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An Investigation of Increased Rates of Autism in U.S. Public Schools

Abstract

This study is intended to enhance our understanding of the dramatic increase in autism prevalence rates across the United States. A robust national and multi-state sample of children and youth (5 to 22 years of age) was gathered and analyzed, using visual and statistical analysis of autism eligibility over a 15- to 17-year period. Although the impact of environmental or genetic influences cannot be entirely ruled out, we identified significant shifts in eligibility trends that substantially contribute to the remarkable increase in autism prevalence. Assessment procedures and criteria for autism have sustained an indelible influence from this diagnostic migration, which has had a lasting impact on public schools. We use this information to provide meaningful implications for practicing psychology in the schools.

Keywords: autism eligibility, autism prevalence, diagnostic migration, legal/policy issues, special education

An Investigation of Increased Rates of Autism in U.S. Public Schools

A substantial increase in the identification rates of autism spectrum disorder (ASD) in the United States and many countries around the world warrants further attention and consideration. The process of effectively establishing and analyzing prevalence data is critical to guide and inform research and practice in schools. According to the 2014 Centers for Disease Control and Prevention (CDC) Autism and Developmental Disabilities Monitoring (ADDM) longitudinal study, prevalence rates of autism were 1 in 59 children aged 8 years (Baio et al., 2018). These estimates are considerably higher than the previously reported estimates from the ADDM network of 1 in 150 (2000–2002) and 1 in 68 (2010–2012) in children aged 8 years.

Consistencies across the increasing prevalence rates of ASD include higher male-to-female ratios of identification (4.5:1), the median age at ASD diagnosis (50-56 months), and the number of comprehensive developmental evaluations conducted by age 3 (43–46%). Although the increase in ASD rates occurs consistently across race/ethnicity and socioeconomic status, the level of increase varies and has some disproportionalities (Baio et al., 2018), which will be discussed throughout this paper. The initial remarkable difference in ASD rates between the 2002 and 2012 data represents a twofold increase in autism prevalence rates, leading investigations of ASD to center on the cause of this steep increase (Kuehn, 2012; Lange, 2012; Lin et al., 2011; Liu & Bearman, 2015; Merrick et al., 2004; Miller et al., 2013).

Investigations of prevalence that rely on assumptions about the causes of autism has created confusion (Lin et al., 2011; Liu & Bearman, 2015) between the cause of autism and the reasons for the remarkable increase in prevalence. A focus on the cause is often seen in the medical community, as most research on autism etiology is rooted in a neurological explanation, notwithstanding the authenticity of the claims of environmental influences. Although, in recent

years we understand much more about the causes of autism, we do not have a comprehensive explanation. We do know, however, that autism is not distinguished by one major characteristic but, rather, a cluster of symptoms that can be difficult to identify and group (Ben-Itzchak & Zachor, 2019).

Although the research mentioned above provides a context for understanding the complex interplay between the etiology and prevalence of autism, our research seeks to better understand the rise in prevalence rates of autism and its impact on school psychology practices. To better understand the scope of this issue, we review the history of autism classification, prevalence, and changes in diagnosis and eligibility for services. We contend that a better understanding of autism prevalence can be achieved by analyzing prevalence data and comparing it to changes and trends in areas of eligibility. School psychologists serve as witnesses to this increase in prevalence and its overall impact on and implications for everyday practices. Thus, we conclude this paper with guidance and practical implications for school psychologists. We begin with the diagnostic history of autism as related to eligibility for services.

History of Diagnostic Classification and Eligibility

In the 1960s, autism was thought to be a severe condition accompanied by intellectual disability, at which time prevalence was believed to be around 1 in 2,000 (Gillberg & Wing, 1999). During that period, the American Psychiatric Association (APA) did not formally recognize autism. In 1980, the APA published the third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM), which established diagnostic criteria for pervasive developmental disorder and infantile autism (APA, 1980). The APA revised the DSM in 1994 to include five subtypes of autism: autistic disorder, Asperger's disorder, pervasive developmental disorder-not otherwise specified, childhood disintegrative disorder, and Rett's disorder (APA,

1994). Most recently, in 2013, the APA published a fifth edition of the DSM, in which they redefined autism as a single disorder with a spectrum of severity and included updates to the diagnostic classification of autism (APA, 2013).

Much like the DSM, autism has experienced changes in terms of students' eligibility for educational services. In 1975, Public Law (P.L.) 94-142, the Education for All Handicapped Children Act, was established to provide public education to students with disabilities. At this time, autism was subsumed under the classification of seriously emotionally disturbed, however students with related behaviors were often classified under other eligibility categories (Brock, 2006; Triano, 2000). Additionally, earlier students with autism were commonly classified with mental retardation (changed to intellectual disability in 2010; Zirkel, 2011). Among other changes following the 1990 transition of P.L. 94-142 into the Individuals with Disabilities Education Act (IDEA), autism was designated as its own independent category. Further revisions to IDEA have involved minimal alterations with regard to autism eligibility; however, the procedures and criteria vary across each state (Barton et al., 2016). A primary difference from the DSM criteria for autism is IDEA's requirement for behaviors to adversely affect educational performance; thus, students with a diagnosis of autism may not require special education (Dahle, 2003).

The periodic changes to these diagnostic criteria, however, do not always translate into practice as quickly as necessary to stay current with these criteria. For this reason, considering clinical diagnoses recorded over time without knowing the details of the reported behavior and symptoms may be misleading in terms of our understanding of autism (Barbaresi et al., 2009; Kočovská et al., 2012). Researchers have expressed concern about the methods used to evaluate autism prevalence due to the changes in criteria over time (Schieve et al., 2012). As such, a

review of data related to school eligibility may provide a more comprehensive picture of the increase in prevalence. Specifically, eligibility may provide a more stable measure that reflects the needs of students in school systems, as the factor that determines eligibility has not changed (i.e., whether symptoms adversely affect educational performance).

When reviewing these data, however, we must consider the complexities behind diagnostic or eligibility determinations. For example, there is no specific protocol for identifying ASD. Professionals use a variety of assessment tools and approaches, which can result in different diagnostic and eligibility decisions. Furthermore, although school psychologists make a recommendation for eligibility based on their assessment data, the final eligibility determination is made by the Individualized Education Plan team, comprised of qualified school professionals and the parent (20 USC § 1400, 2004). As our focus is on autism prevalence, rather than etiology (i.e., cause), we highlight the research that attempts to understand the change in autism prevalence in recent years.

Autism Prevalence

Without question, the rate of autism diagnosis has experienced an unprecedented increase. The most cited source of autism prevalence is a series of study outcomes funded by the CDC. The CDC's ADDM study was updated in 2014 and concluded that the rate of autism prevalence is 1 in 59 in a U.S. sample of 8-year-olds (Baio et al., 2018). The 2014 CDC's ADDM study results indicate an increase in autism prevalence after being unchanged at 1 in 68 for the previous four years. The National Center for Health Statistics in 2015 reported an even more distributing rate of 1 in 45, and another CDC-funded study reported that 1 in 50 children, age 8 years, have the diagnosis of autism (Christensen et al., 2016).

Estimations of prevalence often neglect the discrepancy that occurs across settings (e.g., community clinics versus schools). Yeargin-Allsopp and colleagues (2003) found that 18% of children in their sample (3 to 10 years of age), with a medical diagnosis of autism, had not been identified in special education by their local education agency. Similarly, Brock (2006), who considered data from 46 states, found that identification rates for students with autism ranged from 1 in 933 to 1 in 101. The investigator suggested these rates indicate substantial differences in criteria across state agencies. This discrepancy in identification highlights differences in practice and has implications for prevalence considerations of autism.

Despite the substantial increase in overall autism identification, its prevalence is not equally distributed across cultural or demographic variables. Black, Hispanic, and Indian/Alaskan native children have previously been much less likely to be identified as having autism than are White non-Hispanic children (Sullivan, 2013). These disparities may be due to a reluctance among professionals to identify students faced with cultural or linguistic variables as having autism. This reluctance also may be due to a readiness to consider intellectual disability (ID) eligibility criteria instead of autism (Brock, 2006; Sullivan, 2013). Moreover, the development of considering autism as a spectrum disorder, with relative degrees of symptoms and impact, is also suspected to contribute to misclassification by identifying students with less symptom severity under different eligibility categories (e.g., SLD) (Brock, 2006).

Broader concerns involve many clinicians' struggle to distinguish autism from other developmental delays (Worley et al., 2011). Research in community-based healthcare settings has found sparse alignment across practitioners in diagnostic validity and assessment procedures (Williams et al., 2009). We find similar issues in schools; for example, an analysis of 402 school psychologists indicated that less than 25% upheld established evidence-based assessment

methods (Aiello et al., 2017). Of school psychologists surveyed in 2004, 95% reported an increase of students with autism symptoms referred for assessment on their caseload, indicating a need for further guidance for identification procedures (Kohrt, 2004).

Despite differences in rates of prevalence, there is agreement that rates of autism are on the rise and that it is crucial to understand the cause of this rise. Researchers have offered an explanation—that there has been a shift in diagnostic assignment rather than an increase in disability overall. Several terms or phrases characterize this diagnostic shift, including "diagnostic substitution" (Coo et al., 2008; Croen et al. 2002), "difference in case identification methods" (Parner et al., 2011), "wider diagnostic criteria" (Weintraub, 2011), "diagnostic criteria and methods of ascertainment" (Kielinen et al., 2000), "broadening of the criteria themselves or the *interpretation* of the criteria" (Miller et al., 2013), "increased awareness and diagnostics" (Idring et al., 2015), "internal measurement effects" (Schieve et al., 2012), "clinical diagnosis vs. research identified diagnosis" (Barbaresi et al., 2009), "considerable variability as regards to diagnostic sub-groupings" (Kočovská et al., 2012), "diagnostic recategorization from frequently comorbid features such as ID [intellectual disability]" (Polyak et al., 2015), and "changing rates of ASD and its impact on the prevalence of other disabilities, ID, and learning disabilities" (van Bakel et al., 2015). Researchers suggest that the increase in autism prevalence has more to do with how practitioners identify autism during an evaluation, perhaps due to greater awareness and broader diagnostic criteria for autism, than to an actual increase in prevalence (Coo et al., 2008; Croen et al., 2002; Fombonne, 2003; Idring et al., 2015; Johnson et al., 2012; Kielinen et al., 2000; Lin et al., 2011; Miller et al., 2013; Neik et al., 2014; Schieve et al., 2012; Weintraub, 2011).

We attempt to better understand the reasons for the remarkable increase in autism prevalence in the public schools and make a significant contribution to the literature. First, our study includes a robust national and multi-state sample, many times the size of the CDC's ADDM study. Second, we include children from 5 to 22 years old, whereas the CDC's ADDM study relies only on 8-year-old children. Third, our research compares national data with data from six states both to affirm the national data and to detect state-specific anomalies that are otherwise hidden in a national-only analysis. Fourth, we empirically analyze the patterns of eligibility of autism over the recent 15- to 17-year period, encompassing over 10 million eligibility designations across the United States.

Method

Data Selection

This investigation used data from two sources. National data were gathered from the National Center for Education Statistics (NCES) for students 6 through 21 years of age for the years 2000–2001 to 2014–2015. State data were for the same population for the years 1999–2000 to 2014–2015, the most current data available at the time of this investigation. State data were gathered individually from each state's publicly available database through their online websites. When needed, we made direct calls to the state's office that oversees these data for clarification of data formatting. In our analysis, we use 15 years of data in our national sample and 17 years of data in our state sample. All data use the same parameters, and the data are based on enrollment records of special education students as a requirement of IDEA. State departments of education report the individual eligibility category for every student who receives services via an individualized education program (IEP). These data cover the 13 federally identified eligibility categories (Table 1).

[Insert Table 1 about here]

Our data-gathering methods allowed for consistency of definition and reporting across state and national data sources (we note minor exceptions in the Anomalies of Reported Data section). The disability categories listed in IDEA are autism, deaf-blindness, deafness, emotional disturbance, hearing impairment, intellectual disability (formerly mental retardation), multiple disabilities, orthopedic impairment, other health impairment, specific learning disability, speech or language impairment, traumatic brain injury, or visual impairment (including blindness). Although eligibility and diagnostic criteria are frequently similar, the data from the two should not be confused. Eligibility criteria include the assumption that the disability interferes with the educational process, and, thus, the individual requires appropriate services to access his or her education. Consequently, eligibility data often indicate a slightly lower prevalence rate than do diagnostic data, as eligibility data have one additional component to satisfy. All data presented in this current study are eligibility data, as outlined in IDEA. State data were gathered from individual states, using their public data dashboards. When not available, data requests were submitted directly to state offices of education. In all cases, our requests were fully satisfied.

Anomalies of the Reported Data

Because federal legislation drives the 13 reporting categories, data reporting across states and nationally was highly consistent. Two anomalies, however, were detected. Before 2005, Missouri reported separate categories for Language Impairment and Speech Impairment. For this study, we combine the two categories into one, favoring the standard federal eligibility category of Speech-Language Impairment (SLI). In addition, Colorado did not begin to report the Other Health Impaired (OHI) category until 2012. It appears that the OHI eligibility data were combined under Orthopedic Impairment (Physical Disabilities) before 2012. There was no

correction for this anomaly; thus, one must view the OHI category in the Colorado data with this reporting variance in mind. Autism rates were not affected.

Six-State Sample

The six-state sample represents approximately one-third of all special education student enrollment in the United States (34% based on 2013–2014). We were able to numerically combine these data across our multi-state sample, as federal eligibility regulations mandate reporting of these data across the same 13 disability categories. As noted above, Colorado did not report OHI eligibility until 2012. This reporting difference may have had an impact on two critical areas of analysis for this current study—autism and specific learning disability.

Table 2 presents the six states in the study along with their population rankings in the United States and within their respective geographical regions. The individual states were selected primarily for their size and significance within their U.S. region. A previous large-scale examination of prevalence used three of the six states. Specifically, the CDC's ADDM study also used data from the states of Colorado, Missouri, and Pennsylvania. The three highly populated states, California, Texas, and New York, were unique to this current study. This sampling technique was used to assess whether regional differences (the population size of the state and their location) existed that could not be detected when looking at composite national data alone.

[Insert Table 2 about here]

Data Analysis

First, we wanted to establish whether the actual growth of autism in schools was significantly higher than would be expected based on the special education population growth. That is, we wanted to determine whether the actual prevalence rates were due to something other

than chance. To determine whether there is a significant difference between the means of the

two related groups (national growth of autism and national growth of special education), we

conducted a *t*-test analysis.

Second, we sought to determine the conditions that could account for the significant

difference between the growth in autism and the overall special education enrollment. Here, we

relied on both visual comparisons, using advanced ocularmetrics for trend analysis (Drew, 1983),

and statistical correlation. According to Drew (1983), the advanced ocularmetric visual method

is a technique in which covariates are controlled and evaluation data are presented graphically in

a manner that makes sense to policymakers. In this case, we identified which disability

categories could explain the significantly larger growth rate of autism (see Figure 1 for an

example). Once we identified the suspect category, we used Pearson correlations to determine

whether there was a significant relationship. If so, we determined the degree of relationship

between the suspected condition and the rate of autism growth. We conducted a single-order

correlational analysis of each suspect condition with the category of autism. The goal was to

assess whether any of the suspected categories contributed to the increase in autism prevalence.

Although we considered all 13 disability categories in the model, we eliminated the disability

categories that showed relatively minor changes (<5%) over the time of the study. The reduced

number of categories provided for a more manageable and meaningful set of categories. We

viewed the eliminated categories as representing minor changes (increases and decreases) and,

thus, were considered to have inconsequential predictive influence. This process left five

disability categories for the analysis: Intellectual Disability (ID), Emotional Disturbance (ED),

Specific Learning Disability (SLD), Other Health Impaired (OHI), and Autism (AUT).

[Insert Figure 1 about here]

Third, we sought to determine whether our findings from the NCES national data were similar to our six-state sample, both together and individually, and to report any variations. We created a gap analysis to compare actual to expected rates of growth (Clark et al., 2006; Trisi et al., 2002). Expected growth scores were established by indexing the annual growth rate in all special education to each disability category. We created a variable that represented the number of students in each disability category, had it grown at the rate of growth of all special education for each reported year. How each category (actual) varied from the baseline (expected) rate would visually reveal the outlier categories. Figure 2 is the visual representation of these calculations. This rate would help us to assess better whether the national findings could be generalized to individual states. We compared the state and national findings across each of the correlational analyses that we conducted in our second analysis, and we presented variations between states and national data.

[Insert Figure 2 about here]

Results

Comparison of Actual to Expected Autism Frequency, Based on NCES National Data

A comparison of the actual to expected changes in the NCES data on autism revealed that, in 2001, the proportion of students who had the eligibility category of AUT was 1.53% ($N = 93,000$) of all students in special education ($N = 6,084,000$). In 2015, 8.89% ($N = 538,000$) received the AUT eligibility category, for an almost unchanged total number of students who receive special education services nationally ($N = 6,052,000$). Although the total number of special education students in the nation was highly similar over this period (a decrease of .05%), the number of students in the AUT eligibility category increased by nearly six times (5.78) the national rate of 2001 (an increase of 478%).

We used special education enrollment data because they were highly correlated with general education enrollment changes over time for the latest 15-year period, $r(14) = .97, p < .001$, and, therefore, measure practically the same thing. To determine whether there was a significant difference between the two groups (national growth of autism versus national growth of special education enrollments), we conducted a t-test, $t(14) = 86.25, p < .001$. We concluded that the rate of AUT growth over the 15 years of national data has increased at a statistically significant higher rate than have national changes in special education.

An Explanation for the Increase in Autism

We sought to explain how there was both a dramatic increase in the rate of AUT at the same time that the total population of special education students remained relatively stagnant. One or more disability categories must be decreasing to account for the rapid increase in AUT. Visual metrics allowed us to view the entire time-series pattern (Figures 3 and 4). Figures 1 and 2 were used to amplify the visual patterns and represented the gap analysis and to compare actual to expected rates of growth. Using advanced ocularmetrics, the main suspect category becomes visually apparent. The category of SLD appears to be inversely related to AUT. Pearson correlation analysis reveals that there is a strong and inverse statistically significant relationship between the SLD and AUT categories, $r(14) = -.932, p < .001$. Stated another way, the decrease in the SLD eligibility category almost wholly explains the increase in the rate of autism; as previously noted, the investigation of the dramatic increase in the *rate* of autism is the primary purpose of this study.

[Inserts Figure 3 and 4 about here]

Nevertheless, the visual model of national data (Figure 2) demonstrates that there are other trends of note. Specifically, the number of students in the OHI category indicates a greater

increase than that for the category of AUT over the same time, 515,594 and 445,489,

respectively. The growth in the OHI category over this same time represents an important but

much lower percentage of growth than does AUT, 170% to 478%, respectively. OHI and AUT

are statistically colinear, $r(14) = .996, p < .001$, and, as such, one could conclude that SLD and

OHI have the same relationship as do SLD and AUT. The growth in AUT and OHI, taken

together, are almost entirely accounted for (96%) by the combined decreases in ID, ED, and

SLD. The statistical collinearity between the OHI and AUT categories was a primary reason for

using single-order correlations, instead of multiple regression analysis, in this analysis. In

addition, regressing the suspected categories of ID and ED on AUT would do little to explain

more of the variance in the dependent variable, AUT.

Comparison of State to National Findings

We first compared the state and national data, using visual models. We did this to

determine whether the findings based on NCES national data were sensitive to regional

variations. Figure 1 represents the six-state data stacked together for comparison to the national

data. A comparison of Figures 1 and 2 reveals a highly similar visual representation. Again, the

substantial increase in the number of students with AUT eligibility stands out, as does the radical

decrease in the number of students in the SLD category, mirroring the national pattern. As well,

the OHI and AUT categories are almost identical, much like the national population, and the ED

categories also match. As noted, our focus in this study is to explain the increase in the

prevalence of autism. Toward that end, we conducted a *t*-test analysis to determine whether

there was a significant difference between the combined state growth of autism and the total state

enrollment in special education. Similar to the national findings, using a *t*-test ($t(15) = 72.16, p <$

$.001$), we determined that there was a significant difference between the two groups (state

growth of autism versus state growth of special education enrollments). We concluded that the rate of autism growth over the 17 years of combined state data has increased at a statistically significant higher rate than have combined state changes in special education enrollment.

We then set out to determine which categories could explain the significant growth in the AUT eligibility category. Based on a review of the visual model, we selected SLD as the suspect category. We conducted a Pearson correlation to determine whether there was a significant relationship between these two variables (SLD and AUT) and, if so, the extent of that relationship. The relationship between the combined state categories of AUT and SLD was significant, strong, and inverse, $r(14) = -.941$, $p < .001$. These results were highly similar to those of the national findings.

Although the combined state results appear highly similar to those of the national data, relative to explaining the high rise in autism prevalence over time, some state-to-state differences are worth noting. For example, the national ID eligibility category exhibited a significant decrease over time of 196,000, which indicates its role in the increase in autism prevalence. In the combined state data, however, the decrease is modest. By taking a closer look at the state-to-state comparison data, we can see that all states, except Texas, registered a decrease in the ID category, totaling 28,059. Texas registered an increase of 17,099 in the ID category over that same period, masking what could have been a noticeable decrease overall.

Discussion

Classification Substitution as Explaining the Increase in Autism Prevalence

The rate of autism prevalence in U.S. schools has increased dramatically over the past 15 to 17 years. Across our six-state sample, autism increased by 684% over the 17 years, or 43% per year, on average. The growth in all special education, however, remained relatively the same

as the general population growth, about 0.5% each year. Of the six states in our sample, some

had declining enrollment, as much as -0.8% per year. Others experienced growth as high as

1.7% per year, not nearly enough to explain the growth in autism. We cannot explain the

significant increase in the rate of autism across the country by more students who are entering

the system. Other factors must be causing the rate of autism to increase.

In search of a data-supported cause for the increase in autism in school-aged children, we

analyzed the prevalence patterns of all 13 federal disability categories across a six-state sample.

Although the intensity of the prevalence rates varies, the patterns of increase are highly similar.

In all states, the rate of autism has increased dramatically. The visual data provide a possible

explanation of how one category can increase so dramatically while the total number of children

in special education has remained generally stable. Although autism has increased, there has

been a steady and corresponding decrease in the number of children identified with the eligibility

category of SLD. This "classification substitution" is suspected to be mainly responsible for the

excessive increase in autism prevalence (Brock, 2006).

The substitution of SLD with AUT is only one of the critical migration effects that is

occurring. We mathematically estimated how many children would be assigned to each

disability category if their numbers grew at the same proportions as they had before our base

year (2000). In other words, we grew each category based on each state's change in total special

education population growth rate. This became the "expected" number of children in each

category. We then compared the expected rate to the actual rate. In a general sense, 10 of the 13

disability categories performed as they were mathematically expected to perform. Three

categories did not: The AUT and OHI categories increased far beyond their expected levels, and

the performance of the SLD category was much lower than expected. These trends are

increasingly important for school psychologist practitioners to be aware of when responding to

questions from families and educators and making assessment considerations.

Applications to Psychology in the Schools: The Impact of Trends in Practice

When assessing for autism, practitioners face a complex array of often heterogeneous

symptoms across cognitive, processing, social, communicative, adaptive, and behavioral

domains. Strong connections link each of these factors to individuals with autism, involving

concepts of theory of mind, executive functioning, and local processing bias (Cantio et al.,

2016). These struggles, although most prominent in individuals with autism, often present as

similar to other areas for eligibility consideration. In conjunction with changes to the DSM and

IDEA criteria for autism, these factors pose complications for effectively classifying individuals

with autism.

There is limited research that analyzes the dynamic overlap in autism and emotional

disturbance (ED), despite sharing their eligibility category prior to 1990 (Clinton, 2016; Triano,

2000). Individuals with autism often experience mental health struggles that exacerbate, or are

exacerbated by, their core symptoms of autism. This causes a potential diagnostic

overshadowing in which struggles related to autism (social withdrawal) may mask symptoms of

ED (withdrawal due to a fear or pervasive mood of unhappiness; Matson & Nebel-Schwalm,

2007). Difficulties with self-awareness or understanding and identifying, labeling, and

expressing emotions are traits inherent with autism and can subsequently increase mental health

symptoms. As early as preschool, a substantial phenotypic overlap is seen in children with

autism and core emotional and behavioral symptoms (Georgiades et al., 2011).

Children with autism often display similar behavioral tendencies related to executive

functioning as children with ADHD on commonly used standardized instruments (Russo et al.,

2007). In addition, multiple studies from the mid-1990s, soon after autism eligibility was added to IDEA, found that at least 30% of children with mild-to-severe learning disabilities also met the criteria for autism (O'Brien & Pearson, 2004). This complex interplay requires equally sophisticated assessment and intervention procedures (Magyar & Pandolfi, 2012). School professionals must consider differential assessment techniques to identify behavioral and mental health symptoms and their impact across multiple settings (e.g., home, school, community). By upholding a thorough evaluation process, more accurate data can be compiled regarding the actual occurrence and co-occurrence of an individual's needs, leading to more informed interventions.

When represented across a spectrum of severity, these students' profiles are challenging in nature. These complexities and overlapping symptoms may lead to further classification confusion and inconsistencies in practice (Barbaresi et al., 2009; Leonard et al., 2010). For school psychologists, there is an acknowledged lack of publications regarding school-based assessments for autism (McKenney et al., 2015). Scholars report that the evaluation of measures (e.g., development and validation) and factors that affect assessment (e.g., assessment-related challenges; educational policies, laws, and standards; race and ethnicity issues) were among the least researched areas (McClain et al., 2018). In addition, a survey of school psychologists regarding practices for evaluating autism in schools revealed that only 25% of respondents reported implementing desired practice methods for assessment (Aiello et al., 2017).

Despite established methods for effectively evaluating autism (Wilkinson, 2017), regular changes to classification procedures pose a clear challenge to school psychologists' maintaining consistent practice methods. In certain scenarios, children with a clinical or medical diagnosis of autism are not always found eligible for special education (Pinborough-Zimmerman et al., 2012).

In addition, with high levels of comorbidity present in individuals with autism, these children may be classified under a separate special education eligibility. Collectively, these factors indicate an unfortunate lack of alignment between research, policy, and practice. By collaborating on more effective assessment practices, school psychologists, researchers, and policymakers can contribute to more accurate indicators of prevalence (Carpenter et al., 2016).

This study suggests that the increase in autism can be partially explained by an exchange effect or, as we term it, *diagnostic migration*. We are not suggesting that children previously identified with SLD are now identified with AUT. Instead, as new children enter the system with learning characteristics and behaviors previously associated with SLD, these characteristics are now being seen as consistent with AUT or even with OHI. There is no single explanation for the marked changes over time across disability categories, especially in the increase of autism prevalence. We should, however, consider diagnostic migration as a substantial contributing factor in future models that attempt to explain these phenomena.

Implications for Policy and Practice

The results of this study indicate that many individuals with autism have been in schools all along. We were, however, viewing and identifying them from a different eligibility perspective. The increased numbers of students found eligible for special education under the autism criteria may be due, in part, to the comfort level and ability of IEP team members with using autism criteria to identify individuals. Further contributing factors may include the increase in public awareness of autism, particularly the broad spectrum of how autism symptoms may present, as well as the availability of resources for individuals with autism within schools and communities.

Based on the findings of this study, school professionals must continue to develop a more thorough approach to the assessment and identification of individuals with autism. First, our field must continue the work on developing assessment tools for differential classification of students with similar behavioral presentations as those seen in ASD (Matson et al., 2012). Further, as we begin to understand standard assessment practices and how they affect eligibility trends, we must then link the assessment data to relevant and practical intervention approaches. A critical component of the assessment for autism is to generate interventions and information to guide educational programming (Aiello et al., 2017). These responsibilities are inherent to the daily efforts of school psychologists (Skalski et al., 2015).

The results of this study may be used to help allocate appropriate resources for intervention and research. For example, it may be prudent to consider funding more intervention studies rather than focusing on the cause of autism. The expenses for supporting individuals with autism in the United States has been documented reaching $90 billion annually and increasing with the growing prevalence reports (Sullivan, 2013). Further, school-based services for students with Autism are the highest costing group when compared to other eligibility categories. Specifically, cost estimates by disability category indicate the spending ratio for ASD is at 2.9, followed by ED (2.2), OHI (2.0), and SLD (1.6) (Kolbe, 2019). It is important to note that these cost estimates are based on extensive national data collected in 1999-2000, that were updated in 2014 by applying the Comparable Wage Index to the 1999 estimates. The 2014 estimates simply represent the 1999 estimates in 2014 dollars and do not capture potential changes in service delivery that may have occurred between 1999 and 2014 (Kolbe, 2019).

It may be beneficial to direct more funding and support toward identifying cost-effective evidence-based practices to address autism in the school setting. Along these lines, it also is essential to consider the ways that schools typically structure intervention programs, particularly as the large numbers of individuals identified as having autism vary significantly in terms of their learning characteristics and behavioral presentation. As school professionals, we should continue to place an emphasis on developing customized individual supports across multiple settings with frequent inclusion of typical peers and consider reducing "autism-specific placements." We know that providing a continuum of services is a requirement of federal law and best practice when considering the individualized needs of students.

Limitations of the Study

Although we used appropriate analyses, a predictive multivariate statistical model may have been a better means to determine whether the variance in the autism rate could have been significantly accounted for by the other disability categories. Nevertheless, we felt that we could better mitigate the risk of Type II error due to the modest number of years (17) in the current model. In addition, the statistical collinearity between the OHI and AUT categories was the primary reason for using single-order correlations instead of multiple regression analysis. Regressing the suspected categories of ID and ED on autism would do little to explain more of the variance in the dependent variable, AUT. We believe that the use of visual methods of analysis was particularly beneficial because, although the number of occurrences is large (millions), the number of years to compare is modest, at 17. Further, the national and individual state data represent the full populations (every school-age child who attends public school in the state), which avoids errors in generalization. While the population sample is extremely large, representing one-third of all students in special education in the US, there is potential that these

results cannot be fully generalized. Demographic variations across states, such as state

population size and individual state population demographics, may influence results.

Suggestions for Further Research

Further research should employ more advanced statistics to predict future migration of

eligibility. A multivariate analysis may shed light on the role of other disability categories, such

as ID, that were not considered as heavily in this current analysis. Because each state has its

unique micro-patterns, it would be useful to study why these patterns exist and how state and

national policies affect these migrations. Further, understanding the variance between the east

and west coasts (Pennsylvania and California, for example) may lead to connecting state policy

to eligibility.

During the course of gathering data for this study the authors identified numerous

noteworthy and unexplained trends in the data. While each of them fell outside the scope of this

current research they seem to justify further investigation. We reported earlier in this study that

the state-to-state comparisons found that all states, except Texas, registered a decrease in the ID

category. In contrast, Texas registered a significant increase in that same category over that same

period, somewhat masking the decreasing trend overall. Future research into the unexplained

increase in ID identification in Texas while the other five states and national data indicate a

decrease in the ID category would be well warranted. Other noteworthy trends for follow-up can

be seen in Figure 3, such as the consistently higher rates of ASD classification in California and

the abrupt increase in Texas starting in 2012. Figure 4 reveals a dramatically descending trend in

SLD in Missouri and the curvilinear relationship of SLD in Colorado is also curious.

Understanding these unexplained trends could shed greater light on our understanding of

prevalence rates in ASD and other disability categories and at least partially explain why studies

that view only national data may be masking anomalies within individual states. And, as such, clouding our understanding of the forces behind autism prevalence.

A study of government policy changes and how they may have an impact on the future (and even past) distribution of eligibility may teach us more about disability composition in schools. For example, researchers could study the impact of federal guidance memos of the 1990s (regarding how schools should treat ADHD, as included under OHI instead of SLD) on diagnostic migration. As well, we need to understand better how our educator credentialing policies and programs have an impact on our current systems of support for children with disabilities in our schools. We must continue to focus our training programs toward a continuum of services individualized approach and away from a categorical placement model.

Additional considerations for research to guide school psychology practice would consider students who have been reclassified from autism to another eligibility, or to autism from other eligibility categories. In particular, we should look at students reclassified in the category of autism who were previously identified under Speech and Language Impairment (SLI) and consider reclassifying students for eligibility under ED who were initially eligible under autism. Further, research across clinical and educational fields must consider diagnostic, eligibility, and assessment considerations that are related to the discrepancy between identification rates in schools and clinical settings.

Conflicts of Interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

Compliance with Ethical Standards

All procedures performed in studies that involve human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

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Table 1

Special Education Eligibility Categories and Criteria

Eligibility Category	Criteria
Intellectual Disability (ID)	• Significantly subaverage general intellectual functioning • Exists concurrently with deficits in adaptive behavior • Manifested during the developmental period • Adversely affects the child's educational performance (Previously labeled "mental retardation")

Emotional Disturbance (ED)	• Exhibits one or more of the following characteristics over a long period of time that adversely affect the child's educational performance:
	  • Inability to learn, unexplained by intellectual, sensory, or health factors
	  • Inability to build or maintain interpersonal relationships
	  • Inappropriate behaviors/feelings under normal circumstances
	  • General pervasive unhappy or depressed mood
	  • Tendency to develop physical symptoms or fears associated with personal/school problems
	• Includes schizophrenia
	(Does not apply to children who are socially maladjusted)

Specific Learning Disability (SLD)	• A disorder in one or more of the basic psychological processes involved in understanding/using language either written or spoken • May express as imperfect ability to listen, think, speak, read, write, spell, and do math • Includes perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia (Does not include learning problems that are primarily the result of vision, hearing, or motor disabilities; intellectual disabilities; emotional disturbance; or environmental, cultural, or economic disadvantage)
Other Health Impairment (OHI)	• Having limited strength, vitality, or alertness that results in limited alertness in the educational environment • Due to chronic or acute health problems, including asthma, ADD/ADHD, diabetes, epilepsy, a heart condition, hemophilia, lead poisoning, leukemia, nephritis, rheumatic fever, sickle cell anemia, or Tourette's syndrome (Adversely affects the child's educational performance)
Autism Spectrum Disorder (ASD)	• A developmental disability that significantly affects verbal and nonverbal communication and social interaction • Generally evident by age 3

- Other symptoms may include engagement in repetitive activities and stereotyped movements, resistance to environmental change/daily routine change, or unusual responses to sensory experiences (Adversely affects the child's educational performance)

Note. Criteria for Special Education and Related Services provided by IDEA. Adapted from Sec. 300.8 Child with a Disability, Individuals with Disabilities Education Act, 2017, retrieved from https://sites.ed.gov/idea/regs/b/a/300.8

Table 2

Sample States and their Rank in the United States and by Region for Population Size

State	U.S. Region	Special Education Population 2015	U.S. Rank	Region Rank
California	West	734,422	1	1
Colorado	West	86,349	21	2
Texas	South	446,276	2	1
Missouri	Midwest	109,830	18	4
New York	Northeast	448,768	3	1
Pennsylvania	Northeast	285,806	5	3

Figure 1

Gap scores per disability category and state: 2000–2015
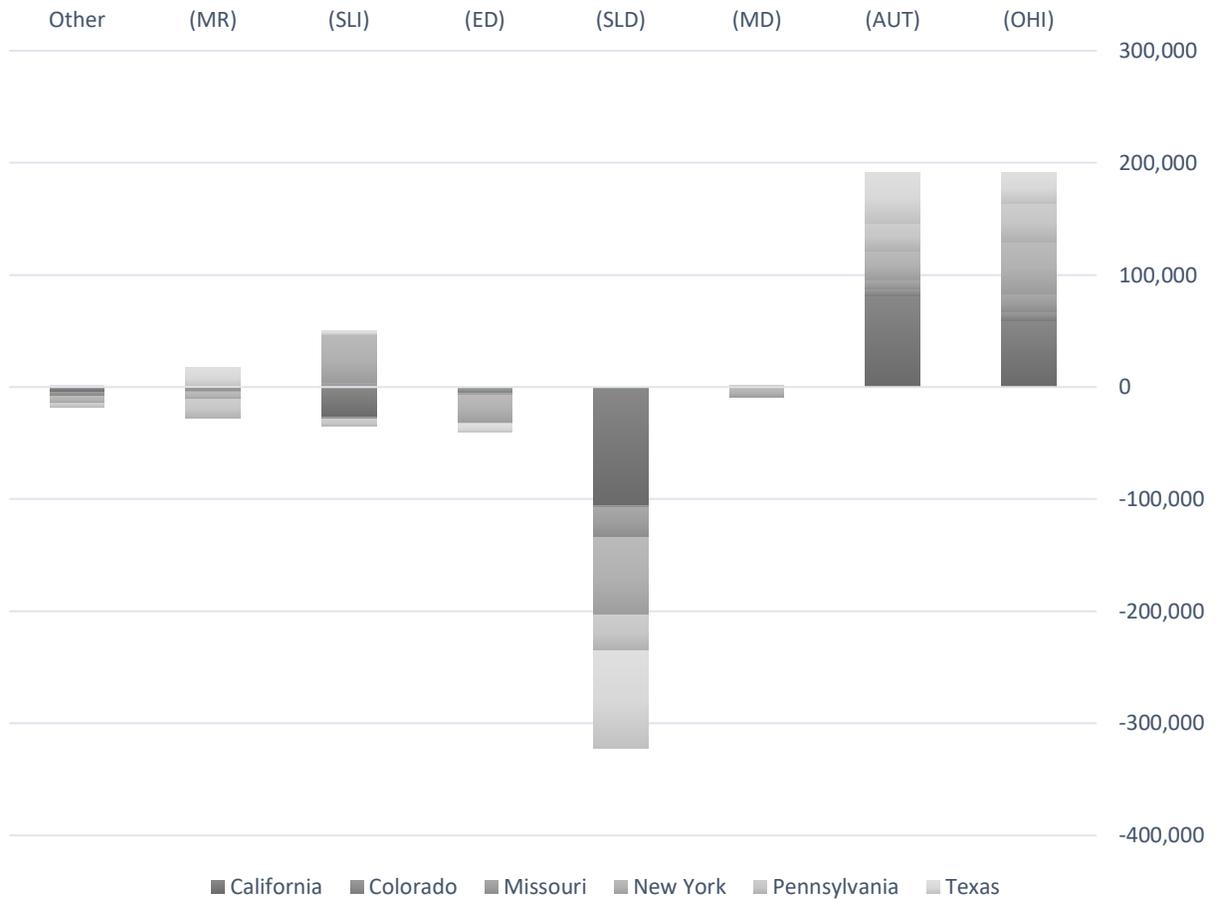
Note. Gap scores represent the difference between the expected and actual population in each disability category. Expected population is determined by multiplying the enrollment in each category in the year 2000 by the growth rate in each state's special education population from 2000 to 2015.

Figure 2

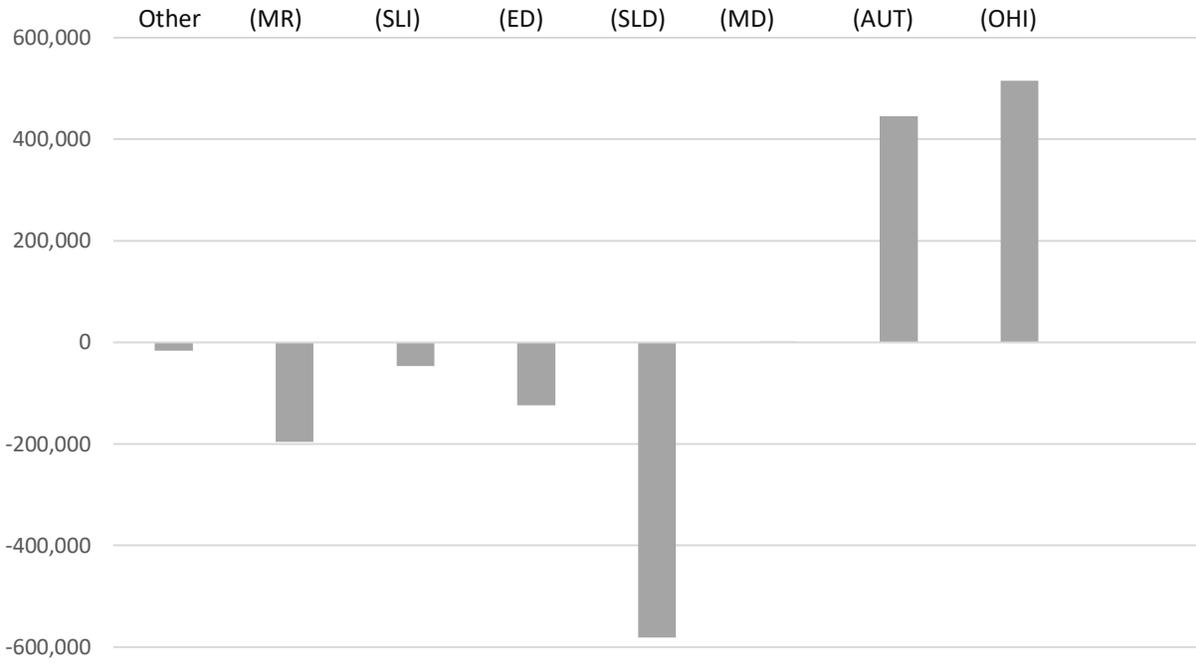*Gap scores per disability category, using NCES data 2000–2015*

Figure 3

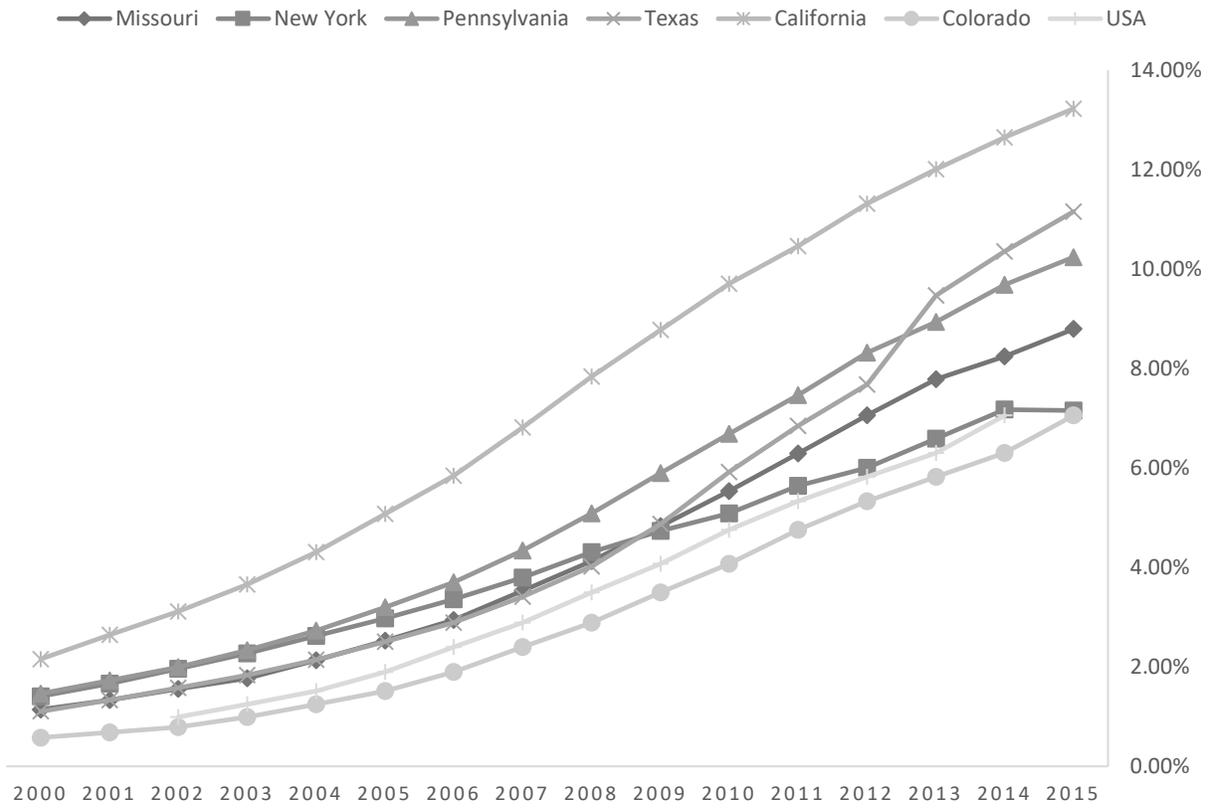*Increase in autism rate from 2000 to 2015 by state and percentage of all special education students*

Figure 4

Decrease in specific learning disability (SLD) rate from 2000 to 2015 by state and percentage of all special education students