Original Research Article

EVALUATION OF SOCIO-EMOTIONAL BEHAVIOR IN CHILDREN WITH AUTISM IN CANID-ASSISTED THERAPY

ABSTRACT

Animal-assisted therapy in children with autism (AAT) is a complementary therapy, which includes procedures from all other therapies. AAT is a group of interventions based on an animal's behavioural characteristics (the most common therapy animals being dogs), which, depending on needs, can be included in standard treatments such as behavioural therapy, play therapy, music therapy, occupational therapy, speech therapy and art therapy. The purpose of this study was to evaluate the impact of an existing TAA program on social communication skills, executive functions, and motor skills in children diagnosed with ASD. The study used an observational research design, exploring the frequency of behaviors when dogs are present or absent from an intervention group program. This study involved 16 children, diagnosed with ASD, aged between 7 and 13 years (12 boys and 4 girls) who were recruited from the School Center for Inclusive Education (C.S.E.I.) "LACRIMA" BISTRIȚA. The results obtained by us concluded that Canide-Assisted Therapy, applied under the conditions of our experiment, led to a significant improvement in all behavioral parameters taken in the study. We notice the positive effect, especially on the parameters related to group gaming behavior with a share of 38.7% higher than the control group, Eye Contact with a share of (15.68%) higher than the control group and Social Attention with a share of 28.57% higher than the control group. We also notice a positive effect on the parameters regarding emotional and physical functionality.

Keywords: therapy, children with autism, therapy dogs, complementary therapy, canine-assisted therapy

INTRODUCTION

Autism spectrum disorder (ASD) is a heterogeneous group of neurodevelopmental disorders characterized by persistent deficits in social communication and social interaction, and by restrictive, repetitive patterns of behavior, interests, or activities (American Psychiatric Association 2013)[1].

Animal-assisted therapy in children with autism (AAT) is a complementary therapy, which includes procedures from all other therapies. AAT is a group of interventions based on an animal's behavioural characteristics (the most common therapy animals being dogs)[2], which, depending on needs, can be included in standard treatments such as behavioural therapy, play therapy and more.

The most common therapy animals worldwide are dogs, as they are easy to train and evaluate at a behavioral level, given their behavioral characteristics that favor adequate communication with people, such as the inclination to play and the initiation of social interactions, as well as similarities in body postures associated with certain anxieties [3]. Other species of animals are also used, depending on the patient's needs (functional field of address: motor, cognitive, emotional, social) and the possibility of maintaining the animals: dolphins, cats, farm animals (dwarf pigs, llamas) and horses [4].

Studies on attachment focus on relationships between people; however, studies on children and pets indicate that this model can also be applied to the child-pet relationship [5, 6]. Sweats show that teenagers aged 11 to 12 spend more time caring for pets, and those aged 10 to 13 have found that a pet can be more understanding than humans, while those aged 7 to 15 get attached to an unfamiliar dog more easily, generally when they go to visit people who own pets [5].

Stress-related mental health problems, such as depression and anxiety, are very common in adults with autism spectrum disorder (ASD), affecting up to 77% of this population [7], premature mortality and poor health outcomes [8], and severity of ASD traits, which include problems in social interaction and communication [9]. Difficulties in social interactions and negative social experiences (for example, rejection) may contribute to reduced physical activity in children with ASD [10, 11, 12]. The theory behind animal-assisted intervention (AIA) for children with ASD comes from human-animal interaction studies. Particularly, research has shown that interacting with animals can be beneficial both physically and psychologically [13]. Dog-assisted therapy offers an attractive option for children with ASD because the presence of therapy dogs improves their social interactions [14, 13, 15]. Social interaction is related to the intensity of physical activity in children with ASD [16, 11, 12].

In addition to social communication deficits, people diagnosed with ASD have impaired motor skills [17, 18]. A review by Ruggeri et al. (2020) [19], noted that equine-assisted therapy can improve strength, agility, and coordination in children with autism, but on this topic few studies have explored interaction with dogs; however, it has been mentioned that activities such as throwing a ball, petting and caring for a dog can improve these skills [20].

TAA is a broad term for programs that focus on goals to improve social, physical, or cognitive behavioral well-being (International Association of Human-Animal Interaction Organizations 2018) [21]. These programs usually use "therapy animal", which means an animal involved in these programs organized by a self-employed professional in the field of health [22]. This field of study has grown a lot over the past twenty years, with reports showing that dogs therapy can enhance social and communication skills [14, 23]. In addition to dogs therapy, reviews suggest that therapeutic riding and

staying with a pet are linked to better social communication skills and reduce the severity of autism syndromes [24,15].

Improvements in social interaction and communication have also been reported [25, 26]. AAT may be particularly suitable for people with ASD, as animals communicate non-verbally, which can be a less stressful form of interaction than a conversation with a therapist that involves metacognitive and introspective aspects [27]. It has been hypothesized that in therapeutic area, animals act as social catalysts, causing patients to become more willing to communicate with their social environment, which in turn facilitates improved social interaction and communication [26]. Although the described effects of AAT (especially using dogs) in children with ASD are promising, but it is unclear whether these results can be generalized to adults. It is important that AAT studies in children report a number of limitations, such as small sample sizes, limited or no verification of ASD diagnosis, limited descriptions of the intervention and lack of control groups, randomization, and validated outcome measures [19].

The purpose of this study was to evaluate the impact of an existing AAT program 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 a dog, if any, was associated with observed differences in behavior and abilities over the course of that interaction. The study used an observational research design, exploring the frequency of behaviors when dogs are present or absent from an intervention group program.

MATERIALS AND METHODS

The 16 children participating in the study (12 boys and 4 girls) were recruited from the School Center for Inclusive Education (C.S.E.I.) "LACRIMA" in Bistrita. The ages of the children involved in the study ranged from 7 to 13 years. These children are diagnosed with: psychomotor delay; deficient general and specific motor skills; unfixed laterality; spatio-temporal disorientation; non-development of articulated 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 signaled their agreement, in writing, for the participation of the children in our approach.

The Dog Assist team was a multidisciplinary one, made up of volunteers – people and dogs. It includes specialist therapists (psychologists, psychopedagogues, psychotherapists, physiotherapists), canine instructors, animal-assisted therapy teams – canine handlers and therapy dogs – veterinarians,

as well as other professionals in the field who work to confirm the benefits of human-animal interaction, as well as to popularize the effects of these activities.

The 16 children were separated into two batches:

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

- Batch 2 (n = 8) consisting of children who have not undergone Canid Assisted Therapy (CAT).

The experimental protocol imagined by us lasted 8 weeks. During this interval, with a frequency of 2 sessions per week, the CAT was initiated, with children from Lot 1.

The duration of one meeting was 2 hours (10.00-12.00 hours). For this purpose, 5 dogs trained and specialized in CAT were used, assisted by a trainer specialized in this direction. These animals were part of the group of animals used for the purpose of performing appropriate treatments for children with ASD through CAT scan, by specialists from a specialized center in Bistrita-Nasaud County.

The 5 dogs used in the experiment were aged between 3-7 years. The dogs used in the experiment formed a uniform sample in terms of maintenance status. The animals' feed consisted of dry feed, administered in quantities ranging from 17-25 grams of feed per kg body weight/day. The water was administered ad libitum. The dogs were verified from the point of view of health and behavior by the veterinarian before each session.

During the CAT sessions, activities were carried out such as: contact with the patient, socialization and adaptation with the child under treatment, walking, running together, playing with frisbee (flying saucer) and other pet-toys.

Children from Batch 2 were subjected, for 8 weeks, with a frequency of 2 sessions per week, to regular treatment sessions (without the use of dogs), in the presence of a therapist. This regular treatment was applied at the same time to the children in batch 1, who also benefited from the associated treatment with dogs. The duration of these sessions was 2 hours.

During the 16 sessions of the experiment, children were subjected to behavioral surveillance, completed by drawing up ethograms.

The interpretation of the ethograms was made in accordance with the data in Table 2.

Table 1

Table of animals used in the experiment

Animal nr.	Taste	Sex	Age (years)
1	German Shepherd	Female	3
2	Golden retriever	Female	4

3	**Beagle**	**Male**	**6**
4	**Golden retriever**	**Female**	**5**
5	**Beagle**	**Male**	**4**

Table 2

Interpreting the behavioral aspects targeted in the experiment

BEHAVIORAL ENABLED	**DEFINITION**
Communication skills (socialization)	
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 absent	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 (for example, screaming). It is not considered a word.
Game	
Solitaire game	Child engaged in solitary recreational activities.
Play in pairs	Child engaged in recreational activities with another child.
Adult game	Child engaged in recreational activities with an adult.
Group play	Child engaged in recreational activities with more than two other children.
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, orienting 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 order in which the participating children were monitored was randomized and established before the start of each session. Once the data was collected for one child, monitoring of the next child began, until all 8 children were observed. Once the entire sample was monitored, a second observation period was triggered, with another randomized order of participants. This pattern continued throughout the intervention session.

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.

RESULTS AND DISCUSSIONS

The analysis of the ethograms drawn up during the conduct of our experiment is centralized in Table 3.

Regarding the affective state of the children involved in the experiment, we found a significant difference between the two groups ($P<0.05$). In the case of Batch 1 (children who benefited from the CAT) the number of positive records having a weight of 56.09%, 137.08% higher than the share of positive records found in the case of Batch 2 (children who did not benefit from the CAT) (See fig.1).

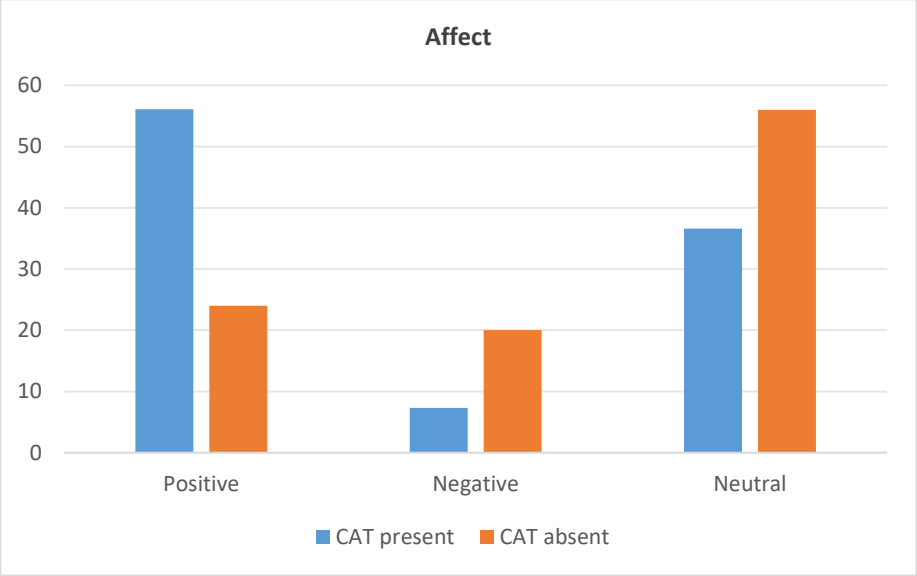

Fig.1.Percentage weight of the categories of affective states taken in the study, in the case of the two experimental groups.

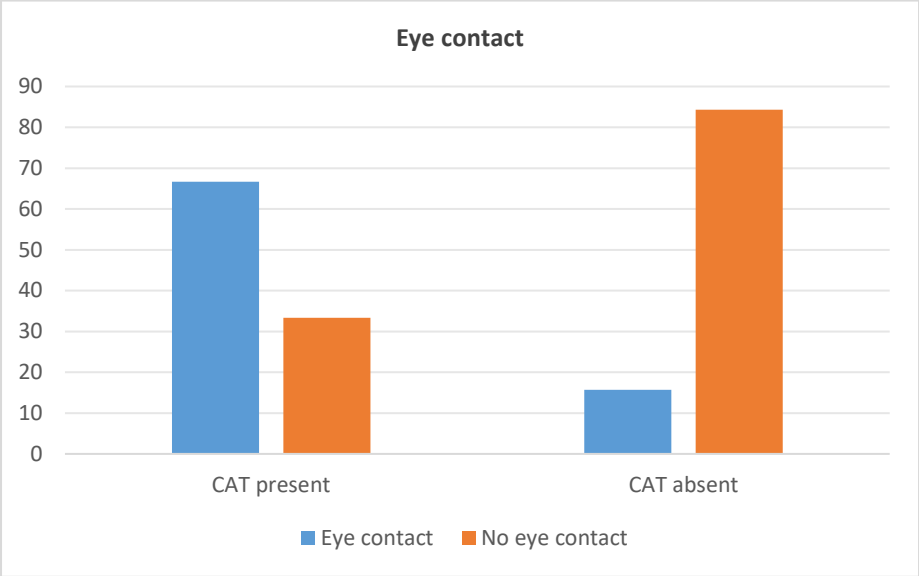

Fig.2.Percentage weight of observations regarding eye contact, in the case of the two experimental batches.

Regarding the eye contact of the children involved in the experiment, we found a significant difference between the two groups ($P<0.05$). In the case of Lot 1 (children who benefited from the CAT) the number of observations indicating eye contact having a weight of 66.66%, 325.12% higher than the similar observations found in the case of Lot 2 (children who did not benefit from the CAT). (See fig. 2).

Regarding the vocalization of the children involved in the experiment, we found a significant difference between the two groups ($P<0.05$). In the case of Batch 1 (children who benefited from CAT), the number of observations indicating positive vocalization having a weight of 75.0%, 94.88% higher

than the similar observations found in the case of Batch 2 (children who did not benefit from CAT). (See fig. 3).

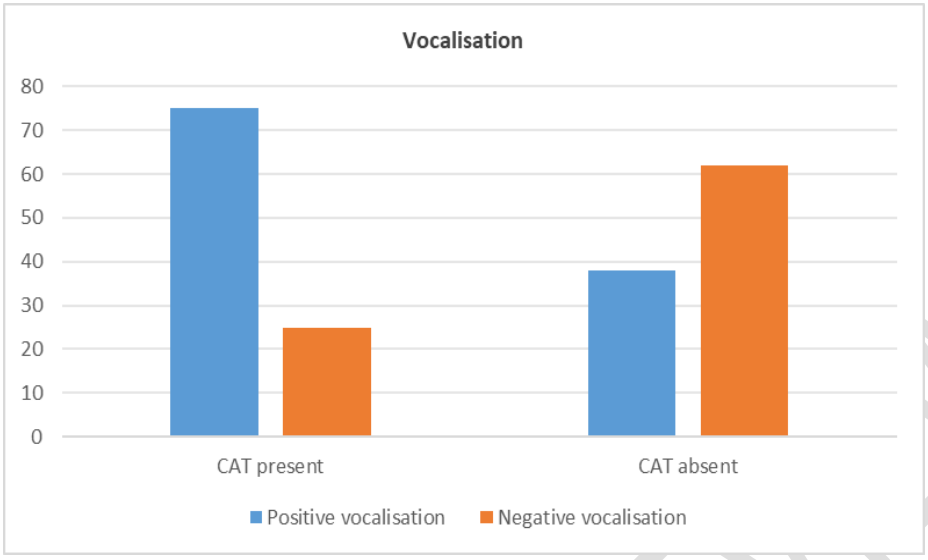

Fig.3.Percentage weight of vocalization observations, in the case of the two experimental batches.

Regarding the play of the children involved in the experiment, we found a significant difference between the two groups ($P<0.05$). In the case of Lot 1 (children who benefited from the CAT) the number of observations indicating group play having a weight of 38.7%, with 216.17.80% higher than the similar observations found in the case of Lot 2 (children who did not benefit from the CAT). Also, in the case of Lot 1 (children who benefited from the CAT) the number of observations indicating solitary play had a weight of 22.58%, 44.67% lower than the similar observations found in the case of Lot 2 (children who did not benefit from the CAT). (See fig.4).

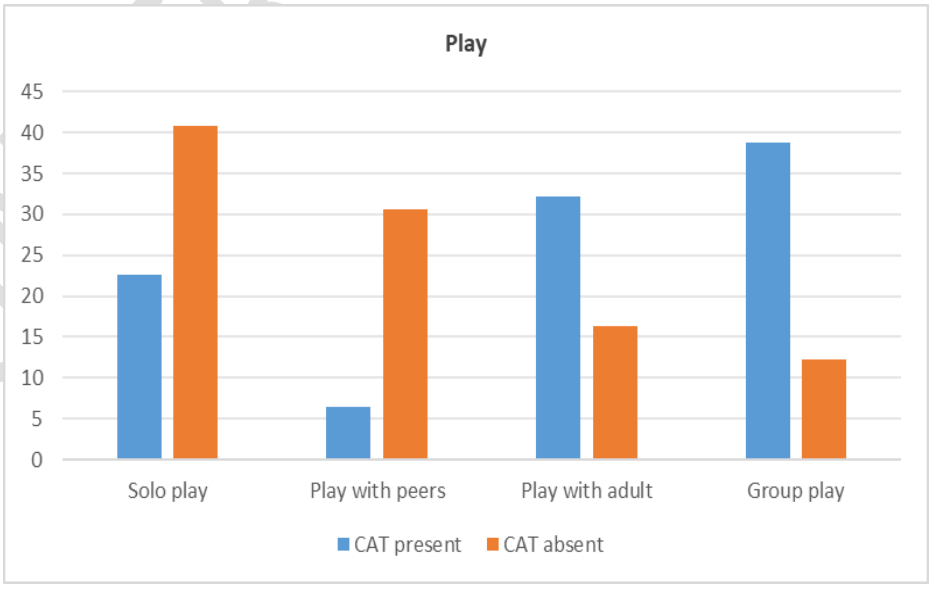

Fig.4.The percentage weight of the observations regarding the Game, in the case of the two experimental batches.

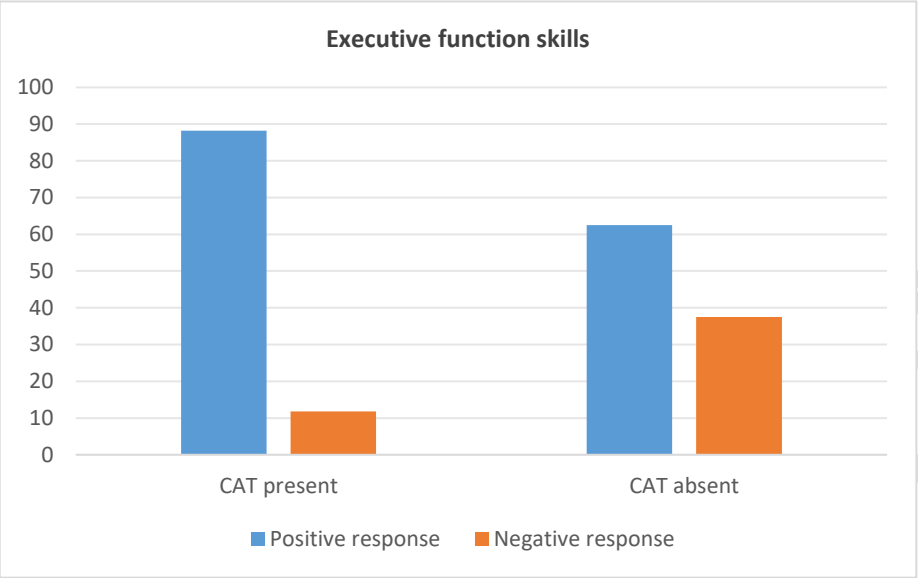

Fig.5.Percentage weight of observations regarding Execution Skills, in the case of the two experimental batches.

Regarding the execution skills of the children involved in the experiment, we found a significant difference between the two batches ($P<0.05$). In the case of Lot 1 (children who benefited from the CAT), the number of observations indicating a positive response to the order having a weight of 88.23%, 41.16% higher than the similar observations found in the case of Lot 2 (children who did not benefit from the CAT). (See fig. 5).

Regarding the social attention of the children involved in the experiment, we found a significant difference between the two groups ($P<0.05$). In the case of Lot 1 (children who benefited from TAC), the number of observations indicating a positive response to the order having a weight of 42.85%, with 49.98% higher than the similar observations found in the case of Lot 2 (children who did not benefit from the CAT). (See fig.6).

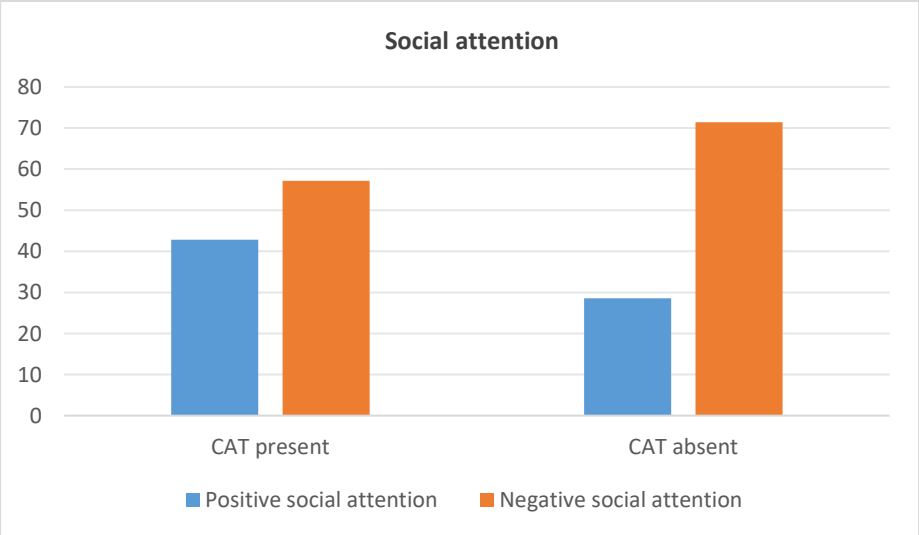

Fig.6.Percentage weight of observations regarding social attention, in the case of the two experimental groups.

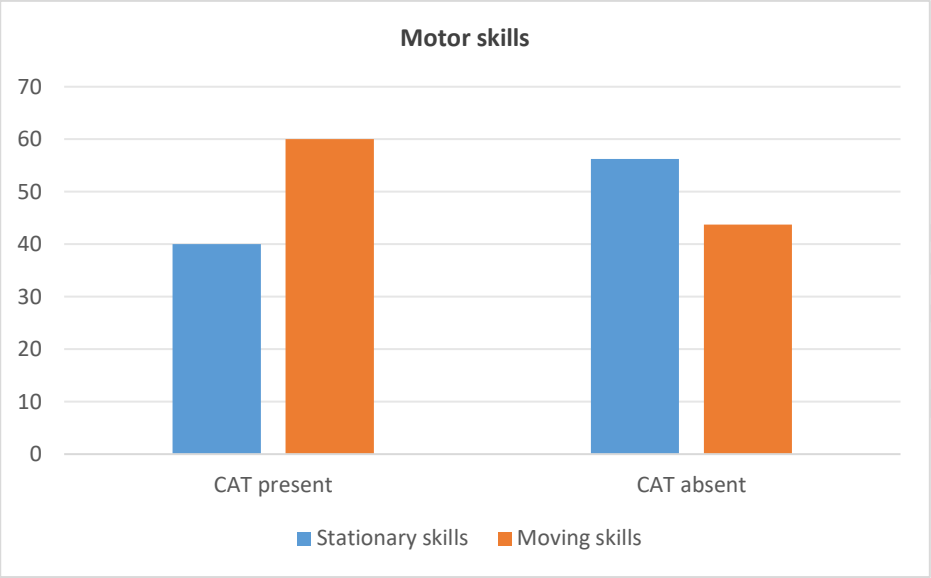

Fig.7.Percentage weight of observations regarding motor skills, in the case of the two experimental groups.

Regarding the motor skills of the children involved in the experiment, we found a significant difference between the two groups (P<0.05). In the case of Lot 1 (children who benefited from the CAT), the number of observations indicating dynamic abilities having a weight of 60.00%, 37.14% higher than the similar observations found in the case of Lot 2 (children who did not benefit from the CAT). (See fig. 7)

Table 3

Absolute and percentage frequency of monitored behaviors, in the case of the two experimental batches

	Observations			
	CAT **present**		CAT **absent**	
	n	**%**	**n**	**%**
Communication skills (socialization)				
Affective state				
Positive	23	56,09*	12	24
Negative	3	7,31*	10	20
Neutral	15	36,58*	28	56
Eye contact				

Eye contact present	20	66,66*	8	15,68
Eye contact absent	10	33,33*	43	84,31
Vocalizare				
Positive vocalization	12	75*	8	38,09
Negative vocalization	4	25*	13	61,90
Joc				
Solitaire game	7	22,58*	20	40,81
Play in pairs	2	6,45*	15	30,61
Adult game	10	32,25*	8	16,32
Group play	12	38,70*	6	12,24
Functional execution skills				
Positive order response	15	88,23*	20	62,5
Negative command response	2	11,76*	12	37,5
Social attention				
Positive social attention	6	42,85*	4	28,57
Negative social attention	8	57,14*	10	71,42
Motor skills				
Static abilities	10	40*	45	56,25
Dynamic skills	15	60*	35	43,75

*P<0,05

Our research shows that the association of CAT with the current therapy of children with ASD left a significant imprint on the parameters highlighted in our study. Our observations of the effect of CAT on eye contact, play and social attention indicate a consistent attenuation of signs of agoraphobia, syndrome specific to children with ASD. These results coincide with those published by Wijker et al. (2020), [28] and Deanna et al. (2022), [2**9**]**,** indicating a positive influence on the affective status of the children involved in the experiment.

Our research highlights the positive effects of animal-supported approaches on children with autism. Here we note especially with regard to sensory, emotional and physical functioning, findings that are in line with the results published by Chin-Siang Ang et al (2022), [30].

We also emphasize the positive effect of canine treatment on the parameters related to eye contact. This relevant indicator of the level of social contact was three times higher in the experimental group compared to the control group. This fact is noteworthy being, at the same time, in accordance with the research carried out in the same field of study by Deanna et al (2022), [29].

In our research we had among the working hypotheses the idea that interaction with animals, during treatment sessions against autism spectrum disorders, should improve motor skills. We believe that this may be a consequence of contact with animals and a result of the exercises done by the child with the dogs in the experiment. Well, the results obtained by us indicated such an effect, manifested by a fourfold improvement in the dynamic abilities of the children placed in the experiment.

Interestingly, in similar experiments conducted by other researchers (Deanna et al.,2022), this parameter was not influenced in a significant manner.

In this case, the authors explained these results by a potential calming effect of dog therapy on patients, associating in this direction the research carried out by Kirnan et al. (2018) [31], that highlighted such an effect. Coming to this discussion, we should emphasize that not all research has highlighted a calming effect of therapy associated with canids in children with autism spectrum disorders. It is worth highlighting the results reported by Germone et al. (2019) [32], who showed that children with autism spectrum disorders showed an increase in the level of agitation in the presence of treatment dogs.

In these circumstances and taking into account the above, we allow ourselves to conclude that the effects of therapy associated with canids on motor skills should be deepened. In our analysis, we should highlight the high share (38.7%) of group play behavior, manifested by children in the experimental group, representing a level three times higher, compared to the observations regarding children in the control group.

These results, which are consistent with those published by other authors, clearly highlight the positive effect of canid-associated ternage on social communication skills in children with autism spectrum disorders. These results coincide with our observations in this experiment that refer to the improvement of the parameters related to social attention in the case of the children in the experimental group. In the case of these children, the mentioned parameters showed values twice as high, compared to those recorded by the children in the control group.

However, our study that CAT is not a treatment that ensures the reintegration of children on its own, but only a modality that can help alleviate some symptoms associated with ASD.

It was not part of the objective of our research to assess whether the use of dogs in therapy had a calming effect on children. Therefore, we believe that it would be useful in the future to deepen the research in this field of study. We also recommend conducting further studies investigating the effect of dog therapy on social communication skills. Last but not least, we emphasize that it would be interesting to evaluate the effect on restrictive and repetitive behaviors.

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.

CONCLUSIONS

Canide-Assisted Therapy, applied under the conditions of our experiment, led to a significant improvement in all behavioral parameters taken in the study. We notice the positive effect, especially on the parameters related to Gameplay, Eye Contact and Social Attention. We also notice a positive effect on the parameters regarding emotional and physical functionality.

However, it should be underscore that CAT cannot be a miracle treatment for ASD, but only a therapeutic auxiliary that can improve patients' performance.

We emphasize the need to deepen research in this field, in order to quantitatively and qualitatively quantify the contribution that CAT can bring in the direction of improving the therapeutic palette usable in ASD in children.

An important restriction of this study is the small sample size. Also, although subjects in the CAT group and those in the control group were randomly assigned, different initial scores were observed in certain areas assessed. Therefore, we cannot rule out the possibility that the superior core performance has left little room for improvement. This limitation must be taken into account, especially in the case of the socialization skills assessed, where we could assume a ceiling effect caused by the social deficit of subjects with ASD.

Ethical approval

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

Consent

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 participation of the children in our approach.

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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