Critical Review: In children with ASD, does the presence of bilingualism lead to comparable outcomes in expressive and receptive language development compared to monolingual children?

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The number of families who speak more than one language at home has increased over the years. Due to the rise in the prevalence of Autism Spectrum Disorder (ASD), it is important to understand whether bilingualism affects the language development of children with ASD. This critical review examined the evidence regarding bilingualism and its effect on the expressive and receptive language development of children with ASD compared to monolingual children with ASD. A literature search was completed and resulted in eight articles satisfying the search strategy and inclusion criteria. The articles included in the review consisted of four cohort studies, three case-control studies and one nonrandomized mixed study design. Overall, the current research provides suggestive evidence that no additional delays in expressive and receptive language development are experienced by children with ASD in the presence of bilingualism.

Introduction

Autism Spectrum Disorder (ASD) is a developmental condition that can be characterized by challenges in nonverbal communication, speech and social interaction, as well as repetitive and/or restricted behaviours, activities or interests (American Psychiatric Association, 2018). According to 2015/2016 data from Canada and the United States, the prevalence of ASD has been steadily rising over the years, and is four times more common in males compared to females (Centers for Disease Control and Prevention, 2020; Government of Canada, 2018).

The term 'bilingual' is commonly used to refer to an individual who uses two or more dialects or languages in their day-to-day life (Petersen et al., 2012). According to Statistics Canada (2017), the number of Canadians who speak more than one language at home has increased from 17.5% in 2011 to 19.4% in 2016. Research has demonstrated that some professionals in the fields of health care, childcare and education recommend that bilingual families only speak one language when communicating with their children with ASD (Beauchamp & MacLeod, 2017). These professionals appear to believe the misconception that children with ASD do not possess language skills that are strong enough to facilitate bilingualism (Ohashi et al., 2012).

This misinformed recommendation that children with ASD should only learn one language may cause bilingual parents to reduce the use of their first language therefore reducing the overall number of interactions they have with their child (Beauchamp & MacLeod, 2017). Some parents may react to this recommendation by choosing to solely speak their second language at home which may result in the provision of a less accurate language model (Ohashi et al., 2012).

Existing literature has demonstrated that no additional delays in language development are seen in bilingual children with various developmental disabilities (including ASD) when compared to monolingual children (Beauchamp & MacLeod, 2017). Research has made it clear that exposure to multiple languages, through rich interactions with teachers and parents, is beneficial to children with ASD and does not result in poorer language development compared to their monolingual counterparts (Conner et al., 2020). As both the number of children raised in bilingual environments and the prevalence of ASD increase it is paramount that speech-language pathologists (SLPs) are informed regarding the impact of bilingualism on the language development of children with ASD. Ensuring that SLPs are well-versed on this topic will allow for the provision of evidence-based recommendations regarding bilingualism to families of children with ASD as well as other professionals.

Objectives

The primary objective of this paper was to examine the existing literature to determine if the presence of bilingualism in children with ASD leads to comparable outcomes in expressive and receptive language development when compared to monolingual children with ASD.

Methods

Search Strategy

Several computerized databases, which include Western University's system Omni, PubMed and PsycINFO,

were searched and yielded the articles for review. The following search strategies were used:
("Autism") AND ("bilingual*") AND ("monolingual*") AND (children) AND (language)
("Autism") AND ("bilingual*") AND ("monolingual*") AND (children) AND (language) AND (expressive) AND (receptive)

Selection Criteria
Articles were selected for review if they included measures of expressive and/or receptive language obtained from children with a diagnosis of ASD; including Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS), Asperger syndrome, and/or Autism Low Mental Age. The studies selected compared a bilingual/bilingually exposed group of participants to a monolingual group of participants. Articles in which the ASD participant results could not be separated from the results gathered from participants with other developmental disorders were excluded.

Data Collection
The literature search based on the search strategy and inclusion criteria above yielded eight studies that were included for review. These studies consisted of four cohort studies, three case-control studies and one nonrandomized mixed study design.

Results

Cohort Study Design

A cohort study design involves groups that share common characteristics. In this critical review, that characteristic was the presence of ASD among all participants. The two participant groups included in the cohort design studies from this review differed by the presence or absence of bilingualism in all participants. Cohort study designs also do not individually match participants between groups based on specific factors.

Hambly and Fombonne (2012) used a cohort study design to compare the language and social abilities of 45 children from bilingual environments to those of 30 children from monolingual environments with diagnoses of ASD (including PDD – NOS and Asperger syndrome). The participants were between 36 to 78 months of age. Nonverbal children were also included in the sample. Participants were included in the bilingual environment group if they had lifetime exposure to a second language. This bilingual group was subdivided into a simultaneous bilingual exposure group (exposure before 12 months of age) and a sequential bilingual exposure group (exposure after 12 months of age). It is worth noting that 11 children included in this bilingual participant group were actually from trilingual environments. A variety of measures were collected from standardized parental reports (e.g. MacArthur Communicative Development Inventory – MCDI) and non-standardized parental reports as part of this study, including those related to receptive and expressive language. The receptive and expressive language outcomes were extracted and examined as part of this critical review. Results revealed no significant differences between the monolingual, simultaneous bilingual and sequential bilingual environment groups on any receptive or expressive language measures.

A strength of this study was that nonverbal children with ASD were included as participants. This inclusion increased the generalizability of the results. Appropriate statistical tests were applied. A limitation of this study was that convenience sampling was used to recruit participants, decreasing the ability to control for confounding variables and contributing to reduced reliability of the results. Standardized and non-standardized parental report assessments were exclusively used to obtain receptive and expressive language data, potentially decreasing the reliability of the results due to recall bias. Recall bias can occur when individuals do not remember previous experiences accurately, such as over or underestimation of a child's language skills. The participants' nonverbal IQ (NVIQ) data was also not included. This decreased the validity of the results as NVIQ can be a confounding variable.

Overall, this study provides suggestive evidence that no additional receptive and expressive language delays are experienced by children with ASD in bilingual environments when compared to children with ASD in monolingual environments.

Valicenti-McDermott et al. (2012) used a cohort study design to compare the receptive and expressive language skills of 40 bilingual English-Spanish speaking children and 40 monolingual English speaking children with ASD diagnoses. The participants were between 20 to 32 months of age. Data was analyzed retrospectively from multidisciplinary evaluations conducted at a university-affiliated developmental centre. Participants were considered bilingual if parental reports indicated that they were exposed to both Spanish and English at home. Receptive and expressive language data was obtained from previous speech and language assessments, which included standardized parental reports (e.g. Rosetti Infant Toddler Language Scale) and non-standardized parental reports of language skills and clinical observations. Results revealed no significant differences in expressive language skills between the bilingual and monolingual groups (with the exception of increased cooing seen in

the bilingual group). No significant differences in receptive language skills were noted between groups.

A strength of this study was that the demographics, autism severity, and developmental testing of the participants were analyzed to control for these potential confounding variables. Appropriate statistical tests were applied. A limitation of this study included the use of standardized and non-standardized parental reports as they may have introduced recall bias, reducing the overall reliability of the data. Examining retrospective data is another limitation as the data included may be less accurate than a prospective study, decreasing the validity of the results.

Overall, this study provides somewhat suggestive evidence that young bilingual and monolingual children with ASD have comparable receptive and expressive language skills.

Reetzke et al. (2015) used a cohort study design to compare the pragmatic and structural language skills of 23 bilingual exposed (BE) (M=31, F=6) and 31 monolingual exposed (ME) (M=23, F=5) children with ASD in their dominant language. The participants were all Chinese-speaking children between 45 to 98 months of age from Southeast China and had confirmed diagnoses of ASD or PDD-NOS based on the Chinese Classification and Diagnosis Criteria of Mental Disorders. The participants were recruited from parent meetings and clinic visits to a child development clinic and from an ASD school. Children were placed in the BE group if a) they had ongoing exposure to two Chinese languages and b) they had more than 20% exposure to both languages over their lifetime. Demographic characteristics, language exposure, pragmatic language and structural language measures were obtained from standardized parental report questionnaires (e.g. Children's Communication Checklist-2) and parent interviews. The research assistants who conducted the assessments were blind to the purpose of this study. This critical review specifically examined measures from this study that were relevant to receptive and expressive language. Results revealed that there was no significant difference between the BE and ME groups on their structural language scores, which included measures of syntax, speech, semantics and coherence.

A strength of this study was that the standard deviations of the participants' structural language scores were reasonable and not large, indicating homogeneity among the participants included. Appropriate statistical tests were applied. A limitation of this study was that participants' NVIQ data was not included, which decreased the validity of the results as NVIQ can be a confounding variable. This study used convenience sampling to obtain its sample of participants, decreasing the ability to control for confounding variables and contributing to reduced reliability of the results. This study exclusively used standardized and non-standardized parental report assessments to collect receptive and expressive language data, reducing the reliability of the results due to potential recall bias. The gender of the participants included in this study was not congruent with the ASD population. Males are four times more likely to be diagnosed with ASD than females, which is not reflected in this study, reducing the generalizability of the results.

Overall, this study provides somewhat suggestive evidence that the presence of bilingualism does not affect the development of syntax, speech, semantics and coherence in bilingual exposed children with ASD when compared to monolingual exposed children with ASD.

Dai et al. (2018) used a cohort study design to compare the receptive and expressive language abilities of 388 bilingual exposed (BE) and monolingual exposed (ME) children with ASD and other developmental disorders (DD) before they had received intervention. The participants were between 21 to 31 months of age. Of these children, 57 BE and 176 ME had diagnoses of ASD. Participants were recruited from a larger study and divided into an ASD group (diagnoses included: autistic disorder, PDD-NOS, Autism Low Mental Age) and DD group, (diagnoses included: Global Developmental Delay, Language Disorder) based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria. Children were included in the BE group if they were exposed to both English and at least one other language according to parental report. Notably, 28 children from the BE group were exposed to three or more languages. Demographic data and language exposure were collected from clinical interviews with the parents of participants. Cognitive abilities, including receptive and expressive language abilities, and autism severity measures were obtained from standardized direct assessments (e.g. Mullen Scales of Early Learning – MSEL) during a developmental and diagnostic evaluation. This critical review examined the results from this study that were relevant to the ASD participants. There were no significant differences between the BE and the ME groups on gender, age, nonverbal cognitive abilities or autism severity. Results revealed no significant difference between the BE and ME groups on receptive and expressive language measures.

A strength of this study was that it had a large sample size which increased the validity of the results. Appropriate statistical tests were applied and effect

sizes were included. A limitation of this study was that the dominant language of the BE participants was not determined. All participants were assessed in English; therefore, some children may have been assessed in their dominant language while others were assessed in their non-dominant language. This may have reduced the reliability of the study.

Overall, this study provides suggestive evidence that the receptive and expressive language abilities of children with ASD are not negatively impacted by exposure to more than one language when compared to monolingual children with ASD.

Case-Control Study Design

A case-control study design compares two clearly defined groups of participants that differ by the presence of a condition. In this critical review, that condition was the presence of bilingualism; a condition that cannot be randomized, therefore it is not a randomized study design. Participants are also matched on specific factors (e.g. age, NVIQ) to control for confounding variables.

Ohashi et al. (2012) used a case-control study design to compare six language measures between 20 bilingual exposed (BE) and 40 monolingual exposed (ME) children with ASD between 24 and 52 months of age. Participants were recruited from the Pathways in ASD research project database and had confirmed ASD diagnoses. BE participants were individually matched to two ME participants based on chronological age and NVIQ. The BE group included children who a) had ongoing exposure to two or more languages at home from birth to one year of age and b) had a minimum of 20% exposure to each language from one year of age to their first Pathways study language assessment according to parental report. Standardized parental report measures and a standardized direct assessment (i.e. Preschool Language Scale-4 – PLS) were used to measure autism-related communication impairment, age of first phrases and words, expressive and receptive language scores, and functional communication scores. Assessments were conducted within four months of a participant's diagnosis of ASD to minimize the possibility of number of therapy hours becoming a confounding variable. This critical review examined results from this study that were relevant to receptive and expressive language. Results revealed no significant differences between the BE and ME groups on the receptive and expressive language measures examined.

A strength of this study was that a direct standardized assessment was used to obtain data from the participants rather than relying on parental report. This approach decreased the likelihood of recall bias influencing the results, thereby increasing the reliability of the data. Detailed participant matching methodology and inclusion criteria increased the replicability of this study. However, the details of the assessment results (i.e., means and individual scores) were not included in the article making it impossible to determine the appropriateness of the statistical measures used.

Overall, this study provides suggestive evidence that bilingual language environments do not impact the early receptive and expressive language development of children with ASD.

Petersen et al. (2012) used a case-control study design to compare the overall language skills and lexical comprehension and production skills of 14 monolingual English speaking children (M=13, F=1) and 14 bilingual English-Chinese speaking children (M=13, F=1) with confirmed ASD diagnoses (including PDD-NOS). The participants were between 43 to 73 months of age. Participants were individually matched by chronological age to control for language exposure. Participants were considered bilingual if a) they were exposed to Chinese and English simultaneously before three years of age, b) could speak and understand both languages at the time of assessment and c) could produce 30 words between both languages. Data was obtained from three direct standardized assessments (e.g. Peabody Picture Vocabulary Test-3 – PPVT) for receptive vocabulary, language production and comprehension skills and cognitive abilities, as well as a standardized parental report measure for vocabulary and a previous services log. Assessments were counter-balanced and occurred in the homes of each bilingual family twice over a three-week period. After controlling for NVIQ, results revealed no significant differences between the two groups in terms of English production vocabulary, vocabulary comprehension or conceptual production vocabulary. The data did however reveal that bilingual children had a significantly larger total vocabulary than chronological age matched monolingual children.

A strength of this study was that the investigators reported, and controlled for, the total number of intervention hours received by participants to determine that there were no significant differences between the groups, therefore removing this potential confounding variable. Appropriate statistical tests were applied. A limitation of this study is that the procedure used to gather assessment data from the monolingual group is unclear, reducing the replicability of the study. The gender of the participants included in this study was not congruent with the ASD population, decreasing the generalizability of the results.

Overall, this study provides suggestive evidence that language development is not negatively affected by bilingualism in children with ASD when compared to age matched monolingual children with ASD.

Gonzalez-Barrero and Nadig (2019) used a case-control study design to compare the receptive vocabulary and expressive morphology skills of 13 bilingual (M=11, F=2) and 13 monolingual (M=11, F=2) school aged children with ASD between 4.9 to 10.8 years of age. Participants were matched on NVIQ, chronological age, maternal education and dominant language. Children diagnosed with language impairments and ASD were also included as participants and were equally distributed between groups. Children were included in the bilingual group if they a) had exposure of more than 20% to a non-dominant language, b) achieved a proficiency score of 3 or 4 on a four-point scale in both languages based on parental report and c) were able to complete a minimum of five out of eight tasks in both languages during the study. Data was collected using two standardized direct assessments of receptive vocabulary and expressive morphology skills in English, French or Spanish (e.g. PPVT-4). Results revealed that while both the monolingual and bilingual participants had receptive vocabulary skills within the standardized average range, the monolingual group demonstrated higher scores overall. No significant difference between groups on expressive morphology skills was revealed.

A strength of this study was that children diagnosed with a language impairment and ASD were included with their individual scores, increasing the generalizability of the results. However, the gender of the participants included in this study was not congruent with the ASD population. Appropriate statistical tests were applied and effect sizes were included. The use of direct standardized assessments further increased the reliability of the data. A limitation of this study was that the recruitment process was vague and the assessment environment was not specified, which reduced replicability and external validity.

Overall, this study provides highly suggestive evidence that the presence of bilingualism does not create additional delays in the language development of bilingual school aged children with ASD when compared to their monolingual peers.

Nonrandomized Mixed Study Design

A mixed study design involves using one or more different experimental designs in a study. The study that used a mixed design in this review included comparisons within groups over time, and comparisons between groups at different moments in time. This study was also nonrandomized in its design. Nonrandomized studies are effective when the factor being examined (i.e., bilingualism) cannot be randomized.

Zhou et al. (2019) used a nonrandomized mixed study design to compare the social skills and language abilities of 13 children with ASD from bilingual homes (BLH) and 24 children with ASD from monolingual homes (MLH) over the course of two years. The participants were between 12 to 26 months of age at baseline. The participants and the data analyzed were taken from a previously conducted large, longitudinal, randomized intervention study. In the previous study, all participants had confirmed diagnoses of ASD and were stratified by gender, age and developmental quotient. In this study, children from the BLH group were individually matched to one or two children from the MLH group on NVIQ and age by one of the authors, who was blind to other outcomes of the original study. The BLH group included children who were exposed to a language besides English at least 20% of the time based on parental report. Social skills and language ability measures from the previous longitudinal study were obtained using standardized parental report measures and a standardized direct assessment (e.g. MSEL). This study analyzed data taken at baseline, one year after beginning intervention and two years after beginning intervention. This critical review examined results from this study that were relevant to receptive and expressive language. Results revealed that there were no significant differences between the receptive and expressive language outcomes of the BLH and MLH groups after one or two years of intervention. At baseline, the MLH group achieved a significantly higher total gesture score than the BLH group. However, after two years of intervention the BLH group obtained a higher total gesture score than the MLH group.

A strength of this study was that the data analyzed was longitudinal. This allowed the investigators to obtain data on the same participants completing the same language assessments over two years, and compare the language growth between and within groups. This assisted in increasing the reliability of the results. However, this study examined retrospective data, which may be less accurate than a prospective study. Appropriate statistical tests were applied. The data was obtained primarily by standardized parental report assessments, introducing potential recall bias to the data collected.

Overall, this study provides suggestive evidence that exposure to a second language does not affect the receptive and expressive language outcomes of children

with ASD when compared to monolingual exposed children with ASD over a period of two years.

Discussion

This critical review analyzed eight studies to determine if the presence of bilingualism in children with ASD results in comparable outcomes in expressive and receptive language development when compared to monolingual children with ASD. Overall, the studies reviewed provided suggestive evidence that children with ASD do not experience additional expressive or receptive language delays in the presence of bilingualism.

The definition of bilingualism varied considerably across the studies included in this review. Many studies included very broad definitions of bilingualism, such as exposure to English and another language (Valicenti-McDermott et al., 2012; Dai et al., 2018). While Hambly and Fombonne (2012) separated the bilingual group of participants in their study into those who had exposure to another language before 12 months (simultaneous group) and after 12 months (sequential group), their definition of bilingualism was also broad. Other studies incorporated more specific criteria into their definition of bilingualism, such as exposure to a language besides English at least 20% of the time (Zhou et al., 2019). Certain studies also specified a particular amount of language production was required in their definition of bilingualism, such as producing 30 words between both languages (Petersen et al., 2012). The participants from the bilingualism groups were all considered to be bilingually exposed or bilingual despite these terms being defined differently in each study. Future research in the area of bilingualism in children with ASD should include a clearer, well-defined definition of bilingualism and categories of bilingualism (e.g. exposure to a second language since birth, introduction to a second language in childhood, speaking two or more languages since infancy). This would allow for increased consistency among the participants included in a particular bilingual category, enhancing the reliability and validity of the evidence provided by a study.

Another factor that varied between the studies in this review was the age ranges of the participants. Three studies only included children under three years of age (Zhou et al., 2019; Dai et al., 2018; Valicenti-McDermott et al., 2012). One study included toddler and preschool aged children (Ohashi et al., 2012). The children included in three studies varied between early preschool to school aged children (Reetzke et al., 2015; Hambly & Fombonne, 2012; Petersen et al., 2012). Only one study exclusively included school age children (Gonzalez-Barrero & Nadig, 2019). Age plays a role in the amount of second language exposure a child receives in their life. Comparing children across large age ranges may provide expressive and receptive language outcomes that are less accurate. Future research in the area of bilingualism in children with ASD should include well-defined age groups of the participants included in a study (e.g. toddlers, preschool children, school age children).

Many of the studies included in this review used parental report assessments to obtain expressive and receptive language outcomes of bilingual exposed/bilingual and monolingual children with ASD. Three studies gathered data using direct standardized assessments or clinical observations and parental report assessments (Zhou et al., 2019; Petersen et al., 2012; Valicenti-McDermott et al., 2012). Two studies exclusively used parental report assessments to collect their data (Reetzke et al., 2015; Hambly & Fombonne, 2012). Only three studies did not use parental report assessments to obtain their language data, opting to use direct standardized assessments (Gonzalez-Barrero & Nadig, 2019; Dai et al., 2018; Ohashi et al., 2012). Using parental report assessments to collect language outcomes can reduce the reliability of results, as parents may under or overestimate the language abilities of their child. Future research in the expressive and receptive language development of children with ASD in the presence of bilingualism should include increasing the use of direct standardized assessments to enhance the reliability of the results.

Only one study included in this review analyzed expressive and receptive language data from a previous longitudinal study (Zhou et al., 2019). This longitudinal study allowed for the comparison of language growth between groups and within groups (i.e. bilingual exposed children and monolingual children). The results showed that over an extended period of time, the expressive and receptive language outcomes of bilingually exposed and monolingual children with ASD remained comparable. Future research should include more longitudinal studies so that expressive and receptive language growth in the presence of bilingualism can be monitored over a period of time, broadening the scope of research surrounding bilingualism in children with ASD.

Conclusion

Overall, the studies selected for this critical review provided suggestive evidence that the presence of bilingualism in children with ASD results in comparable outcomes in expressive and receptive language development when compared to monolingual children

with ASD. Although the level of evidence varied from somewhat suggestive to highly suggestive, all the studies in this review came to the same conclusion that children with ASD do not experience additional delays in expressive or receptive language development in the presence of bilingualism when compared to their monolingual peers.

Clinical Implications

The study of the effects of bilingualism on the expressive and receptive language development of children with ASD has several implications for SLPs who work with children in a clinical setting. The information provided by the studies in this review can support the recommendation that families who have children with ASD and speak multiple languages at home should continue to speak those languages to their child. SLPs can also inform other professionals who work with children with ASD that no additional delays in expressive or receptive language are experienced by children with ASD in the presence of bilingualism, so that a consistent recommendation is provided to families by all members of their health care team.

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