Original Article

Social Differences Between Monolingual English and Bilingual English-Spanish Children With Autism Spectrum Disorders

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ABSTRACT

Objective: Bilingualism is increasingly prevalent; however, research in bilingual children with autism is sparse. The purpose of this study was to compare social skills and autistic features in monolingual English and bilingual English-Spanish children with autism spectrum disorder.
Methods: We conducted a review of the multidisciplinary evaluations done in all children aged one to six years diagnosed with autism spectrum disorder in an inner city, university-affiliated clinic from 2003 to 2013. Collected information included demographics, developmental testing, and autistic characteristics.
Results: We identified 462 children; 165 were bilingual English-Spanish and 297 were monolingual English. Parents of bilingual children reported stereotyped or repetitive use of language more often (66% vs 48% $P = 0.002$) than monolinguals. Significant differences were not found in social interaction, use of nonverbal behaviors, peer relationships, sharing or social or emotional reciprocity, mannerisms, or autism severity.
Conclusions: Bilingualism does not seem to confer an extra vulnerability on children with autism spectrum disorder; however, differences in qualitative use of language were observed.

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Introduction

Autism spectrum disorders are characterized by deficits in socialization and communication and the presence of restricted, repetitive behaviors or circumscribed interests.[1,2] Autism spectrum disorders appear to occur in all racial, ethnic, and socioeconomic backgrounds,[3] and yet, children from ethnic minorities or those raised in bilingual environments are not adequately identified or represented in autism research.[4,5] Communication and language deficits are canonical features of autism spectrum disorder, and the impact of being raised in a bilingual environment on these fundamental functions is not fully understood. Bilingualism is common and very likely on the rise. In 2016, 22% of the US children spoke a language other than English at home, most commonly Spanish (US Census Bureau, 2016).[6] All bilingual children are presented with the challenge of acquiring proficiency in more than one language. In typical development, the rates of vocabulary acquisition and distribution of lexical categories generally fall within the range reported for same-age monolinguals.[7,8] In adolescence, bilinguals demonstrate greater executive control than their monolingual peers, regardless of socioeconomic backgrounds.[9,10]

Most studies on comparative language development in bilingual children with developmental disabilities have examined bilingual children with language impairment; these studies have found that bilingual children with specific language impairment present the same pattern and extent of deficits as their monolingual counterparts.[11-13] Research strongly indicates that bilingualism does not cause or exacerbate a disability, and students with disabilities can and do become bilingual.[14]

There are very few reports in the literature of differences in language and social skills between children with autism who are exposed to one language versus those who are exposed to two languages.[15-19] Besides language, socioeconomic factors play a role and, in the United States, bilingualism and lower socioeconomic

status, often co-occur. According to US census data, of families who spoke a language other than English at home, 75% were Latino.[6] Latino families face difficulties accessing services for their children, eliciting developmental concerns to their medical providers, and obtaining autism diagnoses.[20,21] Still, there is a beneficial effect of bilingualism in areas of cognition, regardless of socioeconomic status.[10]

At this point, there is lack of evidence to guide professionals and parents in making decisions about bilingualism for children with autism spectrum disorder, and the practice of advising bilingual parents to speak in a single language with their child with autism is common.[22,23] Thus the impact of being raised in a bilingual environment on language and communication abilities in autism spectrum disorder should be better understood.

We previously reviewed the expressive and receptive language skills in 80 toddlers (aged younger than three years) diagnosed with autism spectrum disorder, 40 classified as bilingual English-Spanish.[17] In that study, compared with monolinguals, bilingual children were more likely to vocalize and utilize gestures, with no other differences in language skills, cognitive functioning, and autistic severity between the groups. We, therefore, expanded our initial study group to all children aged one to six years, diagnosed with autism spectrum disorder, from 2003 to 2013, to examine the impact of being raised in a bilingual environment on the social characteristics of autism spectrum disorder in an ethnically diverse population. Specifically, a review of the multidisciplinary evaluations was conducted to examine if, in autism spectrum disorder, bilingual English-Spanish children showed differences in their social and communicative language skills compared with monolingual English children. We hypothesized that social characteristics and autism severity would be similar between groups.

Methods

Participants

We reviewed the multidisciplinary evaluations of all children aged one to six years diagnosed with autism spectrum disorder or autism, evaluated in a university-affiliated developmental center from 2003 through 2013. Referrals to the center came from early intervention programs, foster care agencies, parents, and pediatricians. Children evaluated at our center undergo a standard multidisciplinary evaluation by a neurodevelopmental pediatrician, psychologist, special educator, and speech and language pathologist. Bilingual professionals evaluated children with Spanish exposure at home. The center sees primarily inner city Bronx residents with a substantial proportion of Hispanic and African American children.

Subjects were identified using the center's clinical database, based on their developmental diagnoses. The diagnosis of autism spectrum disorder or autism was made by the multidisciplinary team based on the Diagnostic and Statistical Manual for Mental Disorders,[24] Fourth edition, (DSM-IV) criteria; the Childhood Autism Rating Scale[25]; and, in some cases, the Autism Diagnostic Observation Schedule.[26]

Measures

Information included diagnostic assessments, test data, and demographics obtained from the child and parents during the course of the multidisciplinary evaluation. In particular, information included social and communication characteristics obtained from the DSM-IV[24] checklist, based on parental reports and clinical observations. The DSM-IV checklist was part of the neurodevelopmental evaluation and was given to all patients referred to the center in whom a diagnosis of autism was suspected. Social interaction, from the DSM-IV checklist, included (1) marked impairments in the use of nonverbal behaviors, (2) failure to develop peer relationships, (3) lack of spontaneous seeking to share enjoyment and interests with other people, and (4) lack of social and emotional reciprocity. Impairments in communication, from the DSM-IV checklist focused on (1) delays in the development of spoken language, not accompanied by an attempt to compensate through alternative modes of communication; (2) impairment in the ability to initiate or sustain a conversation with others, in individuals with adequate speech; and (3) the stereotyped and repetitive use of language or idiosyncratic language. The presence of stereotyped and repetitive motor mannerisms was recorded from the DSM-IV checklist. Autistic features and severity were characterized by using the Childhood Autism Rating Scale, total score.[25] Information on developmental or cognitive level was collected, and adaptive behaviors were examined using the Vineland Adaptive Behaviors Scale.[27] In individuals with language regression, it was defined as the loss of one word (besides mama or dada) and communicative intent,[28,29] was recorded in the evaluation done by the neurodevelopmental pediatrician, and was confirmed by referral to child neurologist due to "language regression." Information about bilingualism was based on a bilingual information survey that parents completed at initial visit at the center and assessment from the bilingual speech and language pathologists. Language dominance was established by a speech pathologist during the speech and language evaluation. A bilingual child was defined as a child who was exposed to both English and Spanish at home, regardless of their expressive or receptive abilities in either language.

Demographic data included age at the time of the evaluation, gender, ethnic group, level of maternal education, maternal age at the time of the child's birth, maternal country of origin, and use of private medical insurance coverage versus Medicaid.

A comparative analysis was performed after subjects were placed in subgroups depending on whether the child was monolingual English or bilingual English-Spanish. Categorical data were analyzed using the chi-square test, and continuous variables were analyzed with independent t tests. As socioeconomic factors play a role in language and bilingualism, univariate and multivariate logistic regression analyses were used to assess the relation of bilingualism with impairments in communication, by adjusting for demographics. Statistical significance was defined as a P value < 0.05, with two-tailed tests used throughout. Data analysis was performed using SPSS 24th edition.

The study was approved by the Committee of Clinical Investigation of Albert Einstein College of Medicine.

Results

Five hundred and one children were identified as having an autism spectrum disorder. Based on the bilingual survey and the evaluation by the speech pathologist, 297 children were identified as monolingual English, nine as monolingual Spanish, 165 as bilingual English-Spanish, and 27 children as bilingual English/another language; in two patients information was missing. Owing to the small numbers, monolingual Spanish and bilingual English/another language children were excluded from the analysis. Results were based on 462 children, who were classified as monolingual English (n = 297) or bilingual English-Spanish (n = 165). There were no significant differences in demographics between the groups that were analyzed versus the excluded groups, and overall, results were not different after excluding monolingual Spanish and bilingual English/other language.

There were some demographic differences between the monolingual and bilingual groups, including ethnic distribution, level of maternal education, maternal country of origin, and use of Medicaid (Table 1). As expected in a sample of bilingual English-Spanish children, the vast majority was Hispanic (95% vs 20% of monolinguals $P < 0.001$) and fewer mothers were US-born (50% vs 76% of monolinguals $P < 0.001$). The level of maternal education was higher in the monolingual group, with 43% having at least some college or higher level of education, compared with 25% of the bilingual group ($P = 0.004$). There was no difference in the age at initial diagnosis of autism or gender distribution between both groups (Table 1).

Although there were no significant differences in their social interaction, including the use of nonverbal behaviors, peer relationships, sharing, or social/emotional reciprocity, more bilingual children were reported to have delays in the development of spoken language (87% vs 77% $P = 0.04$) and stereotyped and repetitive use of language (66% vs 48% $P = 0.002$) than monolinguals (Table 2).

There were no differences in the presence of mannerisms; autism severity, based on the total score of the Childhood Autism Rating Scale; or adaptive behaviors between groups. Developmental or cognitive testing was available only in a subset (N = 322), and it included different tests (Bayley-III, Stanford Binet V).[30,31] Of those, 99 of 212 monolingual children (47%) and 58 of 110 bilingual children (53% $P = 0.3$) had nonverbal abilities equal to or higher than 70 (Table 2).

Multivariate logistic regression analysis was performed (Table 3) to assess the association of bilingualism with impairments in communication, such as (1) delays in the development of spoken language, not accompanied by an attempt to compensate through alternative modes of communication, and (2) the stereotyped and repetitive use of language or idiosyncratic language, adjusting for potential confounders including ethnic group (Latino versus not Latino), level of maternal education, mother born in the United States, use of Medicaid, age of child, and gender. These variables were chosen due to the differences between the groups and possible confounder effects. In the multivariate analysis, after adjusting for demographics, bilingualism was significantly associated with stereotyped and repetitive use of language (odds ratio, 3.1; ninety-fifth confidence interval, 1.3 to 7.8), whereas the association with delays in the development of spoken language did not remain significant.

Discussion

The literature on development in bilingual children with autism spectrum disorder is small and newly emerging, with varied findings. Information about social skills and autistic characteristics in children with autism who are exposed to two languages is sparse. In this ethnically diverse group, we found that key aspects of development, such as cognitive level, autism severity, and social interaction were similar between monolingual English and bilingual English-Spanish children. The prevalence of reported regression, seizures, and family history of autism was similar. Age at diagnosis was similar. As previously reported[16-18] being bilingual did not seem to be associated with more delays or impairments, and bilingual children with autism spectrum disorder did not demonstrate significantly different performances on standard measures compared with monolingual peers.

A few differences were found between both groups. More bilingual children were reported to present abnormalities in communication, in particular in the stereotyped use of language. These findings have not been previously reported and are intriguing. Previous studies in bilingual children with autism examined the age of first words and scores on language testing[16-18] and found no differences with monolingual children, but reports of qualitative use of language and language sterotypes or echolalia are sparse. This study was based on parental report on social communication skills based on the DSM-IV checklist[24]; it did not address specific information about echolalia. Replication in a larger sample, with more objective measures, should be conducted.

TABLE 1.
Demographics Characteristics for Children by Household Language

Demographic Characteristics	Monolingual English N = 297	Bilingual English-Spanish N = 165	P^*
Mean age at diagnosis (months ± S.D.)	39 ± 15	39 ± 16	0.9[†]
Diagnosed before age 3, n (%)	158 (51)	80 (48)	0.4
Gender: male/female	241 (81)/56 (19)	128 (78)/37 (22)	0.3
Use of Medicaid, n (%)	148 (51)	126 (76)	<0.001
Ethnicity, n (%)	N = 264	N = 164	0.004[‡]
Hispanic	53 (20)	156 (95)	
White	72 (27)	1 (0.8)	
Black	108 (41)	2 (1.2)	
Other	31 (12)	5 (3)	
Level of maternal education, n (%)	N = 236	N = 138	0.004[‡]
Less than HS	27 (11)	33 (24)	
HS graduate/GED	44 (19)	28 (20)	
Some college	64 (27)	42 (31)	
College graduate	68 (29)	28 (20)	
Master's degree	33 (14)	7 (5)	
Mother born in the United States, n (%)	174 (76)	71 (50)	<0.001
Maternal age at birth of child (year ± S.D.)	30 ± 6	29 ± 6	0.4[†]
Paternal age at birth of child (year ± S.D.)	N = 249	N = 132	0.3[†]
	34 ± 7	33 ± 7	
Family history of autism, n (%)	50 (16)	36 (22)	0.1

Abbreviations:
GED = General education diploma
HS = High school
N = Number of patients
* Chi-square test;
† Independent t test;
‡ Mann Whitney U test

TABLE 2.
Child Clinical and Autistic Characteristics by Household Language

Clinical Characteristics	Monolingual English N = 297	Bilingual English-Spanish N = 165	P*
Language regression, n (%)	62 (21)	37 (22)	0.8
Nonverbal cognitive testing >70, n (%)	N = 212	N = 110	0.2
	99 (47)	58 (53)	
Seizures, n (%)	14 (5)	6 (4)	0.4
Vineland Adaptive Behavior Composite (mean ± S.D.)	N = 204	N = 109	0.4[†]
	66 ± 11	67 ± 11	
Total Score Childhood Autism Rating Scale	N = 228	N = 132	0.3[†]
	34 ± 5	35 ± 6	
Autistic characteristics (from DSM-IV criteria)	N = 243	N = 129	
Qualitative impairment in social interaction			
Impairment in the use of nonverbal behaviors, n (%)	186 (77)	106 (80)	0.4
Failure to develop peer relationships, n (%)	165 (67)	88 (67)	0.9
Lack of spontaneous seeking to share, n (%)	115 (47)	69 (53)	0.2
Lack of social or emotional reciprocity, n (%)	147 (60)	85 (64)	0.3
Qualitative impairments in communication			
Delay in the development of spoken language, n (%)	188 (77)	110 (87)	0.04
Impairments in initiate conversations, n (%)	83 (34)	33 (26)	0.1
Sterotyped and repetitive use of language, n (%)	118 (48)	85 (66)	0.002
Lack of make believe play, n (%)	154 (63)	82 (62)	1
Sterotyped and repetitive motor mannerisms, n (%)	152 (60)	84 (64)	0.4

Abbreviation:
DSM-IV = Diagnostic and Statistical Manual for Mental Disorders, Fourth edition
* Chi-square test.
† Independent t test.

The association between bilingualism and delays in the development of language did not remain after adjusting for demographic factors. Differences in socioeconomic status are strongly associated with variation in language outcomes,[32] and previous research has reported that both socioeconomic status and bilingualism influence children's language and cognitive development. However, the natural co-occurrence of these factors, especially in the United States, has made it difficult to determine if they have independent contributions.[33] In autism research, underserved populations are underrepresented in web-based national registries as well as in special education programs,[34] and more information on subpopulations within the autism community as a whole is needed.

The demographic differences found between groups have been reported previously in studies looking at Hispanic families.[35] In this ethnically diverse population, living in a bilingual English-Spanish household was not associated with a delayed diagnosis of autism spectrum disorder; both monolingual English and bilinguals were likely to be evaluated at similar ages.

As previously reported,[17] bilingual families were more likely to be enrolled in Medicaid. Whether this reflects referral bias among different ethnic groups or is a real finding will need to be confirmed in a larger prospective study.

Research has been hampered by how to define and characterize bilingualism.[31] Our definition is broad,[17] but involves parents' report of the exposure to both languages and the assessment of language dominance by experienced bilingual speech and language pathologists.

A limitation of this study is its retrospective approach. Yet, evaluations done at our center are structured similarly, and the information obtained by the multidisciplinary team, history, and examination from the charts is standard and similar in all patients. Another limitation is the lack of objective information about milestones of language development, because information was obtained from the DSM[24] checklist, based on parental reports and clinical observations.

Despite these limitations, this is the first study that has examined social skills and autistic features in bilingual children by comparing children with autism spectrum disorder who are monolingual English with those who are bilingual English-Spanish. Both groups presented similar cognitive levels, autistic severity, and core features of social interaction. Thus, in agreement with a few prior studies,[16-19] there appears to be no clear disadvantage to raising children with autism spectrum disorder in a bilingual environment, although a few differences in the qualitative use of language are reported by parents.

TABLE 3.
Demographic Factors Associated With Impairments in Communication by Household Language (Logistic Regression Model)

Independent Variable	Unadjusted OR	95th CI	Adjusted OR	95th CI	P
Age of child	0.9	0.9-1	0.9	0.93-0.99	0.01
Gender of child	0.8	0.5-1.2	1.07	0.4-2.7	0.8
Use of Medicaid	3.1	2-4.8	1.04	0.3-2.7	0.9
Maternal education	0.6	0.5-0.8	0.8	0.6-1.3	0.5
Ethnic group Latino	77.1	35-167	49.8	19-128	<0.001
Mother US-born	0.2	0.1-0.4	0.3	0.1-0.8	0.02
Delay in development of spoken language*	1.7	1.01-3.1	1.5	0.4-5.2	0.4
Sterotyped and repetitive use of language*	2	1.3-3.1	3.1	1.3-7.8	0.01

Abbreviations:
CI = Confidence interval
OR = Odds ratio
Dependent variable: bilingual household.
* Autistic characteristics from Diagnostic and Statistical Manual for Mental Disorders, Fourth edition.

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