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Trends in Special Education Eligibility Among Children With Autism Spectrum Disorder, 2002-2010

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Abstract

Objective: Although data on publicly available special education are informative and offer a glimpse of trends in autism spectrum disorder (ASD) and use of educational services, using these data for population-based public health monitoring has drawbacks. Our objective was to evaluate trends in special education eligibility among 8-year-old children with ASD identified in the Autism and Developmental Disabilities Monitoring Network.

Methods: We used data from 5 Autism and Developmental Disabilities Monitoring Network sites (Arizona, Colorado, Georgia, Maryland, and North Carolina) during 4 surveillance years (2002, 2006, 2008, and 2010) and compared trends in 12 categories of special education eligibility by sex and race/ethnicity. We used multivariable linear risk regressions to evaluate how the proportion of children with a given eligibility changed over time.

Results: Of 6010 children with ASD, more than 36% did not receive an autism eligibility in special education in each surveillance year. From surveillance year 2002 to surveillance year 2010, autism eligibility increased by 3.6 percentage points ($P = .09$), and intellectual disability eligibility decreased by 4.6 percentage points ($P < .001$). A greater proportion of boys than girls had an autism eligibility in 2002 (56.3% vs 48.8%). Compared with other racial/ethnic groups, Hispanic children had the largest increase in proportion with autism eligibility from 2002 to 2010 (15.4%, $P = .005$) and the largest decrease in proportion with intellectual disability (–14.3%, $P = .004$).

Conclusion: Although most children with ASD had autism eligibility, many received special education services under other categories, and racial/ethnic disparities persisted. To monitor trends in ASD prevalence, public health officials need access to comprehensive data collected systematically, not just special education eligibility.

Keywords
autism spectrum disorder, special education, trends, surveillance, prevalence

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The documented prevalence of autism spectrum disorder (ASD), which is characterized by impairment in social communication and interaction and repetitive and restricted behaviors and interests, has increased substantially in the past 2 decades.[1-3] The most recent prevalence estimate from the Autism and Developmental Disabilities Monitoring (ADDM) Network, an active ASD surveillance system in the United States, was 14.6 per 1000 children aged 8 in 2012,[4] more than double the prevalence reported in 8-year-old children in 2000 (6.7 per 1000 children aged 8), when the ADDM Network first reported ASD prevalence.[5] Tracking and understanding trends in ASD prevalence are important public health objectives, and assessing special education eligibility can help public health practitioners and education policy makers better evaluate this network and patterns in school-provided autism services.

The Individuals with Disabilities Education Act was enacted by the US Congress in 1975 to ensure appropriate education for children with special needs.[6] The current version of the Act specifies that a child can be placed into 1 of 14 "primary eligibilities" that are intended to reflect the area in which they most need services if their disability adversely affects their academic achievement.[7] Primary eligibility categories are autism, deaf-blindness, deafness, emotional disturbance, hearing impairment, intellectual disability, multiple disabilities, orthopedic impairment, other health impairment, specific learning disabilities, speech or language impairments, traumatic brain injury, and visual impairments. At the state and local levels, developmental delay can be included as an additional eligibility. Although mandated at the federal level, states can set their own criteria for what constitutes a child's need for eligibility services.[7]

According to the National Center for Education Statistics, 6.5 million school-aged children in the United States, or 12.9% of all school-aged children, received special education services in the 2013-2014 school year, and this percentage has been largely unchanged since 2002, when it was 13.5%.[8] With the number of children identified with ASD in the population increasing, the percentage of children with autism named as the reason for special education eligibility (hereinafter, autism eligibility) should also increase. Although publicly available special education statistics are informative and offer a glimpse of autism trends and use of educational services among children with developmental disabilities, using these data for population-based public health monitoring has drawbacks. Primarily, autism eligibility is not equivalent to an autism diagnosis defined by using clinical criteria.[9,10] A child who meets diagnostic criteria for ASD may not need specialized education services, whereas a child who does not formally meet ASD diagnostic criteria may need autism-related school services.[9] Furthermore, using only school records may underestimate the prevalence of ASD, because data on children with ASD who do not receive school-based autism services would not be captured in a school-only surveillance system.[11] These national education statistics provide a denominator of all children and not just all children with ASD; therefore, the data cannot be used to make inferences on children with ASD. To monitor trends in the prevalence of ASD, public health officials need access to comprehensive data collected in a systematic manner.

By evaluating how special education eligibilities among children with ASD change during a time of increasing ASD prevalence, we can evaluate how the rise in the documented prevalence of ASD is associated with special education classification, with a focus on disparities. The primary objective of this study was to analyze data from 5 ADDM Network sites (Arizona, Colorado, Georgia, Maryland, and North Carolina) during 4 surveillance years (2002, 2006, 2008, and 2010) to assess trends in special education eligibility classifications of 8-year-old children with ASD. A secondary objective was to examine disparities in special education eligibility by sex and race/ethnicity.

Methods

We examined data collected by the ADDM Network during 4 surveillance years from 2002 to 2010. ADDM Network is a population-based, multisource, active surveillance system established by the Centers for Disease Control and Prevention to estimate the prevalence of ASD and other developmental disabilities using a standardized methodology.[12] The ADDM Network conducts ASD surveillance among children aged 8 based on a review of information abstracted from health and education records. Trained clinicians review the abstracted information to determine whether a child meets surveillance criteria for ASD.

Study Population and ADDM Network Case Ascertainment

This study included all 8-year-old children with ADDM Network-identified ASD from the 5 sites that contributed data from both education and health sources during the 4 surveillance years. At each site, a child was eligible for inclusion in the ADDM Network if he or she was aged 8 during a given surveillance year and had at least 1 parent who resided in the site's defined geographic surveillance area during that year. For a child to be identified as potentially having ASD and be subject to clinician review to confirm this diagnosis using criteria from the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision* (DSM-IV-TR),[13] a child had to have met ADDM Network triggers for abstraction (eg, a previous ASD diagnosis, prefers to play alone or engage in solitary activities). If these criteria were met, a trained clinician reviewed and abstracted all of a child's developmental evaluations in special education and health records from multiple community providers who serve, diagnose, and treat children with developmental disabilities. The trained research staff member abstracted medical, behavioral, psychiatric, and developmental histories, as well as symptoms and diagnoses consistent with DSM-IV-TR criteria, for each child along with available school records. If more than 1 record was available for a child, all available records were collated into a composite record. Trained clinicians reviewed all abstracted composite records by using a highly structured scoring protocol based on DSM-IV-TR criteria to determine whether classification criteria for ASD were met. Clinicians maintained 90% agreement for reliability on final case status and 80% to 90% agreement for individual variables scored.[12] The study met the requirements for privacy and confidentiality by the institutional review boards at each site: University of North Carolina, Centers for Disease Control and Prevention, Emory University, University of Utah, University of Wisconsin, University of Colorado, University of South Florida, and Johns Hopkins University.

Special Education Eligibility

The clinician abstractor determined the child's most recent primary reason for special education eligibility from school records. In this analysis, we tabulated results for 7 eligibility categories that each included at least 5% of our sample in at least 1 surveillance year: autism, emotional disturbance, speech or language impairment, specific learning disability, other health impairment, intellectual disability, and developmental delay. Six eligibilities combined (deafness, deaf-blindness, vision impairment, traumatic brain injury, hearing impairment, and multiple disabilities) contributed 3.8% of all eligibility in 2002, 3.0% in 2006, 3.8% in 2008, and 2.3% in 2010 and did not have adequate power to be assessed, even when collapsed into an "other" category. Criteria to meet autism eligibility varied across sites; Arizona and Maryland followed the outline provided in the Individuals with Disabilities Education Act, whereas Georgia, North Carolina, and Colorado added detail about the wider range of ASDs as defined by DSM-IV.[9,13] We included developmental delay as an eligibility category in our analyses. The Individuals with Disabilities Education Act allows states more flexibility in the use of developmental delay as an eligibility type compared with other eligibilities, and all sites in this analysis included development delay; however, in all states, developmental delay can be used as the primary eligibility only through age 9.[7,14] Although the definition of developmental delay varies by state, we collapsed all developmental delay types into 1 category in our analyses to increase statistical power and simplify interpretation of our results.

We excluded data from 7 sites that did not abstract education records, leaving 5 ADDM Network sites that met inclusion criteria: Arizona, Colorado, Georgia, Maryland, and North Carolina ($n = 7735$ children). We excluded from analysis children who did not have a school record available ($n = 1641$) or who lived at an address that could not be geocoded to a 2010 census tract ($n = 13$). We excluded 30 children from the aforementioned 5 participating sites because they were missing data on special education eligibility or did not have special education eligibility. We also excluded 41 children who were missing information on race, leaving 6010 children who were eligible for analysis.

Data Analysis

We used linear risk regression analysis to estimate the change in proportion of children with ASD in each eligibility classification across surveillance years. We ran a crude model that controlled only for site, because site is a design variable and sites may have differed slightly in record-keeping systems, diagnostic practices, and education evaluation practices. We tested for differences between years, with 2002 as the referent year, using a likelihood ratio test with 2-sided test of significance and $P < .05$ considered significant. Because of the small sample size in developmental disability eligibility in 2002, we used 2006 as the referent year for the likelihood ratio test. To address potential confounding, we also used a model that adjusted for sex and race/ethnicity, because race/ethnicity differed across ADDM Network surveillance years,[3] sex is commonly adjusted for in ASD analyses, and both race/ethnicity and sex are associated with eligibility type.[15-17] We defined race/ethnicity as non-Hispanic white, non-Hispanic black, non-Hispanic other, and Hispanic. Furthermore, we conducted likelihood ratio tests to determine trends over time. Because of differences in the geographic areas that some sites surveyed across study years, we performed a sensitivity analysis restricted to children residing in a common catchment area (ie, the geographic area that was surveyed in all study years). When we restricted analysis to this common catchment area, 710 cases were excluded from the sample and our estimates changed by less than 10%. Both analyses are presented; however, we focused our interpretation on findings from the sample not restricted to a common catchment area based on the lack of change after restriction.

We stratified our models by sex or race/ethnicity to evaluate differences by these demographic characteristics over time. We assessed trends in each stratum using likelihood ratio tests. In addition, we ran linear risk regression models with sex by surveillance year or race/ethnicity by surveillance year interaction terms and used likelihood ratio tests to assess whether any of the interaction terms differed from zero at a 2-sided significance level of 0.1, signifying significant effect measure modification. We conducted all analyses using SAS/STAT version 9.3.[18]

Results

Across 4 ADDM Network surveillance years, 6010 children met eligibility criteria: 849 (14.1%) in 2002, 1334 (22.2%) in 2006, 1743 (29.0%) in 2008, and 2084 (34.7%) in 2010 (Table 1). Most children with ASD were non-Hispanic white in all 4 surveillance years, but the percentage of non-Hispanic white children with ASD decreased from 59.7% in 2002 to 52.4% in 2010, and the percentage of Hispanic children increased from 9.8% in 2002 to 14.3% in 2010. From 2002 to 2010, North Carolina increased in percentage of the total study sample (from 12.4% to 26.2%) and Arizona decreased (from 31.6% to 23.3%) because of the changes in the defined surveillance areas.

Table 1. Characteristics of 8-year-old children with autism spectrum disorder identified in 5 sites in the Autism and Developmental Disabilities Monitoring Network, 2002-2010[a]

	No. (%)			
	2002	2006	2008	2010
Characteristic	(n = 849)	(n = 1334)	(n = 1743)	(n = 2084)
Sex				
Male	697 (82.1)	1106 (83.0)	1460 (83.8)	1735 (83.2)
Female	152 (17.9)	228 (17.0)	283 (16.2)	349 (16.8)
Site				
Arizona	268 (31.6)	479 (35.9)	477 (27.4)	485 (23.3)
Colorado	54 (6.4)	38 (2.9)	69 (4.0)	45 (2.2)
Georgia	300 (35.3)	414 (31.0)	543 (31.2)	628 (30.1)
Maryland	122 (14.4)	198 (14.9)	226 (13.0)	380 (18.2)
North Carolina	105 (12.4)	205 (15.4)	428 (24.6)	546 (26.2)
Race/ethnicity				
Non-Hispanic white	507 (59.7)	756 (56.7)	926 (53.1)	1092 (52.4)
Non-Hispanic black	224 (26.4)	293 (22.0)	443 (25.4)	504 (24.2)
Non-Hispanic other	35 (4.1)	90 (6.8)	141 (8.1)	191 (9.2)
Hispanic	83 (9.8)	195 (14.6)	233 (13.4)	297 (14.3)
Special education eligibility				
Autism	486 (57.2)	771 (57.8)	1082 (62.1)	1331 (63.9)
Developmental delay	3 (0.4)	51 (3.9)	99 (5.7)	180 (8.7)
Emotional disturbance	52 (6.1)	55 (4.1)	68 (3.9)	64 (3.1)
Hearing or visual impairments	1 (0.1)	3 (0.2)	1 (0.1)	3 (0.1)
Intellectual disability	93 (11.0)	123 (9.2)	115 (6.6)	94 (4.5)
Multiple disabilities	17 (2.0)	28 (2.1)	27 (1.6)	38 (1.8)
Orthopedic impairments	11 (1.3)	9 (0.7)	19 (1.1)	9 (0.4)
Other	0	0	1 (0.1)	0
Other health impairment[b]	50 (5.9)	106 (8.0)	106 (6.1)	142 (6.8)
Specific learning disabilities	61 (7.2)	86 (6.5)	116 (6.7)	128 (6.1)
Speech or language impairments	75 (8.8)	102 (7.7)	108 (6.2)	95 (4.6)
Traumatic brain injury	0	0	1 (0.1)	0

[a] Data sources: Autism and Developmental Disabilities Monitoring Network.[3,4]

[b] Other health impairment defined as limited strength, vitality, or alertness due to chronic health problems.

The largest increases in primary special education eligibility were in the proportion of children with an autism eligibility (from 54.9% in 2002 to 58.5% in 2010, $P = .08$) and developmental delay eligibility (from 5.2% in 2006 to 8.1% in 2010, $P = .006$) (Table 2). The largest decrease was in the proportion of children with ASD who had an intellectual disability eligibility (from 9.6% in 2002 to 5.0% in 2010, $P < .001$). Regarding potential confounding, adjusting for sex and race/ethnicity did not change any estimates over time in eligibility (Table 3). We found no meaningful quantitative differences (>10% change in estimate) in our sensitivity analysis comparing the common catchment area subsample (n = 5370) with the total study sample (Table 4), except for a significant negative trend in speech or language impairment eligibility (3.0 percentage-point decrease from 2002 to 2010, $P < .001$).

When we stratified by sex and controlled for race/ethnicity, a greater proportion of boys than girls had an autism eligibility in 2002 (56.3% vs 48.8%), and we found a nonsignificant increase in autism eligibility for boys and girls over time (a 3.6 percentage-point increase from 2002 to 2010 for boys, and a 2.1 percentage-point increase from 2002 to 2010 for girls; Table 5). In contrast, a greater proportion of girls than boys had an intellectual disability eligibility in 2002 (16.1% vs 9.3%), but this trend significantly decreased for boys only ($P < .001$). Neither autism eligibility nor intellectual disability eligibility was significantly modified by child sex (likelihood ratio test $P = .60$ and $P = .65$, respectively).

After we adjusted for sex, Hispanic children had the lowest percentage of autism eligibility in 2002 (38.2%); however, this racial/ethnic subgroup was the only one to have a significant increase in autism eligibility (a 15.4 percentage-point increase from 2002 to 2010, $P = .005$). The likelihood ratio testing of all racial/ethnic groups by surveillance year interaction terms was significant ($P = .04$). Hispanic children with ASD had the highest percentage of intellectual disability eligibility in 2002 (26.8%), and non-Hispanic white children with ASD had the lowest percentage of intellectual disability eligibility (7.0%). All racial/ethnic groups had decreasing trends for use of the intellectual disability eligibility, but only trends among non-Hispanic white

Table 2. Temporal differences in special education eligibility of 8-year-old children with autism spectrum disorder identified in the Autism and Developmental Disabilities Monitoring Network, 2002-2010[a]

Eligibility	% in 2002 (n = 849)	Percentage-Point Change Since 2002 (95% CI)[b]			Overall Trend,[c] χ^2 (*P* Value)
		2006 (n = 1334)	2008 (n = 1743)	2010 (n = 2084)	
Autism	54.9	0.4 (–3.8 to 4.6)	3.5 (–0.4 to 7.5)	3.6 (–0.3 to 7.6)	6.7 (.08)
Developmental delay[d]	—	5.2[e]	0.7 (–2.0 to 3.4)	2.9 (0.2 to 5.6)	10.4 (.006)
Emotional disorder	5.5	−1.3 (–3.1 to 0.6)	−1.4 (–3.2 to 0.4)	–2.0 (–3.8 to –0.4)	6.9 (.08)
Intellectual disability	9.6	−1.8 (–4.3 to 0.7)	–3.5 (–5.8 to –1.2)	–4.6 (–6.8 to –2.3)	25.8 (<.001)
Other health impairment[f]	7.2	1.5 (–1.3 to 4.4)	–0.3 (–3.0 to 2.4)	0.2 (–2.4 to 2.9)	2.1 (.55)
Specific learning disabilities	6.6	–0.8 (–2.9 to 1.2)	–0.7 (–2.7 to 1.3)	–0.9 (–2.9 to 1.1)	0.9 (.81)
Speech or language impairments	11.3	−1.7 (–3.7 to 0.3)	–3.3 (–5.1 to –1.6)	0.9 (–5.2 to –1.8)	28.4 (<.001)

[a] Data came from the Arizona, Colorado, Georgia, Maryland, and North Carolina sites of the Autism and Developmental Disabilities Monitoring Network.[3,4]
[b] All estimates adjusted for site only.
[c] Likelihood ratio tests with a $P < .05$ significance level tested for differences between years, with 2002 as the referent year.
[d] Because of the small sample size in developmental disability eligibility in 2002, 2006 was the referent year.
[e] Percentage of 8-year-old children with developmental delay in 2006.
[f] Other health impairment defined as limited strength, vitality, or alertness due to chronic health problems.

Table 3. Adjusted temporal differences in special education eligibility of 8-year-old children with autism spectrum disorder, Autism and Developmental Disabilities Monitoring Network, 2002-2010[a]

Eligibility	% in 2002 (n = 849)	Percentage-Point Change Since 2002 (95% CI)[b]			Overall Trend,[c] χ^2 (*P* Value)
		2006 (n = 1334)	2008 (n = 1743)	2010 (n = 2084)	
Autism	52.3	–0.1 (–4.4 to 4.1)	3.0 (–1.0 to 7.0)	3.4 (–0.6 to 7.3)	6.4 (.09)
Developmental delay[d]	—	5.2[e]	0.7 (–2.0 to 3.4)	2.8 (0.2 to 5.6)	8.0 (.02)
Emotional disorder	5.1	−1.1 (–3.0 to 0.7)	−1.2 (–3.0 to 0.5)	−1.9 (–3.6 to –0.1)	5.1 (.17)
Intellectual disability	11.9	−1.8 (–4.2 to 0.6)	–3.5 (–5.8 to –1.3)	–4.4 (–6.5 to –2.2)	27.5 (<.001)
Other health impairment[f]	7.2	1.6 (–1.5 to 4.7)	0.0 (–3.0 to 3.0)	0.5 (–2.4 to 3.4)	1.4 (.70)
Specific learning disabilities	7.6	–0.1 (–2.9 to 1.0)	–0.8 (–2.8 to 1.1)	−1.3 (–3.2 to 0.7)	1.7 (.64)
Speech or language impairments	12.2	−1.5 (–4.0 to 1.1)	–3.1 (–5.4 to –0.7)	–3.7 (–5.9 to –1.5)	5.4 (.14)

[a] Data from the Arizona, Colorado, Georgia, Maryland, and North Carolina sites of the Autism and Developmental Disabilities Monitoring Network.[3,4]
[b] Models adjusted for sex, non-Hispanic black race, non-Hispanic other race, Hispanic ethnicity, and surveillance site.
[c] Likelihood ratio tests with a $P < .05$ significance level tested for differences between years, with 2002 as the referent year.
[d] Because of the small sample size in developmental disability eligibility in 2002, 2006 was the referent year.
[e] Percentage of 8-year-old children with developmental delay in 2006.
[f] Other health impairment defined as limited strength, vitality, or alertness due to chronic health problems.

Table 4. Adjusted temporal differences in special education eligibility of 8-year-old children with autism spectrum disorder, analysis restricted to geographic area that was common across the 4 surveillance years (n = 5370), Autism and Developmental Disabilities Monitoring Network, 2002-2010[a]

Eligibility	% in 2002 (n = 829)	Percentage-Point Change Since 2002 (95% CI)[b]			Overall Trend,[c] χ^2 (*P* Value)
		2006 (n = 1270)	2008 (n = 1531)	2010 (n = 1740)	
Autism	52.3	0.0 (–4.4 to 4.3)	1.5 (–2.7 to 5.7)	2.7 (–1.4 to 6.8)	3.1 (.38)
Developmental delay[d]	—	4.5[e]	1.9 (0.0 to 3.8)	5.4 (3.6 to 7.2)	6.0 (.05)
Emotional disorder	5.3	−1.2 (–3.2 to 0.7)	−1.0 (–2.9 to 0.9)	–2.0 (–3.8 to –0.1)	5.1 (.17)
Intellectual disability	12.2	−1.8 (–4.3 to 0.7)	–3.5 (–5.8 to –1.2)	–4.3 (–6.5 to –2.1)	22.4 (<.001)
Other health impairment[f]	7.4	2.1 (–1.3 to 4.7)	0.5 (–2.8 to 3.7)	0.7 (–2.5 to 3.8)	0.0 (>.99)
Specific learning disabilities	8.2	–0.1 (–2.9 to 1.2)	–0.7 (–2.7 to 1.4)	−1.8 (–3.9 to 0.2)	3.6 (.31)
Speech or language impairments	10.4	−1.6 (–4.0 to 0.4)	–2.4 (–4.3 to –0.5)	–3.0 (–4.8 to –1.2)	18.2 (<.001)

[a] Data from the Arizona, Colorado, Georgia, Maryland, and North Carolina sites of the Autism and Developmental Disabilities Monitoring Network.[3,4]
[b] Models adjusted for sex, non-Hispanic black race, non-Hispanic other race, Hispanic ethnicity, and site.
[c] Likelihood ratio tests with a $P < .05$ significance level tested for differences between years, with 2002 as the referent year.
[d] Because of the small sample size in developmental disability eligibility in 2002, 2006 was the referent year.
[e] Percentage of 8-year old children with developmental delay in 2006.
[f] Other health impairment defined as limited strength, vitality, or alertness due to chronic health problems.

Table 5. Adjusted stratum-specific temporal differences in special education eligibility of 8-year-old children with autism spectrum disorder, Autism and Developmental Disabilities Monitoring Network, 2002-2010[a]

		Percentage-Point Change Since 2002 (95% CI)[b]				
Eligibility	**% in 2002**	**2006**	**2008**	**2010**	***P* Value for Overall Trend**[c]	***P* Value for Interaction**[d]
Autism	(n = 486)	(n = 771)	(n = 1082)	(n = 1331)		
Sex						
Male	56.3	0.5 (–4.2 to 5.1)	2.7 (−1.8 to 7.1)	3.6 (–0.7 to 7.9)	.22	.60
Female	48.8	–3.3 (−13.5 to 6.9)	5.1 (–4.7 to 14.9)	2.1 (–7.4 to 11.5)	.28	
Race/ethnicity						
Non-Hispanic white	54.3	1.3 (–4.3 to 6.9)	2.7 (–2.6 to 8.0)	2.9 (–2.4 to 8.2)	.68	.04
Non-Hispanic black	52.6	–2.8 (–11.1 to 5.5)	1.8 (–5.8 to 9.4)	−1.8 (–9.2 to 5.7)	.54	
Non-Hispanic other	55.1	–6.4 (–26.1 to 13.4)	1 (–17.9 to 19.9)	0.6 (–18.0 to 19.3)	.66	
Hispanic	38.2	2.2 (–9.9 to 14.2)	5.3 (–6.7 to 17.2)	15.4 (4.1 to 26.8)	.005	
Intellectual disability	(n = 93)	(n = 123)	(n = 115)	(n = 94)		
Sex						
Male	9.3	–1.9 (–4.5 to 0.7)	–3.4 (–5.8 to −1.1)	–4.3 (–6.6 to –2.0)	<.001	.65
Female	16.1	1.0 (–6.1 to 8.1)	–3.3 (–9.9 to 3.3)	–3.3 (–9.8 to 3.3)	.18	
Race/ethnicity						
Non-Hispanic white	7.0	–0.6 (–3.3 to 2.1)	–2.4 (–4.8 to 0.1)	–2.9 (–5.2 to –0.5)	.009	.001
Non-Hispanic black	14.1	–2.6 (–7.9 to 2.7)	–4.6 (–9.4 to 0.2)	–4.8 (–9.8 to 0.2)	.16	
Non-Hispanic other	18.3	–8.7 (–24.1 to 6.8)	–9.9 (–25.8 to 6.0)	–8.3 (–22.4 to 5.8)	.41	
Hispanic	26.8	–7.5 (–18.7 to 3.7)	–8.9 (–19.6 to 1.9)	−14.3 (–24.8 to –3.7)	.004	

[a] Data from the Arizona, Colorado, Georgia, Maryland, and North Carolina sites of the Autism and Developmental Disabilities Monitoring Network.[3,4]
[b] Models adjusted for sex, non-Hispanic black race, non-Hispanic other race, Hispanic ethnicity, and site.
[c] Likelihood ratio tests with a $P < .05$ significance level tested for differences between years, with 2002 as the referent year.
[d] Interaction test is a likelihood ratio test for sex × surveillance year or race/ethnicity × surveillance year interaction terms.

($P = .009$) and Hispanic ($P = .004$) groups were significant. The overall likelihood ratio test evaluating race/ethnicity as an effect measure modifying the relationship between intellectual disability eligibility and surveillance year was significant ($P = .001$), indicating that these decreasing trends differed in the rate of change among racial/ethnic groups.

Discussion

This study assessed changes over time in the distribution of special education eligibility in a sample of children identified with ASD in the ADDM Network. Autism eligibility was the most common eligibility category for children with ASD; however, in all years, at least 36% of children identified with ASD received primary special education services under non-autism eligibility. In our overall sample, we found no significant change in the proportion of children with ASD under autism eligibility over time. Although not significant overall, change in autism eligibility was variable across subgroups over time, because the interaction between race/ethnicity and trend was significant. It is not surprising that estimating ASD prevalence solely by using special education eligibility would substantially underestimate ASD prevalence, and time trends did not indicate that using special education data as a source of ASD prevalence has improved such an underestimation over time.

Special education eligibility may not mirror ASD prevalence rates or trends for several reasons. First, not all children with ASD need specialized school services, because the Individuals with Disabilities Education Act eligibility applies only if the condition negatively affects educational performance.[7] Furthermore, diagnostic accretion or substitution could factor into the difference we found between data sources. Diagnostic substitution is when children who would have once received other diagnoses are identified as having ASD, and diagnostic accretion is when children receive ASD diagnoses in addition to other diagnoses they received in the past.[19,20] These changes would not be evident when solely assessing primary eligibility. Last, it is not expected that school professionals have the expertise in ASD as clinical specialists, and thus, some ASD cases may not be accurately identified.[21]

The differences observed between sexes may be attributable to girls with ASD being identified later than boys[22,23] and possibly having a different phenotypic profile.[24-26] In our study, girls had a similar trend in autism eligibility distribution to boys. We had expected that as ASD awareness increased, girls with ASD would increasingly receive autism eligibility, because they were identified as having ASD less frequently than boys. However, although ASD prevalence has increased, autism as an eligibility for special education has remained fairly constant for both girls and boys. Children of racial/ethnic minority groups may be less likely than non-Hispanic white children to receive an autism eligibility,[17,27] even though children of racial/ethnic minority groups are disproportionately more frequently enrolled in special education.[28] Non-Hispanic black and Hispanic children with ASD are more likely than non-Hispanic white children with ASD to have co-occurring intellectual disabilities,[3] which may lead to an intellectual disability eligibility instead of an autism eligibility. In this study, Hispanic children were the only subgroup to have a significant increasing trend in autism eligibility. This increase may indicate the under-identification of ASD in the Hispanic population among participating ADDM Network sites in the earlier study years or an increase over time in schools' ability to identify the need for autism services among children whose primary language is Spanish.

Limitations and Strengths

This study had several limitations. One limitation was that we had data only on primary special education eligibility. If education records were to be effectively used for ASD surveillance, more data would be needed. Studies indicate that children with developmental disabilities are often identified as having more than 1 type of disability.[29,30] Having data only on primary eligibility precluded us from fully assessing all reasons and all factors used to determine the need for special education services. However, our data informed us about what was the most pressing educational concern for a child with ASD at the time of special education classification, and these data mirrored publicly available education statistics. Second, we examined only children with education records reviewed from public schools; as such, we could not infer information on educational services received by children with ASD who did not receive special education services in public schools. Third, we did not have data on the child's primary language, which would have been useful in exploring trends by race/ethnicity. Finally, the study was limited to the 5 ADDM Network sites that consistently had access to education data; therefore, although our data were population based, our results may not be generalizable to the US population or to the entire ADDM Network.

This study also had several strengths. First, we limited temporal variability by assessing a similar geographic area during 4 surveillance years and ran sensitivity analyses to ensure that any geographic changes did not affect our results. ADDM Network surveillance for ASD relies on review from all the Individuals with Disabilities Education Act eligibility categories and is not limited to the categories most likely to be used for children with ASD. Using a record review approach, we assessed trends in a diverse subset of children for whom a wide range of demographic, medical, and education data were available. Finally, the ADDM Network uses comprehensive, reliable, and systematic protocols to ensure appropriate case classification, and these methods have been standardized and consistent since the ADDM Network's inception.

Conclusion

Our results show that the primary special education eligibility for 8-year-old children with ASD would underestimate ASD prevalence compared with a wider surveillance net, and this underestimation did not change over time. However, we did observe an increase in autism eligibility over time for Hispanic children. Although ASD surveillance data and special education data have different purposes, they should be used in conjunction to better understand service use and the health needs of children with ASD.

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