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The impact of bilingualism on the communicative development of children with autistic spectrum disorder

El impacto del bilingüismo en el desarrollo comunicativo de niños con trastorno del espectro autista

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ABSTRACT

Bilingualism is a phenomenon known as the ability to speak two languages fluently for communication. This skill has been shown to bring a number of cognitive benefits, especially in the area of the prefrontal cortex, where executive functions (EF) and language functions are located. However, children diagnosed with autism spectrum disorder (ASD) may have difficulties in using language due to the involvement of these brain areas. Within the ASD spectrum, there are different profiles ranging from mild to very severe impairment, which is why some children with ASD have less impairment in language and cognition, meaning that they could benefit from bilingualism to enhance these skills. Therefore, this study aims to assess whether bilingual children with ASD (ASD-B) have specific cognitive improvements in language use and cognitive skills in comparison with monolingual children with ASD (ASD-M) and typically developing bilingual children (TD-B). The aim is to validate or not the main hypothesis and to propose a research approach on how bilingualism could be beneficial for this population.

Keywords: ASD, bilingualism, FE, language

RESUMEN

El bilingüismo es un fenómeno conocido por la capacidad de una persona para emplear adecuadamente las lenguas vehiculares que conoce de manera indistinta y efectiva. Se ha demostrado que esta habilidad proporciona una serie de beneficios a nivel cognitivo, especialmente en el área de la corteza prefrontal, donde se encuentran las funciones ejecutivas (FE) y del lenguaje. Sin embargo, los niños diagnosticados con trastorno del espectro autista (TEA) pueden tener dificultades en el uso del lenguaje debido a la afectación de estas áreas cerebrales. Dentro del espectro TEA, existen diferentes perfiles que van desde personas con un grado leve hasta un grado muy severo de afectación y es por ello que algunos niños con TEA tienen menor afectación del lenguaje y cognición, lo que significa que podrían beneficiarse del bilingüismo para potenciar estas habilidades. Por lo tanto, este estudio tiene como objetivo evaluar si los niños bilingües con TEA (TEA-B) tienen mejoras cognitivas específicas en el uso del lenguaje y habilidades cognitivas en comparación

Palabras clave:
TEA, bilingüismo, FE, lenguaje.

	con los niños monolingües con TEA (TEA-M) y los niños bilingües con desarrollo típico (DT-B). El objetivo es validar o no la hipótesis principal y proponer un enfoque de investigación sobre cómo el bilingüismo podría ser beneficioso para esta población

Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder of childhood origin characterized by impaired social communication and social interaction, as well as repetitive behaviors and behavioral rigidity. In addition, they present significant difficulties in receptive and/or expressive language, verbal reasoning, verbal memory and cognitive flexibility, among others (Garrido et al., 2021). This population comprises a heterogeneous group of traits with multiple affected areas that allow grouping those affected by the disorder based on 3 symptomatological cores: qualitative relationship disorder, communication and language disturbances, and lack of mental and behavioral flexibility (Rivero, 2019). Behavioral alterations and cognitive deficits have been related to neuroanatomical and neurophysiological alterations located in the frontal part, establishing a connection with the temporal and parietal regions (Padilla and Infante, 2022).

One of the cognitive alterations related to ASD are those affecting executive functions. Executive functions (EF) are characterized as a set of higher-order cognitive skills that are goal-directed and future-oriented (Demetriou et al., 2019), as well as being essential for carrying out effective, creative and socially accepted behavior (Seijas, 2015). Similarly, they are presented as a set of cognitive, affective and motivational processes that aim to exercise conscious control of thinking, thus allowing an anticipation of behavior, setting goals and providing self-regulation of both mental operations and behavior to achieve efficient problem solving (Lepe et al., 2018). Among these mechanisms, working memory, cognitive flexibility, executive and inhibitory control, planning, self-monitoring, decision making, and verbal fluency stand out as the main ones (Tabares, 2022). These skills have been related to the prefrontal area of the brain (Ruiz and Castillo, 2019).

EFs begin to develop around the first year of life and generate significant changes between 2 and 5 years of age, finally stabilizing between 12 and 18 years of age. However, in the case of ASD, each executive function is affected from an early age, which is evident in situations involving social interaction, language, thinking and behavior, which will later influence the ability to acquire adaptive skills (Ruiz and Castillo, 2019).

Working memory (WM) as a component of EF is described as a short-term memory system capable of controlling the processing and temporary storage of information. Similarly, this system plays a crucial role in performing complex activities of high-level cognition, such as language comprehension, long-term learning, reasoning, reading comprehension, mental arithmetic, and problem-solving ability among others (Habib et al., 2019).

Likewise, one of the main impairments observed according to the EF in the ASD population corresponds to working memory, causing an alteration of planning and cognitive flexibility mostly. These difficulties are related to deficits in the prefrontal cortex, an essential area for cognitive development and socio-emotional functioning (Cid et al., J. C).

Similarly, those diagnosed with ASD present difficulties in planning and organization, i.e., in the ability to integrate, sequence and develop the necessary steps to achieve goals, whether short, medium or long term (Ruiz & Castillo, 2019). There are also difficulties in inhibition that are explained as the inability they possess to delay tendencies to generate impulsive responses and therefore regulate behavior and attention (Diamond, 2012, as cited in Ruiz and Castillo, 2019).

On the other hand, language is a complex structure that possesses several interconnected abilities, such as vocabulary, syntax and learning capacity (Abellán, 2022). In this way, human beings would be able to solve tasks, overcome impulsive acts, plan actions in advance and maintain control over their own behavior (Macías and Alexandra, 2022). Although these abilities are closely related to each other, they are known to be located in different areas of the brain. For this reason, it is important to examine the different elements of language

individually and globally (Abellán, 2022). Several studies have shown that early language development depends on EF processing. Therefore, for their integration it will be necessary to acquire social and pragmatic skills in addition to linguistic skills, which will serve to understand the meaning of the new words (Abellán, 2022).

One of the most frequent characteristics of ASD is the problems they present in social communication and difficulties in integrating verbal and nonverbal communication. However, although social development is one of the main language and speech difficulties in children with ASD, there are other conditions that can also hinder the correct development of speech and language and that may have a greater or lesser impact on it. Developmental language disorder (DLD), apraxia of speech (AS) or low intelligence quotient (IQ) are presented as associated morbidity in ASD and may also influence the acquisition of the aforementioned skills (Vogindroukas et al., 2022).

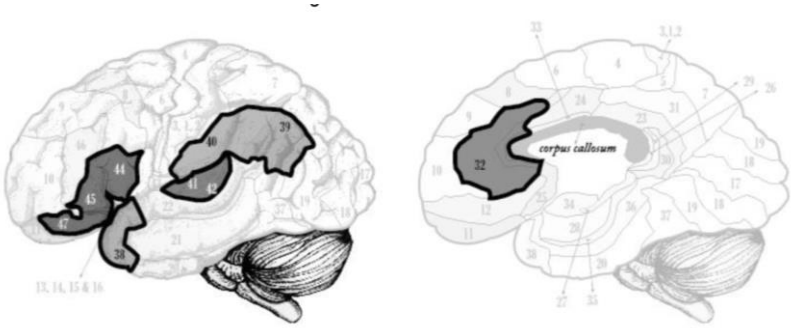
There are other language disorders commonly associated with children with ASD. Selective mutism and phonological-syntactic syndrome, the latter being the most frequent, which occurs not only in ASD children with language disorder, but also in those who do not have it. Along the same lines, the semantic-pragmatic language disorder is the most distinctive in the ASD population, due to the fact that it is the one that is closely related to alterations in social interaction, influencing the ability to initiate conversations or maintain turns of speech (Cordón and Torrijos, 2021).

Today, bilingualism is a very common condition in the world's population. Many studies show that the acquisition of more than one language has academic, social, emotional and cognitive benefits (Garrido et al., 2021). The acquisition of a second language has been linked to an increase in brain plasticity and neural connections leading to faster and easier learning. Similarly, imitation, adaptability, memorization and communication skills would benefit (Castro and Zuluaga, 2019).

As mentioned, there is evidence that this condition results in various structural and functional brain modifications (see Figure 1). Among them, a greater density of gray matter (GM) in the left inferior parietal cortex in the bilingual population with respect to the monolingual population, thus correlating the increase in GM with the increase in second language proficiency. Likewise, the white matter is also affected in the left parietal and left Heschl's gyrus regions of the temporal lobe. Subcortical structures are shown to be significantly larger in bilateral putamen and thalami, as well as in the right globus pallidus and right caudate nucleus (Rosselli, 2021).

Figure 1

Cortical Brain Areas Associated with Bilingualism in Normative Population



Note. Brain areas in which there is a significant increase in gray matter in normative bilingual population with respect to normative monolingual. It includes Brodmann's areas (BA), anterior cingulate gyrus in both hemispheres (BA 32), inferior frontal gyrus of the left hemisphere (BAs 44, 45 and 47), anterior temporal lobe (BA 38), anterior parietal lobe (BAs 39

and 40) and Heschl's gyrus (BAs 41 and 42). Adapted from Cortical Areas Associated with Bilingualism, by Rosselli, M., 2021. [Figure].

Although bilingualism presents a notorious advantage in executive function tasks, it should be noted that its effect will also depend on the age of the individual, language proficiency, age of acquisition of the second language and exposure to each of them (Esnaola, 2019). Another major impact of bilingualism is associated with inhibition and attentional control. The latter is related to the ability to pay attention to the language being performed at a given moment in relation to the maintenance and control of possible interference from language that is not in use (Castro & Zuluaga, 2019).

On the other hand, it has been recurrently studied whether the acquisition of more than one language in ASD would have a negative impact on their development. Comparative studies between bilingual ASD groups (ASD-B) with another monolingual ASD group (ASD-M) or typically developing bilinguals (TD-B) similar in chronological age have affirmed that ASD-B do not present any additional disadvantage with respect to the ASD-M group (Garrido et al., 2021).

Despite this, there is some concern among bilingual families of children diagnosed with autism spectrum disorder (ASD) about the uncertainty of whether or not to raise their child in a bilingual environment. However, no disadvantages were found in language skills in B-ASD children with respect to M-ASD. On the other hand, ASD-B showed an additional advantage in socialization skills with respect to ASD-M (Hastedt et al., 2023).

However, due to the heterogeneity of the ASD population, there is still no unanimity as to the benefits they may have from bilingualism. Children with ASD have various language deficits and research is unclear as to whether or not bilingualism can lead to an improvement not only in language, but also in other cognitive skills. Therefore, there is a need for further investigation and research on whether ASD-B children show cognitive improvements and better language strategies compared to ASD-M or TD-B children (Garrido et al., 2021).

Accordingly, the general objective of the study is to specify whether ASD-B children have greater cognitive and language abilities than ASD-M and TD-B children. In turn, in order to reach the general objective, the specific objectives are to analyze the different characteristics related to language in ASD children, as well as to study and evaluate other cognitive variables such as MT, cognitive flexibility, organization, planning, inhibition and problem solving.

Method

Participants

It is proposed to work with a sample of approximately 150 participants during the course of approximately 6 months. These will be chosen randomly among the different ASD associations throughout Spain. The age of the participants will range from 3 to 7 years old, since at these ages brain plasticity and language explosion is at its peak. Therefore, it will be more beneficial to work on that age range (Parra, 2022).

Specifically, three groups will be formed among which a group of typically developing bilingual children (TD-B), another group diagnosed with ASD that is monolingual (ASD-M) and finally another bilingual ASD group (ASD-B) will be distinguished.

The inclusion criteria required to participate in the study are differentiated according to the three proposed groups: children between the ages of 3 and 7 years, diagnosed with ASD grade 1 and speaking more than one vehicular language (group TEA-B), children with typical

bilingual development (group DT-B) and children diagnosed with ASD grade 1 monolingual (group TEA-M) will be selected.

Finally, exclusion criteria are specified as being diagnosed with any other mental disorder, as well as having any other medical condition that may affect language development and having intellectual disability or neurological comorbidity.

Measuring Instruments

To know the severity of participants' ASD symptomatology, the ADOS-2 measurement instrument from Lord et al., (2015) and the Spanish version of Luque (2015) with an internal consistency between 0.47 and 0.94 will be used (Neophytou, 2021). Specifically, module 3 will be used since it corresponds to children with fluent language. This instrument consists of a quantitative, standardized, semi-structured assessment with 30 items grouped into five evaluation modules. It examines aspects such as social interaction, verbal/nonverbal communication, play or imaginative use of materials, and restrictive and repetitive behaviors. Regarding response style, most of the items are binary response items, i.e., the presence or absence of specific behaviors of the child during the assessment is evaluated. The application time ranges from 40 to 60 minutes (Luque, 2015).

Next, the Wechsler Intelligence Scale (WPPSI-III) would be applied to children between 2.6 and 7.3 years of age. Depending on the age of the child, the first stage of the test (2.6-3.11 years) or the second stage (4-7.3 years) will be applied. Its use is aimed at measuring the IQ of children through 14 subtests of verbal comprehension, perceptual organization and processing speed. In addition to obtaining information about their working memory (WM) to help establish a baseline between groups. Regarding the response style of the items, most of the subtests are multiple choice, although some include open-ended questions or tasks requiring verbal response or object manipulation. Being its original version and Wechsler (2002) and the adapted Spanish version Corral et al. (2009). This instrument consists of a total of 14 subtests. Likewise, this scale has an internal consistency of around 0.83 (Corral et al., 2009).

Along the same lines, in order to rule out any other language impairment in addition to language assessment, the Illinois Test of Psycholinguistic Aptitudes (ITPA) will be used in its original version by McCarthy and Kirk (1968), with its Spanish adaptation by Ballesteros et al. (1983). Suitable for children aged 3 to 10 years for the evaluation of language difficulties and measurement of psycholinguistic functions involved in communicative ability. It consists of 11 subtests, 5 of which are dedicated to the visuo-motor channel and 6 to the auditory-vocal channel. There are multiple response type items as well as items where subjects must listen and repeat a word or phrase. This test has an internal consistency between 0.70 and 0.95 (Ballesteros et al., 1983).

In the case of bilingual subjects, a semi-structured interview will be conducted with the children and their parents or legal guardians in order to collect information on the level of competence in both languages and the level of use of each language.

The NEPSY-II battery of Korkman et al. (2007) with Spanish adaptation by Centro de Rehabilitación Neurológica-FIVAN and Laboratorio de Diversidad (2016) will be beneficial to perform a comprehensive assessment of neuropsychological functioning across the domains of attention and executive function, language, memory and learning, social perception, visuospatial and sensorimotor processing. Depending on the subtest, the items may have different forms of response, some of them being verbal, motor, multiple choice, object, or construction items. Similarly, items suitable for ages 3 to 7 will be used. This battery has an internal consistency ranging from 0.60 to 0.90 (Korkman et al., 2007).

Procedure

The research project proposal would then be reviewed and approved by an appropriate ethics committee. This would lead to the selection of study participants according to the inclusion and exclusion criteria, respectively. Subsequently, a communiqué would be issued to the ASD associations throughout Spain and to the different bilingual institutions to inform them about the study, its objectives and the criteria to be followed for the selection of the participants.

An information sheet will then be given to each study participant detailing the purpose of the study, the duration of the study, the favorable report of the ethics committee, the voluntary participation, the objectives of the study and the procedure to be followed. In addition, it will detail the possible benefits of participation and the right to revoke consent, the protection of personal data where confidentiality, informed consent and the return of results will be detailed.

Once the groups have been formalized, the study investigators will meet with the participants in specialized centers to properly employ the tests described above.

Results

The present study focuses on comparing each of the variables included in the NEPSY-II scale, such as attention, executive function, memory and learning, in addition to the variables related to language in children diagnosed with bilingual (ASD-B) and monolingual (ASD-M) Autism Spectrum Disorder (ASD-B), as well as comparing them with bilingual children with typical development (TD-B).

The results of each test will be analyzed by means of a Kolmogorov-Smirnov normality analysis to determine whether or not the scores obtained from each test follow a normal distribution. If followed, the ANOVA statistic will be used to evaluate the differences between the results of each group in each of the tests mentioned above. Otherwise, the non-parametric Kruskal-Wallis statistic will be used.

Although the differences between ASD-B and TD-B are smaller or may show smaller differences between them, it is still an indicator that ASD-Bs have better cognitive conditions than ASD-Ms.

This may be a clear indicator that bilingualism is strongly associated with cognitive improvements.

In the present work we will attempt to study this phenomenon by correlating the tests applied within each group to observe the reciprocal relationship between the different variables, i.e., we will analyze whether the different scores of each of the areas evaluated with each test (memory, attention, cognitive flexibility, inhibition, etc.) are different to observe which variable correlates better.

Similarly, this relationship between variables will show whether within bilingualism, improvement in language scores correlates with improvements in any of the other aspects assessed. For this purpose, a multiple regression will be performed between the dependent variable (DV) "language ability due to bilingualism", since, as we have seen above, it helps to improve it, and all the neuropsychological areas analyzed in NEPSI-II in order to analyze which of them correlates. Having as independent variable (VI) all memory components.

In short, the aim is to observe whether being bilingual improves some cognitive condition, such as memory or some subtype of it. Therefore, a multiple regression analysis will be performed, correlating the language scores obtained with each of the variables, resulting in a general improvement or the improvement of a specific area.

Discussion and Conclusions

Finally, the conclusions of the article will be presented in a last section The main objective of the research program is to assess whether or not the ASD-B population possesses greater cognitive and language abilities by evaluating the different aspects of working memory (WM) and language in ASD-B children and comparing them with the ASD-M and TD-B groups.

Confirmation that ASD-B children have advantages compared to ASD-M will show that bilingualism can be an important tool to improve cognitive and linguistic development in children with ASD. We were able to find an increase in working memory in B-ASD children with respect to M-ASD, as well as in their inhibitory cognitive control. Similarly, visual discrimination tests between these groups seem to show that ASD-Bs have faster attention focus (Peristeri et al., 2021).

Based on this, it is expected to be able to generate intervention strategies that would allow offering greater stimulation in relation to another language, letting us see if children with ASD raised in an optimal bilingual environment present improvements in their executive functions or if it will be efficient and effective to implement a second language in the development of a child with ASD (Gonzalez and Nadig, 2018).

In addition to these studies, it would be interesting to also perform neuroimaging studies to analyze whether there are indeed neuroanatomical and functional changes in ASD-B children that could explain these changes in cognitive and language variables (Rosselli, 2021).

Direct exposure to more than one language from infancy to a child diagnosed with autism spectrum disorder (ASD) shows no evidence that it impedes optimal language development in the child (Beauchamp et al., 2020). As well as no deleterious effect on nonverbal cognitive functioning, nor on language abilities (Dai et al., 2018).

However, further research with larger and more varied samples of bilingual and monolingual children with ASD is needed to better understand the effects of bilingualism on language and working memory development in this population (Garrido et al., 2021).

In addition, it is also important to consider additional factors such as the age of second language acquisition, the amount and quality of exposure to the second language, and any other variables that may be influencing performance on these tests (Esnaola, 2019).

Ultimately, although the study suggests that bilingualism does not have a significant negative influence on language skill performance in children with ASD, more research is needed to fully understand the role of bilingualism in the development of specific cognitive skills in this population (Garrido et al., 2021).

The limitations of the study include the difficulty of selecting representative samples due to the inclusion and exclusion criteria established. Therefore, the fact of focusing exclusively on working with children with ASD grade 1 makes it interesting to expand the type of ASD symptomatology in future studies, as well as to widen the age range, since this could be positively or negatively influencing the aspects studied. Similarly, the cultural complexity of the population is present, since language is an aspect rooted in the culture and society from which the individual derives. Therefore, it will be important to keep in mind that the sociocultural contexts in which children acquire language may affect the development of working memory and language, as well as the age of second language acquisition.

In sum, the fact that there are no significant differences between ASD-B and BT-B, but there are significant differences in ASD-B and ASD-M, may indicate that having ASD and being bilingual will generate a significant advantage over monolingualism, to improve not only aspects of language but other neuropsychological aspects, such as working memory (WM), cognitive flexibility or inhibition, among others.

Therefore, given that children with ASD-B present improvements in cognitive and language skills, it would be interesting to investigate how bilingualism could be a tool not only

to improve language but also to improve the rest of the cognitive skills that could represent a better adaptation of the child in his environment.

References

Abellán Roselló, L. (2022). Relación entre el desarrollo del lenguaje y las funciones ejecutivas en sujetos de 0 a 6 años. Una revisión sistemática. *International Journal of New Education*, (10), 103-126. https://doi.org/10.24310/IJNE.10.2022.15730

Ballesteros Jiménez, S., Cordero Pando, A., & Manga Rodríguez, D. (1983). Los procesos de comunicación en el niño: El ITPA como instrumento para su evaluación. *Revista de Psicología General y Aplicada*.

Beauchamp, M.L.H., Rezzonico, S. & MacLeod, A.A.N. Bilingualism in School-Aged Children with ASD: A Pilot Study. *J Autism Dev Disord* 50, 4433–4448 (2020). https://doi.org/10.1007/s10803-020-04501-8

Castro-Castiblanco, Yira Marieta, & Zuluaga-Valencia, Juan Bernardo. (2019). Evaluación de atención, memoria y flexibilidad cognitiva en niños bilingües. *Educación y Educadores*, *22*(2), 167-186. https://doi.org/10.5294/edu.2019.22.2.1

Centro de Rehabilitación Neurológica-FIVAN y Laboratorio de Diversidad, Cognición y Lenguaje, del Departamento de Psicología Evolutiva y de la Educación de la Universidad de Sevilla; en colaboración con el Departamento I+D de Pearson Clinical & Talent Assessment. (2016). *Evaluación de la NEPSY-II*. https://www.cop.es/uploads/PDF/2016/NEPSYII.pdf

Cid-Duarte, S., Areces, D., & Carlos Núñez, J. (2023). Las Funciones Ejecutivas en Población Infanto-juvenil que presenta TEA y TDAH en comorbilidad: Una revisión sistemática. *Journal of Psychology & Education/Revista de Psicología y Educación*, *18*(1).

Marzo-Cordón, M. ., & Belda-Torrijos, M. (2021). Trastornos del lenguaje en alumnado con TEA. *International Journal of New Education*, (7). https://doi.org/10.24310/IJNE4.1.2021.12016

Dai, Y. G., Burke, J. D., Naigles, L., Eigsti, I. M., & Fein, D. A. (2018). Language abilities in monolingual-and bilingual-exposed children with autism or other developmental disorders. *Research in Autism Spectrum Disorders*, *55*, 38-49. https://doi.org/10.1016/j.rasd.2018.08.001

Demetriou, E. A., DeMayo, M. M., & Guastella, A. J. (2019). Executive function in autism spectrum disorder: history, theoretical models, empirical findings, and potential as an endophenotype. *Frontiers in psychiatry*, *10*, 753. https://doi.org/10.3389/fpsyt.2019.00753

Esnaola, M. (2019, December). Los efectos del bilingüismo en el desarrollo cognitivo. In *Ideas* (Vol. 5, No. 5). https://p3.usal.edu.ar/index.php/ideas/article/view/4983

Garrido del Águila, D., Aguado López, B., & Carballo García, M. G. (2021). Bilingüismo y lenguaje en niños con trastorno del espectro autista: una revisión sistemática. https://doi.org/10.1016/j.nrl.2021.04.010

Gonzalez-Barrero, A. M., & Nadig, A. (2018). Bilingual children with autism spectrum disorders: The impact of amount of language exposure on vocabulary and morphological skills at school age. *Autism Research*, *11*(12), 1667-1678. https://doi.org/10.1002/aur.2023

Habib, A., Harris, L., Pollick, F., & Melville, C. (2019). A meta-analysis of working memory in individuals with autism spectrum disorders. PloS one, 14(4), e0216198. https://doi.org/10.1371/journal.pone.0216198

Hastedt, I., Eisenhower, A., Sheldrick, R. C., & Carter, A. S. (2023). Bilingual and monolingual autistic toddlers: Language and social communication skills. *Journal of Autism and Developmental Disorders*, *53*(6), 2185-2202. https://doi.org/10.1007/s10803-022-05504-3

Kirk, S. A., McCarthy, J. J., & Kirk, W. D. (1968). *Illinois test of psycholinguistic abilities (ITPA)* (Revised ed). University of Illinois Press

Korkman, M., Kirk, U., & Kemp, S. (2007). NEPSY-II (2nd ed.). San Antonio, TX: Harcourt Assessment. https://doi.org/10.1177/0734282909346716

Lepe-Martínez, N., Pérez-Salas, C. P., Rojas-Barahona, C. A., & Ramos-Galarza, C. (2018). Funciones ejecutivas en niños con trastorno del lenguaje: algunos antecedentes desde la neuropsicología. *Avances en psicología latinoamericana*, *36*(2), 389-403. https://doi.org/10.12804/revistas.urosario.edu.co/apl/a.5609

Lord, C., Rutter, M., DiLavore, P. C., Risi, S., Gotham, K., & Bishop, S. L. (2015). *ADOS-2 . Escala de Observación para el Diagnóstico del Autismo - 2 . Manual (Parte I): Módulos 1-4.* (T. Luque, adaptadora). Madrid: TEA Ediciones.

Macías, S. Y. P., & Alexandra, M. I. H. (2022). Estrategia didáctica para el desarrollo del lenguaje oral en los niños y niñas del nivel preescolar. *Revista EDUCARE-UPEL-IPB-Segunda Nueva Etapa 2.0*, *26* (Extraordinario), 551-576. https://doi.org/10.46498/reduipb.v26iExtraordinario.1676

Neophytou, N. (2021). The importance of motor assessment, and current motor assessment tools available for individuals with autism spectrum disorder. In *Emerging Programs for Autism Spectrum Disorder* (pp. 273-284). Academic Press. https://doi.org/10.1016/B978-0-323-85031-5.00006-2

Oudet, S., Howard, K., & Durrleman, S. (2022). Early years autism and bilingualism: An interpretative phenomenological analysis of parent perceptions during lockdown. *Autism & developmental language impairments*, *7*, 23969415221138704. https://doi.org/10.1177/23969415221138704

Quero, F. J. P., & Cañete, L. I. (2022). Funciones ejecutivas en TEA: Análisis de variables contextuales en el desarrollo. *Revista de Discapacidad, Clínica y Neurociencias*, *9*(1), 1-14. https://doi.org/10.14198/DCN.20290

Parra Cárdenas, V. R. L. (2022). *Estimulación de lenguaje comprensivo a través de técnicas lúdicas en niños preescolares (3 a 5 años de edad)* (Master's thesis, Universidad Técnica de Ambato/Facultad de Ciencias de la Salud/Centro de posgrados).

Peristeri, E., Baldimtsi, E., Vogelzang, M., Tsimpli, I. M., & Durrleman, S. (2021). The cognitive benefits of bilingualism in autism spectrum disorder: Is theory of mind boosted and by which underlying factors?. *Autism Research*, *14*(8), 1695-1709. https://doi.org/10.1002/aur.2542

Rivero Mamposo, M. (2019). Revisión histórica sobre el Autismo.

Rosselli, M. (2021). Bilingüismo, Cognición y Plasticidad Cerebral. *Revista Neuropsicología, Neuropsiquiatría y Neurociencias*, *21*(1), 1-24.

Ruiz, C. M., & Castillo Patiño, N. (2019). Estrategias desde el contexto familiar para favorecer el desarrollo de las funciones ejecutivas en niños escolares con trastorno del espectro autista.

Sara Corral Gregorio, Irene Fernandez-Pinto, David Arribas Águila, Fernando Sánchez Sánchez and Pablo Santamaría Fernández. Departamento de I+D de TEA Ediciones, S. A. (2009).

Seijas Gómez, Raquel. (2015). Atención, memoria y funciones ejecutivas en los trastornos del espectro autista: ¿cuánto hemos avanzado desde Leo Kanner?. *Revista de la Asociación Española de Neuropsiquiatría* , *35* (127), 573-586. https://dx.doi.org/10.4321/S0211-57352015000300009

T. Luque (2015). ADOS-2 . Escala de Observación para el Diagnóstico del Autismo. Madrid: TEA Ediciones.

Tabares, A. S. G. (2022). Asociación entre las funciones ejecutivas y la teoría de la mente en niños: Evidencia empírica e implicaciones teóricas. Revista de Psicología Clínica Con Niños y Adolescentes, 9(3), 3.

Vogindroukas, I., Stankova, M., Chelas, E. N., & Proedrou, A. (2022). Language and Speech Characteristics in Autism. *Neuropsychiatric Disease and Treatment*, *18*, 2367–2377. https://doi.org/10.2147/NDT.S331987

Wang, Y., Kang, S., Ramirez, J. *et al.* Multilingual Diversity in the Field of Applied Behavior Analysis and Autism: A Brief Review and Discussion of Future Directions. *Behav Analysis Practice* 12, 795–804 (2019). https://doi.org/10.1007/s40617-019-00382-1

Wechsler, D. (2002) Escala Wechsler de inteligencia para los niveles preescolar y primario-III Manual de aplicación (3–4) USA: Manual Moderno