

## Screening instruments for early detection of autism spectrum disorder in Spanish speaking communities

Yurena Alonso-Esteban<sup>1</sup>, Rafaela Marco<sup>1</sup>, Darren Hedley<sup>2</sup>, Mirko Uljarević<sup>3</sup>, Josie Barbaro<sup>2</sup>,  
Ricardo Canal-Bedia<sup>4</sup>, and Francisco Alcantud-Marín<sup>1</sup>

<sup>1</sup> Universitat de València, <sup>2</sup> La Trobe University (Melbourne, Australia), <sup>3</sup> Stanford University (USA), and <sup>4</sup> University of Salamanca

### Abstract

**Background:** Since autism detection protocols rely primarily on parental accounts of early symptoms, the use by Spanish-speaking populations of screening tools developed in a different language and socio-cultural context (usually English) might hamper the success of early detection programs. **Method:** A systematic search in four databases was completed, identifying 59 tools used for ASD detection. Of these, only nine tools had been applied in Spanish-speaking populations, and of those, only five can be considered specific tools for the early detection of autism. **Results:** Sensitivity detecting autism was generally lower in the Spanish versions of the reviewed instruments, while specificity tended to be equal to or higher than that reported in the original screeners. **Conclusions:** Heterogeneity and poor methodological rigor of the studies conducted to date emphasize an urgent need for a concerted effort to develop reliable and valid instruments for the early detection of autism in Spanish-speaking populations worldwide.

**Keywords:** Screening tools, early detection, autism spectrum disorder, systematic search.

### Resumen

**Instrumentos de detección temprana de los trastornos del espectro autista para poblaciones de habla hispana. Antecedentes:** puesto que los protocolos de detección del autismo se basan principalmente en el relato de los padres sobre los síntomas tempranos, el uso de herramientas de detección desarrolladas en un idioma y un contexto sociocultural diferentes (generalmente en inglés) en las poblaciones de habla hispana podría obstaculizar el éxito de los programas de detección temprana. **Método:** se completó una búsqueda sistemática en cuatro bases de datos, identificando 59 herramientas utilizadas para la detección de TEA. De estas, solo nueve herramientas habían sido aplicadas en poblaciones hispanohablantes, y de estas, solo cinco pueden considerarse herramientas específicas para la detección temprana del autismo. **Resultados:** la sensibilidad para detectar el autismo fue generalmente menor en las versiones en español de los instrumentos revisados, mientras que la especificidad tendió a ser igual o mayor que la reportada en las revisiones originales. **Conclusiones:** la heterogeneidad y el escaso rigor metodológico de los estudios realizados hasta la fecha ponen de manifiesto la urgente necesidad de un esfuerzo concertado para desarrollar instrumentos fiables y válidos para la detección precoz del autismo en las poblaciones hispanohablantes de todo el mundo.

**Palabras clave:** herramientas de cribado, detección temprana, trastornos del espectro del autismo, búsqueda sistemática.

Early identification of Autism Spectrum Disorder (ASD) is reliant on behavioral symptoms including reduced social smiling and eye contact, lack of imitative behavior, and poor joint attention skills (Barbaro & Dissanayake, 2013). For early screening, the presence or absence of these early developmental social and communicative behaviors is often based on parental reporting; thus cultural differences in parental expectations of age-appropriate behaviors may play a role in the evaluation (Stronach & Wetherby, 2017). The effect of cultural expectations on symptom detection was explored by Tek and Landa (2012), who compared scores on parent-rated questionnaires measuring

receptive and expressive language, cognitive, social, and motor skills in a group of ethnically diverse toddlers with ASD. Parents' estimation of developmentally appropriate skills was found to differ between US minority (Hispanic and Black) and non-minority groups. It is noteworthy that in Tek and Landa's (2012) study, the minority and non-minority children had a similar Socio-Economic Status (SES), which argues (in the absence of replica studies and population studies) for cultural variables being a relevant factor in determining differences in prevalence and symptom estimation in children with ASD. Culture-driven differences in parent's interpretation of symptoms and beliefs about their cause, course, and treatment with their autistic children (Mandell & Novak, 2005) provides additional evidence of how parents' perceptions of their child's behavior influences the timing and course of evaluation.

In addition to culturally grounded perceptions of what atypical developmental behavior might look like, socio-cultural background might also influence the participation of parents in the assessment

process itself. Value systems in some Spanish-speaking communities might affect the collaboration between families and professionals by, for example, limiting communication between client and professionals (Rogers-Adkinson, Ochoa, & Delgado, 2003). Furthermore, parents from different ethnic groups may display a different degree of involvement in the course of assessment. At least one study found that parents of Hispanic and other minority children were less likely to complete the follow-up of the Modified Checklist for Autism in Toddlers (M-CHAT; Robins, Fein, Barton, & Green, 2001) conducted over the phone than parents of non-Hispanic White children, thus lowering the M-CHAT's positive predictive value in the study sample (Khowaja, Hazzard, & Robins, 2015). This is particularly worrisome given evidence of large differences in the use of screening instruments such as the M-CHAT and Childhood Autism Rating Scale (CARS; Schopler, Reichler, & Renner, 1986) in southern European countries like Spain (Ashwood, Buitelaar, Murphy, Spooen, & Charman, 2015), or throughout Latin America.

Given vast differences in early ASD detection rates across culturally diverse populations, as well as differences in parental perceptions of developmentally appropriate behavior, there is a critical need to develop culturally valid instruments for use across different domains (American Evaluation Association, 2011; Barbaro & Halder, 2016). Within the context of health evaluations, the Center for Disease Control and Prevention (CDC; 2014) specifically recommends the use of culturally appropriate data collection instruments. Moreover, instruments standardized in English-speaking cultures might not effectively identify symptoms in populations characterized by different cultural values or languages. Therefore, ASD screening instruments require appropriate cultural adaptation, including translation or modification of the original linguistic expressions, as well as demonstration of adequate psychometric properties for the target population (Harrison, Slane, Hoang, & Campbell, 2017; Soto et al., 2015).

Research on instruments specifically developed to help early ASD detection in Spanish-speaking populations, either in Spain or countries where Spanish is the main language, is scarce. Therefore, the present study aimed to systematically review the extant literature to identify ASD screening tools that have either been specifically developed for Spanish speaking populations, or have been translated and adapted for use in these populations. The overarching aim of this review was to identify and select instruments that could be implemented in healthcare systems in Spanish-speaking countries including low to medium socioeconomic development, with a specific emphasis on test administration requirements and evidence of culturally appropriate and valid adaptation.

### Method

In order to identify and evaluate ASD detection tools available for use in Spanish-speaking communities, we conducted a review of the literature following the search, selection and document evaluation criteria recommended by the NHS Center for Reviews and Dissemination (CRD, 2008).

For the presentation of the results we referenced the international classification system which includes three levels: development surveillance (Level I), screening (Level II), and diagnosis (Level III) (Hernández et al., 2005).

### Procedure

First, we searched the extant literature on ASD screening tools developed in any language. Four databases (ProQuest-PsychArticles, ProQuest-ERIC, PubMed and Web of Science-Medline) were searched for studies published in peer-reviewed journals (2000-2018) using search keywords: "Early Detection" OR "Screening" AND "Autism" OR "ASD" OR "Autism Spectrum Disorder" OR "PDD" OR "Pervasive Developmental Disorders". These terms could appear anywhere in the paper. We also searched the grey literature, including unpublished doctoral dissertations. The initial search yielded 4,492 documents. After removing duplicate papers, abstracts were screened to discard documents based on the following exclusion criteria: epidemiological or prevalence studies; intervention studies; biomarker studies; diagnostic tools; and studies focused on gender differences and skills assessment. This process identified 282 documents (see Figure 1) and 59 instruments used for ASD screening.

The second phase of the search consisted in detecting which were the tools with a Spanish version or which had been used in Spanish-speaking samples. Although in some instances the publisher advertised a Spanish version of the instrument, follow-up with the publishers revealed that the instrument was either an untranslated English version, or was translated but had not been validated. Subsequently, only 16 instruments had been used in Spanish speaking samples (76 documents). For the presentation of the results we referenced the international classification system which includes three levels: development surveillance (Level I), screening (Level II), and diagnosis (Level III) (Hernández et al., 2005).

Eleven tools of these were excluded for various reasons and five instruments were identified for inclusion in the review. Table 1 provides the reason for exclusion of the 11 instruments (54 documents), and Table 2 provides data for the five included instruments (all Level II).

### Results

Each of the five included instruments (see Table 2) is reviewed in detail below.

#### *Autism Detection in Early Childhood (ADEC)*

A Spanish version of the ADEC (Young, 2007) was developed and validated by Hedley, Young, Juarez-Gallego, and Marcin-Salazar (2010) for use within the Mexican population. Translation of the original ADEC followed international guidelines for cross-cultural text translation, and the resulting version was field tested with functional equivalence between the English and Spanish version being ascertained by means of joint scoring of blind videotapes (inter-rater correlation = .96). The Spanish ADEC was shown to have good internal consistency (Cronbach's  $\alpha = .73$ ), and adequate concurrent validity when contrasted with scores from both CARS (Schopler et al., 1986) and Autism Diagnostic Interview-Revised (ADI-R; Rutter, Le Couteur, & Lord, 2009). The results are consistent with those found in Australia and the United States of America (USA; Hedley et al., 2015; see also Nevill, Hedley, & Uljarević, 2019), making the ADEC an adequate tool for use in Spanish-speaking populations.

*Autism Spectrum Assessment for Hispanic Children (ASA-HiCh)*

The ASA-HiCh (Albores-Gallo et al., 2016) was validated in a sample of 70 children diagnosed with ASD and 16 control children, showing good internal consistency (Cronbach’s  $\alpha = .81$ ) and test-retest reliability (ICC =.92). Criterion validity was examined by comparing results from the ASA-HiCh with the ADI-R (Rutter et al., 2009) and the Schedule for Affective Disorders and Schizophrenia for School-Age Children- Present and Lifetime version (K-SADS-PL, ASD supplement; Birmaher et al., 2009), using a previously translated and validated Spanish version of the K-SADS (Ulloa et al., 2006). Kappa agreement values between the categorical diagnosis ASA-HiCh and the ADI-R at different ages ranged from .60–.87 for children younger than five years (Albores-Gallo et al., 2016). However, the small size of the normative sample, as well as the wide range of ages (3-17 years), suggest the need for additional studies with larger and younger samples.

*Checklist for Autism in Toddlers (CHAT)*

An adaptation of the CHAT (Baron-Cohen, Allen, & Gillberg, 1992) for the Spanish population was developed in Uruguay (Cecchetto-Farina, Linke-Weber, Ottati-Solís, Salles-Dulán, & Prego-Maberino, 2002) and applied to a small sample of 30 children with aged 16-24 months. Although significant detail concerning the adaptation of the language and materials for use in the Uruguayan population was provided, unfortunately no quantitative data on the psychometric properties of the instrument were reported.

*Modified Checklist for Autism in Toddlers (M-CHAT, M-CHAT-R/F)*

Different versions of the M-CHAT have been developed in Spanish-speaking populations, both in the USA, Europe and South America. Canal-Bedia et al. (2011) report the first adaptation in Spain of the M-CHAT with telephone follow-up in a carefully phased study that included development and validation of the Spanish M-CHAT on an initial sample of 2480 children (18-24 months), implementation of a pilot on a subsample of 622 children, and testing on an additional population sample of 2,055 children to assess reliability of the new version. The results of the adapted Spanish version were similar to the original validation (Robins et al., 2001). In a related study by the same group, García-Primo et al. (2014) administered the Spanish M-CHAT with follow-up (from Canal-Bedia et al., 2011) to 9,524 children attending 18 and 24-month well-child visits between 2005 and 2012. Although sensitivity was slightly poorer, specificity was similar to that reported by Canal-Bedia et al. (2011). Notably, the M-CHAT has been examined in various South American countries including Argentina (Manzone, 2013), Mexico (Albores-Gallo et al., 2012), and Chile (Coelho-Medeiros et al., 2017, 2019).

Most recently, Magán-Maganto et al. (2018) validated a Spanish version of the M-CHAT Revised with Follow-up (M-CHAT-R/F; Robins et al., 2014) to be used in the ASD universal screening program implemented in all Public Health Centres in the North-western region of Spain. In this study, 6625 children

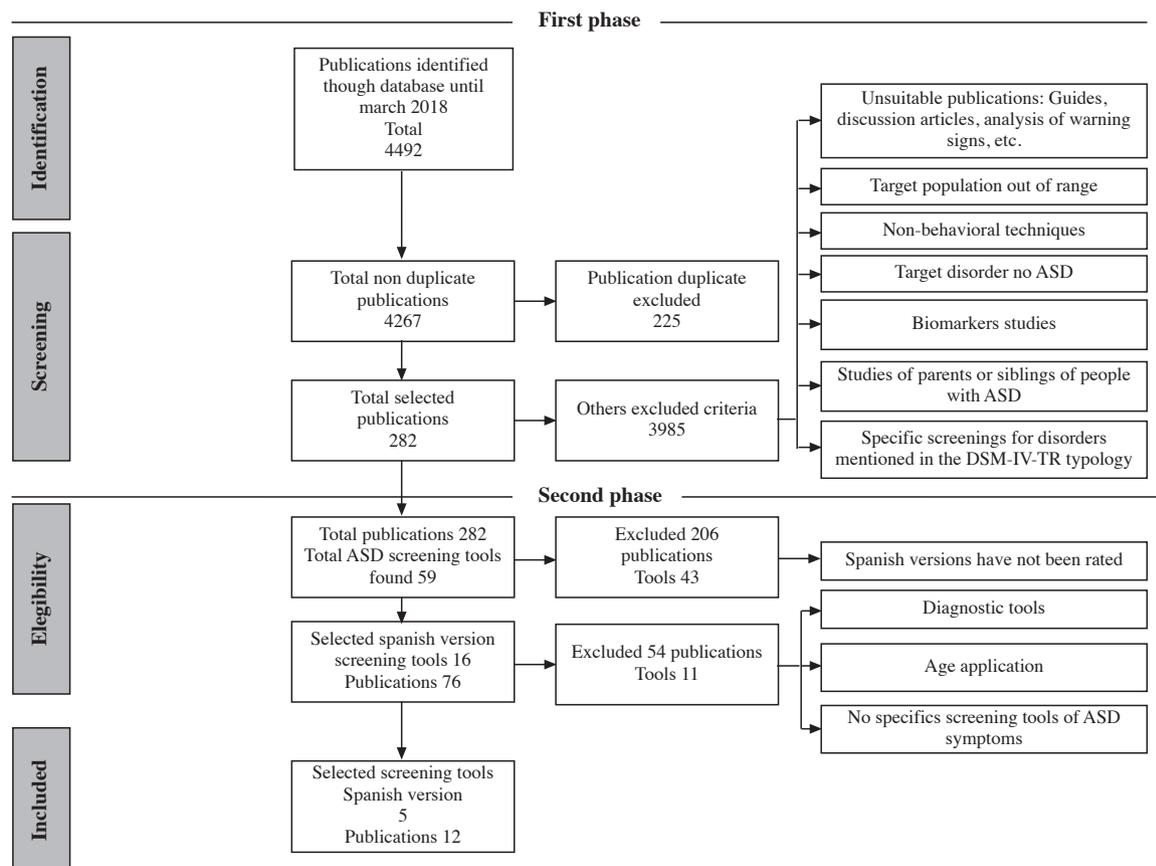


Figure 1. Flowchart that represents selection of studies for the identification of screening tools adapted for Spanish-speaking communities

Table 1  
Excluded tools

	Tool	Autors	Reasons for Exclusion
1	ATA (Avaluació dels Trents Autistes)	Jané-Ballabriga, Escudé, & Domenech-Llaberia, 1994	Diagnostic Tool
2	CARS (Childhood Autism Rating Scale)	Schopler et al., 1986	Diagnostic Tool
3	GARS (Gilliam Autism Rating Scale)	Gilliam, 2006	Diagnostic Tool
4	CAST (Childhood Asperger Syndrome Test)	Scott, Baron-Cohen, Bolton, & Brayne, 2002	Specific for Asperger's disorder Out of age range
5	ASSQ (Autism Spectrum Screening Questionnaire)	Ehlers & Gillberg, 1993	Specific for Asperger's disorders Out of age range
6	CCC (Children's Communication Checklist)	Bishop, 1998	Specific for language impairment Out of age range
7	EAS (Emotionality Activity and Sociability Temperament Survey )	Buss & Plomin, 1984	Specific for temperament disorders Out of age range
8	SRS (Social Responsiveness Scale)	Constantino & Gruber, 2005	Specific for assessing social ability and deficits in social reciprocity Out of age range
9	DCI (Developmental Check In)	Janvier, Coffield, Harris, Mandell, & Cidav, 2018	Items in English supplemented with pictures No specific Spanish version
10	ASQ-3 (Ages & Stages Questionnaires)	Squires & Bricker, 2009	Specific for developmental surveillance
11	CBCL 1½-5 (Child Behaviour Checklist for Age 1½-5)	Achenbach & Rescorla, 2000	Specifics for developmental surveillance

(representing 56.6% of the total number of children eligible for screening) were stratified into two age groups: 14-24 months and 23-36 months. With the exception of internal consistency (which was higher in the older age group), the results indicated that the Spanish M-CHAT-R/F was more appropriate to screen children in the lower age range. Furthermore, while sensitivity to ASD was generally good, specificity was poor resulting in over-identification of children with other neurodevelopmental disorders or a language delay.

#### Social Communication Questionnaire (SCQ)

Although we were unable to identify any published studies concerning the validation of the readily available Spanish SCQ (Rutter, Bailey, & Lord, 2003), a grey literature search revealed two unpublished doctoral dissertations that utilized the SCQ as an ASD screener in Spanish-speaking populations. In a study from the USA, González (2008) examined the SCQ in 115 Hispanic children diagnosed with ASD and 35 children without ASD aged 4-10 years. Diagnostic status was based on a review of historical records. The SCQ items were read verbatim to mothers using the English version (interviewer translated in the spot) and questions about the items were answered. Both the SCQ original cut off score of 15 to distinguish between Pervasive Developmental Disorder (PDD) and non-PDD children and a score of 22 for ASD were applied, with the two cut off scores resulting in lower sensitivity and specificity in this sample of Hispanic mothers than those reported in validation studies of the English version (Berument, Rutter, Lord, Pickles, & Bailey, 1999).

López-Chávez (2016) validated the Spanish SCQ in 162 children (80 children diagnosed with ASD and 82 with normative development) recruited across two sites in Ecuador. All children also completed the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2; Lord et al., 2012) and the ADI-R (Rutter et al., 2009) to determine case status. Sensitivity and specificity

were excellent when compared to the ADOS-2 and reasonable compared to the ADI-R. However, the study was affected by methodological shortcomings. First, age ranged from birth-to-12 months, yet no data on the sample distribution by age is provided, and second, the diagnostic tests used to validate the Spanish SCQ were administered 24 months after the initial screening was given.

#### Others tools

In addition to the five identified instruments, other screening tools for the detection of ASD might have a yet undisclosed version in Spanish. A case in point is the First Year Inventory (FYI; Reznick, Baranek, Reavis, Watson, & Crais, 2007), a parent-rated questionnaire to detect ASD risk at 12-months. In the first paper reporting the development of the instrument, Reznick et al. (2007) noted that “additional work was in progress to develop a Spanish version” (p. 1704). Upon contacting the research group, we were informed that the Spanish FYI was not forthcoming and that no unpublished data were available.

The currently unpublished Social Attention and Communication Study (SACS; Barbaro & Dissanayake, 2010) is the subject of an ongoing study at the University of Salamanca. This observational tool, intended for use in community-based samples (primary care), utilizes a developmental surveillance approach by monitoring children's development from 12-24 months of age. In 2018, the revised SACS (SACS-R; Barbaro & Dissanayake, 2013) was translated into Spanish, checked, and cultural adaptations were made (e.g., use of the word “teddy” as “osito de peluche” and peek-a-boo as “cu-cú-tras”). The final version was reviewed and approved by the original authors. A free mobile application based on the SACS (ASDetect), available worldwide on Android and Apple platforms in English, has also been translated into Spanish using a similar process to the above. It is planned to be released to the public in late-2020.

Table 2  
Synthesis of results (included tools)

Tool	Authors	Country study development	Translation/ Cultural Adaptation	Psychometrics index	N	Age months	Type of study	ROC indices				
								Se	Sp	PPV	NPV	
1	ADEC-SP	Hedley et al. 2010	México	T, BT, PT	C, R, V	Phase I 61 Phase	15-73	CS+TD	.79	.88	.75	.90
						II 54	19-71	RG+TD	.76	1.00	1.00	.71
						Toddlers 31	19-35	RG+TD	.94	1.00	1.00	.93
2	ASA-HiCh	Albores-Gallo et al. 2016	México	Sp	C, R, V	86	>36	CS+TD	.76	.88	.94	.58
3	CHAT (Spanish version)	Cecchetto et al. 2002	Uruguay	T, A	-	30	16-24	-	-	-	-	-
4	M-CHAT (Spanish version)	Canal-Bedia et al 2011	Spain	T, B, T, A, PT		S1 2480	16-40	PS	S1	.98	.35	1.00
						S2 2055			S2			
	M-CHAT (Mexican Version)	Albores-Gallo et al 2012	México	T	C, V	117/ 339	18-72	CS-TD	-	-	-	-
	M-CHAT (Argentine version)	Manzone 2013	Argentine	T, A, PT	C, R, V	420/140	18-24	CS-TD Follow-up interview	.97 .99	.82 .98	.90 .98	.95 .99
	M-CHAT	Windham et al 2014	USA	Use existing translation		1760	16-30	PS	-	-	-	-
	M-CHAT (Spanish version)	Garcia-Primo et al 2014	Spain	Use Canal-Bedia 2011 Version		3991 5533	18-24	PS	.82 .81	.99 .99	.38 .43	.99 .99
	M-CHAT-R/F (Spanish version)	Magán-Maganto 2018	Spain	T, B, T, A, PT	V	3529 3096	14-24 23-36	PS	.82 .75	.99 .99	.47 .30	.99 .99
	M-CHAT-R/F (Chilean version)	Coelho-Medeiros et al. (2017)	Chile	Use existing translation			-	-	-	-.9	-	-
5	SCQ	González 2008	USA H-S	O		150	48-120	CS	.86	.54		
		López-Chávez 2016	Ecuador	-	V	160	0-120	CS	.92	.92	.89	.94

Translation Process: Sp Spanish Original; O Application Original English version; T Translation, BT Back Translation; A Adaptation; PT Pilot Test: - not reported  
 Psychometrics Indices: NI No Information; C internal consistency, R Reliability Test-Retest; V Validity; Sample Type: Clinic Sample (CS); Population Studies or Communities Studies (PS); Followed Cases (FC); Risk Groups (RG) and Typical Development (TD); - not reported  
 Tools: ADEC, Autism Detection in Early Childhood (Young 2007); ASA-HiCh, Autism Spectrum Assessment for Hispanic Children (Albores-Gallo et al. 2016b); CHAT, CHecklist for Autism in Toddlers (Baron-Cohen et al 1992); M-CHAT, Modified Checklist for Autism in Toddlers (Robins et al 1999, 2001); M-CHAT-R/F, Modified Checklist for Autism in Toddlers Revised with Follow-up (Robins et al 2014); SCQ, Social Communication Questionnaire (Rutter, Bailey & Lord 2003)

Discussion

The goal of this review was to identify currently available Spanish language tools for the early detection of ASD. We identified five tools with available validation studies. The ASA-HiCh (Albores-Gallo et al., 2016) is an instrument developed in Spanish, while four instruments (ADEC, CHAT, M-CHAT and M-CHAT R/F, SCQ) were originally developed in English with available validation studies of the Spanish versions. With the exception of the ASA-HiCh and one study (González, 2008) that applied the original English SCQ with translation to Spanish speakers, the remaining studies showed considerable variability concerning the process of cross-cultural adaptation. Standardized guidelines for cultural adaptation to a different language and social context requires independent translation and back translation, review and linguistic adaptation by an expert committee based, and pilot testing of the new version (Muñiz,

Elosua, & Hambleton, 2013). Although 52% of the studies reported having made linguistic or cultural adaptations, only 39% specified or described the cultural adaptations made. One third (33%) did not mention any pilot testing, and 17% provided no indication of either adaptation or field testing. Differences in the methodology for pilot testing were also noted. Studies used ad hoc samples of convenience, clinical samples and, in a few cases, population samples.

There were also differences in the extent to which changes were made to adapt the instrument to the specific type of Spanish used in the study country. Some studies specified which items were modified and provided detail in terms of modifications made to reflect language colloquialisms or other changes (e.g., Canal-Bedia et al., 2011; Cecchetto-Farina et al., 2002; Magán-Maganto et al., 2018), while others merely stated the number of items changed or did not provide any information (e.g., Albores-Gallo et al., 2012; Hedley et al., 2010).

Reliability of the Spanish versions of the instruments was analyzed in only 50% of the studies. Internal consistency was the most consistently reported metric; only 50% of the studies reported test-retest reliability and only 30% provided information about inter-rater agreement. Validity, on the other hand, was investigated in 75% of the studies. Some studies approach construct validation by comparing the scores in the Spanish speaking sample with those obtained in the original standardization sample, in a cross-cultural population, or by replicating the factorial structure of the original screening tool (e.g., Jackson, Little, & Akin-Little, 2013). Construct validity was investigated by means of correlational analysis between the Spanish version and longtime established autism diagnostic instruments including CARS, ADI-R, or the ADOS (e.g., Hedley et al., 2010). The majority of studies (70%) examined discriminant validity by contrasting group analysis of children with ASD or ASD like symptoms and typically developing children, but only 63% of these reported sensitivity and specificity for the new Spanish versions. When compared with ROC values reported for the original English screeners, the Spanish versions tended to return lower sensitivity (in 61% of the studies); although in 38% of the studies sensitivity was equal or higher to that of the original instrument. For specificity the reverse holds true, with Spanish versions overall returning specificity indexes higher than those from the original tool (62% of the studies). However, this comparison warrants caution since the heterogeneity of sample types, and in particular the use of clinical or convenience samples can bias the sensitivity and specificity indexes, making it difficult to contrast different detection tools and different Spanish adaptations of the same tool.

Administering the translated and adapted Spanish versions of more than one early detection instrument in the same sample could enhance comparisons among the tools and provide valuable information for concerning the selection of screening instruments for use in Spanish-speaking populations. Notably, a few researchers report the development of several of the ASD screeners covered in this review in the same population (e.g., Albores-Gallo et al., 2012; Canal-Bedia et al., 2011; Magán-Maganto et al., 2018), but they do so in separate studies. It would be advantageous for researchers to condense their results of different instruments in the same sample to a single study to facilitate the comparison of the examined instruments.

Low parental socioeconomic or educational level sometimes introduced differences in the administration method of specific instruments. For example, studies of Spanish versions of the M-CHAT questionnaire were sometimes completed by parents without support (e.g., Canal-Bedia et al., 2011), yet in other studies trained experts assisted by clarifying or interpreting test items (e.g., Manzone, 2013).

A related aspect is the impact of implementing early screening in the often economically challenged healthcare systems across varied Spanish-speaking countries. Knowing the challenges or limitations associated with administration and implementation of the tools reviewed here would offer valuable information concerning selection of the most appropriate instrument for a given environment. Unfortunately, very few studies actually provided such information. Training of dedicated staff in the use of the Spanish screen was only mentioned in two studies (Canal-Bedia et al., 2011; Hedley et al., 2010). Parents' and health care practitioners' feedback on the "appropriateness" of the tool (e.g., readability, utility, etc.) or on its possible use in public healthcare

systems in Spanish-speaking countries was collected in a few studies by means of informal group discussion, follow-up phone interviews or specifically developed questionnaires. However, responses to a physician survey (Windham et al., 2014) found that 80% (in the case of the M-CHAT) and 90% (for the ASQ) of respondents reported having insufficient time to screen all patients. In relation to the M-CHAT, 75% of physicians were not aware of the follow-up procedure, and several of them expressed doubts about the use of the M-CHAT in Spanish speakers or populations with poor literacy. An evaluation of the screening program that adapted the M-CHAT for use in pediatric services in Spain found that while 80% of pediatricians participated in the program, they reported varying levels of involvement (i.e., 30% high, 22% moderate, and 33% little involvement) (Canal-Bedia et al., 2011; García-Primo et al., 2014). Overall, pediatricians were favorable about participating reporting it did not increase their workload, did not detract time from other patients, and represented no 'nuisance' for families (García-Primo et al., 2014).

The need for early screening in Spanish-speaking populations across different countries is crucial, if not more so, than in countries with a longer established neurodevelopmental disorders screening practice, a fact that is recognized in the guidelines for ASD detection issued in different countries. In Spain, the ASD Study Group (GETEA) at the Carlos III Institute of Health issued a consensus-based practical parameter and diagnostic guide based on the American Academy of Neurology model (Hernández et al., 2005). In Chile, a practical guide was also developed for the early detection of ASD (MINSAL, 2011). Similarly, Argentina (SAIJ, 2012) and Peru (Ministerio de la Mujer y Poblaciones Vulnerables, 2017) have developed guidelines related to ASD detection and intervention. Consistently across these countries, the guidelines emphasize the importance of early detection and intervention. Although they do not recommend the use of a specific detection tool, in some cases they do recommend developmental monitoring by listing some red flags, often naming the M-CHAT as a suitable detection tool based primarily on its accessibility.

The obvious first step would be to provide the healthcare community with reliable and valid screening instruments that have demonstrated efficacy in Spanish speaking populations, thus representing a 'common ground' for research and practice. Yet, the outcome emerging from the present review is one of fragmentation, not only in terms of the goodness of the psychometric standards or of the quality of the cultural adaptation process followed for each tool, but also in terms of direction. While the importance of having culturally appropriate instruments cannot be overlooked (Soto et al., 2015), the need to develop parallel and independent versions of a screening tool for use in countries with the same language and culture is less obvious. Most of the studies reported here have come up with their own translated and adapted version of a screener, sometimes even within the same country. Although there might be differences in the healthcare systems and socio-economic structures that need to be taken into account, the socio-cultural and linguistic similarities in Spanish-speaking countries far outnumber specific linguistic colloquialism in a community of over 560 million speakers. A socio-linguistic reality that would seem to call for, and deserve, more joint coordinated research efforts to accrue our understanding of ASD and to increase the number of tools for early detection of ASD in Spanish-speaking populations.

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