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Augmentative and Alternative Communication on Autism Spectrum Disorder: Impacts on Communication

Comunicação alternativa e aumentativa no transtorno do espectro do autismo: impactos na comunicação

ABSTRACT

Purpose: To verify the effects of the Speech-Language Intervention with Augmentative and Alternative Communication (AAC) in communicative acts in children with Autism Spectrum Disorder (ASD). **Method:** This is a longitudinal case-study design involving three subjects attended in a Speech-Language Pathology (SLP) Clinic School. Primary data were obtained from the observation of recorded videos of pre and post-intervention therapist assessment sessions with each child in play activities, while secondary data come from interviews with parents. The analysis was performed based on the Pragmatic Test of the Infant Language Test - ABFW, through observational recordings, aiming to identify and quantify the communicative acts. **Results:** It was possible to observe a 51.47% increase in the production of communicative acts in the three research subjects. In addition, it was found that there was higher quality in the acts produced, using more present verbal components and decreased acts that had non-interpersonal functions, such as gestures and vocal acts. Thus, there was an evolution in the functional language of the subjects. **Conclusion:** The use of Augmentative and Alternative Communication in the SLP therapy clinic is promising and effective in promoting the development of communication skills of individuals with ASD.

RESUMO

Objetivo: Verificar os efeitos da intervenção fonoaudiológica com Comunicação Aumentativa e Alternativa (CAA) nos atos comunicativos em crianças com Transtorno do Espectro do Autismo (TEA). **Método:** Trata-se de uma pesquisa do tipo estudo de caso, com caráter longitudinal, sendo a amostra constituída por três sujeitos atendidos em uma Clínica Escola de Fonoaudiologia. Os dados primários foram obtidos a partir da observação de vídeos gravados de sessões de avaliação pré e pós intervenção da terapeuta com cada criança em atividades lúdicas, enquanto os dados secundários são advindos das entrevistas com os pais. A análise foi realizada baseada na prova de pragmática do Teste de Linguagem Infantil – ABFW, por meio observacional das gravações, com objetivo de identificar e quantificar os atos comunicativos. **Resultados:** Foi possível observar aumento de 51,47% na produção de atos comunicativos nos três sujeitos da pesquisa. Além disso, verificou-se que houve maior qualidade nos atos produzidos, com uso de componentes verbais mais presentes e diminuição dos atos que possuíam funções não-interpessoais, tais como os atos gestuais e vocais. Sendo assim, constatou-se uma evolução na linguagem funcional dos sujeitos. **Conclusão:** O uso da Comunicação Aumentativa e Alternativa na clínica fonoaudiológica mostra-se promissor e eficaz no que se refere à promoção do desenvolvimento das habilidades comunicacionais do indivíduo com TEA.

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INTRODUCTION

Currently, the autism spectrum disorder (ASD) can be defined as a neurodevelopmental disorder. It is characterized by changes and impairments in communication and social interaction, as well as in restricted and repetitive patterns of behaviors, interests, and activities. It has a great variation in degrees of intensity[1]. It is a type of developmental disorder of great relevance due to its high prevalence[2].

An early diagnosis is of utmost relevance for ASD, since it enables an early intervention, a fundamental factor for the improvement of this clinical condition because it allows significant gains in the child's development and increases the chance of developing its potentialities and its social inclusion with effectiveness[3,4]. Such positive effects are justified by the phenomenon of neuroplasticity, that is, the ability of the brain to recover a function through neural proliferation, migration, and synaptic interactions[5,6].

However, it is known that one of the biggest problems faced in the treatment of ASD is late diagnosis and treatment[7], which is a paradox knowing that, among the rights guaranteed to the person with ASD, are the early diagnosis and information to assist in the diagnosis and treatment of this disorder[8].

In view of the number and variety of impairments in subjects with ASD, there are several types of treatment currently offered. Among the protocols is the use of Augmentative and Alternative Communication (AAC). AAC is an area of clinical and educational research and practice. It aims to compensate, temporarily or permanently, for the impairment of understanding or expression[9].

One of the Brazilian programs that uses Augmentative and Alternative Communication with the objective of promoting the development of communication and social interaction in individuals with ASD is the PECS-Adapted (Engaged People Communicating Socially)[10], which was initially based on the *Picture Exchange Communication System* (PECS)[11]. However, it is based on the proposal of the Natural Functional Curriculum from a socio-interactionist perspective.

The PECS-Adapted is an Augmentative and Alternative Communication (CAA) system. It operates through the negotiation of cards with figures and verbal instigation in all phases of the system. The interaction with the other interlocutors its main focus.

In a report of a recent experience that Monnerat and Walter[12] described, the authors reported that by using the Adapted PECS[10], ten subjects with ASD who underwent speech therapy using AAC broadened the communicative intention and the other communicational skills in such a way that the communication became functional. Functional communication is that which occurs in addition to the actual speech and, even so, is effective regarding the insertion of the individual in the field of social interaction, since it enables dialogue also through low or high technology, such as tablets, communication boards, and picture exchange[13].

The establishment of functional communication affects directly on general development and quality of life, enabling autonomy, freedom of choice, and expression. In addition, it can promote better quality in education, contributing to cognitive development and inclusion in the school environment, as well as improvements in family relationships[13]. Thus, the AAC can be used as a therapeutic tool that aims to promote functional communication and develop the communicative skills of an individual.

In the international literature, the use of AAC for people with ASD is already documented in several types of research, including meta-analytical research and descriptive reviews[14,15]. However, there is still a lack of publications in Brazilian scientific journals on speech therapy in this topic. Therefore, this study is of great relevance given the need to conduct and publish more research focusing on the use of AAC in speech therapy clinic for children with ASD. This study thus aims to verify the effects of using AAC in the speech therapy clinic for the development of communicative acts of children with ASD.

METHODS

This is a quantitative case study with a longitudinal exploratory character and three subjects. This study is part of the research project Speech Therapy and Autism: To Know, Intervene, and Include. It was analyzed by the Ethics Committee of the Federal University of Pernambuco, according to resolution No. 466/12 of the National Health Council, and approved for research under protocol no. 2,106,800.

The research was carried out at the Professor Fábio Lessa Speech-Language Clinic-School. All procedures were performed at this establishment. Three male children with a neurological report of ASD aged between two and four years old participated in the present study. The appointments were from March 2017 to July 2018.

The intervention was based on the use of AAC PECS-Adapted,10 which has five phases. At phase 1, there is the exchange of a card with images for the desired item. In phase 2, there is the generalization of the exchange of cards with different partners and environments. Phase 3 is divided into A and B, stimulating the discrimination of cards (A) and less cards (B). At phase 4, the structuring of simpler phrases is already stimulated. They are composed of desires and information of feelings. Finally, at phase 5, there is a more complex elaboration of sentences, diversifying vocabulary, and concepts. The present study used the Adapted PECS as a basis for analysis. However, at phase 3B, there were no less cards. The collection was carried out from March 2017 to July 2018. The secondary data collection strategy was used. It was obtained through a database of interviews carried out with parents at the beginning of treatment. It was used to describe the child's biopsychosocial issues and obtain information about their initial form of communication, as described by the parents. The collection of primary data was through filming recorded in videos of 15 minutes each of the pre- and post-speech therapy evaluation sessions using AAC, following the author's time criterion[16]. The five initial minutes of recording were discarded. The analysis of the filming took place according to the Pragmatics Protocol, which makes up the ABFW[17]. The communicative acts found were described and accounted for.

The communicative acts mentioned in such a protocol are divided into communicative functions: verbal in case of verbalizations (VE), and non-verbal in case of vocalizations and gestural acts (VO and GE). They are object request, action request, social routine request, consent request, information request, protest, recognition of the other, exhibition, comment, self-regulatory, comment, naming, performative, exclamative, reactive, not focused, game, shared game, exploratory, narrative, protest, and expression[17]. The data obtained were transcribed to the protocol sheet and analyzed in a descriptive way by calculating mean, standard deviation (mean + standard deviation), and median.

In addition, the *Protocol Childhood Autism Rating Scale* (CARS)[18] was applied before and after therapeutic intervention. It is a scale that contains 15 subjective items that address the communicative intentions of the child and its interaction with the environment, which must be completed according to the therapist's observation. This scale allows identifying at which level, approximately, of ASD the child is. It is worth noting that the higher the score, the closer the serious level obtained.

Presentation of cases

Child 1 – Named J., male, three years and three months old, diagnosed with ASD since he was two years old. During anamnesis, the person in charge, named M.R., mentioned that the development of J.'s verbal and non-verbal communication remained normal until the first year of life. The child then began to regress regarding linguistic performance. Social interaction decreased, and communication started to be marked by more stubbornness and crying. The family initially suspected hearing loss, since the child did not answer when called, nor did he even react to loud sounds. However, the hypothesis was discarded after audiological examination, as narrated by the mother. After complementary exams and evaluations, the diagnosis of ASD was determined by the neuropediatrician. Thus, J. has been monitored by the neuropediatrician and the speech therapy team since March 2017. The child does not use medication. During the speech therapy evaluation, it was possible to notice that his language was restricted, such as constant episodes of immediate echolalia, but there was a functional use of objects and understanding of simple commands when accompanied by gestures, in addition to imitation attempts. Eye contact was restricted. Through the result of the application of CARS,[18] at the beginning of the therapeutic process, it was possible to identify which level of the spectrum he was: light-moderate level, with a score of 32.0. The child had few gestural, vocal, and verbal communication means.

Child 2 – Named D., male, three years and six months old, diagnosed with ASD. The person in charge, named E., referred during anamnesis that the development of D.'s language was late and occurred slowly. The first words came about two years and six months of age, being few and difficult to say. Regarding the communicative intention, it was stated that D. pointed and also guided the adult's hand to the desired object, using it as a tool. She also mentions that the difficulties

in social interaction were evident, since D. attacked other children, was anxious and stressed in the presence of other people and fled communicative environments. The child does not use medication. Thus, D. has been monitored by the speech therapy team since March 2017. During the speech-language assessment, it was possible to notice that his vocabulary was restricted and full of late echolalia, for example: the child heard the word "car" and kept focused on the game, until, in a few minutes, he began to repeat the same word in a not functional way or out of context. During the evaluation, it was also observed that there was functional use of some objects, such as a cars and balls. There was difficulty in understanding simple commands, performing imitations, changing shifts with the adult, as well as alternating activities. Eye contact was restricted. The communicative means most used were gestural and vocal. According to the CARS score,18 the child was at the mild-moderate level of ASD, with a score of 35.0.

Child 3 – Named A., male, two years and five months old, diagnosed with ASD. The person in charge, called M.T., says that the development of A.'s language occurred properly until the age of one year and eight months, when it started to regress. The child even produced some small words and made eye contact. Regarding the communicative intention, according to the person in charge, A. used to use the adult as an instrument. In addition, difficulties in social interaction were notable, as A. avoided other children, became anxious and stressed in the presence of strangers, and fled communicative environments. The child does not use medication. During the speech-language assessment carried out in June 2017, there was a great difficulty in understanding simple commands, performing imitations, changing shifts with the adult, and alternating activities. Eye contact was restricted, and the movements were repetitive. The communicative means most used were gestural and rarely vocal. According to the CARS score,18 the child was at the high level of ASD, with a score of 37.5.

RESULTS

The speech therapy intervention to develop communication was carried out using the AAC with activities based on the PECS-Adapted[10]. Each participant presented particular characteristics after intervention, as described below:

The child 1 (J.), after 40 sessions, now aged four years and nine months, reached the phase 5 of the PECS-Adapted. He was able to interact and build sentences with more than four words orally with AAC and up to four words without AAC. His score on the CARS[18] was 20.0, indicating a decrease in the characteristics of the ASD. The mother (M.) has an incomplete higher education level, always performed activities at home with AAC and took the AAC board to school, making J. generalize its use. The mother participated in two workshops on AAC promoted by the speech therapy team.

The child 2 (D.) after 47 sessions, now aged five years and two months, was starting phase 5 of the PECS-Adapted and managed to communicate more effectively and form short sentences with up to four words with the support of communication

cards arranged on a board. His score on the CARS[18] was 24.0, indicating a decrease in the characteristics of the ASD. The mother (E.) has an incomplete higher education level, always performed activities at home, and D. took the AAC board to school, making D. generalize its use. E. also participated in the two workshops for parents promoted by the team and showed a great interest in the child's care.

The child 3 (A.), after 32 sessions, now aged three years and nine months, reached phase 3B of the PECS-Adapted. He performed the exchange of figures and discriminated images, which already had a smaller size. His score on the CARS[18] was 32.5, indicating a decrease in some characteristics of the ASD. The mother (M.T.) has completed high school and only started to carry out the proposed activities at home around the last two months. The use of the folder is not yet widespread. The mother participated in two workshops on AAC promoted by the speech therapy team.

Chart 1 shows the profile of the research subjects, before and after the speech therapy intervention.

The following tables describe the results quantitatively. Table 1 shows the mean, standard deviation (mean ± SD), and median of the number of communicative acts per function in the pre- and post-speech-language intervention with AAC. It is important to highlight that there was an increase in the values of means of the functions action request (from 0.00 to 1.33), information request (from 0.00 to 4.00), commenting (1.50 to 8.67), naming (5.67 to 10.67), performative (2.67 to 3.33), exclamatory (from 1.00 to 2.00), reactive (0.00 to 2.33), shared game (0.00 to 1.33), protesting (1.00 to 2.67), and game (5.67 to 6.00). There was a reduction in the mean of the functions object ordering (3.00 to 2.67), social routine request (from 1.00 to 0.00), self-regulatory (0.33 to 0.00), not focused (3.00 to 1.67), exploratory (4.00 to 2.00), and protest expressions (from 4.00 to 0.00).

Chart 1. Profile of the research subjects before and after speech therapy intervention using Augmentative and Alternative Communication for children with Autism Spectrum Disorder in Recife - PE, 2018, Brazil.

Children	PRE-Intervention with PECS-Adapted	POST-Intervention with PECS-Adapted
A (3)	• 2 years and 5 months • ASD diagnosis • Main characteristics: non-verbal, difficulty in social interaction, lack of eye contact • CARS: 37.5	• 3 years and 9 months • PECS-Adapted Phase 3B • Main results: production of gestural and vocal communicative acts, improvement in social interaction, increased eye contact, improvement in imitation capacity and shift change • CARS: 32.5
D (2)	• 3 years and 6 months • ASD diagnosis • Main characteristics: late echolalia, production of only dissyllable and words disconnected from the context, difficulty in social interaction, signs of aggression, reduced eye contact • CARS: 35.0	• 5 years and 2 months • PECS-Adapted Phase 5 • Main results: reduction of echolalia, increase in vocabulary, production of more complex words, production of phrases, improved social interaction, increase in eye contact during communication, shift change • CARS: 24.0
J (1)	• 3 years and 3 months • SD diagnosis • Main characteristics: immediate echolalia, production of only dissyllable and words disconnected from the context, difficulty in social interaction, signs of aggression, reduced eye contact • CARS: 32.0	• 4 years and 9 months • PECS-Adapted Phase 5 • Main results: elimination of echolalia, increase in vocabulary, production of more complex words, production of phrases, improved social interaction, increase in eye contact during communication, shift change, narrative of stories, asking questions • CARS: 20.0

Table 1. Analysis of functional aspects of communication - subjects before and after speech therapy intervention using Augmentative and Alternative Communication for children with Autism Spectrum Disorder in Recife - PE, 2018, Brazil.

Variable	Evaluation		P value
	Pre-	Post-	
	Mean ± SD (Median)	Mean ± SD (Median)	
Object request	3.00 ± 3.00 (3.00)	2.67 ± 2.52 (3.00)	p[1] = 1.000
Action request	0.00 ± 0.00 (0.00)	1.33 ± 1.53 (1.00)	p[1] = 0.500
Request for social routine	1.00 ± 1.73 (0.00)	0.00 ± 0.00 (0.00)	p[1] = 1.000
Request for consent	0.00 ± 0.00 (0.00)	0.00 ± 0.00 (0.00)	p[1] = 1.000
Information request	0.00 ± 0.00 (0.00)	4.00 ± 6.08 (1.00)	p[1] = 0.500
Recognition of the other	0.00 ± 0.00 (0.00)	0.00 ± 0.00 (0.00)	p[1] = 1.000
Exhibition	2.00 ± 3.46 (0.00)	2.00 ± 2.00 (2.00)	p[1] = 1.000
Comment	1.50 ± 2.12 (1.50)	8.67 ± 9.02 (8.00)	p[1] = 0.500
Self-regulatory	0.33 ± 0.58 (0.00)	0.00 ± 0.00 (0.00)	p[1] = 1.000
Naming	5.67 ± 6.66 (4.00)	10.67 ± 11.59 (9.00)	p[1] = 1.000
Performative	2.67 ± 3.79 (1.00)	3.33 ± 3.51 (3.00)	p[1] = 1.000
Exclamatory	1.00 ± 1.73 (0.00)	2.00 ± 1.00 (2.00)	p[1] = 0.750
Reactive	0.00 ± 0.00 (0.00)	2.33 ± 1.15 (3.00)	p[1] = 0.250
Not focused	3.00 ± 1.00 (3.00)	1.67 ± 1.53 (2.00)	p[1] = 0.500
Exploratory	4.00 ± 3.00 (4.00)	2.00 ± 2.00 (2.00)	p[1] = 0.750
Expression of protest	4.00 ± 3.61 (3.00)	0.00 ± 0.00 (0.00)	p[1] = 0.250

Table 1. Continuation...

Variable	Evaluation		P value
	Pre-	Post-	
	Mean ± SD (Median)	Mean ± SD (Median)	
Shared game	0.00 ± 0.00 (0.00)	1.33 ± 1.15 (2.00)	p[(1)] = 0.500
Narrative	0.00 ± 0.00 (0.00)	0.00 ± 0.00 (0.00)	p[(1)] = 1.000
Protest	1.00 ± 1.00 (1.00)	2.67 ± 1.15 (2.00)	p[(1)] = 0.500
Game	5.67 ± 4.04 (5.00)	6.00 ± 2.00 (6.00)	p[(1)] = 1.000

Four functions continued with equal means, among them three had a zero mean before and after: request for consent, recognition of the other, and narrative. The exhibition function had an average of 2.00 in each evaluation.

Table 2 shows the analysis of the total number of communicative acts per type: gestural, vocal, verbal, and total. Table 2 also shows that the average number of gestural acts increased slightly from 16.00 to 16.67 (4.19%). There was a reduction in the number of vocal acts from 12.33 to 5.33 (-56.77%). The total of verbal communicative acts increased from 6.00 to 30.00 (400.00%). The mean of number of acts also increased from 34.33 to 52.00 (an increase of 51.47%).

Table 2. Analysis of communicative media produced before and after speech-language intervention using AAC for children with ASD in Recife - PE, 2018, Brazil.

Variable	Evaluation	
	Pre-	Post-
	Mean ± SD (Median)	Mean ± SD (Median)
Gestural communications	16.00 ± 5.29 (18.00)	16.67 ± 1.15 (16.00)
Vocal communications	12.33 ± 12.70 (5,00)	5.33 ± 2.89 (7.00)
Verbal communications	6.00 ± 5.57 (7.00)	30.00 ± 26.29 (41.00)
Total	34.33 ± 21.83 (30.00)	52.00 ± 25.71 (61.00)

Figure 1 shows the means of each child regarding the production of communicative acts before and after speech therapy using AAC, with emphasis on the communicative medium. Figure 2, in turn, shows the total gestural communicative acts produced by the studied subjects before and after therapeutic intervention with AAC. In child 1, there was a reduction in gestural acts, while in child 2 the quantity remained stable. In child 3, unlike the others, there was a significant increase in gestural acts.
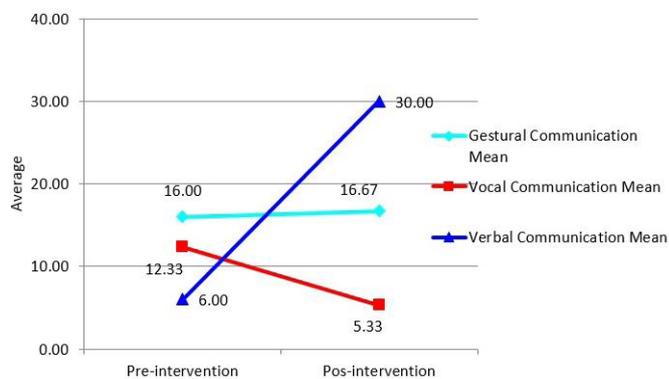

Figure 1. Means of communicative acts characterized by communicative means produced by the research subjects before and after speech-language intervention using AAC in Recife - PE, 2018, Brazil.
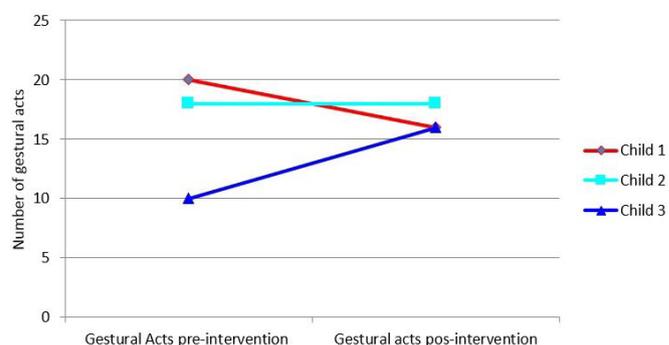

Figure 2. Total number of gestural communicative acts used in the evaluation of each child before and after speech therapy intervention using AAC according to analysis. Recife - PE, 2018, Brazil.

Figure 3 shows the visual presentation of the vocal communicative acts produced by the children before and after the intervention. There was an evident drop in vocal acts of child 1. Before the intervention, there was a large number of vocal acts. There was also a decrease in such acts of child 2, however a little less expressive. In child 3, on the other hand, there was an increase after the therapeutic intervention.
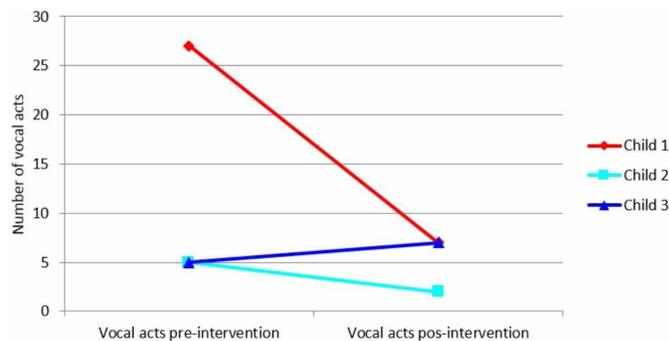

Figure 3. Total number of gestural communicative vocal acts used in the evaluation of each child before and after speech therapy intervention using AAC according to analysis. Recife - PE, 2018, Brazil.

Finally, Figure 4 shows the number of verbal acts produced by children before and after intervention. It is possible to observe that in children 1 and 2, there was a notable increase in verbal acts in the post-treatment period in relation to the moment of pre-intervention assessment. However, child 3 did not produce verbal acts.
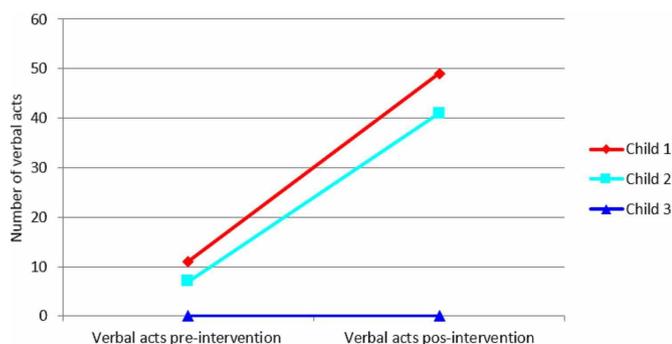

Figure 4. Total number of gestural communicative verbal acts used in the evaluation of each child before and after speech therapy intervention using AAC according to analysis. Recife - PE, 2018, Brazil.

DISCUSSION

One of the main abilities that changes in individuals with ASD is the communicational one. In the present study, AAC was used as a therapeutic strategy aiming to establish functional communication, since many individuals with ASD express themselves and understand better through non-oral systems and, for this reason, AAC becomes a promising alternative for this contingent of people[19].

The results of using such a tool are notable because of the great increase in the number of communicative acts shown by the three studied subjects. This corroborating the studies of Reichle[15], and Schlosser and Wendt[14], who concluded that, after intervention with AAC, communication develops, which is a positive result.

Figure 4 shows that there was a greater increase in verbal communicative acts of children 1 and 2 after speech therapy using PECS-Adapted. Also, as Table 1 shows, the communicative functions *request for information, naming, and comment*, which are verbal acts, increased considerably. Accordingly, the study by Moreschi and Almeida[20], which aimed to verify the linguistic development after AAC, concluded that, after intervention, the individual starts to interact better with the therapist. It feels the need to ask questions and make inquiries during the dialogue, just as it will direct the interlocutor's attention to an event through comments.

It is important to note that these children already attempted imitations, which we noted from the pre-intervention assessment. This data is relevant considering that imitation is a type of behavior that can be considered a predictor that favors the development of oral language, according to the study by Schlosser and Wendt[14].

By comparing Figures 3 and 4, there is a certain coherence. Figure 4 points to an increase in the use of verbal acts by children 1 and 2. Figure 3 shows a decrease in the use of communicative acts of the vocal environment. Therefore, it can be inferred that there was an evolution in the verbal communication of these children characterized by an increase in the oral production of words and phrases. Nunes and Walter[21], in their descriptive review of the literature on the use of AAC in the context of ASD, observed that many studies conducted with AAC reported an increase in expressive vocabulary, also optimizing receptive language skills.

Meanwhile, the child 3 also showed an evolution in communication skills. It is possible to follow this evolution in Figures 2 and 3: there was a slight increase in the production of vocalizations and a great increase in the production of acts in the gestural environment, despite not presenting a production of words or phrases yet. Cardoso and Fernandes[22] emphasized that vocal gestures and signals are pre-verbal acts, that is, they precede the oral language itself. Thus, the evolution of the child 3 follows the course of language development.

In the review of literature Mizael and Aiello[23] conducted, which reviewed studies that address the use of PECS-Adapted, the authors found a considerable number of studies that concluded that stimulation using PECS-Adapted is effective in promoting functional communication, increasing both gestural and vocal acts of individuals and the number of exchanges of figures independently. They also reported an increase in verbal production. Thus, on average, all cases were successful after speech therapy with AAC, according to Figure 1.

In terms of the considerable increase in communicative acts in general, it is evident that their quality has improved greatly. Table 1 shows that the means obtained after intervention are higher for communicative acts in an effective social interaction, a skill that changes in children with ASD.

Among the acts described in Table 1, there was a decrease in some acts according to the pre-therapeutic intervention evaluation, by which we can consider the individual more immature, depending on the age, namely *expression of protest*, *exploratory*, and *not focused*, which are non-interpersonal functions with the sole purpose of regulating actions, and not focused, that is, without a communicative intent[19].

Such acts are characteristic of younger children, since they consist of tantrums without apparent justification, of bringing objects to their mouths, or even not using toys in a functional way, and of presenting gestures or emissions not directed at objects or people, respectively. The results show that the improvement in functional communication also promoted development in the behavior of such individuals. The act not focused on a specific object is generally present in children with ASD. Table 1 shows a reduction of this, which results in a significant improvement.

In addition, there was a small reduction in the communicative function object request. It can be justified because the children's vocabulary enriched after intervention and, consequently, there

was a greater variety of communicative acts. As the individual matures regarding language, the field of social interaction increases and thus other needs arise in addition to requesting objects, such as asking or providing information about objects, people, or situations, and narrating facts.

Therefore, in the general evolution of communication between the children 1 and 2, there is a clear similarity, according to Figures 3 and 4, which show a decrease in vocal acts and an increase in verbal acts. By reflecting on these aspects, there is a similarity between these children regarding a) children's age during the intervention period: between three and four years; b) ASD severity level obtained by CARS[18] since the children 1 and 2 had a light-moderate ASD; c) imitation capacity, according to the initial evaluations, by which we observed that the two subjects had the imitation ability; d) mothers' education: the mother of child 1 has incomplete higher education and that of child 2 has higher education; and finally e) adherence to treatment. In evolution records there is a description of the performance of activities at home consistently by children 1 and 2.

As for the child 3, it is known that he differs from children 1 and 2 in several aspects, including age, since he is the youngest individual. In addition, his ASD level was severe, and the commitments to interaction and behavior were greater. In addition, the mother has only a complete high school, and adherence to treatment, regarding activities to be performed at home, has only improved in the last two months of treatment. Nevertheless, the sample is small to generalize. However, we can consider that there are specific factors of the type of ASD and social factors that influence the effectiveness of the treatment.

CONCLUSION

The use of AAC in the three cases favored the development of functional communication from the level which each child had. This was evidenced by the development of communicative acts through verbal means in children 1 and 2, and an increased use of communicative acts through gestures and vocalizations in the child 3.

The present study is limited by its small sample size. A larger number of subjects could improve the results. Thus, the data obtained must be interpreted with caution. They need to be carefully explored, so that the study can be replicated in future large-scale research.

Despite these limitations, this study shows that the use of AAC in speech therapy provides children with ASD with the opportunity to develop their communication skills.

In addition, it is essential to emphasize that the promotion of functional communication in individuals with ASD provides them with a better quality of life, improving the chances of being included in society and developing all areas of life.

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Authors' contributions

ETP carried out the research for a course completion paper and worked on obtaining data, writing the manuscript, analyzing, and interpreting data; ACAM was the coordinator of the work and worked on the subject and research design, data analysis and interpretation, data collection, data analysis and interpretation, and writing and reviewing the manuscript; AGCR performed a critical review of interpretation of data and statistical analysis; CCFW performed a critical and intellectual review of the study, writing of the manuscript, and data interpretation.