

INVESTIGATING LANGUAGE AND EXECUTIVE FUNCTIONING IN BILINGUAL
CHILDREN WITH ASD: A SYSTEMATIC REVIEW

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Title

Investigating language and executive functioning in bilingual children with ASD: a systematic review

Abstract

Due to the world's increasing globalization, multilingualism is becoming more of a common phenomenon in our modern world. The rise in linguistic exchanges has also been apparent in populations with neurodevelopmental disabilities. Autism Spectrum Disorder (ASD) has been a particular area of interest due to the language delays commonly presented in this disorder. More research is needed to inform parents and professionals about raising children with ASD in bilingual environments. This systematic review examined the literature comparing the language and executive functioning skills of children with ASD, comparing monolingual and bilingual groups. The search strategy aligned with recommendations based on the The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) statement, 2020. The results supported previous literature indicating that bilingualism is not detrimental to children with ASD.

Introduction

Given the growing globalization in today's world, multilingualism has been an area of increasing interest (Lim et al., 2018). This rise in linguistic diversity has also been evident in populations with neurodevelopmental disabilities (ND), thus more research regarding the effects of bilingualism on language and cognition of individuals with NDs is emerging (Peristeri et al., 2020). Children diagnosed with autism spectrum disorder (ASD) are a population of particular interest due to communication and language deficits often presented in ASD profiles (Valicenti-McDermott et al., 2019). Additionally, there is increasing research concerning the executive functioning (EF) skills of children with ASD, raised in bilingual environments, similarly related to the comorbid difficulties in development of EF in children with ASD (Montgomery et al., 2021). Bilingual parents of children with ASD often decide not to raise their children bilingually for fear that dual language exposure could be detrimental to language development (Lim et al., 2018). Providers often advise bilingual parents to only teach their children with ASD the culturally dominant language, instead of incorporating a family's heritage language (Lim

et al., 2018). However, much of the research on comparative language development on bilingual and monolingual children with ASD has not found bilingualism to be a hinderance on language development (Lund et al., 2017). Despite this emerging research, the belief that bilingualism is detrimental to language development in ASD population persists (Beauchamp et al., 2020). Studies express the need for more longitudinal studies on comparative language development in monolingual and bilingual individuals with ASD, as most research focuses on school-aged children (Uljarević et al., 2016). Furthermore, findings on the effects of bilingualism on EF have been inconsistent across studies (Montgomery et al., 2021).

Purpose and Research Questions

Due to the increasing global prevalence of bilingualism, it is important to comprehend how individuals with ASD are affected. Additionally, it is important to examine bilingualism and ASD to better inform the decisions of bilingual parents and professionals regarding selection of language environment for children with ASD. Although there is previous research investigating the effects of bilingualism on children with ASD concerning language and EF, there is little research evaluating effects on both language abilities and EF skills of bilingual children with ASD (Grace Iarocci et al., 2017). Although a previous thesis investigated linguistic and cognitive effects of bilingualism on children with ASD (Barrero, 2017), we are not aware of any systematic reviews that comparatively examine language and EF abilities in bilingual versus monolingual children with ASD. Therefore, the purpose of this systematic review was to comport a comprehensive review of the extant research comparing language and EF abilities in bilingual and monolingual children with ASD.

Research Question 1: What are the characteristics and qualities of research on comparative language and EF abilities in bilingual and monolingual individuals with ASD?

Research Question 2: How do language and EF abilities compare for monolingual and bilingual individuals with ASD?

Methods

Search strategy

To identify studies reporting comparative language abilities or EF skills for monolingual and bilingual children with ASD, the following six electronic databases were consulted: PubMed, Embase, CINAHL, EBSCO, JSTOR, and PsycINFO. All databases were searched for articles containing key MeSH terms, in concurrence with a Word Harvesting Form (Appendix A), developed by Dr. Jennifer Andrews. All articles were then imported to EndNote.

This study did not require approval from the Institutional Review Board as it was a secondary analysis of published literature; human subjects were not involved. This study was conducted following the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement (Page et al., 2021).

Study selection

A reviewer screened articles' abstracts against the inclusion and exclusion criteria. Overall, twenty-five studies were included in the review as shown by the PRISMA diagram (Appendix B). Included articles were downloaded as PDFs and missing articles were received upon request to the University of Arizona Library. All full-text versions of the included articles were reviewed for data-extraction to characterize the nature of the studies (Appendix C).

Type of studies

Articles included those that evaluated either language abilities or EF in children with ASD. All research studies employed quantitative methodologies to evaluate language or EF abilities. Additionally, studies that were not comparative of monolingual and bilingual individuals with ASD were excluded. Articles included were published in English and published after the year 2000.

Type of participants

Only studies containing human subjects were included. There were no age criteria, however all studies concerned school aged children, ranging from two to sixteen years old. Study populations concerned bilingual and monolingual individuals with ASD. Studies that primarily investigated developmental disabilities (DDs) as a broad sample population, or Down Syndrome (DS), or Speech Language Impairment (SLI) *without* mention of ASD were excluded.

Type of comparison

Comparison of language abilities monolingual and bilingual individuals with ASD or comparison of EF skills in monolingual and bilingual individuals with ASD.

Type of outcome measures

The primary outcome of interest was the language or executive function abilities monolingual and bilingual individuals with ASD.

Results

The search yielded 7,448 results, 1,547 of which were duplicates and removed into a separate folder. Please reference Appendix B for the PRISMA 2020 flow diagram for a detailed account of the results. Included in this review were twenty-three cross-sectional studies, one systematic review, and one practitioner review. The studies were published in the range of years 2011 to 2021, with the majority published in 2021 (Montgomery et al., 2021; Peristeri et al., 2021; Ratto et al., 2021; Sharaan et al., 2021; Siyambalapitiya et al., 2021).

Characteristics of included studies

Location and language

Of the 23 cross-sectional studies, most involved participants from Canada (Barrero, 2017; Beauchamp et al., 2020; Gonzalez-Barrero, 2019; Gonzalez-Barrero & Nadig, 2019; Hambly & Fombonne, 2012; G. Iarocci et al., 2017; Li et al., 2017; Nadig & Gonzalez-Barrero, 2019; Ohashi et al., 2012; Petersen et al., 2012) and the United States (Dai et al., 2018; Li et al., 2017; Ratto et al., 2021; Valicenti-McDermott et al., 2012; Vanegas, 2019). Other studies included participants from the United Arab Emirates, Australia, China, India, Greece, Japan, United Kingdom, and Israel. Languages that were the most assessed included English, French, Chinese and Spanish and most studies evaluated at least three different languages in their research for monolingualism or multilingualism. Nine studies looked only at the comparison between two languages for determining bilingual versus monolingual samples (Beauchamp et al., 2020; Li et al., 2017; Meir & Novogrodsky, 2020; Ohashi et al., 2012; Petersen et al., 2012; Sen & Geetha, 2011; Sharaan et al., 2020; Sharaan et al., 2021; Valicenti-McDermott et al., 2012). Almost all these studies measured 'bilingualism' through various parent-report questionnaires, most

requiring $\geq 20\%$ lifetime language exposure for the assessed individuals. Two studies did not specify how they measured or defined bilingualism (Dai et al., 2018; Nadig & Gonzalez-Barrero, 2019).

Sample size

Sample sizes ranged from 15 to 388. Most studies included 50 or more participants (Barrero, 2017; Dai et al., 2018; Hambly & Fombonne, 2012; G. Iarocci et al., 2017; Li et al., 2017; Meir & Novogrodsky, 2020; Montgomery et al., 2021; Ohashi et al., 2012; Peristeri et al., 2020; Peristeri et al., 2021; Ratto et al., 2021; R. Reetzke et al., 2015; Sharaan et al., 2020; Sharaan et al., 2021; Siyambalapitiya et al., 2021; Valicenti-McDermott et al., 2012); 5 studies had between 20 and 40 participants (Beauchamp et al., 2020; Gonzalez-Barrero, 2019; Gonzalez-Barrero & Nadig, 2019; Petersen et al., 2012; Vanegas, 2019); 1 had 15 participants (Sen & Geetha, 2011); 1 did not specify the sample size (Nadig & Gonzalez-Barrero, 2019). In total, this review included studies involving 2,104 participants.

Age and Gender

The age of participants ranged from two to sixteen years old, with most studies examining school-aged children ranging six to twelve years old (Barrero, 2017; Beauchamp et al., 2020; Gonzalez-Barrero, 2019; Gonzalez-Barrero & Nadig, 2019; G. Iarocci et al., 2017; Li et al., 2017; Meir & Novogrodsky, 2020; Montgomery et al., 2021; Nadig & Gonzalez-Barrero, 2019; Peristeri et al., 2020; Peristeri et al., 2021; Ratto et al., 2021; Sen & Geetha, 2011; Sharaan et al., 2020; Sharaan et al., 2021; Vanegas, 2019). Seven studies looked exclusively at participants who were six years-old or younger (Dai et al., 2018; Hambly & Fombonne, 2012; Ohashi et al., 2012; Petersen et al., 2012; R. Reetzke et al., 2015; Siyambalapitiya et al., 2021; Valicenti-McDermott et al., 2012). Almost all the studies included more male participants than females, except for three studies that had more females than males (Montgomery et al., 2021; Sharaan et al., 2020; Sharaan et al., 2021). Additionally, one study did not include female participants at all (Peristeri et al., 2020), and four studies did not specify sex in their sample demographics (Beauchamp et al., 2020; Nadig & Gonzalez-Barrero, 2019; Peristeri et al., 2021; R. Reetzke et al., 2015).

SES

Socioeconomic status was measured primarily through maternal education and/or family income. The SES varied between studies, but most studies involved participants from middle to high socioeconomic statuses. Six studies did not report SES (Beauchamp et al., 2020; Li et al., 2017; Montgomery et al., 2021; Nadig & Gonzalez-Barrero, 2019; Petersen et al., 2012; Siyambalapitiya et al., 2021), and (Valicenti-McDermott et al., 2012) reported low SES for their study sample.

Recruitment

The most common sources for recruitment included hospitals, schools, and clinics. Previous and other established studies or databases were common sources for recruitment as well. Other sources for recruitment included community organizations, providers, or social media and other medias for advertisement. Four studies did not specify methods for participant recruitment (Gonzalez-Barrero & Nadig, 2019; Nadig & Gonzalez-Barrero, 2019; Peristeri et al., 2021; Sen & Geetha, 2011).

Data collection

All the studies except for (Hambly & Fombonne, 2012), (Rachel Reetzke et al., 2015), and (Vanegas, 2019) conducted in-person assessments and sessions, with parents and their children, to collect their findings. (Hambly & Fombonne, 2012) collected parent-reported information via mail or phone surveys; (Rachel Reetzke et al., 2015) combined administered surveys during clinic visits with follow-up in-person interviews; (Vanegas, 2019) abstracted data from participant medical records.

ASD Diagnosis

Nearly all studies involved ASD individuals that were given a prior diagnosis of ASD conducted by multidisciplinary professional teams including and/or involving clinical psychologists, psychiatrists, developmental pediatricians in accordance with DSM-IV or DSM-V criteria (Barrero, 2017; Beauchamp et al., 2020; Dai et al., 2018; Gonzalez-Barrero, 2019; Hambly & Fombonne, 2012; G. Iarocci et al., 2017; Li et al., 2017; Meir & Novogrodsky, 2020; Montgomery et al., 2021; Nadig & Gonzalez-Barrero, 2019; Ohashi et al., 2012; Peristeri et al., 2020; Peristeri et al., 2021; Petersen et al., 2012; Ratto et al., 2021; R. Reetzke et al., 2015; Sen & Geetha, 2011; Sharaan et al., 2020; Sharaan et al., 2021; Valicenti-McDermott et al., 2012; Vanegas, 2019). Two studies did not provide tools or scales for their assessment of ASD (Gonzalez-Barrero & Nadig, 2019;

Siyambalapitiya et al., 2021). Additionally, most studies employed other methods to confirm or determine ASD severity using the SCQ. Other common assessment tools to determine ASD included the M-CHAT, ADOS, ADI-R, VABS, CARS, SRS, and MSEL.

Comparative Language and EF Outcomes

Comparison groups among these studies included ASD bilinguals, ASD monolinguals, Typically Developing (TD) bilinguals, and TD monolinguals. Every study included an ASD bilingual group, and most studies compared findings from an ASD bilingual group to an ASD monolingual group (Barrero, 2017; Beauchamp et al., 2020; Gonzalez-Barrero, 2019; Gonzalez-Barrero & Nadig, 2019; Hambly & Fombonne, 2012; G. Iarocci et al., 2017; Li et al., 2017; Meir & Novogrodsky, 2020; Nadig & Gonzalez-Barrero, 2019; Ohashi et al., 2012; Peristeri et al., 2020; Peristeri et al., 2021; Petersen et al., 2012; Ratto et al., 2021; R. Reetzke et al., 2015; Sen & Geetha, 2011; Sharaan et al., 2020; Sharaan et al., 2021; Siyambalapitiya et al., 2021; Valicenti-McDermott et al., 2012; Vanegas, 2019). One study solely compared an ASD group to a TD group (Montgomery et al., 2021), and another compared an ASD group to a general DD group (Dai et al., 2018). TD groups were not included in every study, they were included in ten of the studies (Barrero, 2017; Beauchamp et al., 2020; Gonzalez-Barrero, 2019; G. Iarocci et al., 2017; Li et al., 2017; Montgomery et al., 2021; Nadig & Gonzalez-Barrero, 2019; Peristeri et al., 2020; Sharaan et al., 2020; Sharaan et al., 2021). Fifteen of the studies examined language abilities (including the one systematic review) (Barrero, 2017; Beauchamp et al., 2020; Dai et al., 2018; Gonzalez-Barrero & Nadig, 2019; Hambly & Fombonne, 2012; Lund, 2017; Meir & Novogrodsky, 2020; Ohashi et al., 2012; Peristeri et al., 2021; Petersen et al., 2012; R. Reetzke et al., 2015; Sen & Geetha, 2011; Siyambalapitiya et al., 2021; Uljarevic, 2016; Valicenti-McDermott et al., 2012; Vanegas, 2019) and ten looked at executive functioning (Barrero, 2017; Gonzalez-Barrero, 2019; G. Iarocci et al., 2017; Li et al., 2017; Montgomery et al., 2021; Nadig & Gonzalez-Barrero, 2019; Peristeri et al., 2020; Ratto et al., 2021; Sharaan et al., 2020; Sharaan et al., 2021). Of these studies, only one looked at both language abilities and executive functioning simultaneously (Barrero, 2017). Most studies looked exclusively at abilities for language or executive function, but some studies evaluated other additional factors like SES, other school abilities, or social functioning. Almost all studies in this review had findings that supported bilingualism is not detrimental to the functioning (either language or cognitive) of children with ASD.

Discussion

Scope and Limitations

The goal of this systematic review was to examine empirical studies on the language and executive functioning abilities of monolingual and bilingual children with ASD. Twenty-five articles met inclusion criteria, with most being published within the last year. The strength of evidence is the implementation of a standard approach to the review, based on the PRISMA 2020 statement, the inclusion of publications from six different databases, and the screening of study eligibility conducted by two reviewers, separately. Given the dearth of studies examining ASD bilinguals and monolinguals about either language or cognitive function, it is important for understanding the impact of language environment on these areas of functioning for ASD individuals. There has been little research examining both the language and EF areas simultaneously for ASD bilingual and monolingual groups, indicating inconclusive results regarding how bilingualism impacts overall functioning of ASD children. While this review indicates that bilingualism is not detrimental to language or EF skills for ASD children, the specificity of results is mixed. Most studies illustrated small differences between monolingual and bilingual ASD groups, while some favored monolingual groups or bilingual groups. One challenge is inconsistency with a) what comparison groups are measured (ASD, TD, Bilingual, Monolingual, Multilingual) b) the definition or criteria for bilingualism and monolingualism and c) the tools of assessment for ASD, language skills, and EF. Additionally, there were other extraneous factors that were not always matched in these studies including SES, sample size, age range, the presence and nature of intervention, and gender.

Implications and Conclusion

The effect of bilingualism on language and EF skills for ASD individuals is a pertinent area of research and more studies need to be conducted to better determine results. An area of need is the effect of bilingualism on language and EF skills for ASD individuals in comparison to TD individuals. Additionally, more studies examining both language and EF to determine the effects of bilingualism on overall functioning of ASD individuals is needed. There is also a lack of longitudinal studies to better understand how language and EF development may change overtime in bilingual versus monolingual ASD groups. Despite the small body of literature presented in this review, these studies

suggest that bilingualism does not significantly delay development of language or EF. Nor does the literature suggest an advantage of bilingualism in EF, as suggested by some studies concerning the “bilingual advantage hypothesis.” There does not appear to be consistent or clear disadvantages for bilingual children with ASD in comparison to their monolingual ASD peers. Therefore parents, practitioners, and other individuals who may be involved with bilingual children with ASD should not attempt to limit the exposure of multiple languages. Additionally, consideration should be given to the recruitment, training, and implementation of knowledgeable professionals who can deliver services in additional languages. More research should be conducted, especially with larger sample sizes and control for other confounding variables.

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Supplementary Information

Abbreviations

ASD: Autism Spectrum Disorder; TD: Typically Developing; EF: Executive Function/ing; ND” Neurodevelopmental Disorder; DS Down Syndrome; DD: Developmental Disability; SLI: Specified Language Impairment; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

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Authors' Contributions

JA and XG conceptualized idea. JA and XG did study eligibility and screening. XG wrote draft for the review which had critical inputs from JA and other members of the ARID Lab.

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Availability

This systematic review included published studies that are readily available to the public.

Ethics approval and consent to participate

This is not applicable.

Consent for publication

This is not applicable.

Competing interests

The authors declare that they do not have competing interests.

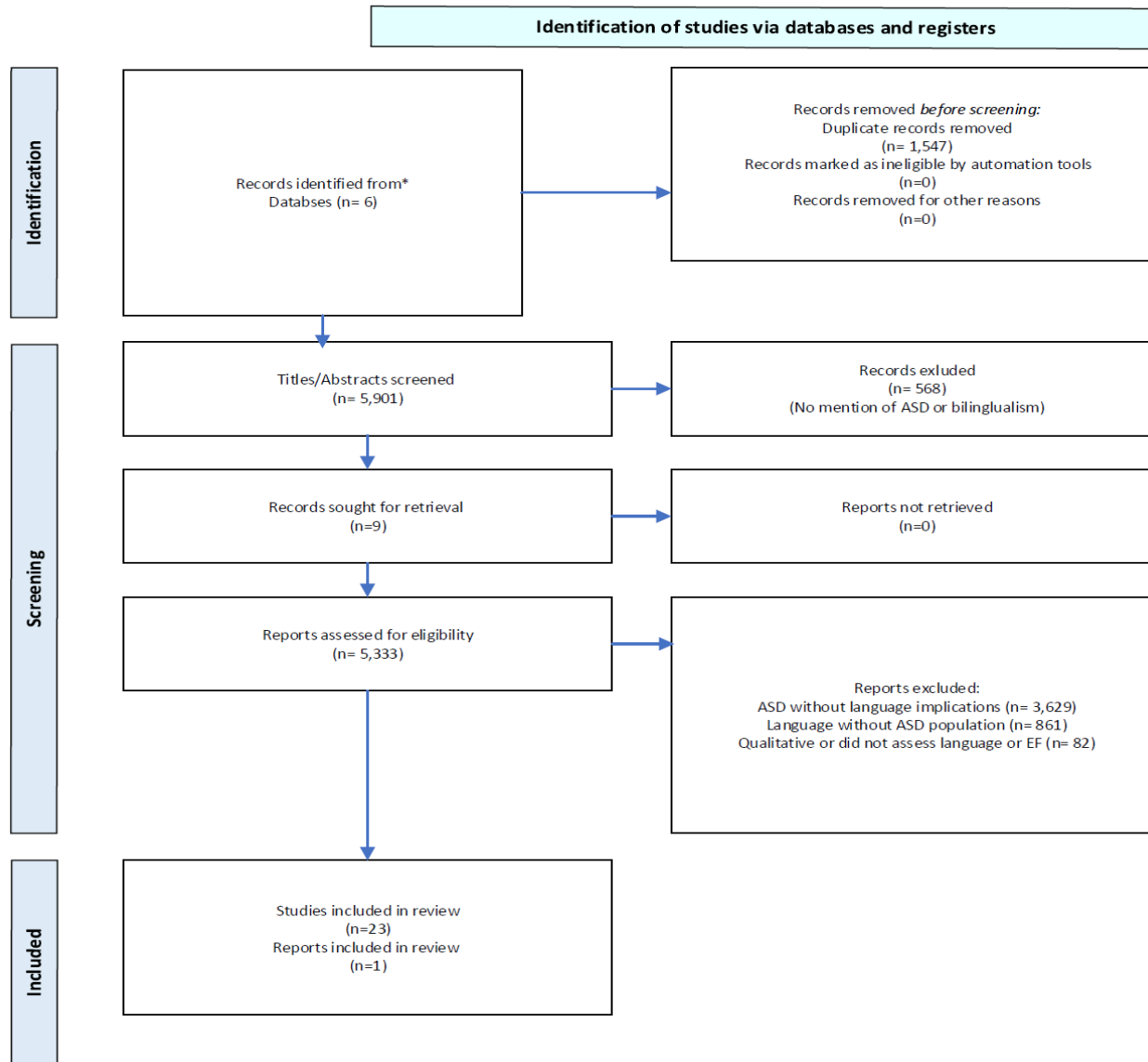
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Appendices

		<p>s"[All Fields] OR "bilingualism"[All Fields] OR "bilingually"[All Fields] OR "bilinguals"[All Fields] OR "multilingualism"[MeSH Terms] OR "multilingualism"[All Fields] OR "bilingualism"[All Fields]) OR ("multilingualism"[MeSH Terms] OR "multilingualism"[All Fields] OR "multilingual"[All Fields] OR "multilinguals"[All Fields]) OR ("dual"[All Fields] AND ("language"[MeSH Terms] OR "language"[All Fields] OR "languages"[All Fields] OR "language s"[All Fields] OR "programming languages"[MeSH Terms] OR ("programming"[All Fields] AND "languages"[All Fields] OR "programming languages"[All Fields])) OR (("second"[All Fields] OR "seconds"[All Fields]) AND ("language"[MeSH Terms] OR "language"[All Fields] OR "languages"[All Fields] OR "language s"[All Fields] OR "programming languages"[MeSH Terms] OR ("programming"[All Fields] AND "languages"[All Fields]) OR "programming languages"[All Fields]) OR ("language development"[MeSH Terms] OR ("language development"[All Fields] AND "development"[All Fields]) OR "language development"[All Fields] OR ("language"[All Fields] AND "acquisition"[All Fields]) OR "language acquisition"[All Fields]) OR "biling*" [All Fields] OR "multiling*" [All Fields] AND ("autism s"[All Fields] OR "autisms"[All Fields] OR "autistic disorder"[MeSH Terms] OR ("autistic"[All Fields] AND "disorder"[All Fields]) OR "autistic disorder"[All Fields] OR "autism"[All Fields] OR ("autistic disorder"[MeSH Terms] OR ("autistic"[All Fields] AND "disorder"[All Fields]) OR "autistic disorder"[All Fields]) OR ("autism spectrum disorder"[MeSH Terms] OR ("autism"[All Fields] AND "spectrum"[All Fields] AND "disorder"[All Fields]) OR "autism spectrum disorder"[All Fields]) OR ("autistic disorder"[MeSH Terms] OR ("autistic"[All Fields] AND "disorder"[All Fields]) OR "autistic disorder"[All Fields] OR "autistic"[All Fields] OR "autistics"[All Fields] OR "autists"[All Fields] OR ("asperger"[All Fields] OR "asperger s"[All Fields] OR "aspergers"[All Fields]) OR ("arthropod struct dev"[Journal] OR "agron sustain dev"[Journal] OR "asd"[All Fields]))</p>	
#5	S4 with exclusion criteria BEFORE 2000	<p>Search: (((((((bilingualism) OR (bilingual)) OR (multilingualism)) OR (dual language)) OR (second language)) OR (language acquisition)) OR (biling*)) OR (multiling*)) AND ((((((autism) OR (autistic disorder)) OR (autism spectrum disorder)) OR (autistic)) OR (aspergers)) OR (ASD)) Filters: from 2000 - 2021</p> <p>((("bilingual"[All Fields] OR "bilingual s"[All Fields] OR "bilinguality"[All Fields] OR "bilingually"[All Fields] OR "bilinguals"[All Fields] OR "multilingualism"[MeSH Terms] OR "multilingualism"[All Fields] OR "bilingualism"[All Fields] OR ("bilingual"[All Fields] OR "bilingual s"[All Fields] OR "bilinguality"[All Fields] OR "bilingually"[All Fields] OR "bilinguals"[All Fields] OR "multilingualism"[MeSH Terms] OR "multilingualism"[All Fields] OR "bilingualism"[All Fields]) OR ("multilingualism"[MeSH Terms] OR "multilingualism"[All Fields] OR "multilingual"[All Fields] OR "multilinguals"[All Fields]) OR ("dual"[All Fields] AND ("language"[MeSH Terms] OR "language"[All Fields] OR "languages"[All Fields] OR "language s"[All Fields] OR "programming languages"[MeSH Terms] OR ("programming"[All Fields] AND "languages"[All Fields] OR "programming languages"[All Fields])) OR (("second"[All Fields] OR "seconds"[All Fields]) AND ("language"[MeSH Terms] OR "language"[All Fields] OR "languages"[All Fields] OR "language s"[All Fields] OR "programming languages"[MeSH Terms] OR ("programming"[All Fields] AND "languages"[All Fields]) OR "programming languages"[All Fields]) OR ("language development"[MeSH Terms] OR ("language development"[All Fields] AND "development"[All Fields]) OR "language development"[All Fields] OR ("language"[All Fields] AND "acquisition"[All Fields]) OR "language acquisition"[All Fields]) OR "biling*" [All Fields] OR "multiling*" [All Fields] AND ("autism s"[All Fields] OR "autisms"[All Fields] OR "autistic disorder"[MeSH Terms] OR ("autistic"[All Fields] AND "disorder"[All Fields]) OR "autistic disorder"[All Fields] OR "autism"[All Fields] OR ("autistic disorder"[MeSH Terms] OR ("autistic"[All Fields] AND "disorder"[All Fields]) OR "autistic disorder"[All Fields]) OR ("autism spectrum disorder"[MeSH Terms] OR ("autism"[All Fields] AND "spectrum"[All Fields] AND "disorder"[All Fields]) OR "autism spectrum disorder"[All Fields]) OR ("autistic disorder"[MeSH Terms] OR ("autistic"[All Fields] AND "disorder"[All Fields]) OR "autistic disorder"[All Fields] OR "autistic"[All Fields] OR "autistics"[All Fields] OR "autists"[All Fields] OR ("asperger"[All Fields] OR "asperger s"[All Fields] OR "aspergers"[All Fields]) OR ("arthropod struct dev"[Journal] OR "agron sustain dev"[Journal] OR "asd"[All Fields])))) AND (2000:2021[pdat]))</p>	<u>4,041</u>

Appendix B: PRISMA 2020 flow diagram



Appendix C: Characteristics of Included Studies

EndNote Lib ref	References	Goal	Skills Assessed	Methods	Conclusion	Participants (n)	Participant age range (yrs)	Languages (other than ENG)
1	Gonzalez-Barrero et al, 2017	The purpose of the present study was to examine the vocabulary and morphological skills of school-age bilingual children with ASD. The specific research questions addressed were: 1). How do school-age bilingual children with ASD perform on standardized vocabulary and morphological tests relative to their monolingual ASD peers? 2). What is the contribution of current amount of language exposure, NVIQ, age, and phonological memory to variation in children's vocabulary and morphological skills?	language abilities; phonological memory; vocabulary	CELFCDN-f; CELF-4; PPVT	Findings revealed that bilingual children with ASD performed within the average range on standardized tests of vocabulary and morphology in their dominant language, although there was a tendency for monolingual children with ASD to outperform the bilingual group on vocabulary scores, consistent with findings reported in the bilingual typically-developing literature. Furthermore, current amount of language exposure was the strongest predictor for these measures. Other factors, such as child's phonological memory, also contributed to language performance in our models.	77 (only ASD subgroup data given on linguistic skills n=18)	5 to 11	French, Spanish
1	Gonzalez-Barrero et al, 2017	In the current study, we examined the lexical and semantic skills, as well as executive functions, revealed by performance on a verbal fluency task in four groups of 5- to 10- year-olds with and without ASD.	language and executive function	CELF	Overall, these preliminary findings suggest that monolingual children with ASD produce fewer correct words on a verbal fluency task relative to bilingual children with ASD who were matched on age and nonverbal IQ, and who had similar receptive vocabulary scores, although the finding was marginally significant after a Bonferroni correction. In fact, our bilingual sample with ASD (from a largely bilingual society) showed a similar performance to matched typically developing bilingual and monolingual children.	52	5 to 10	French
1	Gonzalez-Barrero et al, 2017	This study investigated the effects of bilingualism on executive functions in children with Autism Spectrum Disorders (ASD) and whether they may experience a bilingual advantage.	EF	DDCS, BRIEF, CELF-4	Overall, the present findings go beyond previous results that have shown that bilingualism is not detrimental for the language development of children with ASD (e.g. Hamby & Fombonne, 2012) and, specifically suggest that bilingualism does not negatively affect the cognitive abilities of these children. To the contrary, bilingualism might actually enhance the performance of children with ASD on experimental tasks that reduced the burden of social interaction and build up in skills such as visual ability, as is the case of the computerized version of the DCCS task.	40	6 to 9	French