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Socioeconomic factors do not explain lowered autism rates among Hispanics in Texas

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ABSTRACT

Using data from the Texas Educational Agency and the Health Resources and Services Administration, we found lower rates of autism diagnoses in school districts with higher percentages of Hispanic children. Our results are consistent with prior reports showing 2- to 3-fold lower autism rates among Hispanics than among non-Hispanic Whites. Socioeconomic factors failed to explain lower autism prevalence among Hispanic schoolchildren in Texas. These findings raise questions: Is autism under-diagnosed among Hispanics? Are there protective factors associated with Hispanic ethnicity?

INTRODUCTION

Some studies report lower prevalence of autism among Hispanics than among non-Hispanic Whites[1-3]. Hispanics also receive the diagnosis at an older age.[4] Possible explanations include the fact that Hispanic children are much less likely to have health insurance, three times more likely to fall below the poverty line, twice as likely to lack a regular source of medical care, and 1.3 times more likely to experience difficulty accessing specialty care.[5] Based on this information, one might suspect that autism is under-ascertained in the Hispanics. We test the hypotheses that socioeconomic factors, including the local density of diagnostic physicians, may explain the reported differences in autism prevalence between Hispanics and Non-Hispanic Whites.

METHODS

Data and Sample

Administrative data for the 2004 school year for 1184 Texas school districts (254 counties) provided by the Texas Education Agency (TEA) (see http://www.tea.state.tx.us/peims/) were the source for demographic and diagnostic information. *Total number of students enrolled in district* was calculated as all enrolled students as of October 28, 2004, in grades pre-kindergarten through 12, who attended at least 1 day of school for that school year. Statewide, 6975 students (0.2%) were enrolled in but never attended school. Autism counts per district (autistic disorder only, excluding other autism spectrum disorders) were obtained by special request. Independent variables included: *Percent Hispanic or Non-Hispanic Whites in School District*; *Total Number of Students Enrolled in Each District* (grade K-12); and *Urbanicity* in 3 categories (1) Major urban districts and other central cities (2) Major suburban districts and other central city suburbs (3) Non-metropolitan and rural school districts.

County-level covariates obtained from the U.S. Department of Health and Human Services, Health Resources and Services Administration, Area Research File (ARF) [6] included:

Population Density (estimated persons per square mile by county for 2004); *Number of Pediatricians, Child Psychiatrists, and Neurologists* (the sum of these health professionals calculated as the ratio per 10,000 individuals); and *Median Household Income* in 2004.

Statistical Analysis

School district records of autism, intellectual disabilities (TEA identifies this as "mental retardation"), and learning disability were treated as event counts and used as outcome variables in separate Poisson regression models predicted by the percentage of Hispanics and non-Hispanic Whites in each school district along with the relevant covariates. An over-dispersion correction was applied to the model due to the non-equivalence of means and variances. The Poisson model was fit using MLwiN multi-level modeling software to obtain unbiased standard errors, to account for nested data.[7] Risk Ratios (RR) were obtained by exponentiating the Poisson model coefficients.

RESULTS

Descriptive statistics are shown in Table 1. Table 2 shows the Poisson regression coefficients and relative risk for each outcome variable. Model 1 shows that for each 10.0% increase in the percentage of Hispanic schoolchildren, there is a corresponding 11.0% *decrease* in the number of students diagnosed with autism. Notably, for each 10.0% increase in Hispanic students there is an 8.0% increase in children with intellectual disabilities and a 2.0% increase in those with learning disabilities. This model contains no covariates and represents the direct effect.

Model 2, also a direct effect model, shows that for each 10% increase in Non-Hispanic White children in school districts, there is an 9% *increase* in students with autism and a concomitant decrease in those with intellectual disabilities (11 %) and learning disabilities (2%).

In model 3, all study variables were entered simultaneously to test the hypothesis that the association between the percentage of Hispanic schoolchildren and autism found in model 1 was explained by the covariates. However, increasing percentages of Hispanics in school

districts remained a significant inverse predictor of autism prevalence even after adjusting for socioeconomic and healthcare provider factors. Other significant predictors of autism prevalence were the number of healthcare professionals, urbanicity, and median household income. After adjusting for covariates, we found that the association between increased percentage of Non-Hispanic Whites and increased autism rates is explained by sociodemographic factors.

Overall, less urbanicity and lower household income were most strongly related to increased prevalence of intellectual disabilities. Learning disabilities showed no association with ethnicity after adjusting for covariates.

DISCUSSION

After adjustment for socioeconomic and healthcare factors, autism prevalence remained inversely related to the percentage of Hispanics in school districts. Although the sociodemographic factors we studied do not explain the inverse relationship between percent Hispanic schoolchildren in school districts and the number of autism cases, these factors do explain the higher autism prevalence in districts with higher percentages of Non-Hispanic Whites. Because this is an ecological, hypothesis-generating study, these findings should be interpreted with caution.

The unadjusted results presented in model 1 suggest that diagnostic substitution or misdiagnosis of autism might be occurring. However, after adjustment for covariates, percent Hispanic ethnicity was only minimally inversely associated with intellectual disabilities (similar to Non-Hispanic Whites) and no longer associated with learning disability.

The results of this study suggest that although higher socioeconomic status and the density of local diagnostic physicians explain differences in autism rates for Non-Hispanic Whites, they do not for Hispanics. Whether lower autism prevalence in Hispanics is due to still other, unexamined socio-economic (e.g., a “healthy immigrant effect” “cultural resiliency”) [8, 9, 10],

healthcare delivery (e.g. difficulty communicating with or bias in healthcare providers) [11,12] or biological factors (potential genetic susceptibilities to the development of autism or to environmental exposures that may alter neurodevelopment)[13 - 15] remains a crucial area for future research.

The current data are limited in scope. First, it is known that autism has been under-reported in school-based administrative data [16, 17]. This may account for some of the lowered prevalence of autism among Hispanics in this study. However, while diagnoses are not standardized in this data, there is considerable evidence that diagnoses of autistic disorder are made with good reliability and specificity in the field [18, 19].

In addition, the data contain no information on place of birth, occupational history, or detailed information about ethnicity. While Hispanics are a diverse group, the census indicates that those living in South Texas are primarily of Mexican decent. Therefore these results can not be generalized to the entire Hispanic culture. Understanding how cultural and other factors operate in the phenomena of lowered autism rates among Hispanics in South Texas could potentially inform useful diagnostic and intervention efforts.

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Table 1. Descriptive characteristics of study variables

Predictors	**Mean (standard deviation)**	**Range**
Percent Hispanic in School District	30.68 % (26.69)	0 - 100
Percent non-Hispanic White in School District	61.53 % (26.78)	0 - 100
Number of Pediatricians, Child Psychiatrists, Neurologists in County Number per 10,000 population	60.81 (180.20) 0.97 (1.11)	0 – 1096 0 – 5.2
Urbanicity Urban Suburban Rural	 6.29% 22.61% 71.10%	 -
County Population Density per Square Mile	216.31 (466.42)	0.3 - 2522
County Median Household Income	$36,911 (9,312)	$19,017 – 75,709
Outcome Conditions		
2004 Autism Rate per 1000	4.03 (3.48)	0.31 – 21.57
2004 Learning Disability Rate per 1000	73.86 (26.20)	18.93 – 183.81
2004 Intellectual Disability Rate per 1000	7.24 (5.11)	0.00 – 45.59

Table 2. Unadjusted direct effects of study variables on disability rates

	Autism		Intellectual Disability		Learning Disability	
	B (se)	**RR**	**B (se)**	**RR**	**B (se)**	**RR**
Model 1**:** *Unadjusted direct effect*						
Percent Hispanic in District (per 10% increase)	- .11 (.01)***	0.86	.08 (.01)***	1.08	.02 (.00)** .	1.02
Model 2: *Unadjusted direct effect*						
Percent non-Hispanic White in District (per 10% increase	.08 (.00)***	1.09	-.12 (.01)***	0.89	-.02 (.00)***	0.98
Model 3*: Fully adjusted – all variables included*						
Percent Hispanic in District (per 10% increase)	- .08 (.02)***	0.92	-.01 (.00)***	0.99	01 (.01)	ns
Percent non-Hispanic White in District (per 10% increase	.02 (.01)	ns	-.02 (.00)***	0.98	-.01 (.01)	ns
Number of Pediatricians, Child Psychiatrists, Neurologists (combined) in County per 10,000 population	.06 (.03)*	1.06	Ns		-.05 (.02)**	0.95
Urbanicity						
Urban vs. rural	.28 (.05)***	1.32	-.12 (.03)***	0.89	-.05 (.03)*	0.96
Suburban vs. rural	.19 (.04)***	1.20	-.24 (.03)***	0.79	-.10 (.02)***	0.90
County Population Density: 100 persons/square mile	.01 (.01)	ns	ns		-.01 (.00)**	0.99
County Median Household Income (Per $10,000 increase)	.10 (.05)*	1.11	-.21 (.04)***	0.81	-.05 (.02)**	0.95

* = p<.05; ** = p < .01; *** = p < .001

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R Palmer, C Miller and T Walker conceived of the study and R Palmer performed the analysis and supervised all aspects of its implementation. B Bayles contributed to writing pertinent sections. All authors helped to conceptualize ideas, interpret findings, and review drafts of the manuscript.

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This study was exempt form institutional review board as no human participants were involved.