



## Assessing the effectiveness of animal-assisted therapy on alleviation of anxiety in pre-school children: A randomized controlled trial

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### ABSTRACT

**Objective & background:** Human-animal interactions are considered as being valuable and beneficial for the psychological health. Recently Animal-Assisted Therapy (AAT) has been included for client-therapist interaction. The purpose of the present study was to assess the effectiveness of animal-assisted therapy in alleviation of anxiety in pre-school children.

**Method:** The study was carried out as a randomized controlled trial with pre-test and post-test design and control group. The trial was registered in the Chinese Clinical Trial Registry with the registration id of ChiCTR2000034145. The study consisted of 33 anxious 5–7 years old children (participated in a welfare anxiety screening plan held by Counseling Center, Tehran-Iran) between 2018 and 2019. The participants took part in the study voluntarily. The subjects were randomly divided into experimental and control groups (10 in each group). The experimental group was exposed to 8 sessions of animal therapy. The research instrument used in the present study was Spence Preschool Anxiety Scale (Parent Form) and the data were analyzed on SPSS 21 software.

**Results:** The results showed that animal therapy had a significant effect on general anxiety after adjusting for post-test assessments ( $f = 32.49$  and  $p = 0.001$ ) with the effect equal to 0.70. In addition, the effect of animal therapy on anxiety of separation ( $f = 5.63$ ,  $p = 0.03$ ), generalized anxiety disorder ( $f = 8.56$ ,  $p = 0.01$ ), social phobia ( $f = 14.58$ ,  $p = 0.002$ ) and specific anxiety ( $f = 11.63$ ,  $p = 0.005$ ) was significant with effects equal to 0.30, 0.40, 0.53, and 0.47, respectively. The results also showed that the effect of animal therapy on obsession was not significant ( $p > 0.05$ ).

**Conclusion:** Therefore, it can be concluded that Animal therapy is effective in alleviating anxiety in children. It supports for the inclusion of AAT in therapeutic practice with children having anxiety.

### 1. Introduction

Children constitute a large portion of the world population. Their physical, emotional, mental, and behavioral growth have been always a concern of scientists and researchers. Over the past 25 years, behavioral, social, and emotional problems of children have been among the main and critical issues in psychology and psychiatry [1].

Epidemiology studies have shown that with a prevalence range of 5–17%, anxiety is one of the main psychological disorders in childhood (Castlo and Angold, 1995; cited by Ref. [2]). Anxiety disorder is one of the common disorders in childhood and it can lead to other disorders. Such disorder intervenes with function in other fields and usually

appears along with other disorders like depression and uncontrollable behavioral disorders. Children with anxiety disorder are at a high risk of committing suicide and psychology disorders when they become teenagers or adults [3].

By anxiety, we refer to unpleasant emotions that are expressed by terms like “worries,” “fear,” and “panic.” Everyone experiences different levels of anxiety during their life [4]. It is an indispensable part of childhood and a sign of normal growth of children. In fact, it may have positive effects on child’s growth as it gives the child a chance to develop coping strategy and to deal with stressors and causes of anxiety in the future [5]. Anxiety, in its comparative form, helps children to adapt to others’ world. A normal level of anxiety has a regulating function and

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helps the child to adapt their behaviors to social, educational, and cultural expectations. On the other hand, too low and too high anxiety can be a cause of maladaptation. The individuals who demonstrate antisocial behaviors or behaviors related to conduct disorder are usually do not have anxiety arousal. Constant and excessive anxiety also causes maladaptation, which leads to distress and interruption of development process [6].

According to Silverman [7]; although, the experience of fears and worries, as a part of the development process, is temporary in many children, some of them have this experience for a longer period of time and with high intensity so that it disrupts their daily functions [8,9]. According to Diagnostics and Statistical Manual of Mental Disorders (DSM-V) anxiety disorders diagnosed in children are separation anxiety disorder, opted muteness, specific phobia, social anxiety, panic anxiety, generalized anxiety, anxiety caused by drugs, and anxiety caused by physical disease. A common aspect in all these disorders is that they appear as special and non-continuous responses, cognitive organs responses (physiological), and behavioral responses [10].

Anxiety and the resultant disorders degrade abilities of children notably and lead to problems in doing daily activities, inter-personal relationships, social skills, relationships with peers, and educational performance [11,12]; Last, hanson and Franco, 1997). Anxiety is a risk factor for other disorders and anxiety related disorders in particular [13, 14].

Taking into account the prevalence of anxiety disorders in children, several therapeutic and educational programs have been introduced for adaptation to, prevention of, and treatment of them [2]. Yoosefi et al. [15] showed that narrative therapy alleviated anxiety symptoms and comorbid anxieties in children with anxiety. Hudson et al. [16] showed that cognitive behavioral therapy was effective in anxiety in children. In addition, there has been an increase in attention to animal-assisted therapy (AAT) in the recent years. Researchers believe that AAT can be considered as a supplementary treatment for traumas [17]. The AAT treatment is not limited to a specific group of disorders [18]. Worsman [18] and Ines Pandzic [19] highlighted the effects of AAT to treat the traumas after an accident. They showed that this method can be used to alleviate anxiety and that, as companions, animals function as social facilitators.

Throughout history, animals have been used for different therapeutic purposes [20]. In general, AAT is defined as any intervention with participation of an animal as a part of the process [21]. By process, we refer to purposeful therapeutic interventions using animals (AAT), less structured enrichment activities with animals (animal-assisted activities), and using trained animals to help in performing daily tasks (services or supporter animals) [17]. The AAT is a sort of treatment aimed at creating a therapeutic intervention for humans using animal in the treatment process. This treatment is focused on improving behavioral, social, emotional, cognitive, and physical performance. In most of the cases, AAT is a structured intervention with specified purposes that leads to measurable and well-defined outcomes that are listed the Int'l association of human animal interaction organization (IAHAIO) [22]. As social facilitators, animals can communicate with people and act as a reminder of peace [23], or a safe zone [24]. Through this, animals can alleviate the sense of loneliness and isolation and create connections with humans [25]. Marguerite et al. [17] showed in a review paper that AAT alleviated depression, PTSD, and anxiety. Crump [26] showed that PT programs led to less stress in people and the literature indicates that exposure to PT may attenuate physiological stress, mental stress, and anxiety level [26]. Given this introduction and the absence of studies in Iran on AAT and its effect of anxiety in children, and given the fact that children nowadays are faced with a variety of challenges and problems that affect their anxiety level, it is imperative to find reliable ways to prevent anxiety in children. Prevention of emotional behavioral problems in children using timely intervention is supported by many studies. Therefore, the present paper tries to answer if AAT is effective on alleviation of anxiety in pre-school children?

## 2. Methodology

The study was carried out as a randomized controlled trial with pre-test and post-test design and control group. The trial was registered in the Chinese Clinical Trial Registry with the registration id of ChiCTR2000034145. This trial was conducted in accordance with the Consolidated Standards of Reporting Trials (CONSORT) statement. The objective of the study was to assess the effectiveness of animal-assisted therapy in alleviation of anxiety in pre-school children. The study population consisted of all children at the age of 5–7 years with anxiety (referred by Tehran Welfare Anxiety Screening Program to Consultation Center; n = 33). Totally, 20 children with an anxiety score higher than the average score were selected. The 6 children with average scores were excluded from the present study. A T-score of less than 60 (a percentile score less than 85%) was considered to be normal. A T score above 60 was considered to be normal anxiety but not clinical. Therefore, those scoring above 65 were considered for the inclusion in the present study. The 20 participants were assigned to a control (n = 10) and experiment groups (n = 10). A random-numbers table was used to generate random allocation sequence for the randomization of the participants. The random assignment was made by a research assistant for the study. The experiment group received eight AAT sessions and the control group received no intervention. Before and after the intervention, the mothers filled in Spence Children Anxiety Scale for parents (SCAS-P) and a structured interview based on DSM-V (pretest and posttest) was conducted. Inclusion criteria were anxiety score above the average score, no psychological disorder, no physical disorder, tendency to participant in the study, and age range of 5–7 years. Data gathering tools included SCAS-P, structured interview based on DSM-V, and a demographics form. There were no dropouts from the study and all the participants were retained for the follow-up and data analyses of results. The details of enrollment, allocation and analysis are provided in Fig. 1. Flowchart for Participants Enrollment for Trial Management.

### 2.1. Statistical analysis

After the intervention the data was analyzed by spss 21 version. The statistical analysis used for study findings included frequency and percentage analysis for demographic characteristics of the participants to express the relative occurrence and frequency of data responses, it also specified the percentage observation of occurrences of grouping points that is each demographic characteristic. Levene's test was conducted to examine homogeneity of variances was conducted to test if samples have equal variances. Variance analysis was conducted to examine homogeneity of variance to test if ANCOVA could be used. Analysis of Covariance (ANCOVA) was tabulated to examine the differences in the mean values of the dependent variables that is anxiety and types of anxiety which were related to the effect of the animal-assisted therapy while taking into consideration of the possible influence of the uncontrolled independent variables.

### 2.2. Spence Children Anxiety Scale for parents (SCAS-P)

The scale is designed to measure anxiety based on DSM-IV diagnosis standard by Spence et al. [27]. There are 28 statements in the tool with five sub-scales of separation anxiety (five statements), generalized anxiety (five statements), social anxiety (six statements), agoraphobia (seven statements), and compulsive obsessive disorder (five statements). The scale is designed for the parents to measure anxiety in children at 2–6 years old range. The statements are designed based on Likert's five-point scale (1 = never like this, ..., 5 = always like this). The higher the score the higher the anxiety in the child. Bassak nejad et al. [28] obtained reliability of the scale using Cronbach alpha equal to 0.89 and validity of the whole tool was obtained at 0.01 and 0.57 level. In addition, test register prediction and total diagnosis power of the test were obtained equal to 0.70 and 0.76 respectively. Among the sub-scales,

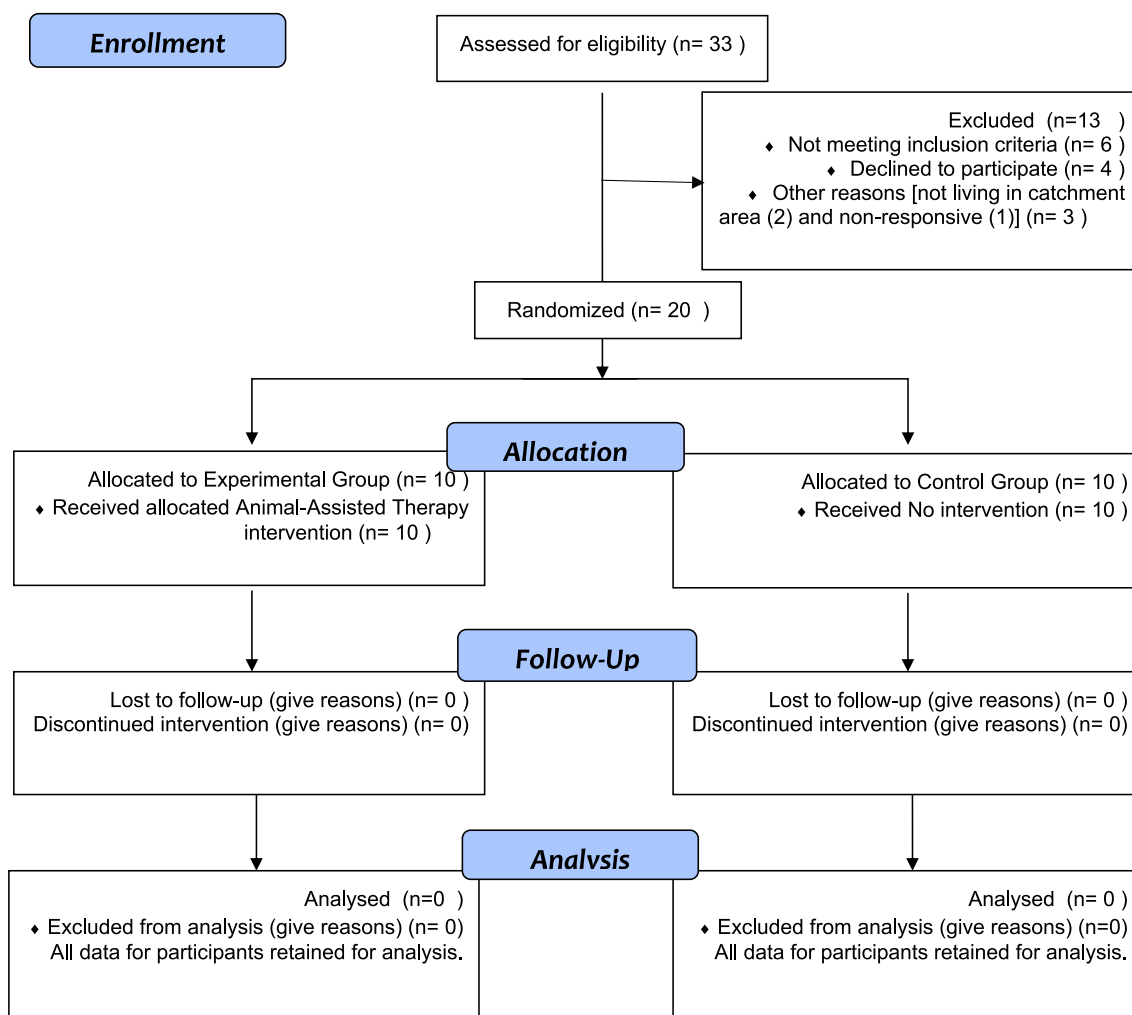


Fig. 1. Flowchart for participants enrollment for trial management.

agoraphobia, social anxiety, and separation anxiety have a higher validity.

### 2.3. Implementation

After securing a letter or permission from the head of Tehran City Iranian Consultation Center and creating a good relationship with the parents of children with anxiety (referred to the center by Tehran City Welfare Organization, n = 33), the parents who were interested in participation in the study were asked to sign a written letter of consent for their child’s participation in the study. Though the legal permission was taken from the parents, however, assent was taken from the children as well. Although legally, children are not able to provide true informed consent but before taking part in a clinical trial, they were asked for their assent. Assent is an affirmative agreement to participate in clinical trial. The assent form was developed and read to child by the researcher. This assent provided the children an opportunity to decide if they would like to take part or decline participation. The participants and their parents were ensured that their personal and private information will remain confidential and that the study is in compliance with religious and cultural codes. Afterwards, the parents filled out SCAS-P and participated in a structured interview based on DSM-V (pre-test). Then, 20 children with anxiety score above the average were selected through convenient sampling method and randomly assigned to experiment and control groups (each with 10 members). The experiment group received eight AAT sessions (each 90 min) and afterwards, the participants filled

out the questionnaire once more (post-test). Pre-test assessment was carried out 2 days prior to treatment. The participants meeting the criteria were provided with therapeutic sessions and post test was conducted after two days of sessions completion.

### 2.4. Findings

Descriptive statistics showed (Table 3) that pretest and posttest mean scores of anxiety in the experiment group were 67.90 and 55.30 respectively-i.e. 12.60 points decrease in anxiety (see Table 1). In contrast, pretest and posttest mean scores of anxiety in the control group

Table 1  
Content of the therapeutic protocol [29].

Session one	Introduction, briefing, primary assessing and introduction to the course
Session two	Giving an introduction about animals and their specific characteristics
Session three	Taking children to the place that animals were kept
Session four	Spending time in the place that animals were kept, talking about them and how to communicate with them
Session five	Convincing children to come closer and touch and pet them
Session six	Playing with animal and feeding them
Session seven	Participation in activities like washing and feeding the animals
Session eight	Summarizing, giving feedback, and post-test

**Table 2**  
Demographic characteristics of participants.

	Experimental group (n = 10)		Control Group (n = 10)	
	f	%	f	%
Age				
5	4	40	3	30
6	3	30	4	40
7	3	30	3	30
Gender				
Male				
Female				
Class/Grade				
Kindergarten	4	40	4	40
Grade 1	2	20	3	30
Grade 2	4	40	3	30

**Table 3**  
Means and standard deviations of total SCAS-P at pretest and at posttest in the AAT group and in the control group.

Variables		Experimental group		Control Group	
		b	(SD)	means	(SD)
Anxiety overall score	pretest	67.90	11.35	69.20	12.10
	posttest	55.30	10.87	70	12.28
anxiety of separation	pretest	12.60	5.35	12.40	5.27
	posttest	10.40	4.31	12.70	5.31
generalized anxiety	pretest	12.40	5.27	12.90	5.40
	posttest	9.5	4.1	13.10	5.44
social anxiety	pretest	13.70	5.67	14.30	5.85
	posttest	10.40	4.31	14.80	5.94
agoraphobia	pretest	16.80	6.46	17.30	7.10
	posttest	13.20	5.44	17.10	6.97
obsession	pretest	12.40	5.27	12.30	5.21
	posttest	11.80	4.45	12.30	5.21

**Table 4**  
Leven's test to examine homogeneity of variances.

Variables	F-value	DF 1	DF 2	P-value
Total score of anxiety	0.003	1	18	0.957
Anxiety of separation	0.244	1	18	0.628
Generalized anxiety	1.247	1	18	0.279
Social phobia	0.051	1	18	0.824
Special phobia	0.518	1	18	0.481
Obsession	0.552	1	18	0.467

As listed in Table 4, Leven's f-value is not significant and variances are identical. Therefore, the assumption of homogeneity of variances is supported.

**Table 5**  
Variance analysis to examine homogeneity of variance.

Variables	Source	Sum of Squares (SS)	DF	F-value	P-value
Total score of anxiety	Group interaction with pre-test	8.450	1	0.166	0.689
Anxiety of separation		0.200	1	0.077	0.785
Generalized anxiety		1.250	1	0.456	0.508
Social phobia		1.800	1	0.489	0.493
Special phobia		1.250	1	0.263	0.615
Obsession		0.050	1	0.028	0.870

As listed in Table 5, f-value is not significant in the interaction of group with pretest and regression line slope for the experiment and control groups is the same. Therefore, ANCOVA can be used.

were 69.20 and 70.0 respectively – i.e. 0.80 point increase. As to the subs-scale anxiety of separation, the pretest and posttest mean scores in the experiment group were 12.60 and 10.40 respectively (2.20points

**Table 6**  
ANCOVA results.

Variables	The sum of the squares (SS)	DF	Mean squares (MS)	F-value	P-value	Power
Total score of anxiety	893.784	1	893.784	40.254	0.001	0.703
Anxiety of separation	21.972	1	21.972	5.628	0.034	0.302
Generalized anxiety	33.097	1	33.097	8.556	0.012	0.397
Social phobia	56.002	1	56.002	14.583	0.002	0.529
Special phobia	40.321	1	40.321	11.634	0.005	0.472
Obsession	1.122	1	1.122	0.448	0.515	0.033

The ANCOVA results (Table 6) showed that AAT was significantly effective in the total score of anxiety after adjusting post-test scores (f = 32.49; p = 0.001) with effect size of 0.70. In addition, as to the sub-scales of anxiety, the effect of AAT on anxiety of separation (f = 5.63; p = 0.03), generalized anxiety (f = 8.56; p = 0.01); agoraphobia (f = 15.48; p = 0.002), and social phobia (f = 11.63; p = 0.005) was significant with effect sizes of 0.30, 0.40, 0.53, and 0.47 respectively. The results showed that the effect of AAT on obsession was not significant (p > 0.05). Table 5 lists the mean scores of anxiety and the sub-scales in the two groups before and after the intervention.

**Table 7**  
Mean scores of anxiety and the subscales in the two groups before and after the intervention.

Variables	Mean difference between pre and post scores in intervention group	Mean difference between pre and post scores in control group	Differences between experimental and control groups	t	P
Total score of anxiety	-12.60	0.80	-13.40	-6.539	0.001
Anxiety of separation	-2.20	0.30	-2.50	-3.019	0.007
Generalized anxiety	-2.90	0.20	-3.10	-3.845	0.001
Social phobia	-3.30	0.50	-3.80	-4.971	0.001
Special phobia	-3.60	-0.20	-3.40	-4.562	0.001
Obsession	-0.60	0.001	-.60	-.836	0.414

As listed in Table 7, the mean scores of anxiety and the subscales in the experiment group are less than that of the control group after the intervention. This difference can be attributed to AAT (P < 0.05).

decrease); these figures in the control group were 12.40 and 12.70 respectively (0.30point increase). With regard to generalized anxiety, pretest and posttest mean scores in the experiment group were 12.40 and 9.50 respectively (2.90 points decrease); in the case of control group these figures were 12.90 and 13.10 respectively (0.20point increase). The pretest and posttest mean scores of social anxiety in the experiment group were 13.70 and 10.40 respectively (3.30 points decrease); these figures in the control group were 14.30 and 14.80 respectively (0.50point increase). As to agoraphobia, the pretest and posttest mean scores in the experiment group were 16.80 and 13.20 respectively (3.60points decrease); as to the control group, these figures were 17.30 and 17.10 respectively (0.20point decrease). Finally, at to obsession, the pretest and posttest mean scores in the experiment group were 12.40 and 11.80 respectively (0.60point decrease); these figures in the control group were 12.30 and 12.30 respectively (no change). In addition, ANCOVA was used for data analysis and before that homogeneity of variances and consistency of regression line slop were checked (see Table 2).

### 3. Discussion and conclusion

Effectiveness of AAT on alleviation of anxiety in pre-school children was examined. The ANCOVA results showed that AAT was effective in the total score of anxiety after adjusting post-test scores ( $f = 32.49$ ;  $p = 0.001$ ) with effect size of 0.70. In addition, the effect on the subscales anxiety of separation ( $f = 5.63$ ;  $p = 0.03$ ), generalized anxiety ( $f = 8.56$ ;  $p = 0.01$ ); agoraphobia ( $f = 15.48$ ;  $p = 0.002$ ), and social phobia ( $f = 11.63$ ;  $p = 0.005$ ) was significant with effect sizes of 0.30, 0.40, 0.53, and 0.47 respectively. The effect of AAT on obsession was not significant ( $p > 0.05$ ).

The results are consistent with Tournier [30]; Badr and Zauszniewski [31]; Ines Pandzic [19]; and Aleksandrowicz et al. [22]. Worsman [18] showed that AAT was effective in anxiety; so that, animals function as companions and social facilitators.

Anxiety disorders are of the most common types of psychological disorders in children at school age. It is estimated that the prevalence of this anxiety ranges from 4 to 19% [32,33]. Anxiety disorders usually appear with other disorders like depression and disruptive behavioral disorders. Children with anxiety disorder are at a high risk of schizophrenia, drug abuse, suicide, and hospitalization in mental hospital during adolescence and young ages [33]. Anxiety is a stable disorder and causes dysfunction in areas like educational performance, self-esteem, depression, and dependence [34].

Several studies have shown that childhood anxiety is a serious mental health problem [35]. Anxiety disorders have a high rate of comorbidity with other psychological disorders in children [36]. Different interventions like behavioral, cognitive behavioral, and medicine therapy are used to treat anxiety disorder. New therapeutic treatments have been also introduced in the recent years, such as AAT, which is a novel treatment for a wide range of diseases. A large volume of literature has showed that interaction between patient and animal prepares a ground to boost self-confidence in the patient, alleviate the symptoms, and improve the quality of life. Short-term contacts or looking after animals in long-run (horse, cat, birds, small animals) alleviate a large number of diseases [19]. In addition, there might be several reasons to explain the effectiveness of AAT. Theory of attachment is one of the theories that tries to explain this. Accordingly, attachment is a stable and emotional bond between two individuals [37,38]. In the case of relationship between man and animal, the emotional bond is formed with the animal. There have been several studies on the relationship of man and animal based on the theory of attachment. There are strong supports of the emotional ties and sensitive bonds between domestic animals and their owners [39,40].

In fact, pets play the role of an unconditional love supplier in families [41,42]. In addition, given the easy access to animal and low costs of keeping pets, they can be used as a reliable and effective treatment. Prothmann et al. [43]; surveyed the effects of animal therapy on mental problems and concluded that AAT improve awareness and range of attention. Pets have a lot of benefits for children and adults; they facilitate making positive social interactions with others, improve daily activity of the owner, facilitate personal relationship, improve sympathy, boost self-confidence, create a sense of safety, and improve communicational and social skills in general [44–46]. Lack of these skills may cause anxiety and through improving these skills, AAT helps the individual to create relationship with others, improve supportive resources, and alleviate anxiety in return. Through improving daily activities, AAT attenuates anxiety and improves psychological situation of the individual. A higher health condition, less stress, and fewer behavioral and psychological problems all have been reported as the results of AAT [43, 47,48]. Therefore, it can be concluded that AAT is effective in alleviating anxiety in children. As to limitation of the present study, the small number of children in the sample group and number of AAT session are notable. Using other domestic animals or doll animals for AAT purposes can be subject of future studies.

### Limitation of the study

A limitation can be considered as the limited application of the results to the general population and people with age more than 7 years. There were variety of animals used with the preference of the child involved in the study, and the previous exposure of the children with animals were not controlled. This means that presence of pets at home may have influenced the attitude and interaction of children with animals.

### Ethical consideration

In the present study, the parents who were interested in participation in the study were asked to sign a written letter of consent for their child's participation in the study. The participants were ensured that their personal and private information will remain confidential and that the study is in compliance with religious and cultural code. This study has been reviewed and approved by the Institutional Review Board of Omid and Neshat Institute of Tehran with the number 0128/1398. this study registered in Chinese Clinical Trial Registry by number ChiCTR2000034145.

### Research involving animals

Not applicable.

### Author contributions

MT designed the study and conducted the literature searches, wrote the first draft of the manuscript. TA assisted in the methodology and planning of the clinical trial. EA and AS revised the draft of the manuscript. All authors approved the final version of the manuscript.

### Consent for publication

Not applicable.

### Funding

Not applicable.

### Declaration of competing interest

The authors report no conflicts of interest in this work.

### Data availability

The authors do not have permission to share data.

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.conctc.2022.100947>.

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