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The effect of pet therapy on the stress and social anxiety levels of disabled children: A randomized controlled trial

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ABSTRACT

Objective: Pet therapy is an effective method in reducing stress and anxiety levels in the treatment and care of children. This study aimed to determine the effects of pet therapy on the stress and social anxiety levels of physically disabled children.

Method: This study was a single-blind randomized controlled experimental study with a pre-test, post-test and follow-up design. The study was carried out between November 2019 and September 2020 in two separate Special Education and Rehabilitation Centers with a total of 44 physically disabled children, 23 in the control and 21 in the intervention group, who met the inclusion criteria. The NCT number of this study is NCT04231799. The data of the study were obtained through Personal Information Form (PIF), the Perceived Stress Scale (PSS), the Social Anxiety in Children Scale-Revised Version (SACS-R) and blood pressure measurements. A pet therapy program was applied to the intervention group. Apart from the standard training given in the rehabilitation center, no intervention was made on the control group

Results: After the pet therapy program intervention, it was found that there was a decrease in the mean PSS and SACS-R scores of the children in the intervention group, and this decrease was significant compared to the individuals in the control group ($p<0.05$).

Conclusion: It was determined that the pet therapy program was an effective intervention in reducing the stress and social anxiety levels of the physically disabled children.

1. Introduction

Children with special needs may experience physical difficulties due to the issues caused by being disabled. They may also face mental health problems. High levels of stress and social anxiety are among the most common problems encountered in children with special needs [1–6]. Children with special needs are a group whose health is difficult to protect and maintain, and who are at high risk of catching diseases [1,2].

The goal of nursing interventions aimed at protecting and improving the health of children is to increase their capability to adapt to their living conditions by strengthening their ability to cope with social, psychological and physiological changes. The incidence of mental disorders may be reduced when the difficulty these children with special needs have in adapting are reduced, along with their levels of stress and social anxiety. Nurses assume the role of protecting and maintaining the mental health of disabled individuals and children. This situation requires that psychiatric nurses make up-to-date and effective interventions and are able to evaluate the effectiveness of these programs. One of the methods that can be used in the care and follow-up of disabled children is pet therapy. Pet therapies have also been included in the Nursing Interventions Classification (NIC) since 2004 [7,8].

A review of the literature found that pet therapy is one of the most effective methods in reducing the anxiety levels of these children with special needs during the treatment and nursing. The majority of former studies address children with autism [9–11], while a limited number of studies [12,13] were found to focus on children with physical disabilities. Pet therapies discussed in recent studies include interventions aiming to help children to cope with pain, improve their communication skills and increase their self-confidence. When the studies evaluating the effect of pet therapy were examined, no study could be found that evaluated the effect of this intervention on both the children's stress and social anxiety levels. This study is unique in that it aimed to reduce the

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levels of stress and social anxiety of physically handicapped children through pet therapy intervention. The data obtained in this study may further guide health professionals in planning nursing and rehabilitation practices that can be applied to children with physical disabilities.

This research, taking the form of a randomized controlled trial, aimed to determine the effects of pet therapy on the level of stress and social anxiety of physically disabled children.

The research hypotheses were as follows:

H1. The stress levels of children with physical disabilities who receive pet therapy will be lower than those of the children in the control group.

H2. The levels of social anxiety in children with physical disabilities who receive pet therapy will be lower than those of the children in the control group.

2. Methods

2.1. Study design

A pre-post experimental design with randomized controlled trials (RCT) was used to determine the effects of pet therapy on the levels of stress and social anxiety in physically disabled children. A seven-week pet therapy program lasting between 45 and 60 min per week was applied to the intervention (pet therapy) group. Apart from the standard training given in the rehabilitation center, no intervention was made to the control (routine education) group.

The study was carried out between November 2019 and September 2020. The study was conducted in rehabilitation centers affiliated to the Antalya Provincial Directorate of National Education. Out of a total of 15 centers, the two institutions that met the sample group criteria and had the highest number of students were used in the study. The study was carried out in two different institutions in order to prevent the risk of contamination. The institutions which would have the experimental and control groups were determined by the independent drawing method. Those students who met the inclusion and exclusion criteria were identified among the students receiving education at the centers; research groups were further allocated by drawing lots among the students who met the sampling criteria. Information concerning this allocation was available only to the principal researcher. To facilitate openness, integrity and transparency, the research was structured in accordance with CONSORT 2010 flowchart (CONSORT 2010 statement) [14,15]. The CONSORT flow chart of the participants in the study is provided in Fig. 1.

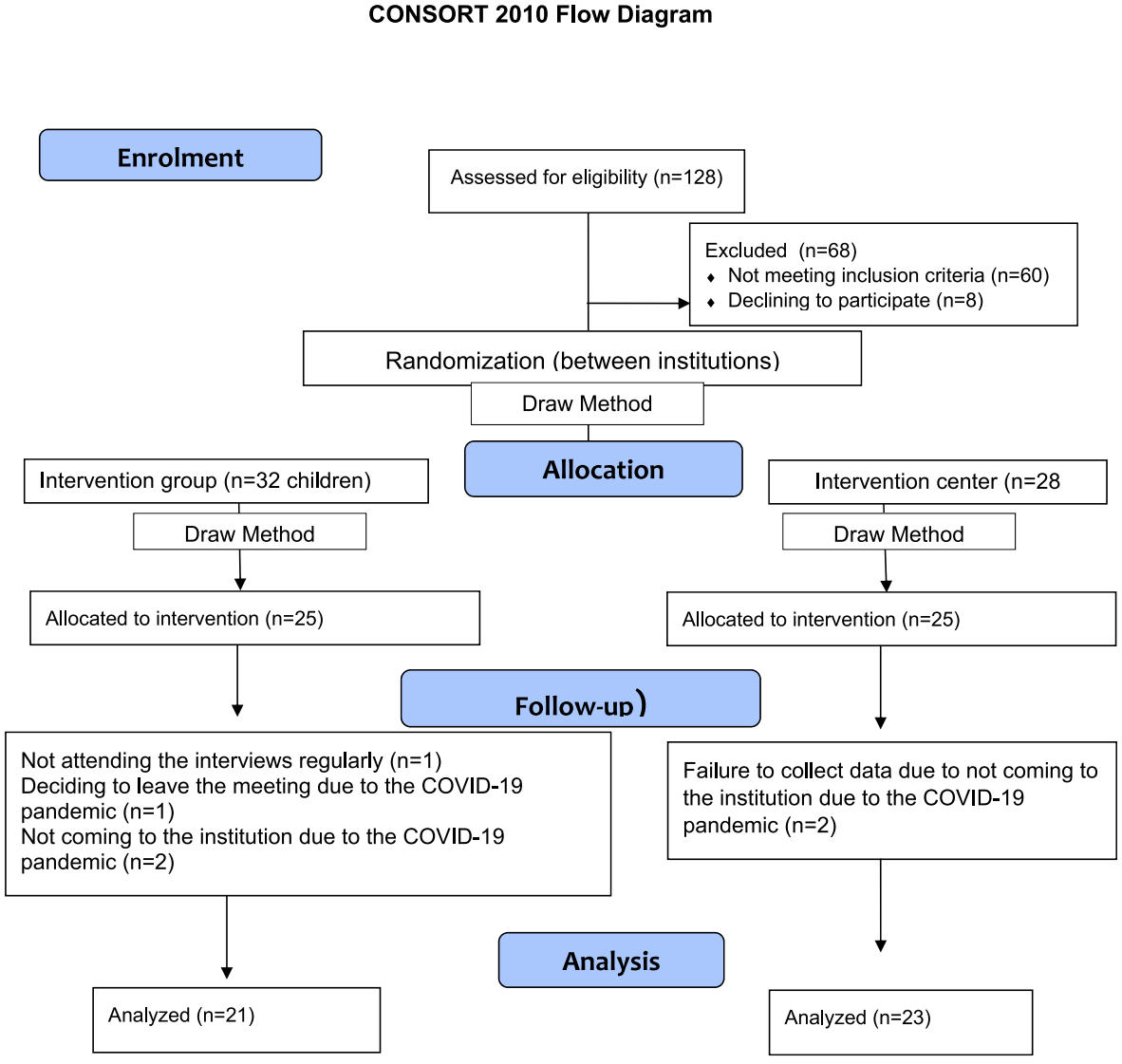

Fig. 1. The CONSORT-SPI 2010 flow diagram.

2.2. Participants

A sample of 44 physically disabled children, aged from 8 to 11 years old as a baseline (T0) were recruited for the present study: there were 21 (11 M and 10 F) participants in the intervention group, and 23 (14 M and 9 F) in the control group (Table 1).

The inclusion criteria were: 1) to be aged between 8 and 11 years old; 2) only being physically disabled; 3) speaking Turkish; 4) being literate. All the children and their parents provided informed consent. Children were excluded if they had a fear of or allergies to animals, any chronic disease associated with immune deficiency, any chronic disease associated with immune deficiency, a pet of their own (either currently or in the past), or having any communication difficulties. Children were excluded if they had a fear of or allergies to animals, did not participate in the intervention for more than two weeks, or developed a medical condition that prevented them taking part.

The participants were evaluated in terms of their sociodemographic characteristics, and both groups were found to be homogeneous. The characteristics of the sample group of the study and the results of the homogeneity test are shown in Table 1.

2.3. Procedure

Before collecting data, we implemented a preliminary phase that included: a) training the researcher in interview techniques and stress management in children; b) definition of the population; c) planning the therapeutic intervention; and d) pre-treatment for two children.

In order to maintain high methodological standards we reduced the number of variables that could bias the interpretation of the results. The selection criteria involved the randomization of children into the intervention or control group. At the beginning of the pet therapy intervention there were no differences in the children's stress and social anxiety levels between the control and treatment groups. The evaluators and clinicians were blinded about which treatment group any specific child was in. However, the expert who applied the intervention and the researcher who evaluated the data in the study were the same person. One-way blinding was provided by ensuring that the individuals included in the study did not learn which group they were in.

2.4. Selection of the pet to be used in the intervention

Various species of pets may be used within the scope of pet therapy intervention. Cats are often favored in pet therapy as they can be easily transported, are relatively docile, and researchers may have the opportunity to use their own cats within research [16]. Since cats are thus very suitable for use in research studies investigating pet therapy programs, they were used as the therapy pets in the current study. Expert opinion was obtained from a veterinarian to determine the sex, characteristics and breed of the cat to be used in the research. A four-year-old Persian chinchilla cat was used in the research due to its docile nature, its long lifespan, and because it could be easily fed in the home. The cat's name was Meşe.

Photo: Therapy pet used in the study: Meşe.

2.5. Intervention

A Pet Therapy Program Implementation Process and Pet Therapy Implementation Protocol were used within the scope of the study.

The study followed the Standard Protocol Items: Recommendations for Interventional Trials [15,17]. The RCT followed the Consolidated Standards of Reporting Trials (CONSORT) statement for reporting RCTs [14,15]. The study was carried out in accordance with the CONSORT steps. The EQUATOR Network and reporting guidelines for the study are shown in Fig. 1. The study was registered at clinicaltrials.gov in January 2020 (NCT04231799).

2.6. Pet therapy intervention

The pet therapy intervention consisted of structured sessions in accordance with the individual therapeutic goals for each child. The children participated in weekly sessions for about seven weeks.

The therapeutic program had seven activities and aims (Table 3). Each session lasted approximately 45–60 min, during which participants interacted with the researcher and her cat. The content of the pet therapy covered a wide range of aims and activities.

The therapy was conducted in the Special Education and Rehabilitation Center's play room. All the subjects in the intervention group took part in the pet therapy program on a regular basis. External stimuli (sound, light, toys) in the environment were removed and the environment was arranged to be suitable for a day-long activity. The

Table 1
The characteristics of the sample group of the study and the results of the homogeneity test.

Characteristic		Intervention Group (n:21)		Control Group (n:23)		Statistical Value	
		N	%	n	%	X^2	P
Age	**8**	6	(28,6)	6	(26,1)	3,474	0,323
	9	6	(28,6)	2	(8,7)		
	10	3	(14,3)	4	(17,4)		
	11	6	(28,6)	11	(47,8)		
Sex	**Male**	11	(52,4)	14	(60,9)	0,322	0,57
	Female	10	(47,6)	9	(39,1)		
Income level	**Income < Expenses**	10	(47,6)	5	(21,70)	4,711	0,059
	Income ~ Expenses	10	(47,6)	18	(78,30)		
	Income > Expenses	1	(4)	0	(0)		
Precentage of physical disability	**25% and below**	1	(4,8)	8	(34,8)	7,737	0,051
	26–50%	11	(52,4)	5	(21,7)		
	51–75%	5	(23,8)	5	(21,7)		
	76–100%	4	(19)	5	(21,7)		
People they spend time with	**None**	0	(0)	4	(17,4)	11,734	0,077
	Mother	5	(23,8)	3	(13)		
	Father	5	(23,8)	0	(0)		
	Sibling	3	(14,3)	6	(26,1)		
	Friends	5	(23,8)	4	(17,4)		
	Close relative	1	(4,8)	2	(8,7)		
	Caregiver	0	(0)	1	(4,3)		
	Family	2	(9,5)	3	(13)		
Total		21	(100)	23	(100)		

Table 2
Cronbach alpha reliability coefficients of data collection tools.

Measurement Tools	Intervention Group			Control Group		
	Pre-test	Post-test	Follow-up	Pre-test	Post-test	Follow-up
PSS	0.659	0.753	0.78	0.78	0.707	0.787
SACS-R	**0.846**	**0.87**	**0.913**	**0.865**	**0.882**	**0.867**

The Cronbach alpha value of the PSS used in the study was found to be 0.659 at the lowest and 0.787 at the highest. The Cronbach alpha value of the SACS-R was found to be 0.846 at the lowest and 0.913 at the highest.

Table 3
Pet therapy weekly program summary.

Week	Duration	Activities	Subject/Purpose
Week 1:	45–60 min	Meeting/introduction	- Developing a trusting relationship - Establishing a bond between the child, therapy pet and the practitioner
Week 2:	45–60 min	Providing information about cats	- Strengthening the bond between the child, therapy pet and the practitioner - Supporting the child's self-expression
Week 3:	45–60 min	Reading a story about a cat	- Evaluating the emotions felt in the face of stressful life events and solutions for them within the scope of the story.
Week 4:	45–60 min	Teaching songs, poems and nursery rhymes about cats	- Identifying factors that may cause social anxiety - Supporting the development/improvement of self-confidence
Week 5:	45–60 min	Building/decorating a cat shelter	- Discussing the relationship and roles of the child in their own social environment by giving examples from cats and raising awareness of these issues - Developing communication and problem-solving skills
Week 6:	45–60 min	Participate in a rehabilitation program with a therapy pet	- Observing the child's compliance with the treatment - Supporting the child's compliance with the treatment in a physiotherapy session in which the child, the research cat and the practitioner actively participate, - Observing stress, social anxiety levels and adaptation behaviors during the treatment process
Week 7:	45–60 min	Evaluation/conclusion	- Reviewing the whole process - Reviewing the bond established with the practice cat in a healthy way

physiological needs of the research cat were met both before and after the interview and the Pet Therapy Program Implementation Process was then applied. The cat was periodically examined by a veterinarian.

2.7. Instruments and measurement tools

Personal Information Form (PIF): This consisted of six questions developed by the researchers based on the literature in order to determine the sociodemographic characteristics of children. This form involved questions about the children's age, gender, family type, income status, school attendance, disability, percentage of physical disability and who they spent their spare time with.

Perceived Stress Scale (PSS): The Perceived Stress Scale for Children (8–11 Years) was developed by Snoeren-Hoefnagels (2014) and the validity and reliability of the Turkish version was performed by Oral and Ersan in 2017. This one-dimensional scale incorporates a 4-point Likert-type rating consisting of 9 items. "Never" is scored with 1 point, "sometimes" 2 points, "often" 3 points, and "always" with 4 points. The minimum score that can be obtained from the scale is 9, and the maximum score is 36. An increase in scores indicates an increase in stress level. There is no reverse coded item. There are no sub-items. The scale is filled in by the 8–11-year-old child her/himself. While Cronbach Alpha internal consistency reliability coefficient of the scale was 0.76, the test-retest correlation was found out to be 0.71 [18]. Cronbach Alpha value of the scale in this study was determined as 0.78. The Cronbach Alpha reliability coefficients in the pre-test, post-test and follow-up evaluations of the scale are exhibited in Table 2.

Social Anxiety Scale for Children-Revised Version (SASC-R): The Social Anxiety Scale for Children-Revised Version (SASC-R) is a self-report scale. This scale was developed by La Greca et al., in 1988 and revised in 1993. The revised scale is a five-point Likert-type scale and the scores obtainable range from 18 to 90. Higher scores indicate higher levels of social anxiety. The validity and reliability study of the Turkish version of the scale was conducted by Demir et al., in 2000. The Cronbach Alpha internal consistency reliability coefficient of the scale was 0.81. The test-retest correlation was high ($r = 0.81$) [19]. The Cronbach Alpha value of the scale in the current study was determined as 0.91. The Cronbach Alpha reliability coefficients in the pre-test, post-test and follow-up evaluations of the scale are shown in Table 2.

2.7.1. Blood pressure measurement

Human-animal interaction ultimately causes changes in vital signs by reducing the release of stress hormones. For the purpose of this study, the systolic and diastolic blood pressures of the children in the intervention group were measured before and after each application in order to evaluate the change in question; their pre- and post-pet therapy intervention values were compared.

2.8. Data collection procedure

The Pre-intervention pre-test, post-intervention post-test and follow-up evaluations at the end of the 11th week were conducted using Personal Information Form (PIF), Perceived Stress Scale (PSS) and the Social Anxiety Scale for Children-Revised Version (SASC-R).

2.9. Intervention tools

The Pet Therapy Program Implementation Process, which was developed by researchers based on the literature review, and the Pet Therapy Implementation Protocol were used within the scope of the study.

2.9.1. Pet Therapy Program Implementation Process

The Pet Therapy Program Implementation Process was developed by researchers following the literature review by using the guidelines that referred to issues to be considered in pet therapy interventions [16, 20–22]. The Pet Therapy Program Implementation Process included topics such as determining which participants were suitable for the study, determining the area of intervention, choosing the therapy pet and preparing the therapy pet for the intervention.

2.9.2. Pet therapy program implementation protocol

The Pet Therapy Program Implementation Protocol was based on protocols used in studies of a similar nature [23–27] following the literature review. The implementation protocol was prepared by the researchers as a seven-week intervention program. Expert opinion regarding this protocol was obtained from Professor Sandra Petersen, who is a psychiatric nurse.

The pet therapy interventions were carried out in the playground of the rehabilitation center. The interventions were structured as 45-60-

min individual interviews once a week. It was planned that the activities carried out within the scope of pet therapy would be related to the therapy pet used for the intervention. Various items and materials (a storybook, a coloring book, paints, an artbook, toys etc.) were used by the researcher in activities on a weekly basis in order to enable the child to participate in the activity. The principles of the implementation process developed for the pet therapy were followed during the intervention. A summary of the program implemented is provided in Table 3.

2.10. Ethical considerations

The study followed the principles of the Declaration of Helsinki and the following processes occurred within the scope of the study:

- Written approval was obtained from the Clinical Research Ethics Committee of the local state university (Document ID: KAEK-20/ Date: 20.02.2019).
- Permission to use the scales was obtained from the authors of the scales used in the study.
- Written permission was obtained from Special Education and Rehabilitation Centers where the research was to be carried out.
- All children and their parents were informed about the purpose of the study and the research process and the parents' informed consent for the participation of their children in the study was obtained. The anonymity of the participants, their parents and the study data was also ensured.
- After the research process was completed, a follow-up interview about pet therapy was conducted with the children from the control group using the research.

We were attentive to the needs therapy pet and periodically met the physiological needs of the cat, including feeding and excretion, etc. within the scope of Pet Therapy Implementation Process.

2.11. Statistical analyses

Descriptive statistics of the variables used in the study are presented as frequency, percentage, mean, standard deviation, minimum and maximum values. While analyzing categorical data, the Pearson Chi-Square Test was used if the percentage value of the cell with an expected value less than 5 was below 20%, and Fisher's Exact Test was used if it was over 20%. The assumption of normality was checked using the Shapiro-Wilks Test. Homogeneity of variances was evaluated with the Levene test and equality of covariances was evaluated with the Box M test. The repeated measurements over time in the experimental and control group were analyzed with mixed-design ANOVA. Repeated measurements were also analyzed with mixed-design ANOVA. Where significant, pairwise comparisons were performed with Bonferroni correction. SPSS 23.0 was used for statistical analysis. Support was received from the Statistical Consultancy Application and Research Center Akdeniz University for the statistical analysis of the study.

3. Results

The children's stress level scores (PSS) and social anxiety levels (SASC-R) at different times are presented in Table 4. Measurements were taken before the intervention (day = 0), after the intervention (week 7) and at the follow-up (week 11).

The children's total PSS scores for each group were compared. It was determined that there was no statistically significant difference between the total PSS scores of the individuals in the intervention and control groups in the pretest evaluation ($p > 0.05$ and the same capital letter). It was determined that the difference between the total PSS scores of the individuals in the intervention and control groups in the post-test evaluation was statistically significant ($p < 0.05$ and a different capital letter). It was determined that the difference between the total PSS scores of the individuals in the intervention and control groups in the follow-up evaluation was statistically significant ($p < 0.05$ and a different capital letter). In accordance with the post-test and follow-up evaluations of the children in the intervention and control groups; it was concluded that the mean total PSS scores were gradually decreasing in both groups. This change was found to be statistically significant ($p < 0.05$) in the intervention group and insignificant in the control group ($p > 0.05$).

Table 4
Comparison of individuals' mean PSS and SCAS-R scores both between and within groups.

	Group	Pre-test	Post-test	Follow-up
		Mean ± SD (min-max)	Mean ± SD (min-max)	Mean ± SD (min-max)
PSS	**Intervention Group**	22.19 ± 4.42Aa	14.80 ± 3.24Bc	16.28 ± 3.53Bb
		16–29	10–21	11–21
	Control Group	21.73 ± 5.36Aa	21.26 ± 4.00Aa	21.08 ± 4.67Aa
		11–30	12–27	12–29
	Total	21.95 ± 4.88	18.18 ± 4.87	18.79 ± 4.78
		11–30	10–27	11–29
Pre-test - Follow-up $p < 0.0001$				

	Group	Pre-test Mean ± SD (min-max)	Post-test Mean ± SD (min-max)	Follow-up Mean ± SD (min-max)
CSAS-R	**Intervention Group**	55.80 ± 11.48Aa	36.19 ± 9.59Bc	38.76 ± 10.10Bb
		35–79	22–61	26–65
	Control Group	55.39 ± 13.41Aa	53.21 ± 12.12Aa	49.47 ± 11.32Ab
		29–77	28–74	26–69
	Total	55.59 ± 12.38	45.09 ± 13.85	44.36 ± 11.93
		29–79	22–74	26–65
Pre-test - Follow-up $p < 0,0001$				

Group effect: $p = 0.009$; Time effect: $p < 0.0001$; GroupxTime effect: $p < 0,0001$. Different upper-case letters along the line are statistically different ($p < 0.05$). Different lower-case letters across the column are statistically different ($p < 0.05$). The repeated measurements for the experiment/control group depending on time and were analyzed with mixed-design ANOVA.

The children's total SACS-R scores for each group were compared. It was determined that there was no statistically significant difference between the total SACS-R scores of the individuals in the intervention and control groups in the pretest evaluation ($p > 0.05$ and the same capital letter). It was determined that the difference between the total SACS-R scores of the individuals in the intervention and control groups in the post-test evaluation was statistically significant ($p < 0.05$ and a different capital letter). It was determined that the difference between the total SACS-R scores of the individuals in the intervention and control groups in the follow-up evaluation was statistically significant ($p < 0.05$ and a different capital letter). While there was a significant decrease in the post-test evaluations of the intervention group ($p < 0.05$), an increase was observed in the total mean SACS-R scores in the follow-up evaluation; however, this increase was found to be statistically insignificant ($p > 0.05$). There was a continuous decrease in the post-test and follow-up evaluations in the control group, but this decrease was found to be statistically insignificant($p > 0,05$).

Changes in blood pressure results of the intervention group after the pet therapy were also evaluated. The blood pressures of the children in

the intervention group were measured before and after each session. In this context, the blood pressure measurement results of the children in the intervention group before and after pet therapy were compared. While no difference was found between the systolic and diastolic blood pressure values for the 1st and 6th weeks ($p > 0.05$), there was a statistical difference between the systolic and diastolic blood pressure values before and after the intervention in the other weeks ($p < 0.05$).

4. Discussion

This is the first study using a controlled protocol and a follow-up to examine the effects of pet therapy with a cat on the stress and social anxiety levels of physically disabled children. Analyzing the data obtained from the study, it was concluded that there was no significant difference between the intervention and control groups in terms of perceived stress level before pet therapy; however, the mean PSS score in the intervention group after the pet therapy and in the follow-up evaluations was found to have significantly decreased compared to the pre-intervention. Studies have revealed that interaction with pets reduces the stress levels of individuals [27–31]. Another group on which pet therapy is widely used is people with disabilities. Studies have evaluated the biopsychosocial effect of pet therapy interventions on children with disabilities' ability to cope with the stress they experience [9,11]. The current study determined that pet therapy given children with physical disabilities reduced their stress level. It is thought that pet therapy interventions are effective in reducing physical and mental symptoms of illness, and that they thus positively assist in coping with stress.

Throughout the intervention performed within the scope of our study, the physically disabled children were encouraged to recognize the difficulties encountered during the process, in addition to their own strengths and weaknesses and to define their particular stressors and effective coping methods. The children were further given the opportunity to review their own roles, stressors and coping methods. A significant decrease was observed in the PSS mean scores in the intervention group following the intervention, and it was concluded that this caused a statistically significant difference between the intervention and control groups. This difference may be associated with providing children with the opportunity to express their feelings during pet therapy sessions, the positive perspective gained by the individual thanks to the feedback provided, and the concomitant positive impact on the individual's roles and ability to self-actualize.

Examining the data obtained from the study, a statistically significant difference was determined in the total SACS-R scores of the intervention group and the pre-test, post-test and follow-up evaluations of the control group. In addition, there was no significant difference in the pre-test evaluation of the intervention group compared to the control group, whereas there was a significant difference in post-test and follow-up evaluations. During the literature review, no study was found that evaluated the effects of pet therapies on the stress and social anxiety levels of physically handicapped children. However, there are studies indicating that pet therapies applied to individuals in different sample populations separately reduces stress and anxiety levels [31–33]. In the meta-analysis conducted by Waite, Hamilton and O'Brien (2018), a total of 22 studies, 13 of which were conducted on children, were examined and it was concluded that pet therapies are an effective intervention in reducing the level of anxiety [32].

In addition to studies that concluded that pet therapies reduce the level of anxiety in general, there are also studies that directly evaluate the level of social anxiety of the individual [34,35]. Further findings are available which indicate that pet therapies improve the amount of social interaction, interpersonal communication and speech [10,34,36,37]; and that they increase eye communication and the frequency of smiles and laughter [9], as well as the frequency of touching and caressing [38]. Elmacı and Cevizci (2015) concluded that pet therapy improved children's ability to cope with their fears/anxiety and increased their empathy, their ability to use their bodies according to their abilities, their ability to get help from or help others and communicate; they also stated that children learned to set goals and objectives through pet therapies [12]. The number of studies demonstrating the effects of pet therapy has recently increased [9,10,27,36,39,40]; however, there are few studies in which pet therapies are used specifically for children with disabilities [9,10,12]. The majority of these studies address children with autism [9,10], whereas only a limited number of studies were found on children with physical disabilities [12,41].

One result of the current study was that there was a significant decrease in the post-test evaluations of the intervention group, while the increase in the follow-up evaluation was statistically insignificant. On the other hand, there was a continuous decrease in post-test and follow-up evaluations in the control group; however, this decrease was found out to be statistically insignificant. The decrease in the post-test evaluation of the intervention group may be explained as a positive consequence of the intervention, whereas the increase in the follow-up evaluation may indicate that the effectiveness of the intervention decreased over time. It is thought that the decrease in the post-test and follow-up evaluations of the control group may be related to the follow-up evaluation occurring at during the COVID-19 outbreak. On the other hand, the social anxiety levels of the children may have decreased naturally as they had to spend more time at home and interacted less with their social environment, due to policies such as curfews, as well as the transition to distance education implemented during the pandemic.

The stress and social anxiety levels of individuals may also be evaluated through different physiological signs and symptoms, such as urine hormone tests [34], enzyme levels in urine and saliva tests [11], pulse [30], respiratory rate [27] and blood pressure [27,42,43]. There are studies in the literature stating that biochemical reactions that enable the individual to relax are activated as a result of human-pet interaction [29,31], and that a decrease in the release of stress hormones further causes a decrease in blood pressure, pulse and respiratory rate [27]. The results of some studies indicate that pet therapy positively supports the regulation of blood pressure in individuals [11,27,30,42–44], whereas others state that there is no significant difference in this regard [27,43].

Bharatharaj, Huang, Al-Jumaily, Elara and Krägeloh (2017) took saliva samples from children before and after each session in their study conducted to determine the effect of pet therapy on the stress levels of children with autism. They found that there was a decrease in the children's stress levels [11]. For the purpose of the current study, the systolic and diastolic blood pressures of the children in the intervention group were measured before and after each intervention, and these values were compared. Examining the data obtained from the study, no difference was found between the systolic and diastolic blood pressure values of the intervention group at the 1st and 6th weeks, whereas there was a statistical difference between the systolic and diastolic blood pressure values before and after the intervention in the other weeks. The reason why no change was observed may be that the bond between the child and the therapy pet is just being established in the first week, the anxiety caused by the child having to make new acquaintances, and the fact that an introductory meeting was held rather than any engaged discussion. The involvement of a third person within the scope of the activity, as in the intervention in week 6, which was conducted at the same time as physiotherapy sessions, may also have affected the child. In addition, the physical aspect of the physiotherapy may also have affected blood pressure.

5. Conclusion

The results of this research indicated that a pet therapy program applied to physically handicapped children had a positive effect on reducing the children's stress and social anxiety levels. The primary goals of psychiatric nurses within the scope of the biopsychosocial care of physically handicapped children are to ensure their complete well-being and to help them protect and strengthen their mental health

through interventions that reduce their stress and social anxiety levels and improve their coping skills. The current study indicated that the pet therapy provided for the physically handicapped children was an effective nursing intervention which had a positive effect on reducing the children's stress and social anxiety levels. Stress and social anxiety was significantly lower at follow-up compared with the baseline, and this was true only for the intervention group after the sessions had finished. Further controlled studies are needed to more accurately define and plan nursing interventions and how to measure the effect of pet therapies on disabled children.

Disclosure statement

No potential conflict of interest was reported by the authors.

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CRediT authorship contribution statement

Şeyma Demiralay: Conceptualization, Methodology, Investigation, Data curation, Writing – original draft. **İlkay Keser:** Conceptualization, Methodology, Data curation, Formal analysis, Visualization, Writing – original draft, Writing – review & editing, Supervision, Validation, Project administration.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ctcp.2022.101574.

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