Original Research Article

RESEARCH ON THE EFFECT OF CANID-ASSISTED THERAPY ON THE THERAPEUTIC EFFICACY OF TREATMENT AGAINST AUTISM SPECTRUM DISORDERS IN CHILDREN

ABSTRACT

Animal-assisted therapy in children with autism (AAT) is a complementary therapy, which includes procedures from all other therapies. TAA 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 and more. 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 10 children, diagnosed with ASD, aged between 7 and 13 years (6 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 Gameplay, Eye Contact and Social Attention. We also notice a positive effect on the parameters regarding emotional and physical functionality.

Keywords: therapy, children with autism, therapy dogs, complementary therapy

INTRODUCTION

Animal-assisted therapy in children with autism (AAT) is a complementary therapy, which includes procedures from all other therapies. TAA 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 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 [1]. 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 [2].

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 [3, 4]. 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 [3].

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 [5]. Stress is closely associated with depression and anxiety [6], premature mortality and poor health outcomes [7], and severity of ASD traits, which include problems in social interaction and communication [8]. To date, research on effective interventions aimed at reducing stress and stress-related outcomes in people with ASD or to improve their social interaction and communication has been very limited [9]. Several randomized controlled trials conducted on ASD interventions suggest that cognitive behavioral therapy and mindfulness-based stress reduction may be effective for reducing depression and anxiety [10]. This effect can be partly explained by the reduction of physical stress, for example measured using markers such as salivary cortisol [6]. To our knowledge, there are no randomized controlled trials (RCTs) that directly target perceived stress in the adult population with ASD.

In addition to social communication deficits, people diagnosed with ASD have impaired motor skills [11, 12]. A review by Ruggeri et al. (2020),[13] 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 [14].

Several studies that are not specific to adults with ASD have shown that physical interactions with animals reduce stress levels [15]. In children with ASD, animal-assisted therapies (i.e., interventions that incorporate trained animals) have also shown promising effects for stress-related outcomes [16]. Improvements in social interaction and communication have also been reported [17, 18]. TAA 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 [19]. It has been hypothesized that in therapeutic settings, 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 [18]. Although the described effects of TAA (especially using dogs) in children with ASD are promising, it is unclear whether these results can be generalized to adults. It is important that TAA 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 [16]. To our knowledge, interventions involving human-animal interactions in adults with ASD have never been reported.

MATERIALS AND METHODS

The 10 children participating in the study (6 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. ASD is characterized by dysfunctional behaviors, communication difficulties, and social interaction [2]. 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 puppies. Comprising therapist specialists (psychologists, psychopedagogues, psychotherapists, physiotherapists), canine instructors, animal-assisted therapy teams – canine handlers and therapy dogs – veterinarians, but also other specialists, who work to show people the benefits of human-animal interaction, but also to popularize animal-assisted therapy and activities.

The 10 children were separated into two batches:

- Batch 1 (n=5), consisting of children undergoing Canid-Assisted Therapy (CT);
- Batch 2 (n=5) consisting of children who have not undergone Canid Assisted Therapy (CT).

The experimental protocol imagined by us lasted 8 weeks. During this interval, with a frequency of 2 sessions per week, the TAC 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 CT 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 CT 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 CT 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. 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	**Ciobanesc german**	**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 (e.g., screaming). It is not considered a word.
Game	
Solitaire game	Child engaged in solitary recreational activities.
I 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.
Abilități motorii	
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 5 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 TAC) 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 TAC) (See fig.1).

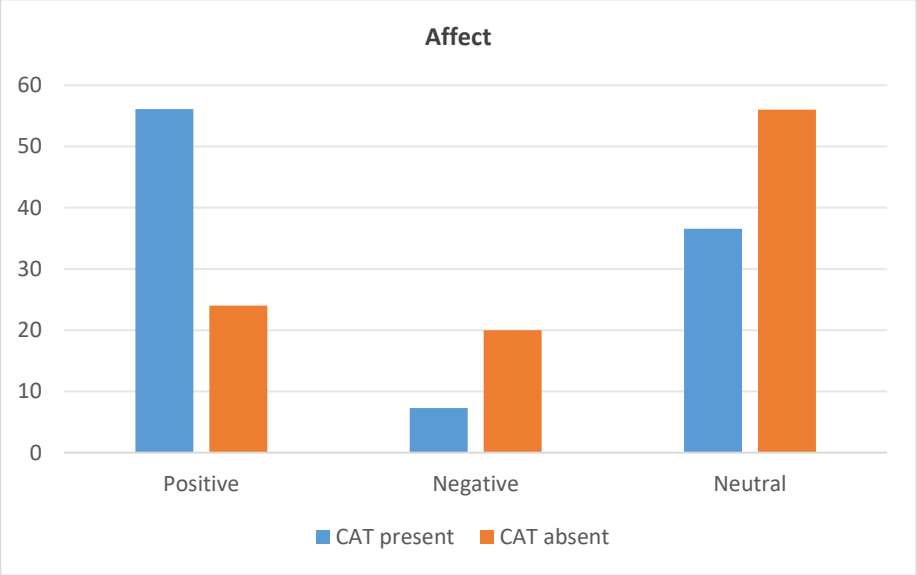

Fig.1.Percentage weight of the categories of affective states taken in the study, in the case of the two experimental groups.

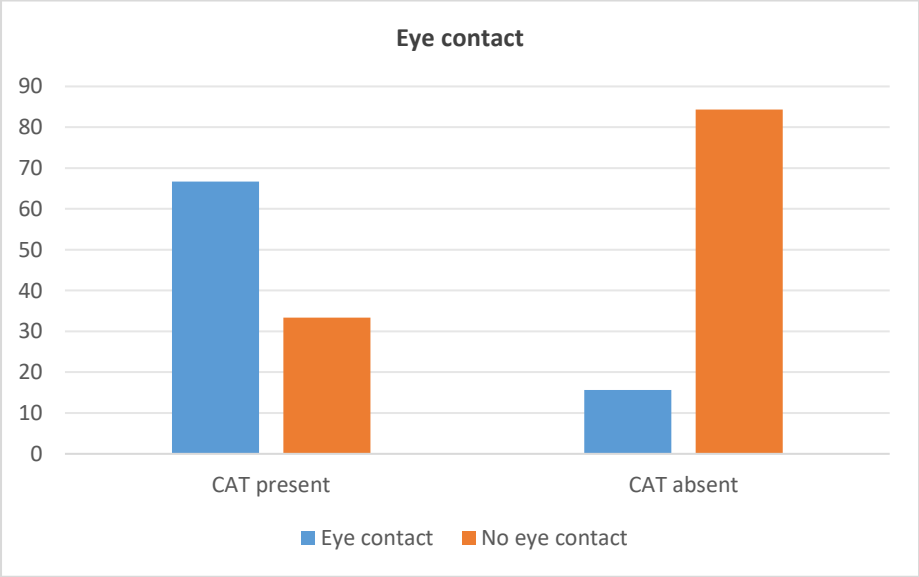

Fig.2.Percentage weight of observations regarding eye contact, in the case of the two experimental batches.

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 TAC) 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 TAC). (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 TAC), 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 TAC). (See fig. 3).

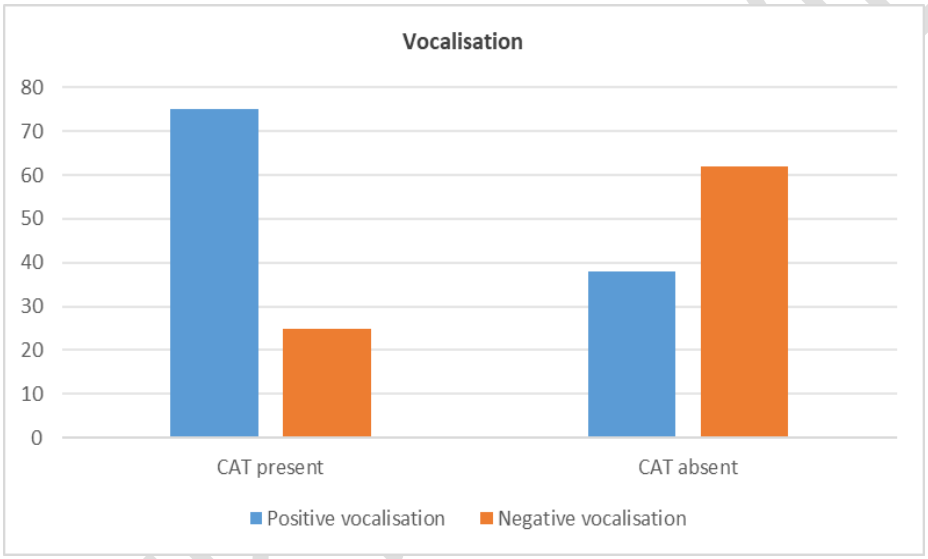

Fig.3.Percentage weight of vocalization observations, in the case of the two experimental batches.

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 TAC) 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 TAC). Also, in the case of Lot 1 (children who benefited from the TAC) 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 TAC). (See fig.4).

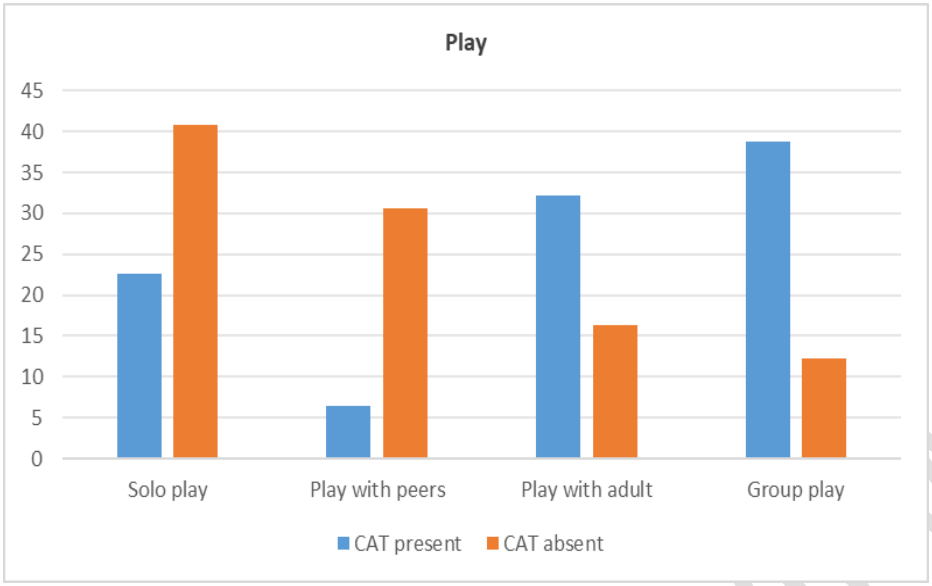

Fig.4.The percentage weight of the observations regarding the Game, in the case of the two experimental batches.

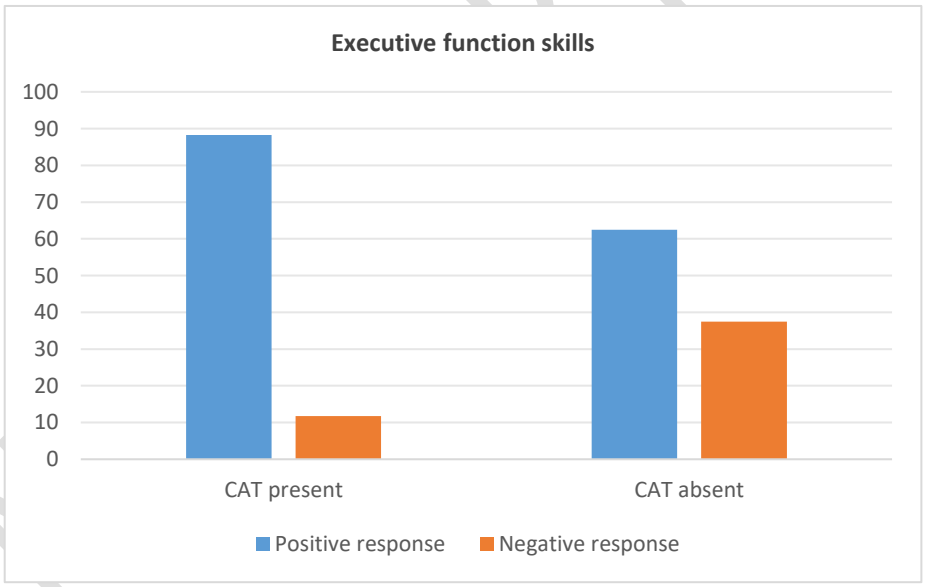

Fig.5.Percentage weight of observations regarding Execution Skills, in the case of the two experimental batches.

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 TAC), 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 TAC). (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 TAC). (See fig.6).

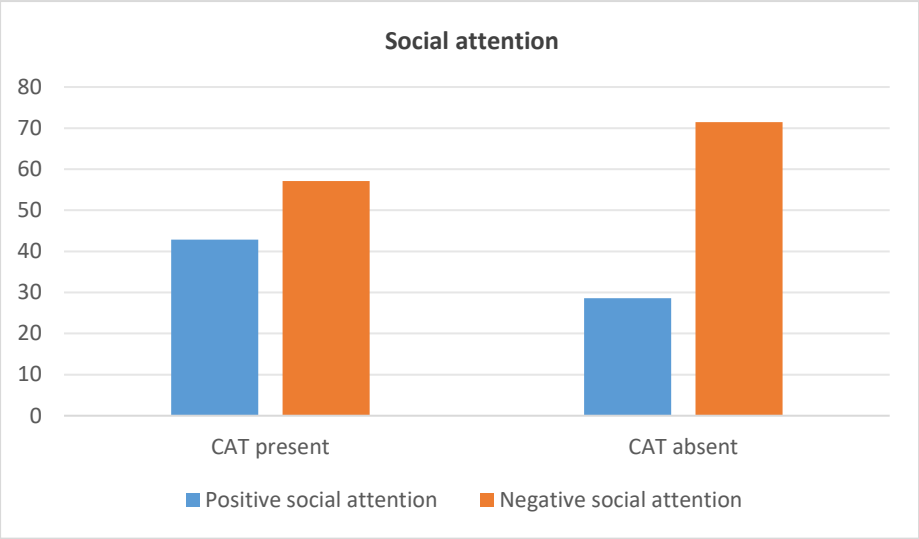

Fig.6.Percentage weight of observations regarding social attention, in the case of the two experimental groups.

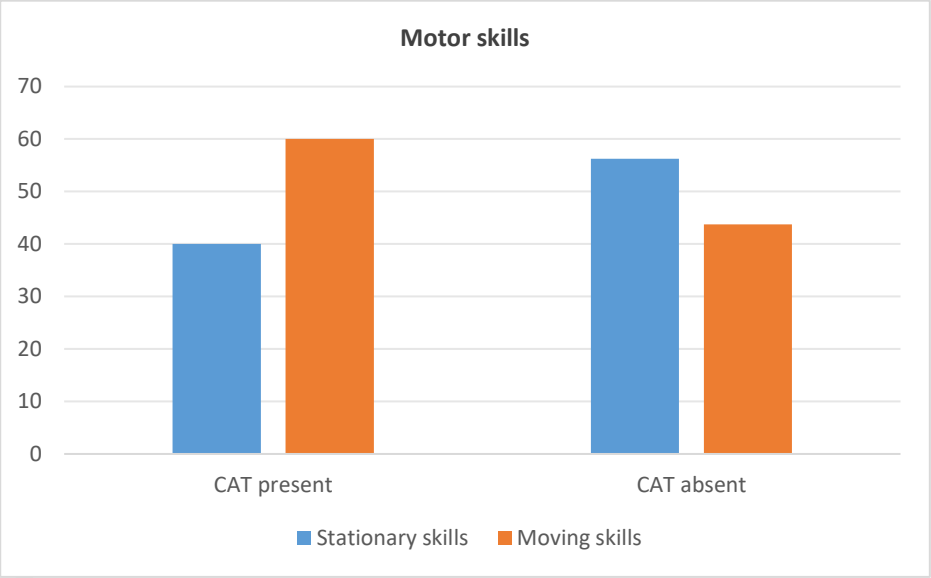

Fig.7.Percentage weight of observations regarding motor skills, in the case of the two experimental groups.

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 TAC), 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 TAC). (See fig. 7)

Table 3

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

	Observations			
	TAC present		TAC 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
I 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 TAC 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 TAC 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),[20] and Tepper et al. (2022), [21].

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),[22].

However, our study that TAC 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.

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 emphasized that TAC 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 TAC can bring in the direction of improving the therapeutic palette usable in ASD in children.

Ethical Approval

Not applicable.

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)

The authors hereby declare that generative AI technologies such as language models (ChatGPT, COPILOT, etc.) and text-to-image generators were NOT used during the writing or editing of manuscripts.

REFERENCES

1. Juraszek K, Kalisz Z, Maszudzińska A, Kucharczuk M, Kalisz J. Healthcare professional's knowledge of autism spectrum disorders. *Journal of Education, Health and Sport.* 2019;9(8):199–215. doi: 10.5281/zenodo.3371694.
2. Frye R.E., Rossignol D.A., 2012 Identification and treatment of pathophysiological comorbidities of autism Spectrum disorder to achieve optimal outcomes. Clinical medicine insights Pediatrics, 10 2012), pp. 43-56
3. Melson, G. (2004, March 28). *Animals in the lives of adolescents: A biocentric perspective on development*. Paper presented at the Can Animals Help Humans Heal? Animal-Asssited Interventions in Adolescent mental Health conference, Philadelphia. Retreived January 18, 2007 from
4. Parish-Plass, N. (2008). Animal-assisted therapy with children suffering from insecure attachment due to abuse and neglect: A method to lower the risk of intergenerational transmission of abuse? *Clinical Child Psychology and Psychiatry, 13*, 7-30.
5. Joshi G, Wozniak J, Petty C, Martelon MK, Fried R, Bolfek A, Biederman J. Psychiatric comorbidity and functioning in a clinically referred population of adults with autism spectrum disorders: A comparative study. *Journal of Autism and Developmental Disorders.* 2013;43(6):1314–1325.
6. Vreeburg SA, Zitman FG, Derijk RH. Salivary cortisol levels in persons with and without different anxiety disorders. *Psychosomatic Medicine.* 2010;72(4):340–347.
7. Slavich GM. Life Stress and Health: A Review of Conceptual Issues and Recent Findings. Teach Psychol. 2016 Oct;43(4):346-355.
8. Hirvikoski T, Blomqvist M. High self-perceived stress and poor coping in intellectually able adults with autism spectrum disorder. *Autism.* 2015;19(6):752–757.
9. Damiano CR, Mazefsky CA, White SW, Dichter GS. Future directions for research in autism spectrum disorders. *Journal of Clinical Child Adolescent Psychology.* 2014;43(5):828–843.
10. Sizoo BB, Kuiper E. Cognitive behavioural therapy and mindfulness based stress reduction may be equally effective in reducing anxiety and depression in adults with autism spectrum disorders. *Research in Developmental Disabilities.* 2017;64:47–55.
11. Lloyd, M., MacDonald, M., & Lord, C. (2011). Motor skills of toddlers with autism spectrum disorders. Autism, 17(2), 133-146. https://doi.org/10.1177/1362361311402230
12. Provost, B., Lopez, B. R., & Heimerl, S. (2007). A comparison of motor delays in young children: autism spectrum disorder, developmental delay, and developmental concerns. Journal of Autism and Developmental Disorders, 37(2), 321-328.
13. Ruggeri, A., Dancel, A., Johnson, R., & Sargent, B. (2020). The effect of motor and physical activity intervention on motor outcomes of children with autism spectrum disorder: A systematic review. Autism, 24(3), 544-568.
14. Smyth, C., & Slevin, E. (2010). Experiences of family life with an autism assistance dog. Learning Disability Practice, 13(4), 12-17.
15. Beetz A, Uvnäs-Moberg K, Julius H, Kotrschal K. Psychosocial and psychophysiological effects of human-animal interactions: The possible role of oxytocin. *Frontiers in Psychology.* 2012;234(3):1-15
16. O'Haire ME. Animal-assisted intervention for autism spectrum disorder: A systematic literature review. *Journal of Autism and Developmental Disorders.* 2013;43(7):1606–1622.
17. Berry A, Borgi M, Francia N, Alleva E, Cirulli F. Use of assistance and therapy dogs for children with autism spectrum disorders: A critical review of the current evidence. *Journal of Alternative and Complementary Medicine.* 2013;19(2):73–80.

18. Gabriels RL, Pan Z, Dechant B, Agnew JA, Brim N, Mesibov G. HHS public access. *American Academy of Child and Adolescent Psychiatry.* 2015;54(7):541–549.
19. Verheggen F., Perrault K. A., Megido R. C., Dubois L. M., Francis F., Haubruge E., et al.. (2017). The odor of death: an overview of current knowledge on characterization and applications. *Bioscience* 67, 600–613.
20. Carolien Wijker, Ruslan Leontjevas, Annelies Spek, Marie-Jose Enders-Slegers. Effects of Dog Assisted Therapy for Adults with Autism Spectrum Disorder: An Exploratory Randomized Controlled Trial J Autism Dev Disord. 2020 Jun;50(6):2153-2163.
21. Deanna L. Tepper, Oriane Landry, Tiffani J. Howell, Delwyne Stephens, Jose Molina, Pauleen C. Bennett. Therapy dogs for children with autism spectrum disorder: Impacts of active versus passive dog engagement. Human-Animal Interaction Bulletin.2022.
22. Chin-Siang Ang, Freya Anne MacDougall. An Evaluation of Animal-Assisted Therapy for Autism Spectrum Disorders: Therapist and Parent Perspectives.Psychological StudiesVolume 67, pages 72–81, (2022)