account for these differences including racial bias, cultural misconceptions and stigma, medical mistrust, cultural influence on the perception of behavior, and structural racism.<sup>13</sup> Kang and Harvey reported differences of perception of child behavior between Black parents and White teachers.<sup>14</sup> In their study, researchers showed parents and teachers video clips of children in classrooms and asked them to rate ADHD behaviors and ADHD likelihood. Parents and teachers completed questionnaires regarding beliefs about ADHD stigma, experiences with racial discrimination, and racial attitudes. White teachers rated Black boys' ADHD behaviors and their likelihood of having ADHD higher than Black parents. This was amplified if White teachers endorsed more negative racial attitudes toward African Americans.<sup>14</sup> The same held true for Black parents who reported

more exposure with racial discrimination.<sup>14</sup> Another study reported that racial and ethnic minority children were less likely to have a parent-reported ADHD diagnosis.<sup>4</sup> Interestingly, when delineating ADHD diagnosis using a case definition obtained by validated symptom rating scales submitted both by parents and by teachers, only Hispanic children were less likely to meet the criteria for diagnosis.<sup>1</sup> The authors concluded under-diagnosis in children classified as minorities is not a true

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*Kentucky's rates of receiving an ADHD diagnosis and a stimulant for children aged 6-17 years exceeds the national average (14% vs 9% and 75% vs 65.5%, respectively).*

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result of lower prevalence but may, instead, be related to clinical under-identification, although results were not as clear for Hispanic children.<sup>2</sup>

Disparate treatment modalities have also been reported in the literature.<sup>12</sup> Hudson and associates found that differences in stimulant use can be partially explained by differences in responses in individual/family characteristics (health insurance, health status, access to care

variables), particularly for Hispanic children.<sup>12</sup> They concluded that culture may play a role in parents' interpretations and in determining how parents respond to child behavioral cues, trust in the health care system, and their confidence in using medications to treat behavioral symptoms.<sup>12</sup>

The findings from our study and those reported here are important because racial/ethnic disparities in the diagnosis and treatment of ADHD pose barriers to treatment of the disorder. School achievement and long-term economic and health outcomes have been associated with ADHD suggesting that a lack of treatment may have long-term negative implications for children of minority race/ethnicity.

In two selective reviews, researchers highlight the contribution of social and cultural influences on ADHD diagnosis and treatment. Cultural norms, beliefs, and values may provide insight to partially explain racial and ethnic differences, including the perception of disruptive behavior. Minority populations may face discrimination, stereotyping, and stigma when a behavioral health diagnosis is made, which may be seen as a reflection of poor parenting skills, lower intellectual abilities of the child, and, in some cases, defiant or criminal behaviors.<sup>15,16</sup> Providers from diverse backgrounds and clinical strategies for providing culturally appropriate services including interpretive language services, are needed to reduce personal, family, and public stigma; and improve uptake of mental health services for ethnic and racial minority families.<sup>15-21</sup> The literature suggests that families from some racial/ethnic minority groups

are more concerned about stigma associated with mental health diagnoses and treatments<sup>17,22</sup> and this serves as a barrier for seeking treatment.<sup>18,23,24</sup> For many Asian cultures, little data are available that address the experience of parental caregivers of children and adolescents with mental health problems.<sup>25</sup> Where studies exist, there are little data within and across various racial and ethnic subgroups. One systematic review across six groups of Asian societies suggested that individuals with mental illnesses were less socially acceptable and their illness was seen as a personal weakness.<sup>16</sup> In the current study, the number of Asian families is small and the data cannot be examined with greater granularity. The rates of diagnosis and treatment with stimulant medication are much lower when compared with all other races/ethnicities especially non-Hispanic White children. In addition to public and self-stigma being associated with decreases in help-seeking for mental health,<sup>18,23,26</sup> diagnostic tools have often not been validated for use in many racial and ethnic groups.<sup>27</sup>

The current study also identified interactions between race/ethnicity and geography of residence. Non-Hispanic Black children received the ADHD diagnosis and a stimulant at a higher rate in suburban and rural areas when compared with non-Hispanic White children in urban areas, but were almost half as likely to receive behavioral health interventions. Hispanic children in suburban and rural areas were more likely to receive the ADHD diagnosis, but there was no difference in treatment type compared with non-Hispanic White children from suburban and rural areas.

As previously discussed, there are provider, access, and family factors that may be associated with these differences, which are confounded by place of residence and availability acceptable services. In smaller geographic areas, it may be less likely that there are providers of similar racial/ethnic backgrounds and the perceived stigma may be greater especially if they lack sufficient social support.<sup>28,29</sup>

### Study Limitations

Like most studies, the current study has limitations. Administrative claims data are known to have limitations.<sup>30</sup> One limitation is that data are only captured if a claim is filed. For the current study, that limits the interpretation as we can only determine if the prescription was filled, not whether a medication was prescribed. Similarly, if a service is known to be reimbursed at a low rate, such as behavioral health interventions, in some cases, a provider may opt not to bill for the service. Additionally, some behavioral health services for some children may be reimbursed as a "bundled payment" that would not be directly billed and thus, not captured. This frequently occurs for some children in foster care, which is why those children were omitted from our analytic sample. Behavioral health services for school-aged children may be offered through the school system, which cannot be captured in claims data. These billing and claims issues may result in an underestimation of the rate of service provision.

Other limitations include that claims data do not provide insight into the type or quality of the service being provided, the appropriateness



of the diagnosis and/or treatment, or the disease symptoms or severity of symptoms. Psychosocial therapy was defined as receiving at least five interventions within the year, which is not an optimal treatment for most. Race/ethnicity is an optional field in Kentucky Medicaid claims data, so data were not collected for analyses if race/ethnicity was not recorded. Additionally, Hispanic ethnicity was not further described by race. Lastly, the data represent only one state, so it is not known whether the findings are generalizable to other states. However, children receiving health care through Kentucky Medicaid would likely be of similar socioeconomic status as children receiving Medicaid services in other states.

Despite the limitations, these data demonstrate that disparities exist related to sex, race/ethnicity, and geography. More research is needed to understand whether these differences represent provider bias, differences in child characteristics, or cultural influences on the uptake of different treatment options.

## CONCLUSION

More efforts are needed to remove barriers for low-income families and those of minority status to receive optimal care for their children with behavioral and mental health problems. Barriers may include structural barriers such as lack of transportation or lack of providers who will accept families with Medicaid coverage. However, barriers may also include a lack of medical and/or mental health providers who are from similar racial/

ethnic backgrounds or who are competent in caring for individuals from diverse cultural backgrounds. Cummins and colleagues reported that children from minority groups were more likely to discontinue medication and disengage in treatment compared with White children.<sup>5</sup> While it is not clear whether refusal of medication results in a higher rate of adverse outcomes, providers must differentiate between discontinuation that is due to barriers that need to be addressed rather than personal preferences. Similarly, if it is personal preference, clinicians need to provide appropriate information based on cultural norms that will help families make informed decisions. A sustained relationship between clinicians and families as partners working for the child's best interests may help overcome issues of mistrust and stigma.

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## CONFLICT OF INTEREST

No conflicts of interest to report.

## AUTHOR CONTRIBUTIONS

Research concept and design: Davis, Feygin, Creel, Lohr, Williams, Le, Jones, Trace, Pasquenza; Acquisition of data: Lohr, Pasquenza; Data analysis and interpretation: Davis, Jawad, Feygin, Creel, Kong, Sun, Lohr, Williams, Le, Trace; Manuscript draft: Davis, Feygin, Creel, Kong, Sun, Lohr, Williams, Jones, Trace; Statistical expertise: Jawad, Creel, Kong, Sun; Acquisition of

funding: Davis, Pasquenza; Administrative: Williams, Jones, Trace, Pasquenza; Supervision: Davis, Creel, Le

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