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Assessment of predisposition in the acquisition of the english language and motor development in children with autism spectrum disorder: Case report

Fernanda Bernardo de Carvalho[1], Jackeline Batista Saldanha[2], Fernanda Protestato[3], Mariana Mendes Trevizan Silva[2], Giovana Lima Silva[2], Jamile Benite Palma Lopes[4], Lorraine Barbosa Cordeiro[1], Claudia Santos Oliveira[1,5].

[1 5]Stricto Sensu Graduate Program in Human Movement and Rehabilitation (PPGMHR) - UniEVANGÉLICA, Anápolis (GO), Brazil; [2]Physical Therapy Course at the Evangelical University of Goiás - UniEVANGÉLICA, Anápolis (GO), Brazil; [3]Psychology Course at the Evangelical University of Goiás - UniEVANGÉLICA, Anápolis (GO), Brazil [4]Faculty of Medical Sciences, Santa Casa de São Paulo, São Paulo (SP), Brazil; [5]Graduate Course in Physiotherapy at Universidade Evangélica de Goiás – UniEVANGÉLICA, Anápolis (GO), Brazil.

ABSTRACT

Background: Autism Spectrum Disorder (ASD) is a complex neurobiological disorder. Characterized by language deficits, however, it is known that there is a development of bilingualism in the autistic population. Delay in motor development is present in the population, with deficits in fine and gross motor coordination. **Objective:** The present study aims to evaluate the predisposition to acquire a second language and motor development in children with ASD. **Method:** The case report is composed of four children, verbal with the cognitive and physical capacity to participate in the evaluations. Mean age ± 8 years and 3 months, 50% male, 100% literate. Distributed into two groups: group I: two children diagnosed with ASD according to DSM-V and group II: two children with typical development. The group of children with ASD underwent the assessment protocol consisting of the application of the Childhood Autism Rating Scale (CARS) while the Revised Psychoeducational Profile (PEP-R) and the Placement Test were applied in both groups. **Result:** Children with ASD assessed with CARS had a low level of support. Regarding the PEP-R, the same group showed a deficit in the development of fine and gross motor coordination compared to group II. The child with ASD from the public network had a lower score compared to the child from the private network in relation to the level of development of bilingualism, both in reading and writing. **Conclusion:** It is possible to suggest that the development of fine and gross motor skills of children with ASD are deficient, however, they demonstrated a good result in the predisposition to learning a second language, including the child who studies in a public school. Although its development is a little smaller.

Keywords: Autistic spectrum disorder; Motor development; Language.

BACKGROUND

Autism spectrum disorder (ASD) is a complex neurobiological disorder characterized by neuropsychological and behavioral deficits. The main symptoms are cognitive impairment, lack of social skills - communication and stereotyped behavior - and motor déficits[1,2].

As for the child with ASD, there is a communication deficit through language, in addition to behavioral perception when compared to children with typical development (TD), which proves the research that presents neural differences in the hemispheric asymmetry of the language regions[3-7]. The TEA population demonstrates greater right asymmetry in the central language regions of the superior temporal gyrus (GTS) and inferior frontal gyrus (GFI)[8] compared to the "typical" left asymmetry of the GTS and GFI seen in the DT8 groups[9,10]. Even with such abnormalities, it is known that ASD is associated with a wide range of language skills, among them, the linguistic ability to learn and achieve fluency in more than one language – bilingualism[11].

Recent evidence suggests dysfunction of the cerebellum in the pathogenesis of ASD[12]. The anatomical, clinical, and neuroimaging aspects of the cerebellum support cognitive functions, including language and executive functions, as well as effective regulation[13]. However, structural abnormalities and volume differences exist in the cerebellum of individuals with ASD[14,15]. In addition, these patients often manifest deficits in fine and gross motor coordination and delay in developing skills associated with cerebellar function[16-18].

Given this, we aimed to evaluate the predisposition to acquire a second language and motor development in children with ASD.

METHODS

The sample consisted of 4 verbal children, with cognitive and physical ability, who participated in the assessments according to the flowchart below (figure 1). Four meetings were held, lasting 40 to 50 minutes with each child, individually, in an appropriate room for the application of the protocol.

Evaluation protocol

Children in Group II participated in the Revised Psychoeducational Profile (PEP-R) and the Placement Test. While Group I participated in the Childhood Autism Rating Scale (CARS)[19] evaluation protocol, in addition to the two tests applied to Group II.

*Corresponding author: Fernanda Bernardo de Carvalho; e-mail: bernardo.fernanda06@gmail.com

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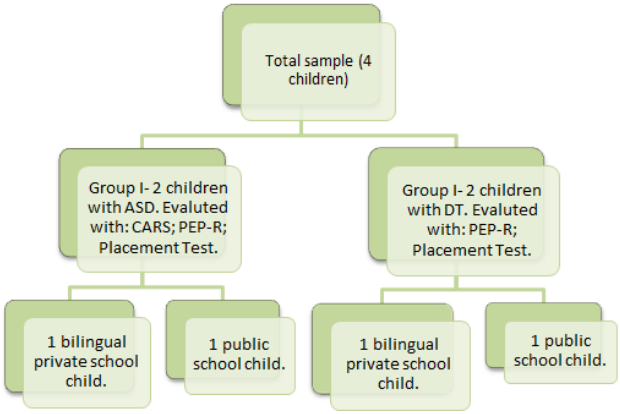

Figure 1. Sample flowchart

Childhood autism rating scale (CARS)

The CARS-BR is a scale applied to parents or guardians as one of the recommended diagnostic tools for ASD[19]. This scale assesses behavior in 14 domains, with 15 items covering a variety of functions, including social, emotional, adaptive, communicative, and cognitive. Final CARS scores are divided into three levels of support. Level 1: Minimal to no symptoms of ASD (15–29.5 for ages <13 years; 15–27.5 for ages >13 years)'; Level 2: 'Mild to moderate symptoms of ASD (30–36.5 for ages <13 years; 28–34.5 for ages >13 years)'; and Level 3: 'Severe ASD symptoms (37 and above for ages <13 years; 35 and above for ages >13 years)[20].

Revised psycho-educational profile - PEP-R

The PEP-R is used to assess the level of development of the pediatric population with ASD. The test classifies developmental age in the following areas: imitation (16 items), perception (13 items), fine motor (16 items), gross motor (18 items), hand-eye coordination (15 items), cognitive performance (26 items) and verbal cognitive (27 items). The pattern involves materials, such as colorful wooden inserts, picture books, puppets, objects with their respective photographs, musical instruments, and modeling clay. The researcher observes, evaluates, and notes the child's response during the test. For each answer, there are three record possibilities: passed (the child successfully performed the task), failed (the child was unable to perform the task), and emergent (the child was able to perform the task with the help of the examiner)[21, 22].

Placement test

The placement test makes it possible to assess the oral, written, and reading aspects of the English language, through a series of understandable, colorful, and engaging activities. These activities cover intelligible conversations, simple instructions, colors, animals, furniture, and transportation. The application material consists of two booklets of visual aids and questions that the researcher can use to test all 4 elements of language: speaking, listening, reading, and writing. There is also an evaluation sheet to record the notes made by the researcher.

RESULTS

The sample consisted of children with a mean chronological age of ± 8 years and 3 months, 50% male, 100% literate, 50% enrolled in a bilingual private education network, and 50% in a public one. Children with ASD assessed with CARS showed a low level of support according to Table 1. According to the assessment of PEP-R, the development of fine and gross motor coordination in autistic children has a deficit when compared to neurotypical children according to Table 2.

Table 1. Sample characteristics

	Chronological age	Age of development		Clinical Diagnosis	Gender	Literate	Teaching Network	Laterality
Child 1	9 years 4 months	6 years and 1 month	NA	NA	Feminine	Yes	Private Bilingual	Right
Child 2	7 years e 11 months	4 years and 6 month	Light	TEA	Masculine	Yes	Private Bilingual	Right
Child 3	8 years 4 month	6 years and 6 month	NA	NA	Masculine	Yes	Public	Right
Child 4	7 years e 3 month	4 years and 8 month	Light	TEA	Masculine	Yes	Public	Right

***Note:** Caption: NA- Does not present; ASD- Autistic Spectrum Disorder; CARS- Childhood Autism Rating Scale; Developmental Age- According to the PEP-R.

Table 2. PEP-R Evaluation Results

	Behavior scale						Development Scale						
	Relationship	Materials	Sensory	Language	Imitation	Perception	Perception Fine Motor Coordination	Gross motor	Hand Eye Integration	Cognitive Performance	Verbal Cognitive Performance	Development Score	Developmental Age
Child 1	12	8	12	11	14	13	16	18	15	26	27	129	6 years and 1 month
Child 2	11	6	10	5	14	11	14	17	13	23	22	114	4 years and 6 month
Child 3	12	8	12	11	16	13	16	18	15	26	27	131	6 years and 6 month
Child 4	10	6	9	9	14	11	14	16	15	24	22	116	4 years and 8 month

***Note:** The reference value for the relationship item: 12; materials: 8; sensory: 12; language: 11; Imitation: 16; Perception: 13; Fine motor skills: 16; Gross Motor Coordination: 18; Hand-eye integration: 15; Cognitive performance: 26; Verbal performance:27.

The child with ASD from the public network had a lower score compared to the child from the private network, in the development of bilingualism, in terms of reading and writing. The same occurs when comparing neurotypical children from private education with neurotypical children from public education, that is, the latter has lower performance in the elements: of speech, listening, writing, and reading. According to Table 3, it is possible to observe that ASD children have a good overall performance in bilingual development.

Table 3. Results of the Placement Test Assessment

		Child 1	Child 2	Child 3	Child 4
SPEECH AND HEARING	1- Can offer and respond to greetings	1	1	0	1
	2- Can you say someone's name	1	1	1	1
	3- Can follow simple instructions	1	1	0	1
	4- Is able to answer simple questions	1	1	0	1
	5- Can name the colors	1	1	1	1
	6- Can name animals	1	1	1	1
	7- Can name everyday objects	1	0	0	1
	8- can name the transport	1	1	0	1
	9- Can answer questions about an image	1	1	1	1
	Total score	9	8	4	9
READING	1- Can find the same image	1	1	1	1
	2- Can find the same letter	1	1	1	1
	3- Can find the same word	1	1	1	1
	4- Know the names of latters	1	1	1	1
	5- Know the sound of latters	1	1	1	1
	6- Can read words	1	1	1	1
	7- Can read complicated words	1	1	1	1
	8- Can read simple sentences	1	1	0	1
	9- Can order simple photos	1	1	0	1
	Total score	9	9	7	9
WRITING	1- Can hold a pencil correctly	1	1	1	1
	2- It can make it recognizable	1	1	1	0
	3- Can write recognizable letters	1	1	0	0
	4- You can write your own name	1	1	1	1
	5- You can copy your own name	1	1	1	1
	6- Can copy words from left to right	1	1	1	0
	7- Can write simple words	1	1	1	0
	8- Can you copy a simple sentence with capital letter, space for fingers and period	1	1	1	0
	9- Can write a simple sentence independently with capital letters, spaces between fingers and period	1	1	1	0
	10- Can write simple sentences on an image	1	0	1	0
	Total score	10	9	9	3

DISCUSSION

The present research analyzed the correlation between the predisposition of the acquisition of the English language and motor development in children with ASD. The target audience involved schoolchildren from a bilingual private school and a public school. Comparatively, children with ASD from public schools showed a greater predisposition to acquire the English language, when evaluated in the Placement Test, about TD children.

The predisposition to bilingualism in the autistic population has been the subject of academic research for some time[23,24]. The use of electronic devices with applications such as Youtube indirectly interferes with research results. Especially because they offer children's content, such as cartoons, in several languages, including English[25].

It is noteworthy that both children had a lower-than-expected developmental age, with two years delay

than TD children. One of the factors that may be related to the delay is the pandemic[26] that affected the development of both populations. However, the children with ASD involved in the present study were four years behind in their chronological age, data that corroborates the literature[27]. The fact that TEA children have low performance in fine and gross motor coordination reaffirms the research by Bal et al, 2020. The authors pointed out interesting data in which deficits in fine motor skills can serve as an important surrogate marker to identify children with a delay of language with ASD. Factors that can generate social communication problems[28].

CONCLUSION

From the research, it is suggested that the development of fine and gross motor skills of children

with ASD is deficient. However, these children showed a good predisposition to learn a second language. Even if the ASD child does not study in a bilingual school, it is possible to perceive his predisposition to the second language, which involves social learning and the development of effective communication.

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