Original Research Article

THE IMPACT OF EQUINE-ASSISTED THERAPY ON BEHAVIORAL CHALLENGES IN CHILDREN WITH AUTISM

ABSTRACT

Animal-assisted therapy for children with autism (ASD) is a form of complementary therapy, integrating methods from various other types of therapy. AAT, or animal-assisted therapy, is a series of interventions that are based on the behavioral traits of animals, especially dogs and horses, which are the most common in this context. These interventions can be integrated into conventional treatments such as behavioral therapy, play therapy, music therapy, occupational therapy, speech therapy, and art therapy, depending on the individual needs of patients. The objective of this study was to examine the effects of an already existing Equine Assisted Therapy (EAT) program on social communication skills, executive functions and motor skills in children diagnosed with autism spectrum disorders. The research adopted an observational design to analyze how often certain behaviors occur in the presence or absence of horses in a group intervention program. This research included 16 children diagnosed with autism spectrum disorder (ASD), aged between 9 and 14 years (12 boys and 4 girls), who were selected from an School Center for Inclusive Education. The conclusions drawn from our results showed that the horse-assisted therapy, implemented in our experiment, recorded a notable improvement in all the behavioral parameters analyzed. Improvements were observed in Attention in Activity (21.2%), Communication (18.3%) and Compliance (9.1%) during activities, Physical Movements, with a difference of 34.1%, Affective State (23.33%), Visual Control (45%), Functional Skills and Response to Command (46.66%), Social Attention (33.5%) and Dynamic Motor Skills (35.55%) during activities. And the biggest difference was observed in Vocalizations, with a difference of 53%. Our results strongly support the fact that complementary therapy of autism spectrum disorders with the help of horses is an effective form of intervention, which can bring substantial improvements in therapeutic outcomes.

Keywords: children with autism, equine therapy,complementary therapy, assisted therapy of horses

1. INTRODUCTION

Autism spectrum disorders (ASD) is a heterogeneous group of neurodevelopmental alterations, characterized by persistent deficits in social communication, social interaction, and by restrictive, repetitive patterns of behavior, interests, or activities (American Psychiatric Association [1].

Social deficiencies are a main problem in the case of people with autism, and the integration of an animal as a complementary method for children with ASD is supported by the idea that an animal can function as a social mediator, contributing to the development of their social skills [2, 3]. Favorable outcomes achieved by EAT for people with ASD include positive influences on mood, reduction of problematic behaviors such as irritability, lethargy, stereotyping, hyperactivity, and aggression [4, 5, 6]. Improvement in physical, emotional, and social functioning, improved executive functioning, and improved postural stability are also observed [7,8,9].

The theory behind animal-assisted intervention (AIA) for children with ASD comes from human-animal interaction studies. In particular, research has shown that interacting with animals can be beneficial both physically and mentally (O'Haire, 2013). Dog-assisted therapy offers an attractive option for children with ASD, as the presence of therapy dogs enhances their social interactions [10, 11, 12]. Social interaction is related to the intensity of physical activity in children with ASD [13, 14, 15].

Equine Assisted Therapy (EAT), is an alternative treatment that offers certain activities with equines, to build a therapeutic interaction and communication between rider and horse [3, 16]. SAD can have positive effects on multiple impairments in children with ASD, including physical, emotional, social, cognitive, behavioral, and educational functioning [17,18]. There is also evidence for improved motor functioning and sensory processing in children with ASD [19, 20, 21]. Furthermore, it has been reported that EAT can positively alter children's mental well-being, self-efficacy, and self-esteem, and thus significantly influence the quality of life of children with ASD [22, 23].

An essential feature of ASD is the difficulty of social interactions and communication, which can lead to isolation and withdrawal tendencies, having a direct effect on personality and social development. Thus, it is essential that an EAT program emphasizes the development of social and communication skills, as this is crucial for increasing and improving the quality of life of children with ASD [24, 25, 26]. TAE can create an engaging multisensory environment and therapeutic interactions through collaborative activities between children and horses, which have a positive impact on the social and communication skills of the little ones [27].

Taylor et al. (2009)[28] and Gabriels et al. (2015)[29], proved that Equine-assisted therapy, therapeutic riding, and hippotherapy could improve sensory sensitivities, increase social motivation, and reduce stereotypical behaviors in children with ASD. Ward et al. (2013)[19] explained that social communication and sensory processing skills in children with ASD were improved during the intervention period with Equines. Llambias et al. (2016)[16]

reported a significant increase in social engagement among children with ASD, who participated in equine-assisted therapy, increased their social awareness and communication skills.

Mapes and Rosén (2016)[30], focused specifically on SAD in the context of autism spectrum disorder (ASD) in children. They found that the APR can be helpful in encouraging various outcomes. They involve more effective social communication, self-regulation capacity, standard of living, behaviors, physical functioning, and the fundamental symptoms frequently associated with ASD.

In 2016 Wiese et al.,[31] a systematic review of the APR for ASD was published, axându-se în mod particular pe rezultatele din domeniile comportamental și social.

In a comprehensive analysis of the mapping by Peters and Wood (2017)[32] on Dog-Assisted Therapy (CAT) in people with Autism Spectrum Disorder (ASD), the authors observed that the provision of Equine Assisted Therapy (EAT) is highly diversified and studied the features and outcomes of the intervention according to the classification of the program as equine-assisted "therapy" or "activity".

According to the review by O'Haire (2017),[9] Peters and Wood (2017)[32] noted that better social interaction, along with effective communication, is the most promising outcome of horse-assisted activities for people with ASD, in parallel with improved motor control, which is one of the best outcomes achieved in equine-assisted therapy.

A systematic review by Kendall et al. (2015)[33], focusing on the psychological outcomes of various population groups, demonstrated that the evidence on the effectiveness of EAT is most convincing for children, particularly in terms of behavioural improvement, social interactions, and family cohesion.The review also highlighted that group programs that emphasize physical skills and horseback riding, at the expense of psychosocial processes, can help improve social skills, behavior, well-being, self-regulation, and quality of life. The authors concluded that although the overall benefits seen from using EAT are preliminary, there is "promising support" for the effectiveness of these interventions in children and adolescents who have difficulties in the areas of language, communication, social functioning, behaviour, emotional regulation and learning. All these aspects are common among people with ASD.

The main objective of the study was to assess the impact of an existing EAT programme on social communication skills, executive functions and motor skills in children diagnosed with ASD. Unlike previous studies that primarily explored changes over time, this study was designed to explore what level of interaction with equines, if any, was associated with observed behavioral differences, and other abilities, during that interaction.

2. MATERIALS AND METHODS

The study involved 16 children (10 boys and 4 girls) who were selected from a School Center for Inclusive Education (C.S.E.I.). The ages of the children involved in the study ranged from 9 to 14 years, all included in conventional therapies and school assistance (primary/elementary education, the first stage of compulsory education) throughout the study. These children are diagnosed with: psychomotor delay; deficient general and specific motor skills; unfixed laterality; spatio-temporal disorientation; non-development of articulate verbal language; affective instability, autism spectrum disorders (ASD), based on specialized psychiatric and psychological examinations. The families of these children were notified about the development of this experiment within the C.S.E.I. and expressed their agreement, in writing, for the children's participation in our approach.

EAT sessions can be very demanding for children, as they consist of highly structured activities (e.g. horseback riding, grooming) that involve participants for about an hour. They thus require attention and the ability to focus on tasks. For these reasons, we chose to include only verbal children, older than 9 years old.Exclusion criteria: severe motor/neurological problems, verified allergies, fear response towards horses. Participants were randomly assigned to one of two groups (simple randomization):

- Batch 1 (n=8), consisting of children undergoing Equine Assisted Therapy (EAT);

- Batch 2 (n=8) consisting of children who were not subjected to Equine Assisted Therapy (EAT);

The EAT sessions took place at the equestrian, entertainment, recreation center and were used to treat children with autism spectrum disorders through equine-assisted therapy.

To ensure that the therapeutic sessions are carried out homogeneously and appropriately, before the start of the study, all riding instructors participated in preliminary meetings with the researchers and received both written and video materials (a properly prepared DVD) describing the session to be conducted.

The therapeutic sessions included the patient, the horse, a riding instructor, a psychotherapist, a psychopedagogue, an expert veterinarian who ensured the welfare of the animals throughout the study, and also included fences, boxes, arenas, ropes, bridle and gripping areas, all designed to manage the horses and their behavior.

In our experiment we used 5 riding horses (4 females and 1 neutered male), of the Lipizzaner breed, loved for its gentle, docile, but still temperamental, agile character, famous for its intelligence and great learning capacity. The 5 horses were aged between 4-8 years.

The sample of animals was uniform in terms of maintenance status. The animal feed consisted of: hay ad libitum, oats 6 kg/per animal/day and bran 1.5 kg/per animal/day. These animals were kept in a riding school in Ilfov County, where, in addition to other activities specific to horseback riding, entertainment and recreation, they were used to treat children with autism spectrum disorders through equine-assisted therapy.

The horse's welfare was ensured and guaranteed by the veterinarian specialized in equestrian rehabilitation throughout the study, taking into account health care, living conditions, working hours and equipment requirements.

2.1. Experimental design

The EAT meetings were held twice a week, over the course of three months, totaling 24 sessions for each child. The EAT sessions were structured in small groups of three to four children. The protocol of the sessions held during the 3 months is detailed in (table 1). Each session lasted approximately 50-60 minutes, comprising an initial 15-minute floor stage dedicated to care and 10 minutes of bridle horse walking, followed by 15-20 minutes of riding, and ending with a final 10-minute ground phase.

The care phase was designed to teach children the fundamental rules of safety and improve their knowledge of horses, including their morphology and behavior. Emphasis was also placed on aspects such as the harness, riding saddle, latches and practical elements of horse management, such as the correct way to care for them and the proper identification and use of the necessary tools. At this stage, the children were stimulated to listen to the psychotherapist's advice and communicate with the horse both through words and gestures.

The children were helped with visual materials (pictures, colorful drawings, and posters on the walls) illustrating both the horses' grooming tools and behaviors (e.g., facial expression), which were maintained in the stables throughout the entire study. Horseback riding activities were included from the fourth meeting and consisted of riding sessions (sessions 4-5) and saddle riding (starting from session 6).

The activities have been designed so that children learn the fundamentals of horseback riding, such as position, getting on and off the horse, walking and truffling, while participating in group activities (slalom, cup games, ball and cone games, etc.), which contribute to the development of motor skills and executive functions. The riding classes included lessons on how to drive a horse, how to manage the reins, and how to steer the horse through various obstacles.At the end of each riding session, another 10-minute segment on the field was provided, intended to conclude the activities. During this time, the children were helped to get off the horses and feed them, being encouraged to interact with them through expressions

such as "thank you" and "goodbye". Also, socialization activities were carried out with the research team.

Table 1

Protocol of equine-assisted therapy sessions during the 3 months.

From: Effectiveness of a standardized equine-assisted therapy program for children with autism spectrum disorder Borgi et. al. 2016 [35]

Sessions	Activity	Method of approach	Work tools	Objectives	Duration
1- 24	Horse care	Group meetings located in the stable	Care tools, harness, weaver, brushes, etc. Visual aids (images, posters and cards)	Getting to know the child about the morphology and behavior of horses, horse harnesses Main security rules Use of care tools, use of care techniques. Improvements in attention and memory Horse Management	15 min.
4-5	Circular riding without a saddle.	Individual or group sessions, horse handling	Vaultedcircumference, saddle, bridle. Cups, flags, balls, and cones (as landmarks while riding)	Assembly, disassembly of equipment. Learning the basics of horseback riding (walking, trotting). Improved balance and coordination on the horse Socializing with the group (group games)	20-25 min.
6-24	Saddle riding				
1- 24	Ending	Individual sessions held in the stable	Water, feed Visual aids (images, posters and cards)	Feeding the horse. Socializing: saying goodbye to the horse ("thank you" and "goodbye") and the group	10 min.

During the 24 sessions of the experiment, children underwent behavioral surveillance, according to the Pet Intervention Checklist (MOPI) [34], which is a four-item observational measure that assesses participants' involvement in an AAI, through attention, physical movement, verbal communication, and compliance. It uses a seven-point Likert scale, where (1) indicating no evidence, (7) is for strong evidence of behavior, and includes a short section for qualitative comments about the participant (see Table 2). It was concluded by drawing up ethograms, after each intervention session for each participant. The interpretation of the ethograms was made in accordance with the data in Table 3.

Table 2

Interpretation of the Pet Intervention Checklist (MOPI)

SKILLS	DEFINITION

Attention in the activity	It refers to attention and concentration, as well as the time spent on task (time-on-task) for a certain activity; in other words, the time dedicated to an activity until the beneficiary is distracted.
Physical movements	Fine and gross motor skills (intentional, load-oriented movements, etc.).
Communication	It refers to verbalization and observing the client's intention to communicate.
Compliant	ability to complete certain tasks.

Table 3

Interpreting the behavioral aspects targeted in the experiment

BEHAVIORAL SKILLS	DEFINITION
Communication (socializing) skills	
Affective state	
Positive	The corners of the lips raised, the incisors visible (smile).
Negative	The corners of the lowered lips, invisible incisors.
Neutral	Expressionless face.
Eye contact	
Eye contact present	Face visible, the child has eye contact with adults.
Eye contact not present	Face invisible, the child has no eye contact with adults.
Vocalization	
Positive vocalization	A sudden, loud vocalization that indicates excitement or happiness. It is not considered a word.
Negative vocalization	A sudden, loud, and/or harsh vocalization (e.g., screaming). It is not considered a word.
Functional execution skills	
Positive order response	Adequate response to adult requests (e.g. the child answers the question "What's your name?")
Negative command response	Inadequate response to requests from adults (e.g., screams).
Social attention	
Positive social attention	The child focuses on a person who is talking or performing actions (for example, directs the body towards an adult who is talking). The child looks at the adult when his name is spoken. It can overlap with eye contact.

Negative social attention	The child does not focus on a person who is talking. The child does not respond to adult calls.
Motor skills	
Static abilities	The child remains stationary for the entire observation period.
Dynamic skills	The child engages in behaviors such as walking, running, dancing, or crawling.

The way in which the monitoring of the participating children was carried out was chosen randomly and defined before the start of each session. After information about one child was gathered, monitoring of the next child was initiated, until all 8 children were assessed. After the entire sample was supervised, a second phase of observation began, in which the participants were arranged in another random order. This model was maintained throughout the intervention.

The team involved in this project was diversified and included volunteers, both humans and horses. It was composed of specialists in the therapeutic field, such as psychologists, psychopedagogues, psychotherapists and speech therapists, along with professionals in animal-assisted therapy, including veterinarians. Other experts who are striving to highlight the benefits of human-animal interaction, as well as to promote therapy and activities involving animals, have also contributed.

The families of these children were notified about this experiment and expressed their written agreement for the children's participation in this endeavor.

The experimental procedures imagined did not affect the level of animal welfare.

2.2. Statistical analysis

The data obtained were statistically analyzed, calculating the Mean and Standard Deviation (SD), using the Microsoft Excel application. At the same time, the statistical significance of the differences between the batches was calculated using the t-test (Student), using the Microsoft Excel application.

3. RESULTS AND DISCUSSIONS

The analysis of the data obtained by using the Pet Intervention Checklist (MOPI) in the two experimental batches created for the conduct of our experiment is presented in Table 4.

The results regarding the attention of the children who participated in the activity in our experiment showed a significant difference between the two groups ($P<0.05$). A decrease

of 28.9% was observed in Batch 1 (children who received EAT) compared to Batch 2 (children who did not receive EAT)(See Figure 1).

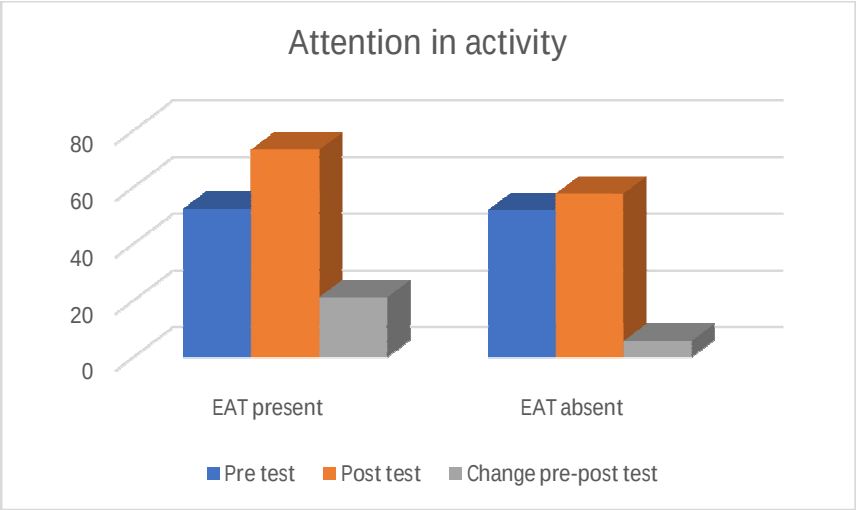

Figure 1. Percentage share of Attention in the activity (taken in the study), in the case of the two experimental groups.

There was a significant difference between the two groups ($P<0.05$) in terms of the results obtained regarding the amount of physical movements of the children who took part in the experiment. In the case of group 1 (children who received EAT), the reduction was 40.74%, approximately ten times higher than in the case of group 2 (children who did not receive EAT) (See Figure 2).

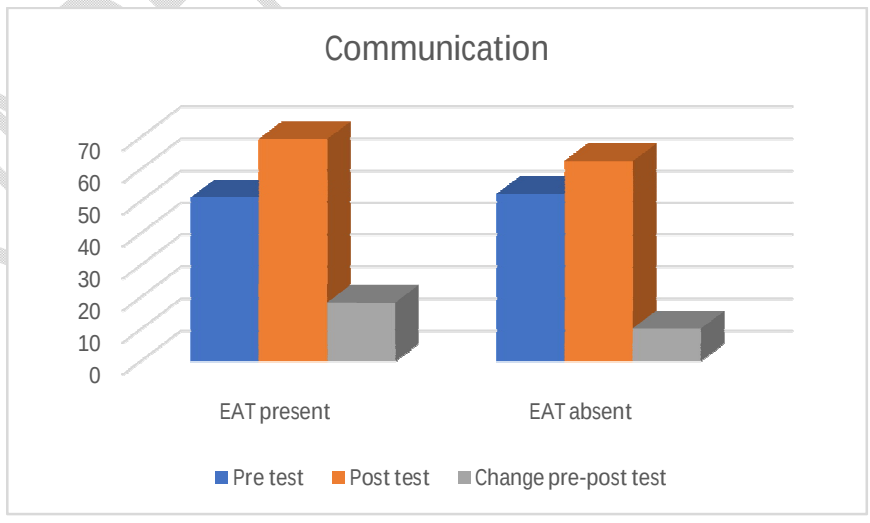

Figure 2. The percentage weight of the physical movements taken in the study, in the case of the two experimental groups.

Significant differences were observed between the two groups participating in the experiment regarding communication ($P<0.05$). A reduction of 26.33% was observed in group 1 (children who received EAT) compared to group 2 (children who did not receive EAT). (see Figure 3).

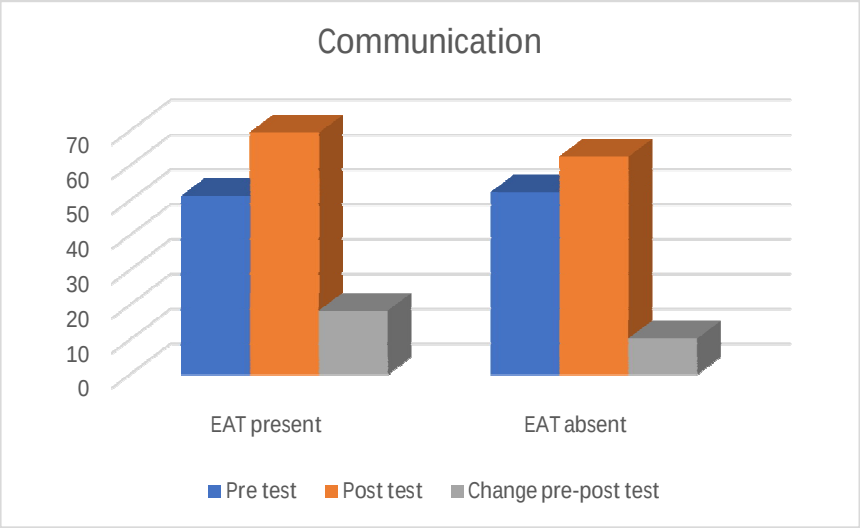

Figure 3. The percentage weight of the Communication taken in the study, in the case of the two experimental groups.

When the Compliance of the children who participated in the experiment was examined, a significant difference was found between the two groups ($P<0.05$). A 9.1% increase in the compliance of children in batch 1 (children who received EAT), compared to those in batch 2 (children who did not receive EAT). (see Figure 4).

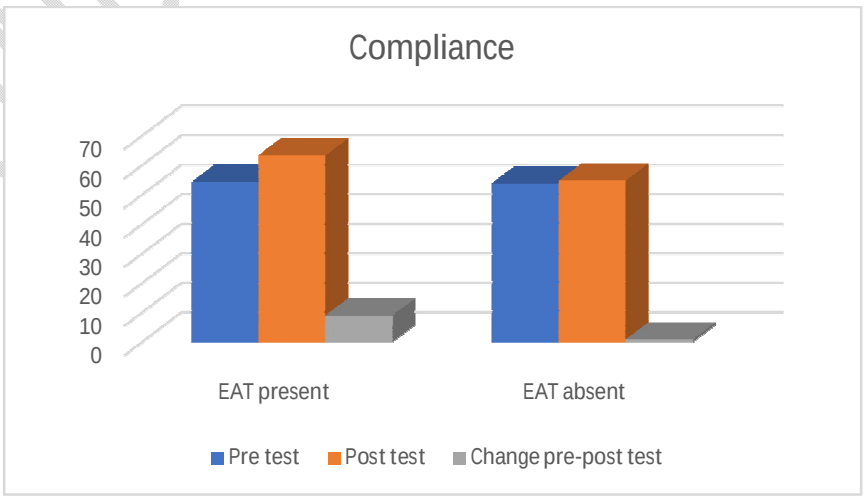

Figure 4. The percentage weight of the Compliance taken in the study, in the case of the two experimental lots.

Results on the effectiveness of EAT as a complementary intervention for children with ASD, assessed by the MOPI method, are presented in Table 4. Here, significant differences ($P<0.05$) were observed between the two experimental groups. Improvements were observed in terms of Attention in activity (21.2%), Communication (18.3%) and Compliance (9.1%) during activities. The largest difference was observed in Physical Movements, with a difference of 34.1%.

Table 4

Analysis of effectiveness in the intervention of horses compared to the control group (MOPI)

Test measure	**Experimental batch (n=8)**			**The control lot (n=8)**		
	Pre-test Media ±SD	**Post test Media ±SD**	**Pre-post test modification**	**Pre-test Media ±SD**	**Post test Media ±SD**	**Pre-post test modification**
Attention in the activity	52,5±5,1	73,3±5,1	21,2±3,8*	51,9±4,9	57,7±4,7	5,8±1,2*
Physical movements	49,6±4,8	83,7±4,6	34,1±2,9*	55,8±3,6	60,2±3,4	4.4±0,9
Communication	51,2±4,6	69,5±3,9	18,3±2,5*	52,3±3,2	62,6±3,2	10,3±1,2*
Compliance	54,3±4,3	63,4±4,2	9,1±1,5*	53,9±4,1	54,8±3,9	0,9±0,1

The analysis of the measurements made with the help of the ethograms made during the conduct of our experiment are centralized in Table 5.

Regarding the affective status of the children involved in this experiment, we observed a notable distinction between the two groups ($P<0.05$). In Batch 1, i.e. those children who benefited from Equine Assisted Therapy (EAT), no less than 58.33% positive reactions were recorded. This represents a considerable increase, 23.33% more than the percentage of positive reactions observed in Lot 2, which includes children who did not receive the same therapy. (See figure.5).

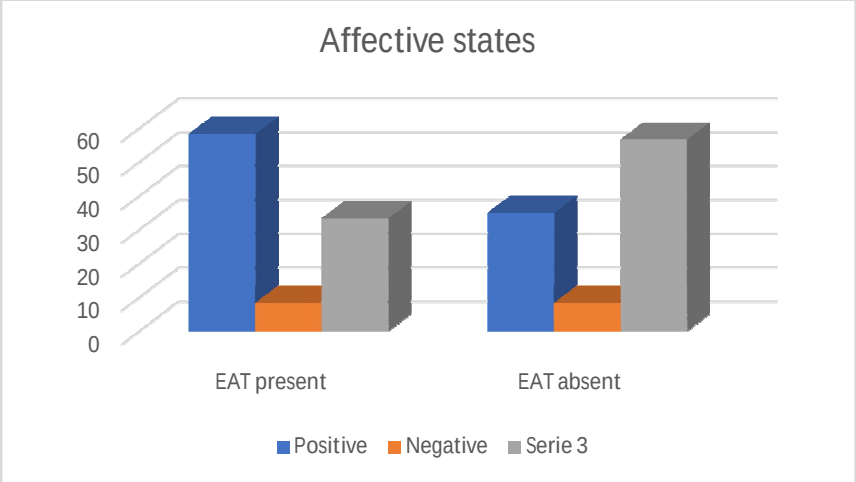

Figure 5. Percentage weight of the categories of affective states taken in the study, in the case of the two experimental groups

In our analysis of the eye contact of the children involved in the experiment, we discovered something really interesting: a notable difference between the two study groups ($P<0.05$). When we looked at Batch 1, made up of children who benefited from Equine Assisted Therapy (EAT), we noticed that 67.5% of the observations revealed eye contact and, surprisingly, this was 45% higher than in Batch 2, where the children did not receive Equine Assisted Therapy (EAT). (See figure 6).

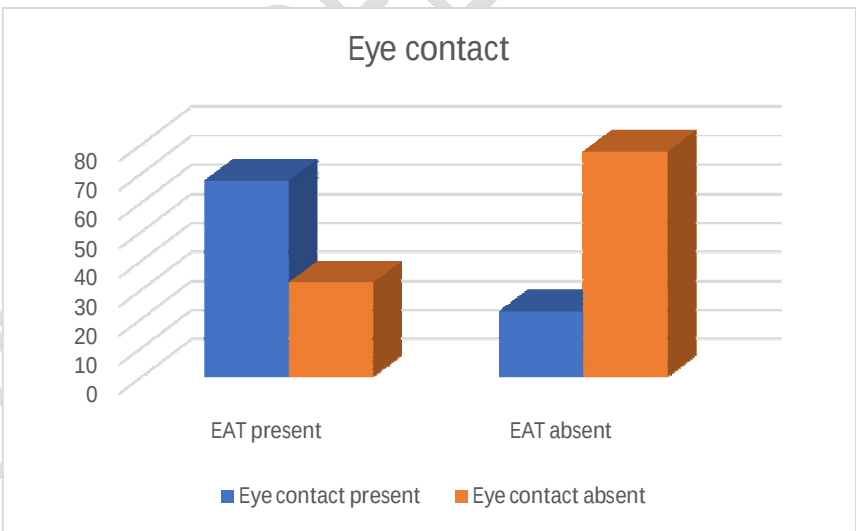

Figure 6. Percentage weight of observations regarding eye contact, in the case of the two experimental batches

When we analyzed the vocalizations of the children involved in the experiment, we found a remarkable variation between the two groups ($P<0.05$). In Lot 1, that is, that group of children who had Equine Assisted Therapy (EAT), we noticed that their positive expressions

were in an impressive number, reaching a proportion of 76.2%. This result turns out to be 53% higher compared to Batch 2, where children did not benefit from this therapy. (See Figure 7).

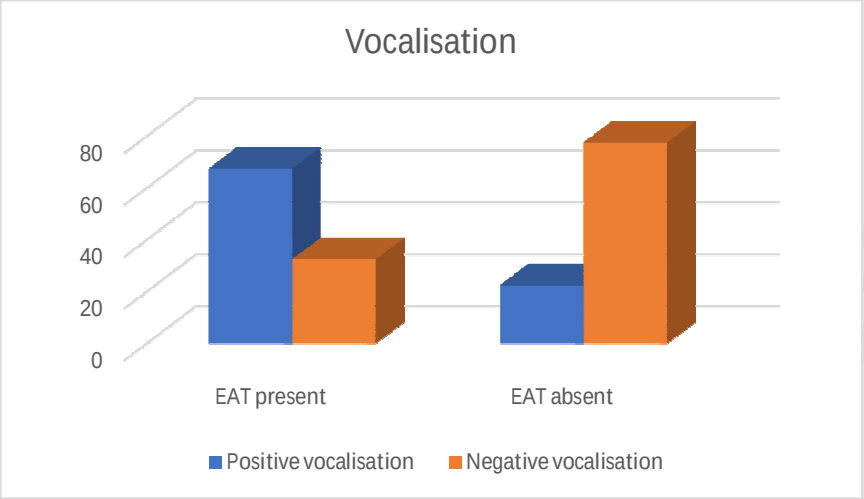

Figure 7. Percentage weight of vocalization observations, in the case of the two experimental batches

Regarding the functional skills of execution and response to command of the children involved in this experiment, we observed a considerable difference between the two groups ($P<0.05$). In Lot 1, i.e. those children who benefited from Equine Assisted Therapy (EAT), the share of observations that show a favorable reaction to the order is 76.2% positive reactions. This represents a considerable increase, 46.66% more than the percentage of positive reactions observed in Lot 2, which includes children who did not receive the same therapy. (See fig.8).

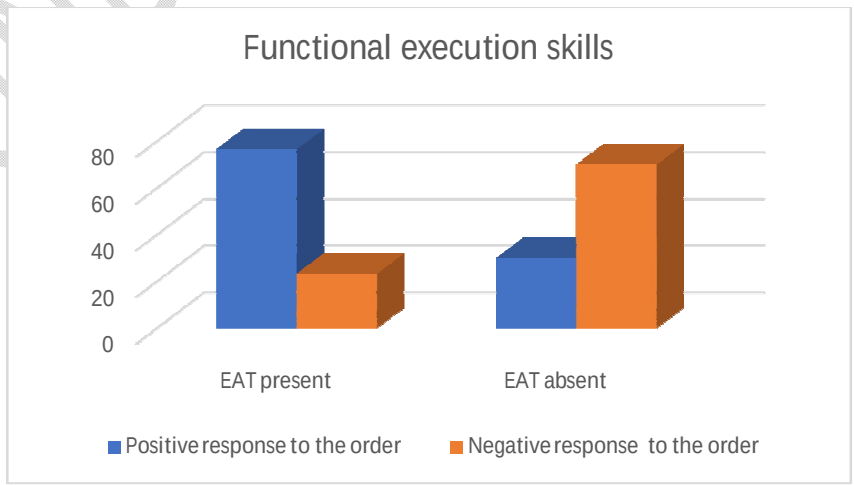

Figure 8. Percentage weight of observations regarding Execution Skills, in the case of the two experimental batche

In our analysis of children's social attention in the experiment, we observed a notable difference between the two study groups (P<0.05). When we looked at Batch 1, made up of children who benefited from Equine Assisted Therapy (EAT), we noticed that 66% of the observations revealed a positive response to the requirements, with a difference of 33.5% higher than the similar findings in the case of children who did not receive Equine Assisted Therapy (EAT). (See figure 9).

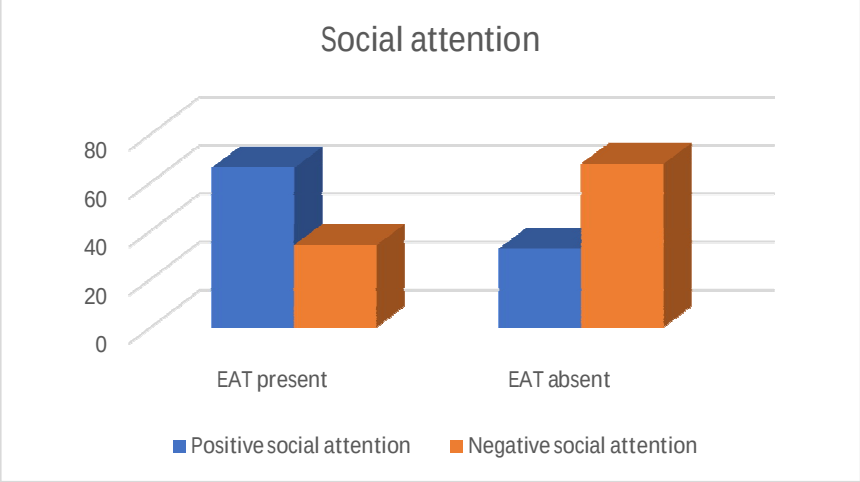

Figure 9. Percentage weight of observations regarding social attention, in the case of the two experimental group

Looking at the motor skills of the children involved in the experiment, we noticed a significant discrepancy between the two groups (P<0.05). In the case of group 1 children who benefited from Equine-assisted therapy, the number of findings showing dynamic abilities represents 66.67% of the total, with an increase of 35.55% compared to similar findings in the case of group 2 children who did not benefit from Equine-assisted therapy. (See figure 10).

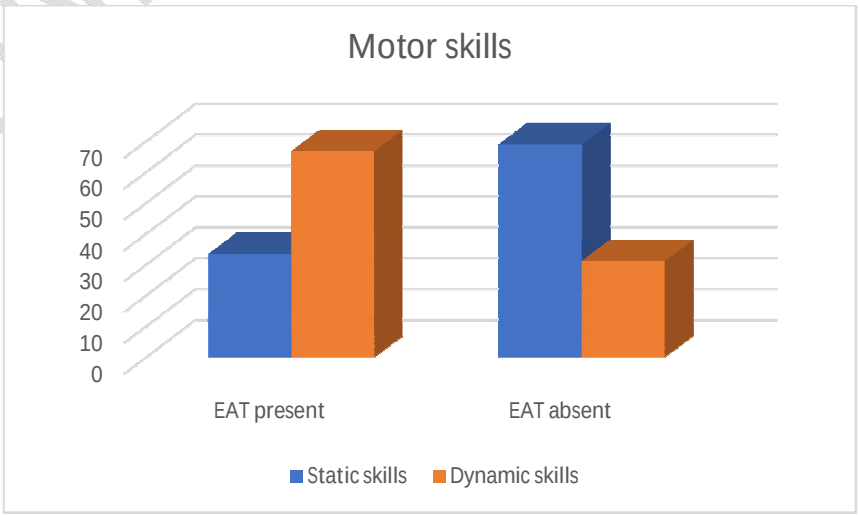

Figure 10. Percentage weight of observations regarding motor skills, in the case of the two experimental groups

Results on the efficacy of EAT, as a complementary intervention for children with ASD, assessed by ethograms, after each intervention session for each participant, are presented in Table 4. Here, significant differences ($P<0.05$) were observed between the two experimental groups. Improvements were observed in terms of Affective State (23.33%), Visual Control (45%), Functional Skills and Command Response (46.66%), Social Attention (33.5%) and Dynamic Motor Skills (35.55%) during activities. And the biggest difference was observed in Vocalizations, with a difference of 53%.

Table5

The absolute and percentage frequency of the monitored behaviors, in the case of the two experimental groups

	Observations			
	TAC present		**TAC absence**	
	n	**%**	**n**	**%**
Communication skills (socialization)				
Affective state				
Positive	35	58,33*	21	35
Negative	5	8,33*	5	8,33
Neutral	20	33,34*	34	56,67
Eye contact				
Eye contact present	27	67,5*	9	22,5
Contact vizual absent	13	32,5*	31	77,5
Vocalization				
Positive vocalization	16	76,2*	9	42,85
Negative vocalization	5	23,8*	12	57,15
Functional execution skills				
Positive order response	23	76,66*	9	30
Negative command response	7	23,33*	21	70
Social attention				
Positive social attention	33	66*	13	32,5
Negative social attention	17	34*	27	67,5
Motor skills				
Static skills	15	33,33*	31	68,88
Dynamic skills	30	66,67*	14	31,12

This experimental research investigated the effectiveness of EAT in reducing challenges related to autism spectrum disorder (ASD). The results indicate that EAT is linked

to increased adaptive behavior and better coordination, while contributing to a gradual development of the child's abilities to react to the increased complexity of this type of positive behavioral support.

Due to the multisensory nature of different forms of animal-assisted therapy in general, it is difficult to identify which is the defining aspect in promoting positive change. Looking at the results obtained, they argue that interaction with a horse, being perceived as a satisfactory incentive, could explain higher levels of motivation and social involvement. Bass et al. (2009)[3].

The results of this study indicated a reduction and improvement in ASD characteristics, including lack of social awareness, commitment or motivation, verbal and non-verbal communication difficulties [35]. Improvements in these key areas are associated with the results obtained by Bass et al. (2009)[3] who reported improvements in motivation and social attention.

Analyzing the results obtained by us in terms of Physical Movements and Dynamic Motor Skills are consistent with those obtained by Collacchi et al. (2023)[36] and Bass et al (2009)[3], who state that the shape of the horse's body and rhythmic movement contribute to the multidimensional nature of EAT, contribute to the performance of society. Interestingly, our results are consistent with the results of Hawkins et al. (2014)[37] who suggest that improved social functioning is due to improved motor skills acquired through participation in EAT, which can allow for the development of age-appropriate social skills.

Our results are consistent with those obtained by Zoccante et al. (2021)[23], indicating a positive influence on the affective status of the children involved in the experiment.

Looking at and analyzing the results obtained in terms of the Affective State, Eye Contact and Positive Vocalizations, resonate with Zonneveld et al. (2012) [35], which shows that when children bond with animals, children can bond with humans, and negative attitudes decrease. These findings are also similar to Kern et al. (2011) [38], which showed an improvement in the severity of ASD symptoms after a 6-month TAE program.

This experimental study investigated whether EAT is effective in reducing problems associated with autism spectrum disorder (ASD). The results show that EAT is associated with better behavior and improves the child's ability to respond positively to the increasing complexity of this type of positive behavioral support. Interestingly, EAT reduced parental distress and improved parental reporting on the child's mood, aggression, non-compliance, and needs

4. CONCLUSIONS

The conclusions of this study indicate that EAT can influence the improvement of social aspects in children with ASD. The conclusions showed that a beneficial decrease in inappropriate behavior and an increase in the capacity for empathy were observed, it also showed a significant improvement in general adaptive behaviors, specifically, there were significant improvements in communication and social interaction.

Our results strongly support the fact that the auxiliary therapy of autism spectrum disorders with the help of horses is an effective form of intervention, which can bring substantial improvements in therapeutic outcomes.

Our research entitles us to argue that further qualitative and quantitative research is needed, and that more programs are also needed to focus on the therapeutic use of animals in children's therapy.

These positive results, according to our findings, do not hinder the level of welfare of the animals used in the therapy.

Ethical Approval

Not applicable.

Consent

The experiment was carried out with the agreement of the School Center for Inclusive Education (C.S.E.I.). The families of these children were notified about the conduct of this experiment within the C.S.E.I. and expressed their agreement, in writing, for the children's participation in this study.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts

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