

Ethnic Disproportionality in Students with Autism Spectrum Disorders

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Introduction

Originally described by Leo Kanner (1943) and recognized as a special education eligibility category by the U.S. Department of Education in 1990 (Individuals with Disabilities Education Act [IDEA], 1990), autism spectrum disorders (ASD) are characterized by deficits in reciprocal social interactions, communication, and interests and behaviors (American Psychiatric Association [APA], 2000; World Health Organization, 1993). Even though individual prevalence rates vary by state (Centers for Disease Control and Prevention [CDC], 2007a, 2007b), published prevalence rate estimates are approximately one out of 150 children (CDC, 2007b), making ASD the most common development disability diagnosed in children.

Demographic Variations in Children with ASD

According to the APA (2000), individuals with ASD are found in all cultures, ethnicities, and across socioeconomic levels. Studies in gender differences indicate that ASD is more common in males than females, with an average ratio of 4.3:1 (Fombonne, 2005). Cross state comparisons list male-to-female ratios from 3.4:1 to 6.5:1 (CDC, 2007b). Little attention has been paid, however, to the ethnic breakdown of children within this disability category (Dyches, Wilder, Sudweeks, Obiakor, & Algozzine, 2004). Most investigations of ethnicity within ASD focus on the family's

immigration status as a means to determine national origin (Fombonne, 2005). These studies have been inconclusive in documenting the prevalence of ASD across ethnic groups.

Yeargin-Allsopp, Rice, Karapurkar, Doernberg, Boyle, and Murphy (2003) found that in one metropolitan area rates of autistic disorder were similar between White and Black 3-10 year olds when ethnic background was analyzed in eligibility determination. In this study, both ethnic groups had a prevalence rate of 3.4 per 1,000, and children from other ethnic groups had a prevalence rate of 2.9 per 1,000, a non-significant difference.

Using data from the U.S. Department of Education, Office of Special Education Programs (OSEP, 2001, 2002), Dyches, Wilder, Sudweeks, Obiakor, and Algozzine (2004) found that children from African American and Asian/Pacific Island backgrounds received special education services under an Autism eligibility at approximately two times the rate of students from American Indian, Native Alaskan, or Hispanic backgrounds. These findings contradict previous data on disproportionate representation which indicate that ethnically diverse students are not overrepresented in specific low incidence eligibility categories such as autism (Parrish, 2002).

More recent multistate data (i.e., Alabama, Arizona, Arkansas, Colorado, Georgia, Maryland, Missouri, New Jersey, North Carolina, Pennsylvania, South Carolina, Utah, West Virginia, and Wisconsin) on the ethnic breakdown of children with ASD (CDC, 2007b) indicates that prevalence is higher among Caucasian children than African American children in 10 of 14 sites under investigation. These rates were significantly different between ethnic groups in five of the 14 states.

Hispanic children had significantly lower prevalence rates than Caucasian students in approximately 43% of the sites, and significantly lower rates than African

American children in approximately 93% of the sites. Although prevalence rates of ASD are reported to be equal across all ethnic backgrounds (APA, 2000), one site (New Jersey) reported higher prevalence rates among Hispanic children (9.7 per 1,000) as compared to African American children (7.7 per 1,000).

Cultural Variations in Parental Views Regarding Identification and Treatment of ASD

The issue of ethnic disproportionality in children with ASD has important implications for diagnosis and provision of intervention since prognosis for children with ASD improves with early identification (McGee, Morrier, & Daly, 2001; National Research Council [NRC], 2001). However, previous investigations of ethnicity and ASD have indicated that parents from different cultures have varying points of view regarding ASD symptomology, often leading to a later diagnosis.

In interviews with 95 families of children with autism in India, Daley (2004) found that families noticed social deficits before they noticed language deficits in their children. These findings differ from those regarding identification of ASD symptoms by Caucasian parents in the United States, who notice language deficits before they identify social deficits (Coonrod & Stone, 2004; Filipek, Accardo, Ashwal, Baranek, Cook, & Dawson, 2000; Filipek, Accardo, Baranek, Cook, Dawson, & Gordon, 1999).

Differences in parental views have also been reported in the Navajo society (Connors & Donnellan, 1993). In the Navajo culture children with disabilities, including children with ASD, are viewed as children first and a disability second. Members of this culture tend to describe children by the unique characteristics they display, rather than describing unusual characteristics as an incompetence factor. Due to this view, in Navajo society a "cure"

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Research

is not sought for children with disabilities (Connors & Donnellan).

Implications of Ethnicity for Special Education Placements

According to Chinn and Hughes (1987), disproportionate representation occurs when children from a specific ethnic group within a disability category are identified at a rate plus or minus 10% as compared to their representation in the general population. Research on disproportionate representation of ethnically diverse students indicates that ethnicity plays a role in the restrictiveness of settings in which children eligible for special education are placed.

Thus, children from ethnically diverse backgrounds tend to be placed in more segregated special education classrooms over placement in the general education classroom (Fierros & Conroy, 2002). This phenomena continues to be found as it relates to the placement of students under a mild mental retardation, specific learning disability, or emotional/behavioral disorder special education eligibilities (de Valensuela, Copeland, Qi, & Park, 2006; Hosp & Reschly, 2001; Skiba, Poloni-Staudinger, Gallini, Simmons, & Feggins-Azziz, 2006).

One of the few studies investigating ethnicity as a factor in diagnosing ASD (Dyches et al., 2003) did not examine educational placement as a variable, although data from OSEP (2005) indicate that children with ASD are placed in more restrictive settings as they advance through the educational system, implying that age is also an important factor in determining placement for this population.

Cultural mismatch between a school system's students and teachers has been found to be one indicator of disproportionate representation. Investigations of referral rates for children with emotional/behavior disorders report that when greater percentages of teachers and administrators from ethnically diverse backgrounds are employed in a school system, children from ethnically diverse backgrounds are referred to special education at reduced rates (Serwatka, Deering, & Grants, 1995).

Neal, McCray, Webb-Johnson, and Bridgest (2003) demonstrated that a significant interaction occurred when the ethnicity of teacher and a student's walking style (e.g., standard v. stroll) were considered for special education referrals. This research found that a cultural match between a school's teachers and students can reduce special education referrals, and as such has an impact on the disproportio-

tionate representation of ethnically diverse students in special education. Similarly, research indicates that a teacher's ethnicity is a factor related to outcomes seen by children with disabilities (Serwatka et al., 1995), with an ethnic-match between students and teachers promoting more positive outcomes.

Socioeconomic Status as a Factor in Diagnosing ASD

Using receipt of Medicaid as a proxy for socioeconomic status (SES), Ruble, Heflinger, Renfrew, and Saunders (2005) found a 10-fold under-representation in the ASD population who access Medicaid services. Mandell, Listerud, Levey, and Pinto-Martin (2002) found that Medicaid eligible children from African American and Hispanic backgrounds received an ASD diagnosis at significantly older ages than Caucasian children, 7.9 and 8.8 years of age respectively versus 6.3 years of age, and that Caucasian children entered treatment services at earlier ages than the other two ethnic groups. Out of the 405 children studied, by the age of 5 ½ years, 50% of the Caucasian children had received an ASD diagnosis whereas only 28% of the African American children had received a diagnosis.

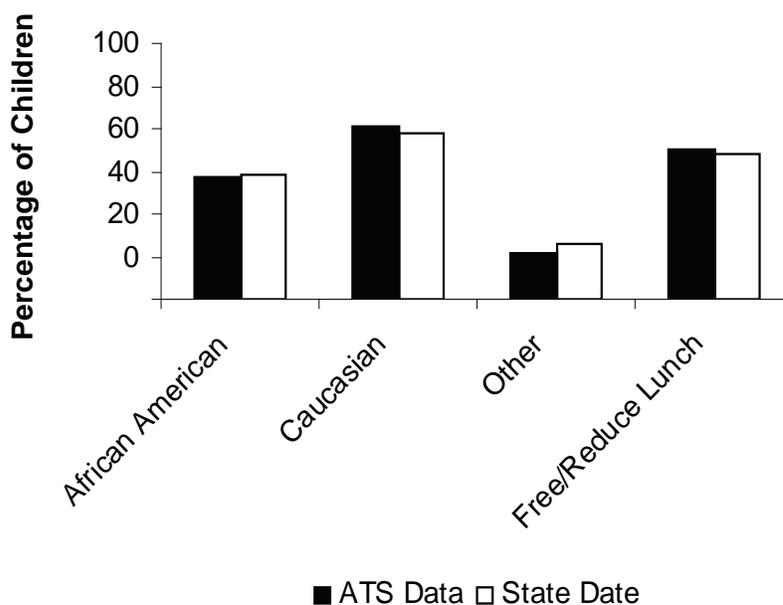
In order to receive an ASD diagnosis, African American and Hispanic children had more visits to health care professionals than Caucasian children (13, 8.3, and

4.1 respectively). This contradicts previous research which showed no significant difference between ethnicity of child and age of diagnosis, although Caucasian children were rated as less impaired than African American children (Wiggins, Bio, & Rice, 2006) even though younger (i.e., 3 years, 3 months) and older (i.e., 4 years, 4 months) children with Autistic Disorder display no differences in social behavior (McGee, Feldman, & Morrier, 1997).

Given contradictory evidence regarding ethnic representation among individuals with ASD, and the recognition that ethnicity may have an influence on rate of identification as well as subsequent special education placement, our current study investigated the characteristics of a sample of children with ASD in Georgia, the classrooms within which they are placed, and the demographics of their teachers. Ethnicity of the child and teacher as well as educational setting were specific variables under investigation. The research questions were:

1. What are the characteristics of the children with ASD in the public school systems throughout the State of Georgia and in what types of classrooms are these students enrolled?
2. Is there disproportionate representation of students with ASD in

Figure 1
Comparison of ATS Sample and Reported Data by the State Department of Education



terms of ethnicity and socioeconomic status?

3. What is the ethnic make up of the teachers working with students with ASD in Georgia, and how does this compare to the ethnicity of this student population in Georgia?

Methodology

Survey Development

This study was part of a larger investigation of educational strategies being used in the public school system with children with ASD in one large Southern state. A detailed description of the Autism Treatment Survey (ATS) development, distribution, and respondent demographics has been reported previously (see Hess, Morrier, Heflin, & Ivey, 2008). Briefly, data were collected via an Internet survey, and respondents answered questions regarding the total number of children in their classrooms, as well as the number of children with ASD enrolled.

Demographic data for the children included age of children with ASD, ethnicity of children with ASD, type of classroom placement, and number of children receiving free or reduced lunch. Teacher data consisted of teacher ethnicity, overall years of teaching experience, and years of experience teaching children with ASD. Respondents then indicated which strate-

gies among 39 educational strategies for students with ASD listed (e.g., Floor Time, visual schedules, discrete trial, incidental teaching, Social Stories™, sensory integration, music therapy; see Hess et al., 2008, for a complete list and sample survey questions) were used with their students.

Participants

Participants were recruited through district-wide letters informing teachers that a survey regarding strategies used with students with ASD was available. School administrators were asked to distribute the recruitment letter with a survey link to teachers educating students with ASD in their classrooms. Potentially, all teachers in Georgia working with children with ASD had access to this survey.

Over the 3-month data collection period, 234 surveys were received. Approximately 80% of these surveys (n = 185) were considered useable for this study. Surveys qualified as useable when a participant was currently teaching children with ASD and answered at least one question related to demographic data. Since Georgia does not take data on the exact number of teachers that have a student with ASD in his or her classroom, an overall response rate for the state of Georgia could not be calculated.

Respondents were representative of the teaching community found in Georgia, with the majority of respondents being female (98.92%), and a mean age of 40.41 (SD=9.49). The sample was largely Caucasian (84.79%), with the remaining reporting their ethnicity as African American (6.52%), Hispanic or Latino (1.09%), and multiracial or other race (7.60%). Years of teaching experience averaged 12.29 years (SD=8.45, range=1-35 years), and years of experience with children with ASD averaged 5.13 (SD=5.05, range=0-30 years). Although the ATS sample had a higher percentage of Caucasians and females than found in Georgia's general teacher population, 77% and 81% respectively (Office of Student Achievement [OSA], 2005), t-test analysis of ATS respondents compared to overall demographics of Georgia's teachers was non-significant ($t=1.008, p=.498$).

Data Analysis

Raw data from the online version of the ATS were imported directly into SPSS™ (Apache Software Foundation, 2000) for analysis. Due to the small number of children representing ethnic groups other than African American and Caucasian, ethnicity was divided into three

Table 2.
Ethnicity and Socioeconomic Status

Ethnicity	Low SES	High SES
African American	F = 0.266 p = 0.951	F = 0.663 p = 0.680
Caucasian	F = 0.450 p = 0.887	F = 1.086 p = 0.383
Other Ethnicity	F = 0.365 p = 0.779	F = 1.787 p = 0.158

categories for all analyses except as noted below: (a) African American, (b) Caucasian, and (c) Other Ethnicity.

Representative Nature of ATS Sample

Student demographics. To ensure that the sample was representative of children with ASD, the ethnicity data in the current sample were compared to data provided by the State Department of Education to the U.S. Department of Education, Office of Special Education and Rehabilitative Services, Office of Special Education Programs (OSEP, 2006). As presented in Figure 1, the results indicate that the current sample is similar to that reported by the State Department of Education for the entire population of ASD in the state ($t=1.04, p=.488$).

To determine if the sample was representative of children who qualify for the free and reduced lunch programs, ATS data were compared to statewide data (OSA, 2005). Percentage of children qualifying for these programs by data source can be found in Figure 1. T-test analysis indicated that the current sample was not significantly different ($t=15.667, p=.041$) from statewide data for receipt of free or reduced lunch, documenting SES similarities between children with ASD in this study and the general population of school age students in the state.

Results

Student Demographics

The 185 respondents reported a total of 1,211 children with and without ASD in their classrooms, and were working with a total of 226 children with ASD (19% of children sampled). Table 1 displays the demographic information for the children with ASD taught by teachers who completed the ATS. The majority of the students with ASD were male (84.07%) yielding a 5.76:1 male-to-female ratio, which is slightly higher than the mean male:female ratio of 4.3:1 reported in epidemiological studies of individuals with ASD (CDC, 2007a,

Table 1.
Demographics of Children with Autism Spectrum Disorders (n = 226)

	Children with ASD
Gender (%)	
Male	84.07
Female	14.60
Not Answered	1.33
Age	
M	9.45
(Range)	(3-19)
SD	3.885
Ethnicity (%)	
Caucasian	57.08
African American	34.51
Other Ethnicity	2.21
Asian	1.33
Two or more races	1.33
Hispanic or Latino	0.44
Native Hawaiian	0.44
American Indian	0.00
Not Answered	2.66
Socioeconomic Status (%)	
Reduced Lunch Program	17.90
Free Lunch Program	32.55
Not Answered	19.24

2007b; Fombonne, 2005; Yeargin-Allsopp et al., 2003).

Children with ASD ranged in age from 3 to 19 years ($M=9.45, SD=3.89$), and their ethnicity indicated that the children with ASD in this sample were close to the ethnic representation in Georgia (U.S. Census, 2000). Approximately 57% were identified as Caucasian; 34.51% African American; 1.33% Asian, 0.44% of Hispanic or Latino origin; 0.44% Native Hawaiian, and 3.54% were reported as other or mixed race.

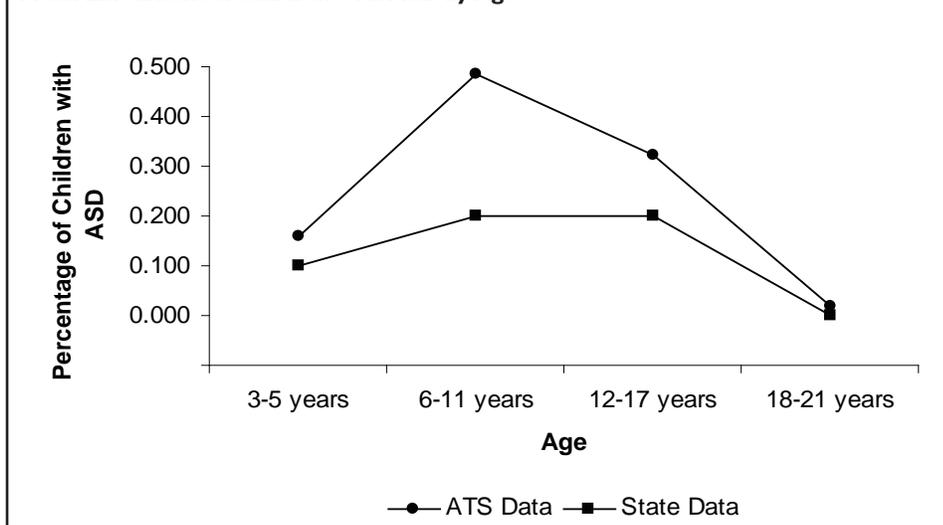
Socioeconomic status of the students was calculated using receipt of free or reduced lunch as a proxy for lower SES status (Skiba, Poloni-Staudinger, Simmons, Feggins-Azziz, & Chung, 2005). Approximately half (50.45%) of the students with ASD in this sample qualified for receipt of either the free or the reduced school lunch programs. To determine if ethnicity was related to SES status, three one-way ANOVAs were conducted with ethnic group as the factor. Non-significant differences were found for all ethnic groups (i.e., African American, Caucasian, Other Ethnicities) across SES groups (i.e., high and low) as indicated in Table 2. These results indicate that ethnicity is not a factor in the child's SES status in this sample.

Classroom Characteristics

Slightly over 42% of the participants documented the educational settings for the students they served. Of these, the most frequently reported category of classroom serving students with ASD was a special education classroom (48.92%), comprising Resource (44.44%), Self-Contained Autism (15.56%), and Other Self-Contained (40.00%). Teachers indicated that 20.65% of the students with ASD were receiving services in general education, while 30.43% reported "other" non-specific classroom types. Of the students with ASD for whom data were reported, 7.87% were in preschool, 49.44% in elementary school, 29.21% in middle school, and 13.48% in high school. Total class size of the students ranged from 3 to 24 ($M=12.64, SD=7.795$), and each class had an average of 2.51 children with ASD ($SD=2.58, range 1-18$).

To investigate if the age of the child with ASD affected placement decisions, a one-way ANOVA with age as the factor was conducted. Results yielded non-significant differences in placement as a factor of age ($F=.863, p=.612$). Univariate ANOVA conducted on grade level with ethnicity yielded non-significant main effects and a significant interaction effect for ethnicity

Figure 2
Mean Enrollment of Children with ASD by Age



($F=5.056, p=.029$). Comparison of mean enrollment by age as reported on the ATS and by the State Department of Education can be found in Figure 2. The data indicate that ATS participants reported more students across all ethnic groups in preschool, elementary school, and middle than in high school, with the majority of students with ASD enrolled in elementary school (i.e., 6-11 year olds).

Multivariate analysis of variance (MANOVA) with classroom type and grade level as the fixed factors yielded non-significant results main and interaction effects across the three targeted ethnic groups (see Table 3). As can be seen in Figure 3, students with ASD from African American and Caucasian backgrounds are enrolled in greater percentages across educational environments for both grade levels than students from other ethnic backgrounds, with special education settings being the most frequently used placement.

Disproportionate Representation of Ethnically Diverse Students with an ASD Eligibility

Disproportionate representation of ethnically diverse students with an ASD eligibility was analyzed using descriptive statistics from the ATS sample in a manner similar to that used previously by de Valenzuela et al. (2006). Specifically, the relationship between children's ethnicity and disability status was calculated using four common indices of disproportionality: (a) composition index (CI), (b) risk index (RI), (c) odds ratio (OR), and (d) relative risk ratio (RRR). These four indices have been used in previous research to deter-

mine disproportionality in students K-12 (de Valenzuela et al.; Hosp & Reschly, 2003; NRC, 2002; Parrish, 2002; Skiba et al., 2005; Skiba et al., 2006; Westat, 2003).

The CI enabled comparisons of the proportion of children with ASD within a given ethnic group to the overall proportion of children with ASD in this sample (NRC, 2002). The CI was calculated by dividing the number of children with ASD in each ethnic group by the total number of children with ASD ($n=7,450$) reported by the State Department of Education to the U.S. Department of Education's Office of Special Education (Westat, 2006). The RI was calculated by dividing the number of children with ASD within a specific ethnic group by the total number of children ages three to 21 years ($N=2,486,688$) estimated by the U.S. Census Bureau for 2006 (U.S. Census, 2000). The OR was calculated by dividing the RI of one ethnic group by the RI of another ethnic group, providing a comparative index of the risk of being identified (NRC, 2002). Oswald, Coutinho, Best, and Singh (1999) noted that the OR can be used to identify the probability of ethnic membership affecting a child being labeled as having a disability. In this study RI calculations used the Caucasian children with ASD as the comparison group, which is consistent with previous research in disproportionate representation calculations (de Valenzuela et al., 2006; Hosp & Reschly, 2003; NRC, 2002; Parrish, 2002; Skiba et al., 2006).

The RRR was calculated by dividing the RI for a specific ethnic group by the RI for all other ethnic groups combined in order to calculate the risk of children from an ethnic group receiving the eligibility

of ASD. An RRR of 1.0 would indicate no disproportionality, an RRR greater than 1.0 would indicate disproportionality, and an RRR of less than 1.0 would indicate under-representation.

As can be seen in Table 4, children from all ethnic backgrounds reported on the ATS are under-represented in the eligibility of ASD in the public school system. When compared to children from other ethnicities, Caucasian children were found to have an ASD eligibility approximately 54 times more than children from other ethnic backgrounds. When compared to other children with ASD, African American children are under-identified approximately 50% of the time, whereas children from Asian, Hispanic, Native Hawaiian, and two or more ethnic backgrounds are under-identified approximately 99% of the time.

Ethnicity of Teachers

To determine whether a teacher's ethnicity was related to the type of classroom taught, a one-way ANOVA was conducted. Results indicated that ethnicity was a non-significant factor for type of classroom taught ($F=.825, p=.484$). To determine the effects of the teacher's ethnicity on grade level taught, a Pearson bivariate correlation was conducted. Results indicate that the ethnic background of the teacher had a low association with grade level taught ($r=.221, p<.05$).

To determine if there was an ethnic

match between students with ASD and teachers in this sample, MANOVA was conducted between ethnicity of the teacher and student ethnicity. Results indicated that Caucasian students were significantly more likely to be taught by a teacher of the same ethnicity than children from other ethnicities ($F=8.761, p=.000$). Neither overall years of experience teaching ($F=1.586, p=.186$) nor experience teaching children with ASD ($F=.698, p=.595$) were significant when the ethnicity of the teacher was considered. The relationship between a teacher's ethnicity and the children's SES also demonstrated non-significant results for children with ASD from both low-SES ($F=1.471, p=.220$) and high-SES ($F=.235, p=.918$) backgrounds.

Discussion

These preliminary data are a first step in understanding the role of ethnicity as it relates to a representative sample of children with ASD in Georgia's public school classrooms, an area that has been lacking in the research literature (Daley, 2002). The first research question in this study inquired about the characteristics of the children with ASD in public school systems throughout the State of Georgia as well as the types of classrooms in which these students are enrolled.

The findings in this study support previous research on gender differences in individuals with ASD, with males being diagnosed more frequently than females (CDC, 2007a, 2007b; Fombonne, 2005). Results suggest that demographic characteristics of the students with ASD served in the public schools are representative of the national profile. Research indicates that ASD eligibility rises as children grow older (Yeargin-Allsopp et al., 2003), which was also true for this sample of children with ASD. However, prior to age 8, reported ASD prevalence is most likely depressed by the fact that federal legislation allows states to use a general developmental delay category for children rather than a specific eligibility category in determining whether a child qualifies for special education services (IDEA, 2004; NRC 2001).

Results from the ATS contradicted other data which indicated that children with ASD are placed in more restrictive settings as their school tenure advances (OSEP, 2005). Contrary to previous research in disproportionate representation that children from ethnically diverse backgrounds are placed in more restrictive settings (de Valensuela et al., 2006; Hosp

& Reschly, 2001; Skiba, Poloini-Staudinger, Simmons, & Feggins-Azziz, 2006), classroom placements (i.e., general education versus special education) did not differ significantly in this sample of children with ASD, nor did they experience more restrictive placements at older ages.

These non-significant results for classroom placement are encouraging given legislative mandates to educate children with disabilities in the least restrictive environment to the maximum extent possible (IDEA, 2004). However, the nature of the placement for children with ASD, once they are identified for special education services, has not been fully researched, and future studies should continue to investigate if this phenomenon continues in the current era of high-stakes testing (No Child Left Behind Act [NCLB], 2001).

The second research question explored disproportionate representation of ethnically diverse students with ASD as compared to Caucasian students with ASD in terms of ethnicity and SES. Consistent with previous findings from other disability categories, current results indicate disproportionate representation of children with ASD from ethnically diverse backgrounds. Specifically, present results indicate that students from ethnically diverse backgrounds are under-represented within the autism eligibility category, while Caucasian students are overrepresented.

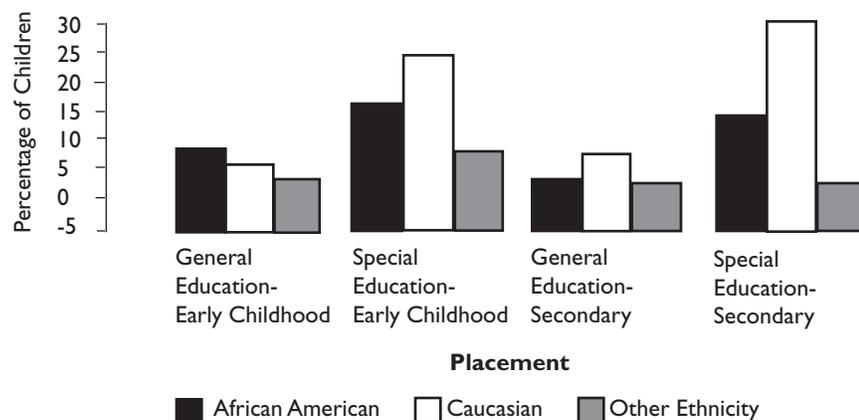
IDEA (2004) mandates that overrepresentation of students from ethnically diverse backgrounds be calculated, and if found, up to 15% of special education funds must be used to remediate the problem. Results from the ATS suggest that teachers, administrators, diagnosticians, and policy makers should pay close attention to the ethnic background of children considered for an ASD eligibility, and reallocate special education funds under IDEA to address this disproportionate representation. The under-representation of students with ASD from ethnically diverse backgrounds, especially those at younger ages, may be a by-product of inequities in information resources available describing the symptoms of the disorder or may be indicative of greater demands on school systems placed by Caucasian parents.

Information about the early indicators of autism needs to be more readily available to parents in underrepresented ethnic groups, as well as professionals who serve these groups. Similarly, recruitment of more ethnically diverse educators may help to reduce this problem, because the cultural match between teachers and students often

Table 3
Multivariate Analysis of Variance
for Classroom Type and Grade Level

Source	df	F	p
Class type (C)			
African American	3	0.105	0.957
Caucasian	3	0.466	0.707
Other Ethnicity	3	1.001	0.398
Grade Level (G)			
African American	3	0.858	0.467
Caucasian	3	0.012	0.998
Other Ethnicity	3	1.338	0.269
C x G			
African American	7	0.369	0.917
Caucasian	7	0.307	0.948
Other Ethnicity	7	1.162	0.336
Error			
African American	68		
Caucasian	68		
Other Ethnicity	68		
Total			
African American	82		
Caucasian	82		
Other Ethnicity	82		

Figure 3
Enrollment in Educational Environment by Grade Level and Ethnicity



produces more accurate eligibility determinations (Sewatka et al., 1995).

Socioeconomic status also was not significantly different between ethnic groups studied. These data correspond to previous data that ASD diagnoses span all SES levels. Future research, using larger sample sizes, should investigate this further in order to determine if school-based eligibility determination is consistent with research-based findings. Future studies on the interface of ethnicity and SES as it relates to ASD may assist with determining causes of disproportionate representation in individuals with ASD.

The third research question in this study explored the ethnic make up of the teachers working with students with ASD in Georgia as compared to the ethnicity of the student population. Results indicate that teachers from Caucasian backgrounds dominate the educational system for children with ASD in Georgia (Hess et al., 2008; Morrier, Irving, Dandy, Dmitriyev, & Ukeje, 2007) even though children with ASD from ethnically diverse backgrounds are increasing in number in the public school system (CDC, 2007a, 2007b; Yeargin-Allsopp et al., 2003).

Previous research demonstrating that a cultural mismatch between teachers and children often leads to more restrictive placements (Hosp & Reschly, 2003; NRC 2002) should be further investigated for children with ASD. Effects of teacher ethnicity has dominated research in referral, assessment, and placement for children with emotional and behavioral disorders (Hosp & Reschly; Neal et al., 2003; Serwatka et al.), as well as mild mental retardation

and learning disabilities (NRC, 2002). This area of study has been lacking in the field of autism diagnosis and treatment.

Changes in teacher recruitment and training procedures that increase ethnically diverse teachers in both general and special education, as well as increased teacher expertise in ASD may assist with leveling the playing field when it comes to cultural mismatch between students and teachers. The preponderance of Caucasian teachers educating students with ASD may be part of the overrepresentation of Caucasian students within this category. Ethnically diverse teachers may be more knowledgeable of the social and linguistic differences characteristic of students.

Although research is limited concerning the preferences of families of different ethnicities with regard to treatment and educational programs, some differences have been reported. For example, one study indicated that Latino families were 7.2 times more likely to use complementary and alternative treatments than were European-American families (Levy Mandell, Merhar, Ittenbach, & Pinto-Martin, 2003).

It should be noted, however, that the findings of Bailey, Skinner, Rodriguez, Gut, and Correa (1999) were contradictory in reporting that families from Latino backgrounds tended to use more traditional treatments for their children, with only a small minority using alternative treatment protocols. Latino families have also been reported to have greater satisfaction with treatment choices when lower awareness and use of alternative treatments were known (Bailey et al.).

Daley (2002) called for additional re-

search into symptomatology perceptions, treatment selection, and placement issues from a cultural perspective pertaining to individuals with ASD. Although recent research indicates that children receive different educational strategies at different grade levels and in different classroom settings (Hess et al., 2008), additional research is needed regarding the interaction of children's age and ethnicity and variations in the educational strategies children receive.

Limitations

Even though this study consisted of a representative sample of students with ASD in the public school system when compared to State Department of Education reports (OSA, 2005; OSEP, 2006), the small sample size makes meaningful generalizations related to children's and teachers' ethnicity difficult. A larger sample size is needed to increase the power of statistical calculations as well as to determine the representative nature of education for children with ASD on a national level.

Methodological limitations made several analyses virtually impossible to complete. Data collection methods did not allow for comparison of strategy use by child ethnicity, which is an important consideration to undertake for public school systems. Although recent legislative mandates require evidence-based practices to be used with all students (IDEA, 2004; NCLB, 2001), students with ASD receive non-research-based teaching strategies the majority of the time (Green, Pituch, Itchon, Choi, O'Reilly, & Sigafos, 2006; Hess et al., 2008; Simpson, de Boer-Ott, Griswold, Myles, Byrd, & Ganz, 2005; Stahmer, Collins, & Palinkas, 2005).

Another limitation which could have influenced data analyses relates to the distribution of the ATS. As reported by Hess and colleagues (2008), the ATS was distributed by school system administrators to educators of children with ASD. This method may have caused some teachers to not complete the survey, or to omit certain data, due to uncomfortable feelings on reporting what occurs in the school system. Future uses of the ATS should distribute the survey through teacher-based websites (e.g., National Association of Teachers) or through hard-copy mailings to the schools themselves.

Finally, the way in which some questions were asked may have influenced results. For example, almost 20% of the respondents did not answer the question

Table 4
Data on Disproportionate Representation of Students with ASD

	Composition Index	Risk Index ^a	Odds Ratio	Relative Risk Ratio
African American	1.047	0.0031	0.596	0.566
American Indian	0.000	0.0000	.. ^b	.. ^b
Asian	0.040	0.0001	0.019	0.012
Caucasian	1.732	0.0052	-	1.538
Hispanic or Latino	0.013	0.0000	0.008	0.005
Native Hawaiian	0.013	0.0000	0.008	0.005
2 or More Ethnicities	0.040	0.0001	0.019	0.012

Notes. ^a rounded to the nearest point one millionth; ^b not calculated due to no children reported in this ethnicity; ^c used as the comparison group for calculations.

regarding free/reduced lunch. This may have been because the teachers had some students who received free/reduced lunch and some who did not, so they were unsure as to how to answer the question. Future research investigations should evaluate how inquiries are written so that complete responses are secured.

Future Research

To determine the interface of ethnicity and children with ASD, future research should investigate if ethnicity plays a role in the strategies children with ASD receive in the schools (Hess, Morrier, Heflin, & Ivey, 2008). Larger sample sizes will be needed to establish meaningful relationships, as well as to determine effect sizes between ethnic groups. Multi-state data should be used in order to permit generalizations across ethnic groups.

Exploration of eligibility requirements as they relate to ASD would also be helpful. Complete record review of ASD eligibility reports would allow analysis of characteristics used to determine eligibility and examination of whether ethnicity factors play a role in specific characteristics. Review of eligibility reports may shed some light on the under-representation of students from ethnically diverse backgrounds, as well as the over-representation of Caucasian students, within the ASD eligibility. These analyses would allow future teacher preparation programs to prepare teachers to attend to these characteristics in order to eliminate ethnic disparity in determining eligibility.

One factor needing further investigation pertains to school-based eligibility categories for ethnically diverse children. This is especially important for young children who by legislative mandates may be served under a broader eligibility of developmental delay until age eight (IDEA, 2004). Connections between eligibility and services

should also be investigated to determine if broader eligibility categories are used to qualify children from ethnically diverse backgrounds in special education.

Previous research indicates that parents of children from ethnically diverse backgrounds view symptomology differently (Connors & Donnellan, 1983; Coonrod & Stone, 2004; Daley, 2002, 2004). Future research should also examine placement issues as these relate to parental choices based on ethnic background. The future research into the interface of ASD and ethnicity is wide open. It is imperative that the field examine this relationship in greater detail in order to meet mandates set through recent education legislation.

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