Explaining Low Rates of Autism Among Hispanic Schoolchildren in Texas

Raymond F. Palmer, PhD, Tatjana Walker, RD, David Mandell, ScD, Bryan Bayles, PhD, and Claudia S. Miller, MD, MS

In data from the Texas Educational Agency and the Health Resources and Services Administration, we found fewer autism diagnoses in school districts with higher percentages of Hispanic children. Our results are consistent with previous reports of autism rates 2 to 3 times as high among non-Hispanic Whites as among Hispanics. Socioeconomic factors failed to explain lower autism prevalence among Hispanic schoolchildren in Texas. These findings raise questions: Is autism underdiagnosed among Hispanics? Are there protective factors associated with Hispanic ethnicity? (*Am J Public Health.* 2010;100:270–272. doi:10.2105/AJPH.2008.150565)

Some studies report lower prevalence of autism among Hispanics than among non-Hispanic Whites.[1–3] Hispanics are also diagnosed at an older age.[4] Possible explanations include the fact that Hispanic children are much less likely than are non-Hispanic Whites to have health insurance, 3 times as likely to live in households that fall below the poverty line, twice as likely to lack a regular source of medical care, and 1.3 times as likely to experience difficulty accessing specialty care.[5] These data suggest that autism could be underdiagnosed in Hispanic children.

We tested the hypothesis that socioeconomic factors, including the local density of diagnostic physicians, might explain the reported differences in autism prevalence between Hispanics and non-Hispanic Whites. A positive answer to this question would suggest that underdiagnosis is prevalent and that access to care is preventing both diagnosis and treatment in many Hispanic children. If socioeconomic factors do not explain the disparity, the answer may lie in genetic vulnerability or heightened exposure to not-yet-identified environmental factors.

METHODS

Administrative data for the 2004 school year for 1184 Texas school districts (254 counties) from the Texas Education Agency provided demographic and diagnostic information.[6] We calculated the total number of students enrolled in a district as all enrolled students as of October 28, 2004, in grades 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. We obtained autism counts per district (autistic disorder only, excluding other autism spectrum disorders) by special request.

Variables

Independent variables included the percentage Hispanics or non-Hispanic Whites in each school district, total number of students enrolled in each school district (grades K–12), and urbanicity in 3 categories: (1) major urban districts and other central cities, (2) major suburban districts and other central city suburbs, and (3) nonmetropolitan and rural school districts.

County-level covariates obtained from the Area Research File compiled by the Health Resources and Services Administration, US Department of Health and Human Services,[7] 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 (the Texas Education Agency identifies this as mental retardation), and learning disabilities 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. We applied an overdispersion correction to the model because the means and variances were not equivalent. We fit the Poisson model with MLwiN multilevel modeling software to obtain unbiased standard errors, to account for nested data.[8] We obtained risk ratios 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% increase in Hispanic children in school districts, there was a corresponding 11% decrease in students diagnosed with autism. Notably, for each 10% increase in Hispanic schoolchildren, there was an 8% increase in children with intellectual disabilities and a 2% increase in students with learning disabilities. This model contained no covariates and represented 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 was an 9% increase in students with autism and an 11% decrease in students with intellectual disabilities and a 2% decrease in students with learning disabilities.

In model 3, we entered all study variables 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 adjustment for socioeconomic and health care provider factors. Other significant predictors of autism prevalence were the number of health care professionals, urbanicity, and median household income, and after adjustment for covariates, these factors explained the association between increased percentage of non-Hispanic Whites and increased autism rates.

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 adjustment for covariates.

DISCUSSION

After adjustment for socioeconomic and health care factors, autism prevalence remained

TABLE 1—Descriptive Characteristics of Study Variables in Texas Schools, 2004

Variable	Mean (SD)	Range
Students' ethnicity, by school district, %		
Hispanic	30.68 (26.69)	0–100
Non-Hispanic White	61.53 (26.78)	0–100
No. of pediatricians, child psychiatrists, and neurologists		
In county	60.81 (180.20)	0–1096
Per 10 000 population	0.97 (1.11)	0–5.2
Urbanicity		
Urban	6.29	. . .
Suburban	22.61	. . .
Rural	71.10	. . .
County population density per square mile	216.31 (466.42)	0.3–2 522
County median household income, $	36 911 (9 312)	19 017–75 709
Outcome conditions		
Autism rate per 1000 students	4.03 (3.48)	0.31–21.57
Learning disability rate per 1000 students	73.86 (26.20)	18.93–183.81
Intellectual disability rate per 1000 students	7.24 (5.11)	0.00–45.59

TABLE 2—Standardized Parameter Estimates and Risk Ratios of Study Variables on Disability Rates Among Texas Schoolchildren, 2004

	Autism, B (SE)	RR	Intellectual Disability, B (SE)	RR	Learning Disability, B (SE)	RR
Model 1[a]	–0.11 (0.01)***	0.86	0.08 (0.01)***	1.08	0.02 (0.00)**	1.02
Model 2[b]	0.08 (0.00)***	1.09	–0.12 (0.01)***	0.89	–0.02 (0.00)***	0.98
	Model 3[c]					
Hispanics in school district per 10% increase, %	–0.08 (0.02)***	0.92	–0.01 (0.00)***	0.99	01 (0.01)	. . .
Non-Hispanic Whites in school district per 10% increase, %	0.02 (0.01)	. . .	–0.02 (0.00)***	0.98	–0.01 (0.01)	. . .
No. of pediatricians, child psychiatrists, and neurologists in county per 10 000 population	0.06 (0.03)*	1.06		. . .	–0.05 (0.02)**	0.95
Urbanicity						
Urban vs rural	0.28 (0.05)***	1.32	–0.12 (0.03)***	0.89	–0.05 (0.03)*	0.96
Suburban vs rural	0.19 (0.04)***	1.20	–0.24 (0.03)***	0.79	–0.10 (0.02)***	0.90
County population density, 100 persons per square mile	0.01 (0.01)	. . .		. . .	–0.01 (0.00)**	0.99
County median household income per $10 000 increase, $	0.10 (0.05)*	1.11	–0.21 (0.04)***	0.81	–0.05 (0.02)**	0.95

Note. RR = risk ratio. Ellipses indicate nonsignificance.
[a]Unadjusted direct effect of percentage Hispanics in school district per 10% increase.
[b]Unadjusted direct effect of percentage non-Hispanic Whites in school district per 10% increase.
[c]Fully adjusted, all variables included.
*$P < .05$; **$P < .01$; ***$P < .001$.

inversely related to the percentage of Hispanics in school districts. Although the sociodemographic factors we studied did not explain the inverse relationship between percentage of Hispanic students in school districts and the number of autism cases, these factors did explain the higher autism prevalence in districts with higher percentages of non-Hispanic Whites.

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

Our results suggest that higher socioeconomic status and the density of local diagnostic physicians explain differences in autism rates for non-Hispanic Whites but not for Hispanics. Whether lower autism prevalence in Hispanics is attributable to other, still-unexamined socioeconomic (e.g., a healthy immigrant effect or cultural resiliency),[9–11] health care delivery (e.g., difficulty communicating with, or bias among, health care providers),[12,13] or biological (e.g., genetic susceptibilities to the development of autism or to environmental exposures that may alter neurodevelopment)[14–16] factors remains a crucial area for future research.

Because we conducted an ecological, hypothesis-generating study, our findings should be interpreted with caution. Our data were also limited in scope. First, it is known that autism has been underreported in school-based administrative data.[17,18] This may account for some of the lowered prevalence of autism among Hispanics in this study. However, although diagnoses were not standardized in our data, considerable evidence exists that diagnoses of autistic disorders are made with good reliability and specificity in the field.[19,20]

In addition, our data contained no information on place of birth, occupational history, or detailed information about ethnicity. Although Hispanics are a diverse group, the census indicates that those living in south Texas are primarily of Mexican descent. Therefore, our results cannot be generalized to the entire Hispanic culture.

Overall, we found significantly lower autism rates among school districts with a predominance of Hispanic children than among districts with a predominance of non-Hispanic White children. It is curious that key socioeconomic community indicators explained the higher diagnosis rates among non-Hispanic Whites but failed to explain the lower rates in predominantly Hispanic school districts. Understanding how cultural and economic factors operate in the phenomena of lowered autism rates among Hispanics in south Texas could inform more useful ascertainment and intervention efforts. ■

About the Authors

At the time of the study, Raymond F. Palmer, Tatjana Walker, Bryan Bayles, and Claudia S. Miller were with the Department of Family and Community Medicine, University of Texas Health Science Center, San Antonio. David Mandell is with the University of Pennsylvania Center for Mental Health Policy and Services Research, Philadelphia.

Correspondence can be sent to Dr. Ray Palmer, Dept of Family and Community Medicine, 7703 Floyd Curl Dr, San Antonio TX, mail code 7794 78229-3900 (e-mail: palmer@uthscsa.edu). Reprints can be ordered at http://www.ajph.org by clicking the "Reprints/Eprints" link.

This article was accepted May 15, 2009.

Contributors

R.F. Palmer, T. Walker, and C.S. Miller originated the study. R.F. Palmer performed the analysis and supervised all aspects of its implementation. B. Bayles contributed to writing pertinent sections. All authors conceptualized ideas, interpreted findings, and reviewed drafts of the article.

Acknowledgments

This research was supported by the Department of Family and Community Medicine, University of Texas Health Science Center, San Antonio.

Human Participant Protection

No protocol approval was required because data were obtained from secondary sources.

References

1. Autism and Developmental Disabilities Monitoring Network Surveillance Year 2000 Principal Investigators; Centers for Disease Control and Prevention. Prevalence of autism spectrum disorders—Autism and Developmental Disabilities Monitoring Network, six sites, United States, 2000. *MMWR Surveill Summ.* 2007;56(1):1–11.

2. Croen LA, Grether JK, Hoogstrate J, Selvin S. The changing prevalence of autism in California. *J Autism Dev Disord.* 2002;32(3):207–215.

3. Croen LA, Grether JK, Selvin S. Descriptive epidemiology of autism in a California population: who is at risk? *J Autism Dev Disord.* 2002;32(3):217–224.

4. Mandell DS, Listerud J, Levy SE, Pinto-Martin JA. Race differences in the age at diagnosis among Medicaid-eligible children with autism. *J Am Acad Child Adolesc Psychiatry.* 2002;41(12):1447–1453.

5. Flores G, Tomany-Korman SC. Racial and ethnic disparities in medical and dental health, access to care, and use of services in US children. *Pediatrics.* 2008; 121(2):e286–e298.

6. Texas Education Agency. Public Education Information Management System. Available at: http://www.tea.state.tx.us/peims. Accessed October 21, 2009.

7. US Department of Health and Human Services, Health Resources and Services Administration, Bureau of Health Professions, Evaluation and Analysis Branch. Area resource file (ARF). User documentation for the 2006 release. June 2007. Available at: http://www.arfsys.com. Accessed August 1, 2008.

8. Rasbash J, Browne WJ, Healy M, Cameron B. MLwiN *Version 2.02.* Bristol, UK: Centre for Multilevel Modelling, University of Bristol; 2005.

9. Collins NL, Dunkel-Schetter C, Lobel M, Scrimshaw SCM. Social support in pregnancy: psychosocial correlates of birth outcomes and postpartum depression. *J Pers Soc Psychol.* 1993;65(6):1243–1258.

10. James SA. Racial and ethnic differences in infant mortality and low birthweight: a psychosocial critique. *Ann Epidemiol.* 1993;3(2):130–136.

11. Franzini L, Ribble JC, Keddie AM. Understanding the Hispanic paradox. *Ethn Dis.* 2001;11(3):496–518.

12. Brewis A, Schmidt KL. Gender variation in the identification of Mexican children's psychiatric symptoms. *Med Anthropol Q.* 2003;17(3):376–393.

13. Weinick RM, Krauss NA. Racial/ethnic differences in children's access to care. *Am J Public Health.* 2000; 90(11):1771–1774.

14. Roberts EM, English PB, Grether JK, Windham GC, Somberg L, Wolff C. Maternal residence near agricultural pesticide applications and autism spectrum disorders among children in the California Central Valley. *Environ Health Perspect.* 2007;115(10):1482–1489.

15. Holland N, Furlong C, Bastaki M, et al. Paraoxonase polymorphisms, haplotypes, and enzyme activity in Latino mothers and newborns. *Environ Health Perspect.* 2006;114(7):985–991.

16. Gamboa R, Zamora J, Rodriguez-Perez R, et al. Distribution of paraoxonase PON1 gene polymorphisms in Mexican populations. Its role in lipid profile. *Exp Mol Pathol.* 2006;80(1):85–90.

17. Yeargin-Allsopp M, Rice C, Karapurkar T, Doernberg N, Boyle C, Murphy C. Prevalence of autism in a US metropolitan area. *JAMA.* 2003;289(1):49–55.

18. Shattuck PT. The contribution of diagnostic substitution to the growing administrative prevalence of autism in US special education. *Pediatrics.* 2006;117(4): 1028–1037.

19. Hill A, Bolte S, Petrova G, Beltcheva D, Tacheva S, Poustka F. Stability and interpersonal agreement of the interview-based diagnosis of autism. *Psychopathology.* 2001;34(4):187–191.

20. Mahoney WJ, Szatmari P, MacLean JE, et al. Reliability and accuracy of differentiating pervasive developmental disorder subtypes. *J Am Acad Child Adolesc Psychiatry.* 1998;37(3):278–285.

LUCHAR: Using Computer Technology to Battle Heart Disease Among Latinos

Bonnie Leeman-Castillo, PhD, Brenda Beaty, MS, Silvia Raghunath, MBA, John Steiner, MD, and Sheana Bull, PhD

Many promising technology-based programs designed to promote healthy behaviors such as physical activity and healthy eating have not been adapted for use with diverse communities, including Latino communities. We designed a community-based health kiosk program for English- and Spanish-speaking Latinos. Users receive personalized feedback on nutrition, physical activity, and smoking behaviors from computerized role models that guide them in establishing goals in 1 or more of these 3 areas. We found significant improvements in nutrition and physical activity among 245 Latino program users; however, no changes were observed with respect to smoking behaviors. The program shows promise for extending the reach of chronic disease prevention and self-management programs. (*Am J Public Health.* 2010;100:272–275. doi:10.2105/AJPH.2009.162115)

Cardiovascular disease, although often preventable through nutrition and physical activity, remains the leading cause of death in the United States.[1,2] Latinos are less likely than members of other racial/ethnic groups to receive information on how to prevent cardiovascular disease,[3–6] in part because of their often limited access to health care services.[7]

Computer technology is rarely used as a means for health promotion among Latinos,[8] even though it may greatly extend the reach, fidelity, and sustainability of health promotion