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Racial Disparity in Administrative Autism Identification Across the United States During 2000 and 2007

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Abstract

Evidence of disparate identification of autism at national and local levels is accumulating, but there is little understanding about disparate identification of autism at the state level. This study examined trends in state-level administrative identification of autism under the Individuals with Disabilities Education Act. Prevalence rates and odds ratios were calculated for each state using enrollment counts for years 2000 and 2007. Results indicated increases in administrative prevalence of autism for all racial groups from 2000 to 2007, but increasing underidentification of Black and Hispanic students in 2007 compared with White students. Variability existed in the identification of autism among Black and Hispanic students across states over time. Implications for the findings are discussed in the context of the field's need to establish rigorous policies and practices for eligibility determinations due to autism and equitable access to evidence-based intervention practices.

Keywords

disproportionality, racial disparity, autism, disability prevalence

Autism was initially conceived as a disability that primarily affected White children from families with middle- and upper-class socioeconomic backgrounds (Bettelheim, 1967; Kanner, 1949). While data from some recent epidemiological studies suggest that autism is not predicted by race, ethnicity, and socioeconomic status (SES; Fombonne, 2003, 2005, 2007; Yeargin-Allsopp et al., 2003), others indicate differences in identification of autism according to race (Croen, Grether, Hoogstrate, & Selvin, 2002; Croen, Grether, & Selvin, 2002; Donovan & Cross, 2002; Mandell et al., 2009; Mandell et al., 2010; Travers, Tincani, & Krezmien, 2011).

Some investigators have used data from Individuals with Disabilities Education Act (IDEA) Annual Reports to Congress to evaluate for differences in administrative prevalence of autism according to race. For example, two studies on administrative prevalence using data from the 1998 IDEA Report to Congress found overidentification of Black students with autism and underidentification of Hispanic students with autism when compared with White students (Donovan & Cross, 2002; Dyches, Wilder, Sudweeks, Obiakor, & Algozzine, 2004). More recently, using data for the 2006–2007 school year, Tincani, Travers, and Boutot (2009) found that Black, Hispanic, and Native American/Alaska Native students were underidentified with autism compared with White students.

Extending these findings, Travers et al. (2011) examined IDEA data for differences in administrative identification of autism for each year from 1998 to 2006. Prevalence rates for all racial categories increased during each year of the sample, but Hispanic and Native American/Alaska Native students with autism were significantly underidentified in comparison with White students. Black (non-Hispanic) students were significantly overidentified in 1998 and 1999, but were significantly underidentified in every year from 2000 to 2006. White students with autism represented a significantly higher proportion of all students with autism over the same time.

State-level analyses of prevalence have also yielded racial discrepancies in autism identification. Prevalence rates of Black students with autism in Missouri from 1988 to 1995 were consistently higher than White students (Hillman, Kanafani, Takahashi, & Miles, 2000). In Texas, 2004 count data revealed that Hispanic children were 2 to 3

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times less likely to be identified as having autism when compared with White students (Palmer, Walker, Mandell, Bayles, & Miller, 2009). Becker, Seay, and Morrison (2009) analyzed 2006 data from Texas and also found a reduced rate of autism among Hispanic students compared with White students. Croen, Grether, and Selvin (2002) examined prevalence of autism in California from 1989 to 1994 and found similarities in diagnosis of autism among Hispanic and White children, but higher rates of autism identification among Black children. Further analysis revealed that children of Mexican-born mothers were identified at significantly lower rates than White children, despite similarities in the aggregate data.

Several factors may contribute to the discrepancies in national and state administrative data. First, the studies used data from counts spanning nearly 20 years. During that time, extensive developments were made in national policy (i.e., reauthorization of IDEA in 1990), research, funding, and advocacy, which increased knowledge and awareness of autism by school districts and society in general. Furthermore, revisions, variations, and broadening of the diagnostic criteria occurred in clinical criteria outlined in the *Diagnostic and Statistic Manual* (4th ed., text rev.; *DSM-IV-TR*; American Psychiatric Association [APA], 2000) and administrative definitions in the IDEA and state law. The *DSM-IV-TR* (APA, 2000) broadened the criteria for autism spectrum disorder to include autistic disorder, Asperger syndrome, Rett's disorder, childhood disintegrative disorder, and pervasive developmental disorder–not otherwise specified. A clinical diagnosis of autism is based on the existence of a set of symptoms in specific categories prior to age 3. However, the administrative criteria for special education eligibility are less rigid. The IDEA (2004) defines autism as a

> developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age three, that adversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences.

The IDEA definition further stipulates that exclusion from the autism category is required if an emotional disturbance (as defined by IDEA, 2004) adversely affects educational performance. The IDEA allows for autism eligibility even if the characteristics are evident after the age of 3 years. Because the criteria are substantially different, differences in clinical and administrative diagnoses would be expected. For example, schools may identify students as having autism who have never been diagnosed using the clinical criteria. Conversely, education agencies may make a child eligible under a different category (e.g., intellectual disability, developmental delay, multiple disabilities, other health impairment) even when a clinical diagnosis of autism has been made.

Further complicating the accuracy of autism diagnosis is the existence of variations of administrative definitions of autism between states. For example, a child may be eligible for special education under the autism category in California but not in Mississippi. Similarly, variations in the interpretation of a definition within a state can influence identification. For example, in geographically large and/or racially diverse states, a child may be eligible under the autism category in one school district, but be found eligible under another category in a different part of the state. Culturally, insensitive screening and assessment for autism also may lead to misdiagnosis. Mandell, Listerud, Levy, and Pinto-Martin's (2002) analysis of Medicaid-eligible children in Philadelphia indicated that diagnosis of autism in Black children was delayed when compared with White children. Results of a follow-up study indicated that Black children with autism were significantly more likely than White children to be initially misdiagnosed with conduct or adjustment disorder (Mandell, Ittenbach, Levy, & Pinto-Martin, 2007). Variability between state demographics is substantial, so some variation in prevalence rates could be expected. For instance, Texas has a large Hispanic population, whereas Wyoming's population is much smaller. Morrier and Hess (2010) suggested that racial disparities may be associated with regional differences in diagnostic procedures and that regional practices may influence identification. Durkin et al. (2010) found that prevalence rates were directly related to SES, with lower prevalence among children from low SES and higher prevalence among children with high SES. Combinations of these and other unidentified factors likely contribute to the reported discrepancies in prevalence rates, but a clear understanding of the patterns and trends of autism identification is requisite for direct examination of such factors.

Autism treatment requires highly specialized and intensive interventions across environments to attain desirable outcomes. Disparate identification suggests that some students with autism are not receiving related evidence-based practices. This phenomenon is not new, and it is the rationale behind the IDEA requirement that states monitor and address instances of disproportionate representation. Although states have been provided with guidelines about how to measure disparity in special education (Westat, 2004), they are expected to develop their own significance criteria and interventions to address disparity. In other words, states use idiosyncratic criteria and examine descriptive statistics to determine whether action is needed. The fact that there exist no empirically based interventions for state education agencies to rely on to address disparate identification means that states must rely on trial and error to maintain compliance with IDEA. What is needed is a

better understanding of the causes of disparity to inform system-level interventions to address and prevent disproportionate representation. An examination of the patterns and trends in prevalence rates by race and across states is an important step toward understanding the problem. For example, if commonalities and distinctions between states can be identified, then these factors may guide the development and analysis of interventions for special education systems (e.g., training for eligibility team members on culturally sensitive screening, evaluation, and decision making), and support policy and legislative action (Mandell et al., 2009; Travers et al., 2011). A comprehensive understanding of the extent to which states identify students with autism by race is a necessary starting point for a more meticulous examination of contributing factors and possible interventions. The consequence of achieving accurate autism identification is equitable access to the specialized services.

The purpose of this study was to determine if and to what extent state-level administrative prevalence of autism differed by race during 2000 and 2007. Data were collected from the IDEA Data Accountability Center (www.ideadata.org) and the National Center for Education Statistics (NCES; www.nces.ed.gov) for years 2000 and 2007. Data from the 2000 school year were used because the Centers for Disease Control (CDC; 2007) prevalence estimate used 2000 data collected from the Autism and Developmental Disabilities Monitoring Network (ADDMN), and we wanted to compare our findings descriptively. Although a later prevalence rate obtained by the CDC (2009) used ADDMN data from 2006, we chose to analyze data from the 2007 school year because they were the most recent count data available. The following research questions guided our investigation:

Research Question 1: Did state administrative reports of prevalence rates of autism differ by year?
Research Question 2: Did state administrative reports of prevalence rates of autism differ by race?
Research Question 3: Did state administrative reports of prevalence rates of autism differ by state?
Research Question 4: Did state administrative reports of prevalence rates of autism by race differ across states in 2000, in 2007, and over time?

Method

Official count data of students receiving special education services under the definition of autism as reported to Congress were retrieved from the IDEA Data Accountability Center (www.ideadata.org). The database provided counts disaggregated by age and race for all 50 states and Washington, D.C. Eligibility figures for White (non-Hispanic), Black (non-Hispanic), and Hispanic students with autism between ages 6 and 21 were chosen because they are the three largest racial groups, and in most cases, the number of Asian/Pacific Islander and Native American/Alaska Native students in individual states was too small for statistical analysis. Count data for total student enrollments according to race were collected for each state from the NCES. White (non-Hispanic), Black (non-Hispanic), and Hispanic students enrolled in kindergarten through 12th grade were retrieved. The database with autism enrollment figures was combined with the database with total enrollments and imported into SPSS for analyses.

Analyses

We analyzed the data in multiple ways. First, we calculated the prevalence rates of autism among each racial group for each state in 2000 and 2007. We divided the number of students within each racial group identified as having autism by the total number of enrolled students within that racial group. Second, we used logistic regression analysis to determine odds and odds ratios (ORs) for each racial group, which allowed us to compare prevalence by race, by state, and by year. An OR represents the proportion of the odds between two groups, and logistic regression analysis allowed us to test the differences in the ORs.

We also used logistic regression analysis to understand differences in prevalence of autism according to race as well as changes in the prevalence by race over time. *Autism* was the criterion variable (0 = *no autism*, 1 = *autism*). *Race* was a categorical variable and was entered as a predictor (0 = *White*, 1 = *Black*, 2 = *Hispanic*). White was used as the reference group because it was the largest group and traditionally has been used for studies of disproportionate representation (Donovan & Cross, 2002). In addition, *year* was a categorical model and was entered as a predictor. The year 2000 was coded as 0 and 2007 was coded as 1. We used 2000 as the reference year because we were interested in prevalence rates in 2007 as compared with 2000. State also was categorical. California was the largest state, was the reference group, and was coded as 0. Each of the other states and Washington, D.C., was entered alphabetically with codes from 1 to 50. In all logistic regression analyses, we used a 95% confidence interval (CI) to test differences between groups.

Results

Overall Model

We conducted a logistic regression analysis to test the overall model using autism as the criterion, and *state, race*, and *year* as predictors. For *state* as a predictor, California was the reference state. For *race* as the predictor, White was the reference category. For *year* as the predictor, 2000 was the reference year. The overall model was significant

(χ^2 = 148727, 51; $p < .001$). In the model, the Black group and the Hispanic group were significantly less likely to be identified with autism than the White group. Year was also predictive of autism, with a significantly greater percentage of youth identified in 2007 as compared with 2000. In addition, *state* was predictive of autism. All states identified were more likely or less likely to identify youth with autism as compared with California.

Differences in Autism Identification by Year

We examined autism prevalence rates for the 50 states and Washington, D.C. in 2000 and 2007 to determine whether there were any differences by year. We used logistic regression analysis using *year* as a predictor and *autism* as the criterion variable. The overall model was significant (Wald = 10,981,332; $p < .001$). In the model, the OR of being identified with autism for all racial groups in 2007 was 3.083, indicating that the odds of being identified with autism in 2007 were about 3 times the odds in 2000.

Differences in Autism Identification by Race

We also used logistic regression analysis to understand difference in prevalence of autism by race in 2000 and 2007. For both analyses, we used *race* as the predictor and *autism* as the criterion variable. The overall model for 2000 was significant (Wald = 3,394,697; $p < .001$). In 2000, the OR of being identified as having autism was 0.97 ($p = .002$) for the Black group and 0.56 ($p < .001$) for the Hispanic group. The overall model for 2007 was significant (Wald = 7,129,386; $p < .001$). In 2007, the OR for the Black group was 0.69 ($p < .001$) and the OR for the Hispanic group was 0.52 ($p < .001$).

Number of Students With Autism by Race

Table 1 displays the number of students identified with autism by race and by state for 2000 and 2007. The number of students identified with autism varied by race and by state. For example, in 2007, some states identified no students as having autism within a racial category, whereas in California, 20,622 White students were identified. The number of Black students identified as having autism increased in all states except Alaska and Montana. The number of Hispanic students identified as having autism increased in all states except Washington, D.C., Kentucky, and Louisiana. The number of White students identified as having autism increased in all the states and Washington, D.C.

Percentage of Students With Autism by Race

Table 1 also displays the percentage of students with autism by race across the states in 2000 and 2007. To calculate the percentages, we divided the number of students identified with autism in each racial category by the total number of students in the respective racial categories. The percentage of students identified with autism varied by race and by state. The percentages ranged from a low of 0.1% to 1.4% identified with autism. Percentage of Black students identified with autism increased in all states but Montana from 2000 to 2007, whereas percentage of Hispanic students identified with autism increased in all states except Washington, D.C., Kentucky, Louisiana, and West Virginia. Over the same 8-year span, the percentage of White students identified with autism increased in all states and Washington, D.C. Despite the increase in prevalence rates, the percentage of students identified with autism were relatively low, especially compared with the CDC (2009) estimate of a 2006 national prevalence rate of about 0.9%. Our 2007 data reflect that no more than 0.5% of Black students were identified with autism in 29 of the states, whereas no more than 0.5% of Hispanics were identified in 45 of the states. These 2007 findings are beyond the lower band of error (0.85%) than the 2006 estimate reported by the CDC.

We compared the percentage of students eligible for special education due to autism in each state in 2007 to the CDC prevalence rate from 2006 (CDC, 2009), which was 0.9%, with a 95% CI of 0.85% to 0.93%. The findings in Table 1 show that 39 states identified a smaller percentage (lesser than 0.85%) of White students with autism in 2007 than the 2006 national prevalence rate reported by the CDC. Conversely, 7 states had prevalence rates for White students that were higher than the CDC data (greater than 0.93%). The table also shows a smaller percentage of Black students identified with autism in 48 states and Washington, D.C., and a smaller percentage of Hispanic students identified with autism in 49 states and Washington, D.C.

Differences by Race Across States

The ORs for the racial categories were calculated using logistic regression with *race* as predictors and *autism* as the criterion variable for 2000 and 2007, with our file split by *year* and by *state*. For this study, we used 100 students identified as the minimum criteria for inclusion in the logistic regression analysis. A number of states did not have sufficient number of students identified as having autism necessary for using logistic regression analysis. We included the descriptive data for all states in the table, even if they were not included in the logistic regression. In 2000, 23 states were excluded because they lacked sufficient numbers in the Black group and 42 states were excluded because they lacked sufficient numbers in the Hispanic group. In 2007, 15 states were excluded because they lacked sufficient numbers in the Black group and 24 states were excluded because they lacked sufficient numbers in the Hispanic group.

Logistic regression. We used logistic regression analyses to determine differences in odds of being identified as having

Table 1. Count, Percentage, Exponentiated Beta Coefficients by Race, and California Comparison by State and Washington, D.C. in 2000 and 2007

		2000		2007		2000	2007	2007 state comparison
State	Race	Count	%	Count	%	Exp (β)	Exp (β)	Exp (β)
Alabama	Black	345	0.13	878	0.33	1.188*	0.822**	0.416***
	Hispanic	5	0.05	46	0.18			
	White	484	0.11	1,768	0.4			
Alaska	Black	16	0.26	15	0.3			
	Hispanic	6	0.13	39	0.52			
	White	156	0.19	360	0.51			
Arizona	Black	88	0.22	314	0.52		0.748**	0.717***
	Hispanic	240	0.08	1,256	0.28	0.454**	0.399**	0.642***
	White	821	0.18	3,350	0.69			
Arkansas	Black	176	0.17	305	0.28	0.951	0.56**	0.406***
	Hispanic	7	0.04	75	0.19			
	White	569	0.18	1,613	0.5			
California	Black	1,531	0.3	3,881	0.83	0.925**	0.721**	
	Hispanic	3,346	0.13	14,236	0.47	0.394**	0.402**	
	White	7,035	0.32	20,622	1.15			
Colorado	Black	43	0.1	122	0.26		0.719**	0.334***
	Hispanic	52	0.03	309	0.14		0.388**	0.303***
	White	385	0.08	1,747	0.35			
Connecticut	Black	152	0.2	564	0.71	0.704**	0.827**	0.825***
	Hispanic	83	0.11	440	0.46		0.538**	0.999
	White	1,101	0.28	3,192	0.86			
Washington, D.C.	Black	108	0.19	239	0.37	1.442	0.591*	0.506***
	Hispanic	5	0.08	0	0			
	White	4	0.13	26	0.62			
Delaware	Black	86	0.24	205	0.51		0.644**	0.691***
	Hispanic	7	0.1	32	0.25			
	White	223	0.32	509	0.78			
Florida	Black	1,024	0.17	2,309	0.38	0.925*	0.709**	0.488***
	Hispanic	975	0.21	3,275	0.5	1.145**	0.94**	1.212***
	White	2,340	0.13	6,463	0.53			
Georgia	Black	814	0.15	2,887	0.46	0.919	0.753**	0.565***
	Hispanic	49	0.07	434	0.27		0.442**	0.680***
	White	1,268	0.16	4,640	0.61			
Hawaii	Black	9	0.21	31	0.74			
	Hispanic	12	0.14	43	0.52			
	White	69	0.18	297	0.85			
Idaho	Black	3	0.16	12	0.38			
	Hispanic	15	0.06	85	0.22			
	White	293	0.14	1,196	0.54			
Illinois	Black	989	0.23	2,069	0.5	0.98	0.7**	0.651***
	Hispanic	351	0.11	1,374	0.33	0.481**	0.453**	0.756***
	White	2,831	0.23	8,186	0.72			
Indiana	Black	312	0.27	799	0.63	0.826**	0.614**	0.823***
	Hispanic	43	0.12	264	0.39		0.379**	0.962
	White	2,701	0.33	8,071	1.02			
Iowa	Black	40	0.2	80	0.29			
	Hispanic	14	0.08	59	0.19			
	White	603	0.13	983	0.24			
Kansas	Black	78	0.19	183	0.44		1.016	0.566***
	Hispanic	30	0.07	137	0.22		0.502**	0.515***
	White	583	0.16	1,475	0.43			

(continued)

Table 1. (continued)

State	Race	2000 Count	2000 %	2007 Count	2007 %	2000 Exp (β)	2007 Exp (β)	2007 state comparison Exp (β)
Kentucky	Black	120	0.18	306	0.43	1.115	1.002	0.550***
	Hispanic	10	0.16	0	0			
	White	884	0.16	2,395	0.43			
Louisiana	Black	666	0.19	1,004	0.32	1.201**	0.736**	0.450***
	Hispanic	15	0.14	11	0.06			
	White	567	0.16	1,457	0.44			
Maine	Black	2	0.08	30	0.6			
	Hispanic	1	0.08	28	1.32			
	White	585	0.29	1,900	1.03			
Maryland	Black	895	0.28	2,100	0.65	1.036	0.733**	0.848***
	Hispanic	65	0.16	283	0.37		0.415**	0.954
	White	1,244	0.27	3,541	0.89			
Massachusetts	Black	83	0.1	580	0.74		0.714**	0.739***
	Hispanic	90	0.09	692	0.52		0.5**	1.061
	White	621	0.08	7,040	1.03			
Michigan	Black	791	0.23	1,731	0.51	0.819**	0.621**	0.666***
	Hispanic	72	0.12	299	0.38		0.46**	0.856**
Minnesota	Black	196	0.35	762	0.97	1.025	0.654**	1.284***
	Hispanic	59	0.21	384	0.76		0.508**	1.802***
	White	2,395	0.34	9,470	1.48			
Mississippi	Black	241	0.09	556	0.22	1.306	0.819**	0.284***
	Hispanic	3	0.08	16	0.17			
	White	171	0.07	622	0.27			
Missouri	Black	299	0.19	807	0.49	0.991	0.791**	0.615***
	Hispanic	25	0.15	97	0.29			
	White	1,371	0.19	4,283	0.61			
Montana	Black	1	0.11	0	0			
	Hispanic	4	0.15	7	0.19			
	White	170	0.13	404	0.34			
Nebraska	Black	28	0.15	88	0.38			
	Hispanic	14	0.07	93	0.25			
	White	320	0.13	1,211	0.55			
Nevada	Black	48	0.14	257	0.54		0.657**	0.671***
	Hispanic	66	0.08	517	0.33		0.4**	0.770***
	White	329	0.17	1,524	0.82			
New Hampshire	Black	4	0.17	14	0.36			
	Hispanic	1	0.03	20	0.32			
	White	387	0.19	1,256	0.68			
New Jersey	Black	549	0.23	1,377	0.57	0.842**	0.681**	0.731***
	Hispanic	336	0.17	1,198	0.45	0.601**	0.53**	1.054*
	White	2,199	0.28	6,380	0.84			
New Mexico	Black	7	0.09	21	0.24			
	Hispanic	68	0.04	319	0.17		0.348**	0.363***
	White	139	0.12	486	0.5			
New York	Black	1,522	0.26	3,205	0.59	1.078*	0.784**	0.760***
	Hispanic	1,019	0.19	2,637	0.46	0.787**	0.6**	1.059**
	White	3,840	0.24	10,766	0.76			
North Carolina	Black	1,062	0.26	2,300	0.55	1.398**	0.849**	0.737***
	Hispanic	46	0.08	346	0.23		0.36**	0.616***
	White	1,481	0.19	5,297	0.65			

(continued)

Table 1. (continued)

State	Race	2000 Count	2000 %	2007 Count	2007 %	2000 Exp (β)	2007 Exp (β)	2007 state comparison Exp (β)
North Dakota	Black	4	0.37	16	0.83			
	Hispanic	1	0.07	9	0.45			
	White	124	0.13	396	0.48			
Ohio	Black	374	0.12	1,202	0.4	0.874*	0.665**	0.472***
	Hispanic	24	0.08	163	0.34		0.569**	0.765***
	White	2,112	0.14	8,314	0.6			
Oklahoma	Black	107	0.16	198	0.29	1.398**	0.751**	0.402***
	Hispanic	21	0.06	80	0.12			
	White	461	0.11	1,414	0.38			
Oregon	Black	60	0.38	188	1.12		0.752**	1.385***
	Hispanic	114	0.2	594	0.62	0.328**	0.418*	1.509***
	White	2,646	0.61	5,799	1.48			
Pennsylvania	Black	745	0.27	1,828	0.64	1.258*	0.737*	0.829***
	Hispanic	138	0.17	652	0.5	0.783*	0.58**	1.209***
	White	3,062	0.22	11,503	0.87			
Rhode Island	Black	17	0.14	74	0.56			
	Hispanic	15	0.07	94	0.35			
	White	322	0.28	1,155	1.13			
South Carolina	Black	523	0.18	1,065	0.38	1.61*	0.973	0.507***
	Hispanic	15	0.12	80	0.22			
	White	424	0.11	1,495	0.39			
South Dakota	Black	2	0.13	6	0.25			
	Hispanic	4	0.25	11	0.38			
	White	239	0.21	529	0.52			
Tennessee	Black	294	0.13	769	0.32	1.136	0.696**	0.415***
	Hispanic	15	0.09	114	0.24		0.525**	0.661***
	White	765	0.12	3,057	0.46			
Texas	Black	1,290	0.22	3,131	0.47	0.944	0.681**	0.636***
	Hispanic	1,543	0.09	6,751	0.31	0.401**	0.444**	0.694***
	White	3,981	0.23	11,185	0.69			
Utah	Black	11	0.23	37	0.42			
	Hispanic	27	0.06	133	0.16		0.299**	0.404***
	White	586	0.14	2,371	0.52			
Vermont	Black	2	0.18	NA	NA			
	Hispanic	0	0	NA	NA			
	White	211	0.21	NA	NA			
Virginia	Black	681	0.22	1,780	0.56	1.167**	0.818**	0.704***
	Hispanic	69	0.12	456	0.43		0.634**	1.049
	White	1,371	0.19	4,780	0.68			
Washington	Black	112	0.21	262	0.46	1.154	0.656**	0.613***
	Hispanic	75	0.07	349	0.23		0.327**	0.537***
	White	1,364	0.18	4,789	0.7			
West Virginia	Black	23	0.19	52	0.35			
	Hispanic	4	0.38	6	0.24			
	White	2,94	0.11	879	0.33			
Wisconsin	Black	250	0.28	428	0.47	1.137	0.592**	0.680***
	Hispanic	45	0.11	245	0.37		0.465**	0.877*
	White	1,769	0.25	5,294	0.79			
Wyoming	Black	3	0.27	8	0.59			
	Hispanic	2	0.03	13	0.15			
	White	110	0.14	359	0.5			

Note: Exp (β) = odds ratios. There were no reported data for Vermont in 2007.
*$p < .05$. **$p < .01$. ***$p < .001$.

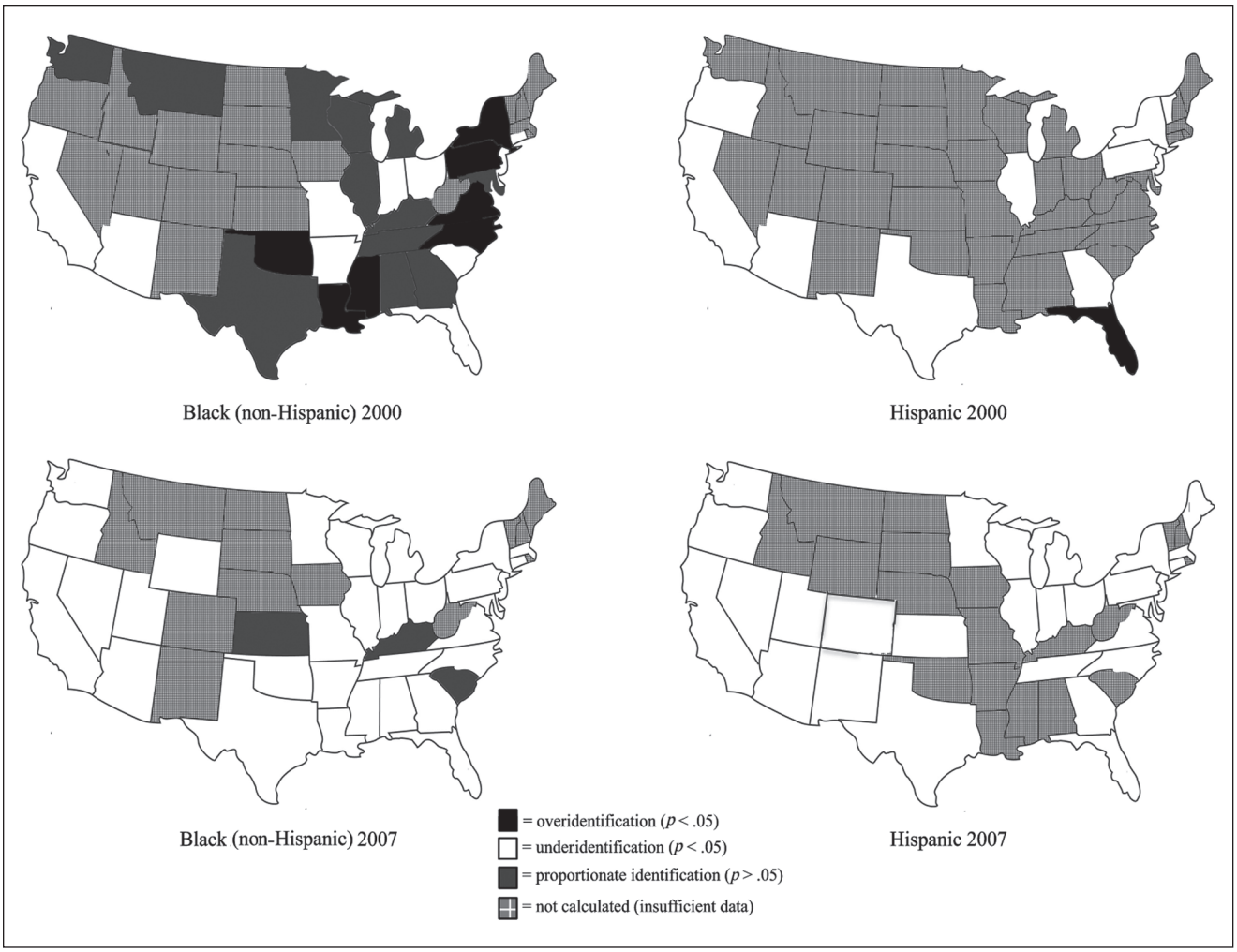

Figure 1. Changes in representation of autism by race and state between 2000 and 2007.

autism by race in 2000 and 2007 in each of the 50 states and Washington, D.C. Table 1 displays the exponentiated β coefficients (Exp β), which represent the ORs, for Black students and for Hispanic students. In the analyses, White was the reference category, so the odds for the Black groups and the Hispanic groups were compared with the odds for the White groups in each state, respectively. Only 35 states had sufficient number of Black students identified as having autism to be included in the logistic regression analysis. Only 26 states had sufficient number of Hispanic students identified as having autism to be included in the analysis.

Table 1 shows that 8 states in 2000 overidentified Black students with autism. Florida was the only state that overidentified Hispanic students with autism in 2000. The overidentification of Hispanic students in Florida during 2000 shifted to underidentification by 2007. In 2007, no states overidentified Black or Hispanic students with autism. Table 1 also shows that in 2000, 8 states underidentified Black students with autism and 8 states underidentified Hispanic students with autism. In 2007, 32 and 27 states underidentified Black and Hispanic students, respectively. Black students were proportionately identified in 11 states in 2000, but 10 of those states shifted to underidentification by 2007. Underidentification of Black students was maintained in 7 states from 2000 to 2007. Of the 8 states that overidentified Black students in 2000, all shifted to underidentification by 2007. No states identified Hispanic students with autism at a rate proportionate with White students in 2000 or 2007. Underidentification of Hispanic students was maintained in 8 states between the 2 years. Figure 1 displays the ORs for 2000 and 2007 that are presented in Table 1, demonstrating the expansion of underidentification of Black and Hispanic students with autism in the United States from 2000 to 2007.

Differences in Prevalence of Autism by State

Finally, we ran a single logistic regression analysis to compare differences in prevalence of autism by racial groups across the states that had sufficient numbers for logistic regression analysis in 2007. This analysis included 34

states with sufficient number of Black students and 26 states with sufficient number of Hispanic students. We conducted separate regressions for Black students and for Hispanic students. In the model, *autism* was the criterion variable and *state* was the predictor variable. For *state*, California was the reference group because it was the largest state. The Exp β represents the OR for each state, as compared with California. For the model examining the Black group, we found that 32 of the states had ORs below 1.0, indicating that the odds of Black students being identified as having autism in those states were significantly lower than the odds for Black students in California. The ORs in Minnesota (1.284) and Oregon (1.385) were greater than 1.0 and significant ($p < .001$). This indicates the odds of Black students being identified with autism in those two states were significantly greater than the odds in California.

Table 1 also shows the Exp β for Hispanic students. We found that the ORs for 15 of the states were below 1.0, indicating that the odds for Hispanic students being identified with autism in those states were significantly lower than the odds in California. Florida, Minnesota, New Jersey, New York, Oregon, and Pennsylvania had odds that were greater than 1.0 and significant, indicating that the odds for Hispanic students being identified with autism were significantly higher than the odds in California. However, the ORs for Hispanic students in New Jersey and New York were very close to 1.0. The ORs for 5 states were not different from 1.0 (Connecticut, Indiana, Massachusetts, Maryland, and Virginia), indicating that the odds for Hispanic students being identified as having autism were not different from the odds in California.

Discussion

The purpose of this study was to examine the extent to which states differed in their identification of students with autism in 2000 and 2007. With respect to our first research question, we found evidence that the odds of being identified with autism were predicted by year and also found a nearly threefold increase in prevalence from 2000 to 2007. With respect to the second question, we found that the ORs for Black students decreased over time and that the odds of identification for Hispanic students remained consistently lower than the odds for White students, demonstrating that prevalence rates of autism differed by race. Our third research question examined the differences in prevalence rates by state. We found differences in prevalence rates by state.

Our fourth question was, "Did state administrative reports of prevalence rates of autism by race differ across states in 2000, in 2007, and over time?" We found the number of students with autism increased over time in all states for White students and in most states for Hispanic and Black students. There were substantial differences in prevalence rates by state as well as by racial category. We found prevalence rates for 2007 as low as 0.1% for Hispanic students and as high as 1.4% for White students. Prevalence rates for Hispanic and Black students were lower and sometimes substantially lower than prevalence rates for White students in most states. We also found prevalence rates of autism in 39 states for year 2007 that were lower than the 2006 epidemiological prevalence rates reported by the CDC.

Although California was used as the comparison state for the logistic regression, the prevalence rates for Black and Hispanic students in California were lower than what might be expected based on the CDC estimates. The administrative prevalence rates we obtained for Black (0.83%) and Hispanic students (0.47%) in California were below the lower limit of the CI for the CDC (2009) estimated prevalence (0.85%). Nonetheless, we found odds of identification for Black students that were significantly lower than the reference group for 32 of 34 states analyzed. Similarly, rates of identification for Hispanic students were significantly lower in 15 of the 26 states analyzed.

As expected, the prevalence rates for all three racial groups and all states increased over time. However, we found that the disparity between White, Black, and Hispanic students generally increased over time. We found that the states that overidentified autism among Black and Hispanic students in 2000 had underidentified them in 2007. Furthermore, nearly every state that had proportional representation of students in 2000 underidentified Black and Hispanic students in 2007. Although there is no firm epidemiological evidence that race is predictive of autism, we found substantial racial differences in the ways U.S. schools identify students with autism.

Implications of the Findings

Our data show that Black and Hispanic children are not being administratively identified with autism at the rate consistent with White students or the estimated prevalence given by the CDC (2009). Specific causes of racial disparities remain unclear. Although the IDEA currently requires that states monitor and address issues of disproportionate representation of diverse students in special education, data presented in this study underscore the need for states to pay closer attention to disproportionate identification of minority students with autism, specifically.

The current findings provide evidence that states have changed over time in the way they identify autism for different racial groups. The variability in identification by race is problematic, particularly in light of the absence of epidemiological or biological evidence to indicate that race predicts autism. Consequently, researchers should look toward identifying underlying causes for the differences in prevalence rates by race. The findings in this study are correlational, and do not support causal statements about the

underlying causes of the differences. However, the findings do permit us to speculate on possible reasons for changes in autism identification rates, as well as allow us to compare the trends with those in prevalence rates for other disability categories. We believe that one of the primary problems is the lack of consistency in the way that school personnel interpret and utilize the *DSM-IV* (4th ed., APA, 1994) definition of autism and the IDEA definition of autism. For instance, if a parent suspects that her child has autism, she would typically report her concerns to a pediatrician. The pediatrician would then refer to the *DSM-IV* to make a diagnosis. If the pediatrician made a diagnosis of autism, then parent could use the diagnosis to advocate for specialized services under the IDEA. Subsequently, the identification of autism (as defined by the IDEA) would be directly influenced by (a) the expertise of the diagnosing pediatrician, (b) parent ability to obtain autism screening from their child's pediatrician, (c) parent ability to advocate for eligibility for special education services under the eligibility category of autism, (d) the provider's expertise in autism, and (e) the provider's likelihood to agree with the clinical diagnosis. In such a situation, the identification of autism has less to do with the biological disorder than it has do with a number of socially constructed circumstances.

One of the interesting aspects of our findings was the similarity between trends in autism identification from 2000 to 2007 and the trends in learning disability (LD) identification from 1974 to 2001. The national prevalence rate for LD increased from 1.21% in 1974 (Donovan & Cross, 2002) to 6.07% in 2001 (U.S. Department of Education, 2005). The increase in prevalence did not necessarily have to do with an increase in the actual number of children with LD. Rather, it was likely due to the increased awareness of LDs, improved advocacy for services only available under the IDEA, and changes in LD identification practices. In some ways, the change in trend was indicative of changes in the social construct of LD rather than true epidemiological increases of LD. The lack of stability in the prevalence of LD is a manifestation of problems with (a) the definitions, (b) variations in diagnostic practices, or (c) a combination of both. Consequently, the lack of clarity about what exactly is LD leads to inconsistencies in educational treatment.

Our findings suggest that special education is likely to encounter the same issues with regard to prevalence and disproportionate representation that LD has encountered. As the transitions to a new set of diagnostic criteria in the upcoming revision of the *DSM-V*, special education must be prepared to establish a consistent and appropriate set of criteria for identification under the IDEA. The administrative criteria must ensure that states, schools, and school districts employ identification procedures in a consistent and reliable manner, with state and federal oversight of identification procedures and prevalence monitoring. If the field does not respond accordingly, there is a strong possibility that autism identification will be heavily influenced by advocacy, subjective diagnoses, and availability of resources. There is evidence that such subjectivity already contributes to racial disproportionality in autism prevalence. For instance, Medicaid-eligible African American children in Philadelphia required more pediatric visits and more time to be identified with autism when compared with White children, suggesting that factors related to poverty and clinician bias might explain delayed diagnosis (Mandell et al., 2002; Mandell et al., 2009).

The field of autism is experiencing a new controversy regarding changes in the definition that informs diagnostic practices (McPartland, Reichow, & Volkmar, 2012; Wing, Gould, & Gillberg, 2011), variations in diagnostic practices within and between pediatricians and education professionals, and controversy about how best to treat autism. Considering that the majority of services provided to children with autism are made available through the IDEA, it is essential that special education be involved in discussions regarding diagnosis and identification of autism. If special education responds, then the field can inform autism identification, ensure proportionate identification, and ensure equitable access to evidence-based treatment.

Directions for Future Research

The long-standing problem of racially disparate identification in special education perhaps best reflects the complexity in understanding and resolving the problems. It seems unlikely that a single factor will ever explain why racial disparities in autism identification are occurring in special education. Thus, studies that examine multiple levels of factors in a single analytical model will be necessary to understand the factors related to the differences in identification. Specifically, understanding the underlying factors associated with differences in autism prevalence by race will require a multilevel model that investigates the contributions of individual factors, school factors, school district factors, and state factors in a single multilevel analysis. Such an analysis would allow researchers to examine how characteristics at each level affect autism identification, and how the characteristics inform and are informed by differences at each of the other levels. If we can determine how (a) individual characteristics (e.g., race, gender, etc.), (b) school characteristics (e.g., SES of student body, racial makeup of student body, school size, percentage of highly qualified teachers in the school, etc.), (c) school district characteristics (e.g., per pupil expenditure, locale, median income of community residents, etc.), and (d) state-level factors (e.g., state population, median income, state special education policies regarding accuracy of eligibility determination, etc.) predict autism identification in a

single model, then we can better identify the factors that predict autism identification within and across levels. Such a model would be extremely complex and difficult to interpret. However, what has become clear in this analysis and previous studies (Mandell et al., 2002; Mandell et al., 2007; Mandell et al., 2009; Mandell et al., 2010; Morrier & Hess, 2010; Travers et al., 2011) is that the issues related to disproportionate identification of autism by race are complicated and likely the result of numerous factors across numerous levels. If we are to understand the nature of the phenomenon, we must untangle the complex system of variables that are at the root of the problem.

Limitations of the Study

The current findings should be viewed in light of the limitations of the study. We did not examine or account for variability of autism identification according to age. Age has been identified as a factor related to autism identification in African American children (Mandell et al., 2007; Mandell et al., 2009), and racial disparities may be concentrated among younger children (Morrier & Hess, 2010). The use of count data for students aged 5 to 22 years in the current analysis precludes an understanding of whether concentrations of disparity among younger students accounts for some of the differences in ORs. Similarly, we did not examine other demographic data that may have influenced the findings, including gender, SES, or rural versus urban residence. We also did not examine population density or racial distribution within states because the data were analyzed at the state level.

Another limitation is the use of California as the reference group for the comparison of 2007 ORs between states. The 2007 ORs for Black and Hispanic students in the reference state were significantly lower than that of White students. Thus, instances where ORs are significantly higher or lower, or are proportionate to California, indicate differences between the reference and comparison state and cannot be exclusively used to discern the extent of disproportionality. Rather, the results for this comparison require careful consideration of all the findings for a state (e.g., prevalence, count, ORs within a state) before drawing conclusions about the extent of disproportionality within a state. Furthermore, although the selection of California as the reference group is logical given that it had the largest population count of students with autism, the procedures for identifying students with autism in California are very likely different from each comparison state in myriad ways. Thus, the findings of the comparison with California may largely reflect differences in procedures used to identify in autism and not in other factors (e.g., SES).

Conclusion

This study was the first to use logistic regression of ORs to examine state-level identification of autism and autism prevalence rates by race across all states in the United States. We found great variability in prevalence rates by race within states, and we found great variability in prevalence rates by race across states. Although this finding represents an important step in understanding the problems of racial disparities in identification of autism, it has become clear that (a) much more research is needed if we are to understand the nature of the problem and (b) broad efforts between health and educational agencies at local, state, and national levels are needed to ensure accurate identification of autism. Until these fields identify and remedy the differences in autism prevalence rates, there will exist substantial number of children with autism who likely do not receive the empirically validated interventions and services critical to attaining desired short- and long-term outcomes. The financial and social implications of failing to provide evidence-based interventions and supports to students with autism warrant swift and dramatic action. Unfortunately, but not surprisingly, until this problem is thoroughly understood and scientifically validated methods to prevent the problem are identified, it seems that the majority of the un- or misidentified students with autism will be children of color.

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