



Autism Assessment with English-Spanish Bilingual Individuals in the United States

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Abstract

Purpose There is limited clinical guidance on best autism assessment practices for bilingual individuals. This study aimed to examine whether Spanish-English bilingual participants display varying levels of autism symptoms on the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) when it is administered in English compared to Spanish, and whether these differences are associated with participants' dominant language. Furthermore, we explored how often participants met the ADOS-2 autism cutoff scores on both the Spanish and English administrations and compared percentages. We then used generalized linear models with random effects to examine whether the language of ADOS-2 administration (English or Spanish) predicted autism severity scores, depending on participants' Spanish exposure or usage [1–99%], while controlling for sex, verbal IQ, and autism diagnosis.

Method A total of 94 community-referred English-Spanish bilingual participants (age range = 1.5 years–44.6 years) from predominantly low-income households were included, all with existing diagnoses of autism or other neurodevelopmental or mental health conditions.

Results We found that, on average, the ADOS-2 yields similar severity scores when it is administered in Spanish and English with bilingual individuals. Additionally, language of the ADOS-2 administration does not predict severity scores regardless of percentage of Spanish use or exposure.

Conclusion We discuss how findings from this study can inform clinical practice in autism assessment for bilingual individuals, while acknowledging that language is only one aspect of culturally sensitive assessment and must be considered when working with bilingual families.

Keywords Autism · Assessment · Bilingual · Hispanic · Latinx

Introduction

The Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) is a reliable semi-structured observation used to assess social communication and restricted and repetitive behaviors (Lord et al., 2012; Hong et al., 2022; Lebersfeld et al., 2021). Five published ADOS-2 modules (Lord et al., 2012) and two modules available for research

by request (Bal et al., 2020), were designed for individuals with different expressive language and developmental levels. Raw scores from the ADOS-2 have been standardized [Calibrated Severity Scores; CSS] to make scores less affected by age and language level. Calibrated Severity Scores yield total, social affect (SA), and restricted and repetitive behaviors (RRBs) scores.

The ADOS-2 was developed and normed in English but has been revised over the years to improve its utility for a broader global population. The ADOS-2 has been translated and made available in over 20 languages (e.g., German, Korean, Hebrew, Afrikaans, and Spanish), though not all translated versions of the ADOS-2 have been validated, including the Spanish version. Translated versions of the ADOS-2 that have been validated show strong psychometric properties, including good interrater reliability, test-retest reliability, and diagnostic sensitivity (Chojnicka &

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Pisula, 2017; Kim et al., 2022; Oosterling et al., 2010; Papanikolaou et al., 2009). However, there is limited research on the best practices for conducting diagnostic assessments like the ADOS-2 with bilingual populations who are at risk for autism (Overton et al., 2008; Smith et al., 2017).

As far as we know, none of the ADOS-2 translations have been yet validated for bilingual populations despite the high rates of bilingualism across the globe. This gap is likely due to the complexity of measuring bilingualism, especially in individuals with autism, whose expressive and receptive language abilities can vary significantly in each language (Digard et al., 2020; Tager-Flusberg et al., 2005). Clinicians are often faced with decisions about which language-version of standardized instruments in which to assess individuals who are exposed to two languages (e.g., one language in their home and a different one in their community or two different languages in their home) and there is no objective data to guide them.

Although research on autism assessment in bilingual individuals is limited, notable progress has been made in the assessment of language impairment in bilingual individuals (Bedore & Peña, 2008). The Bilingual Input-Output Survey (BIOS) is a brief parent interview that provides a full history of exposure to each language on a yearly basis and during daily routines (Peña et al., 2018). Using the BIOS, clinicians can assess a participant's language dominance and get a percentage of input and output of each language to determine whether English, Spanish, or both should be used for assessing language impairment (Peña et al., 2018). The BIOS is particularly useful, as it can provide an estimate of bilingualism even for individuals who are non-speaking by gathering information about the language they are exposed to, the context, and the duration on a weekly basis. However, the BIOS has not yet been applied to in autism and

more specifically, to determine the appropriate language-version for autism diagnostic assessments like the ADOS-2.

In this study, we administered the ADOS-2 in both Spanish and English to 94 bilingual individuals and used the BIOS to measure their language dominance and percentage of exposure to and output of each language. The goal was to examine whether Spanish-English bilingual participants display varying levels of autism symptoms on the different modules of the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) when it is administered in English compared to Spanish, and how this relates to their dominant language. As part of the first aim, we also explored whether participants met ADOS-2 autism cutoff scores on both administration languages. Second, we grouped participants together to create two groups (a less verbally fluent group including some individuals with phrases [Module T, 1 and 2] and a verbally fluent group [Module 3 and 4]) and assessed whether the language of the ADOS-2 administration (English or Spanish) predicts autism severity scores depending on the participants' exposure or use of Spanish (1–99%), while controlling for sex, verbal IQ, and diagnosis (autism or no autism).

Our hypotheses were as follows: (1) Participants would show more severe autism symptoms when administered the ADOS-2 in their non-dominant language (Spanish or English) for each different module. Despite differences in severity of symptoms, participants who met the ADOS-2 autism cutoffs in one language (e.g., English) would also meet the cutoffs in the other language (e.g., Spanish). (2) Language of the ADOS-2 administration would predict autism severity scores for the verbally fluent group depending on the amount of Spanish exposure/use (1–99% Spanish) while controlling for sex, VIQ, and diagnosis, such that those who used Spanish more often (75% or more) would appear to have more autism symptoms on the English administration of the ADOS-2 (and vice versa).

Table 1 Participant demographics by ADOS-2 module

	Toddler (N=19)	Module 1 (N=29)	Module 2 (N=6)	Module 3 (N=17)	Module 4 (N=23)
Age	24.5 (5.2) mo	4.5 (1.8) yrs	6.5 (1.5) yrs	10.9 (3.6) yrs	25.0 (9.4) yrs
Female	29%	38%	33%	41%	48%
NVIQ	84.8 (22.9)	67.2 (24.8)	111.0 (13.2)	97.4 (17.0)	97.9 (15.6)
VIQ	50.5 (26.2)	39.1 (18.0)	75.5 (16.0)	88.4 (16.2)	102.0 (23.8)
Spanish dominant	84%	72%	33%	41%	35%
Pre-existing autism diagnosis	5%	38%	50%	47%	39%
Post-study autism diagnosis	79%	83%	100%	82%	57%

VIQ Verbal intelligence quotient, NVIQ non-verbal intelligence quotient

Method

Participants

A total of 94 community-referred English-Spanish bilingual participants living in southern California, whose parents were predominantly from Mexico and Central America, with existing diagnoses of autism or other neurodevelopmental (e.g., global developmental delays, attention deficit hyperactivity disorder (ADHD) or mental health conditions (e.g., depression and anxiety) were included. Participant demographics are summarized by ADOS-2 module in Table 1. Families included were primarily from low-income, Spanish speaking households (Table 2). Participants were

Table 2 Family demographics, *N*=94

Variable	Value
Household income <i>N</i> (%)	
<\$20,000	17 (18%)
\$21,000–\$35,999	20 (21%)
\$36,000–\$50,999	17 (18%)
\$51,000–\$65,999	10 (11%)
\$66,000–\$80,999	13 (14%)
\$81,000–\$100,999	6 (6.4%)
\$101,000–\$130,999	4 (4.2%)
\$131,000–\$160,999	3 (3.2%)
> \$161,000	2 (2.1%)
No response	2 (2.1%)
Caregiver primary language (%)	
Spanish	72%
English	20%
Both	8%

recruited through schools, regional centers, and local autism organizations such as community non-profits that work with Spanish speaking populations in Los Angeles.

Participants were required to: (1) be exposed to and speak (for those who are verbal) both Spanish and English, (2) have an existing diagnosis of autism or developmental delay or to present with concerns about possible autism, (3) meet the minimum testing requirements for the Autism Diagnostic Observation Schedule–Second Edition (ADOS-2; Lord et al., 2012) (i.e., have a mental age of at least 12 months old, have no significant motor or sensory impairments, be able to walk independently, and have no uncorrected visual or hearing impairments), and (4) be within driving distance from the research site or an agreed upon community setting for two in-person visits. Families were given the option of completing the visits in their home, a clinic, or in a community facility (e.g., library, community center, etc.) to reduce the burden of travel. The setting of the assessment was kept the same across the two visits for most participants. Participants received a \$50.00 Visa or Amazon gift card for each of the two visits (\$100.00 total) and an official report with diagnostic impressions and treatment recommendations provided by a licensed psychologist.

Study Procedure

All participants were seen twice in person to collect questionnaires and observational assessments. All participants received the Spanish and English versions of the ADOS-2 approximately four weeks apart. This time frame was chosen as there are no observed practice effects over short periods of times and up to 8 months for Module 4 (Janvier et al., 2022; Lord et al., 2012). Participants were randomized to determine the order (Spanish first vs. English first) of the administrations for each of the two visits and to the assessor

for each visit (from three research reliable assessors). Assessors did not see the same participant twice and were blind to the ADOS-2 scores of the previous administration. The module of the ADOS-2 was consistent across the two visits for every participant.

Measures

A demographic form was collected to gather participant and caregivers' demographic information. To estimate verbal intelligent quotient (VIQ) and nonverbal intelligent quotient (NVIQ), select subscales from a list of cognitive tests were administered. The cognitive tests that were used included The Mullen Scales of Early Learning (MSEL; Mullen, 1995), Differential Ability Scales, Second Edition (DAS-2; Elliott, 2007), Wechsler Intelligence Scale for Children-Fifth Edition (WISC-V; Wechsler, 2014), the Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV; Wechsler, 2008). Spanish versions of the WISC and the WAIS were available, though all participants who received these preferred that they be done in English. Although the MSEL and DAS have not been officially translated into Spanish, clinicians occasionally translated certain items during administration when children appeared to struggle with the English terminology. We recognize that bilingual administration of these assessments is not standardized. However, our aim was to obtain the most accurate possible estimate of each child's abilities on the administered subtests. To gather more clinical information for best estimate diagnosis, we collected the following questionnaires in either Spanish or English (depending on the parent or adult's preference): the Adaptive Behavior Assessment System, Third Edition (ABAS-3; Harrison & Oakland, 2015) caregiver- or self-report (for adults who could report on their own behaviors), the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000, 2001) or the Adult Behavior Checklist (ABCL; Achenbach & Rescorla, 2003), the Social Responsiveness Scale, Second Edition (SRS; Constantino, 2012) and the Social Communication Questionnaire (SCQ; Rutter et al., 2003a, b). We completed the Autism Diagnostic Interview, Revised (ADI-R; Rutter et al., 2003a, b) in Spanish or English (depending on the parent's preference) with parents of 12 participants because a diagnosis or rule out of autism was not clear based on observations and questionnaire. Using all of the information available, the lead psychologist and clinicians determined a best estimate diagnosis during weekly consensus meetings. Participant diagnoses were converted into a binary variable of autism or no autism diagnosis.

To determine participants' language dominance and percentage of exposure and use of each language, we used a parent questionnaire called the Bilingual Input-Output Survey (BIOS; Peña et al., 2018). The BIOS is unique in its

ability to estimate the language individuals hear and speak during each waking hour of weekdays and weekends, as well as the context (e.g., home, school, daycare, community, etc.). This hour-by-hour data collection allows for an overall proportion of input and output in Spanish and English to be calculated, resulting in two different percentages. For analyses purposes, we used the percentage of input and output of Spanish, specifically. When the individual was exposed to or spoke both languages, this was counted as 50% Spanish in the calculation procedure, as indicated in the manual and done by Gross and colleagues (2022). These calculations were used to describe where on the bilingual continuum participants fell (from 1 to 99% Spanish). For less verbally fluent participants we only used the percentage of Spanish exposure. For verbally fluent participants, we only used the percentage of Spanish spoken language. We then created a binary variable to indicate what participants' dominant language is. We used the percentage of exposure to each language to determine language dominance for less verbally fluent participants and output of each language to determine language dominance for verbal participants. For less verbally fluent participants, being exposed to Spanish over 50% of the time or above were considered Spanish dominant. For verbally fluent participants, speaking Spanish over 50% of the time or above were considered Spanish dominant.

A third visit was scheduled with caregivers or adult participants via telehealth to discuss testing results, diagnostic impression and recommendations. This study received ethical approval from the University of California, Los Angeles IRB (#23-000535) in May 2023. We received written consent in Spanish or English from all caregivers and participants who were 18 years and older who had sufficient language ability to understand. Additionally, we received assent from participants aged 13–17 years who were able to assent.

Data Analysis

For each module, we ran two-way ANOVAs to test for differences in mean total autism severity, social affect and RRB severity scores by language dominance (English vs. Spanish) and by language of the ADOS-2 administration. In order to evaluate whether participants met the ADOS-2 cutoff in one but not both language administrations, we calculated the percentage of participants who had discrepant cutoff scores between the Spanish and English administrations and compared that to best estimate clinical diagnoses. For the second aim, we created two groups based on ADOS-2 modules: minimally verbal including some with phrases (modules Toddler, 1 and 2) whom we will refer to as Group T/1/2 and verbally fluent (modules 3 and 4) whom we will

refer to as Group 3/4. We applied generalized linear models with a random effect to account for the nested structure of participants within the two groups (Group T/1/2 and Group 3/4). This approach allowed us to investigate whether language use or exposure to Spanish predicted autism severity scores, considering the language of the ADOS-2 administration, while controlling for sex, VIQ, and autism diagnosis status (yes or no autism) for the second aim. In Group T/1/2, we tested for an interaction between percentage of Spanish input and language of the ADOS-2 administration. For the Group 3/4, we tested the interaction between percentage of Spanish output and language of the ADOS-2 administration.

Results

Comparison of Calibrated Severity Scores Based on Language Administration

Mean scores across language of administration are provided in Table 3. There were no significant main effects of language administration or language dominance on autism severity scores (CSS) nor were there significant interactions across the Toddler Module, Module 2 or Module 4. For Module 1, there was a main effect of language dominance on RRB severity scores $F(1,54)=5.77$, $p=.02$, where participants who were dominant in English had more severe RRBs. Thus, the interaction between language dominance and language administration was not significant suggesting that the effects of language dominance on autism severity scores within Module 1 did not differ between the English and Spanish administrations of the ADOS-2. For Module 3, there was a main effect of language dominance on total autism severity scores $F(1,30)=8.57$, $p=.006$, social affect severity scores $F(1,30)=6.23$, $p=.02$, and RRB severity scores $F(1,30)=6.95$, $p=.01$, where participants who were dominant in English had more severe autism symptoms across the three domains. These results suggest that there were sample differences between those who were English dominant and Spanish dominant. However, again, the interaction between language dominance and language administration was not significant, suggesting that the effects of language dominance on autism severity scores within Module 3 did not differ between the English and Spanish administrations of the ADOS-2.

Descriptive Statistics on Congruency of the ADOS-2 with Best Estimate Diagnosis

There was a discrepancy in classification based on the Spanish and English versions of the ADOS-2 for 14 of the 94 participants (15%) across modules. Half of those participants

Table 3 CSS means and standard deviations by language dominance

Dominant language	Language admin	# of participants	CSS total mean (SD)	CSS SA mean (SD)	CSS RRB mean (SD)
Toddler Module (<i>N</i> =19)					
English	English	<i>N</i> =3	6.0 (3.6)	5.67 (2.89)	7.33 (2.52)
English	Spanish		6.0 (3.6)	6.0 (3.61)	4.33 (4.04)
Spanish	English	<i>N</i> =16	7.8 (2.5)	7.5 (2.50)	7.0 (2.48)
Spanish	Spanish		6.8 (2.5)	6.62 (2.60)	7.0 (2.45)
Module 1 (<i>N</i> =29)					
English	English	<i>N</i> =8	6.25 (1.28)	5.88 (2.03)	8.0 (1.20)
English	Spanish		6.5 (1.20)	6.12 (1.64)	8.12 (0.84)
Spanish	English	<i>N</i> =21	5.33 (2.67)	5.24 (2.68)	6.57 (2.31)
Spanish	Spanish		5.52 (2.20)	5.24 (2.00)	6.57 (2.44)
Module 2 (<i>N</i> =6)					
English	English	<i>N</i> =4	7.5 (1.00)	7.25 (1.26)	8.67 (1.53)
English	Spanish		7.5 (2.08)	7 (1.83)	7.33 (2.31)
Spanish	English	<i>N</i> =2	4.5 (2.12)	3.5 (0.71)	7.33 (0.58)
Spanish	Spanish		7 (1.41)	5.5 (3.54)	8 (1.73)
Module 3 (<i>N</i> =17)					
English	English	<i>N</i> =10	7.8 (2.57)	8.0 (2.0)	6.5 (3.47)
English	Spanish		7.4 (2.46)	7.3 (2.31)	7.6 (1.78)
Spanish	English	<i>N</i> =7	4.71 (2.81)	5.43 (2.75)	4.43 (3.69)
Spanish	Spanish		5.29 (2.36)	5.43 (2.64)	4.14 (2.97)
Module 4 (<i>N</i> =23)					
English	English	<i>N</i> =15	4.93 (2.91)	5.33 (2.50)	5.13 (3.14)
English	Spanish		5.07 (3.03)	5.73 (2.40)	5.20 (3.21)
Spanish	English	<i>N</i> =8	6.38 (3.42)	6.25 (3.65)	4.38 (3.81)
Spanish	Spanish		5.88 (3.91)	6.88 (3.09)	4.38 (3.54)

differed by 1 CSS point only (i.e., 3 vs. 4). For those whose classifications were discrepant across administrations, the ADOS-2 cutoff classification for 10 of 14 (70%) of the participants matched their best estimate diagnosis when the ADOS-2 was administered in their dominant language. One participant was misclassified on both the English and Spanish ADOS-2, and three were misclassified on the ADOS-2 administered in their dominant language only. Participants

whose ADOS-2 scores on the Spanish and English administrations were discrepant did not show significant differences from those whose scores were consistent across the two languages based on VIQ, age, language dominance, diagnosis, or module (all $p>.05$).

Generalized Linear Models

Group T/1/2

For Group T/1/2 (Toddler Module, Module 1 and Module 2), there were main effects of VIQ and diagnosis (autism or no autism) on total autism and social affect severity scores. Lower VIQ predicted higher total autism severity ($B = -0.03$, $SE = 0.01$, $p = .001$) and social affect scores ($B = -0.04$, $SE = 0.01$, $p = .001$). Not surprisingly, having an autism diagnosis also predicted higher total autism severity ($B = 3.80$, $SE = 0.54$, $p = .001$) and social affect scores ($B = 3.14$, $SE = 0.55$, $p = .001$). There was also a main effect of diagnosis on RRB severity scores such that those with autism had higher RRB scores ($B = 4.08$, $SE = 0.49$, $p = .001$). No significant interactions were found between the percentage of Spanish input and the language of the ADOS-2 administration across the three outcomes ($p>.05$). There were no main effects of language of ADOS-2 administration on autism total, social affect, or RRB severity scores on average ($p>.05$).

Group 3/4

For Group 3/4 (Modules 3 and 4), there were main effects of sex and diagnosis (autism or no autism) on total autism, social affect, and RRB severity scores. On average, males displayed more total autism ($B = -1.69$, $SE = 0.52$, $p = .002$), social affect ($B = -1.25$, $SE = 0.50$, $p = .02$) and RRB symptoms ($B = -1.70$, $SE = 0.73$, $p = .02$). As expected, those with an autism diagnosis displayed more total autism ($B = 3.70$, $SE = 0.57$, $p = .001$), social affect ($B = 2.99$, $SE = 0.55$, $p = .001$) and RRB symptoms ($B = 2.87$, $SE = 0.80$, $p = .001$). Similar to Group T/1/2, no significant interactions were found between the percentage of Spanish output and the language of the ADOS-2 administration across the three outcomes and there were no significant differences in autism total, social affect, or RRB severity scores on average, regardless of whether participants received the ADOS-2 in English or Spanish ($p>.05$).

Discussion

Culturally sensitive assessments are necessary to avoid over or under identification of social communication challenges, such as those observed in autism (Harrison et al., 2017). Additionally, timely assessments are also crucial to ensure children receive early interventions, which can significantly impact their long-term development. To date, there has been limited evidence to support the validity of the ADOS-2 in Spanish, one of the most common assessments used to support a diagnosis of autism in the United States and around the world (Stoll et al., 2021). Results from this study show that bilingual individuals tested on the ADOS-2 in a language that is not their dominant language can still reliably receive the administration.

Verbal fluency and language exposure or use did not moderate bilingual participants' autism severity scores, in contrast to what we had hypothesized. Furthermore, only a small percentage (14%) of participants had diagnostic classifications that differed between the Spanish and English administrations. The majority of participants whose scores on the Spanish and English ADOS were not congruent, were only off by a severity score of 1. This finding was not surprising given that the ADOS-2, or any other autism diagnostic measure, is not 100% accurate even with monolingual English-speaking individuals. Test-retest reliability of the ADOS-2 shows that approximately 10% participants who met the cutoff at time 1 no longer meet at time 2 or vice versa, which is consistent with our results (Janvier et al., 2022). Moreover, the ADOS-2 is designed to be used along with other measures and should be used only as a tool to support a clinician's diagnostic decision (Bishop & Lord, 2023; Lord et al., 2022). There are interviews and questionnaires that measure and characterize autism symptoms, other behavioral symptoms and adaptive skills that are available in other languages and can supplement the information gathered from observational measures.

The lack of differences in the Spanish and English administrations of the ADOS-2 could be due to several factors, including the characteristics of our sample, the qualities of the clinicians involved in the study, or the semi-structured nature of the assessment that was evaluated. In relation to our sample, we included many young children with limited language use and adults who were proficient in both Spanish and English. Structural aspects of language development are often problematic in individuals with autism but the tasks and presses in the ADOS-2 are designed to more broadly assess an individual's communication and social reciprocity and may not have been influenced by an individual's ability in their non-dominant language. This is especially true for the Toddler Module, Module 1 and Module 2, which are designed for children without flexible speech. Participants

who received a Module 3 and 4 were required to truly understand and be able to speak both Spanish and English which could have resulted in similar scores across the two language administrations, even on diagnostic qualities that rely on language use like stereotyped speech.

Furthermore, the three clinicians who administered the assessments as part of the study were bilingual. Two of the primary clinicians identified as Mexican American and spoke Spanish as their first language, making them culturally aligned with the sample. This allowed clinicians to understand most of the participants' communication during the ADOS-2, even if they switched to the other language. Although participants were instructed to use only the language of their administration (Spanish or English), it was common for them to switch between languages when they were unsure of how to express something in one language. Code-switching is a common behavior for many bilingual individuals, and the semi-structured format of the ADOS-2 accommodates this flexibility. The ADOS-2 also allows culturally competent clinicians to adjust aspects of the administration as needed to better suit the needs of the child or adult, including code-switching or adapting the materials. For example, if a child is not interested in an item or is frightened by a particular object, it can be replaced with an equivalent alternative (Smith et al., 2017).

Findings from this study are not to encourage the use of one language over the other during observational assessments, as culturally sensitive assessments with multilingual professionals hold the most value (Chavez et al., 2022). Rather, findings from this study aim to support clinicians, particularly in regions like Southern California, who may often administer the ADOS-2 in English with bilingual individuals due to their limited fluency in Spanish (Chavez et al., 2022; Smith, 2018). As a result, this could help further reduce delays in receiving a diagnosis, which multilingual individuals of color disproportionately experience. Furthermore, these findings could also help ease caregivers' concerns about the validity of the observational assessments their children receive. These results are specific to the ADOS-2 and do not apply for specific language measures. Based on existing literature we know that dominant languages do need to be considered when determining whether a language disorder exists.

Application to Clinical Care Guidelines

In the United States, timely identification of autism has become a priority given the benefits of early intervention (Fuller & Kaiser, 2020). However, in some states in the United States, when a bilingual child is referred to be assessed for developmental disabilities, it is required that they wait for a provider who can speak all of the languages

to which a child is exposed. Sometimes, professional interpreters are employed. However, the use of an interpreter during observational autism assessments has not been systematically tested. Additionally, waiting for an interpreter can lead to longer wait times for bilingual individuals being assessed for autism (Valicenti-McDermott et al., 2013). Spanish speaking psychologists represent only 5% of all psychologists, despite their high demand (Smith, 2018). While the field catches up in recruiting and retaining multilingual professionals, we need to address the needs of bilingual children in need of an autism diagnosis to access early intervention services. Results from this study can ease provider and caregiver concerns about the validity of their bilingual children's observational assessment, if they were assessed in one language over the other. If there is a choice, however, clinicians should consult with caregivers (or directly with older children or adults) to determine what language in which they would feel more comfortable for the assessment. A critical part of autism assessment includes the feedback session where clinicians explain the results to the family of the child or to the adult being evaluated. For young children especially, parents are a big part of the patient's support system and should receive the results and recommendations in their dominant language, ensuring it is clear and understandable. Latinx parents of autistic children experience more barriers related to autism care and therefore should be supported in ways that are culturally relevant (Lopez et al., 2020; Zuckerman et al., 2017).

Limitations

These results should be interpreted carefully, given that our sample represents a specific group of Latinx families from Mexico and Central America living in California. Of note, it was difficult to recruit verbally fluent individuals who were dominant in Spanish. This was because most verbally fluent individuals who were recruited have completed the majority of their education in the United States, where they were exposed to and were required to use English within the school system. Another limitation of our sample is that it was not balanced by gender and existing diagnoses. Adult females without pre-existing diagnoses of autism self-referred to the study at higher rates, which likely drove the sex differences in the ADOS-2 severity scores (Jadav & Bal, 2022). In contrast, male adults mostly had pre-existing diagnoses of autism, and participated in the study because their parents were interested in having them receive an autism re-evaluation.

Conclusion

In our sample of Latinx English-Spanish bilingual individuals, language of administration of the ADOS-2 did not seem to make a significant difference in results regarding autism severity. However, the direct observation was only one part of the diagnostic process. It is important to note that other aspects of the assessment involving caregivers and participants were highly individualized around the preferences and needs of the family/participants, including recruitment, feedback and the location of testing. These results have the potential of speeding up the assessment process and shortening the strained waitlists for autism evaluations around the United States. However, more research on autism assessment of bilingual individuals is necessary to replicate our findings in other languages with participants from different cultures. Bilingual individuals are rarely included in research studies, despite the increasing rates of autistic individuals raised in bilingual environments across the globe. To have evidence-based assessment strategies, we must continue to include bilingual individuals in research and strive to measure bilingualism systematically. Providing culturally sensitive assessments to individuals and their families is necessary and should be the highest priority for all individuals, regardless of race, language, and culture.

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Declarations

Conflict of interest Catherine Lord receives royalties from sales of the Autism Diagnostic Interview-Revised (ADI-R) and Autism Diagnostic Observation Schedule (ADOS/ADOS-2).

Ethical Approval This study received ethical approval from the University of California, Los Angeles IRB (#23-000535) on Month 05, 2023.

Consent to Participate We received written consent from all participants.

Consent for publication Not applicable.

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