



## The Effect of a Pet Therapy and Comparison Intervention on Anxiety in Hospitalized Children

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### ABSTRACT

The purpose of this study was to evaluate the effect of a brief pet therapy visit and a comparison intervention on anxiety in hospitalized children. This quasi-experimental study compared state anxiety before and after structured research interventions in a convenience sample of children between the ages six and 17 ( $N = 93$ ) in two groups. Participants were assigned to the pet therapy group or control group, based upon timing of data collection. Participants in each group received either a visit from the research assistant, therapy dog and handler, or from the research assistant for completion of a puzzle. The child's anxiety was measured using the State-Trait Anxiety Scale for Children (STAIC) S-Anxiety Scale before and after the visit and parents completed a brief background questionnaire. Intervention and comparison groups had no significant differences in key demographic factors or baseline anxiety level. While state anxiety decreased significantly in both groups, children in the pet therapy group experienced a significantly greater decrease in anxiety ( $p = .004$ ). In addition, parents reported high levels of satisfaction with the pet therapy program. Study findings provide support for a brief pet therapy visit with a trained dog and handler as a tool decrease to anxiety in hospitalized children while promoting parent satisfaction. When resources for providing pet therapy visits are limited, clinicians may consider prioritizing children who are most affected by anxiety.

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Hospitalization of a child is a stressful life event for a child and family, causing a sudden disruption in the daily routines of home and school that are fundamental to well-being (Lerwick, 2013). Specific stressors can include physical pain, fear associated with both procedures and unknown healthcare workers, separation from familiar people, foods, environment, belongings, and pets. Specialists in pediatric care including pediatric nurses and childlife specialists are dedicated to promoting healing by normalizing the acute care hospital for the child and family. Animal assisted activities (AAA), also referred to as pet therapy, are a practice widely used in a variety of healthcare settings (Goddard & Gilmer, 2015; Snipeliskly & Burton, 2014). The International Association of Human-Animal Interaction Organizations (IAHAIO, 2014) defines AAA as an informal interaction between a patient and a therapy animal for motivational, educational, or recreational purposes. These activities can include visits with a therapy animal and its handler, who is typically a non-medically trained volunteer, and are spontaneous in nature. Ac-

ording to The American Veterinary Medical Association (AVMA) there are approximately 70 million pet dogs in the United States and 74 million pet cats (American Veterinary Medical Association, 2012), suggesting that interaction with a therapy animal could bring a sense of comfort and home to many children.

### Review of the literature

Pet therapy provides a non-pharmacological, complementary intervention to help alleviate anxiety and fear related to hospitalization in children. While there has been an increase in research related to pet therapy and children in recent years, this is still a developing body of knowledge. Empirical support for the use of complementary therapies to reduce anxiety among children in the acute care setting is needed.

#### *Pet therapy and children*

Among children, pet therapy has long been used as a complementary therapy for those with or at risk for mental health problems. A recent systematic review identified equine therapy for autism and canine therapy for trauma as those areas with the strongest evidence

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base for children with or at risk for mental health problems (Hoagwood, Acri, Morrissey, & Peth-Pierce, 2017). Three out of three studies reviewed showed beneficial effects of AAA for children who experienced trauma. Another systematic review specifically focused on trauma, but not limited to children, found reduced depression, anxiety and post-traumatic stress disorder (PTSD) symptoms across studies among people participating in pet therapy activities (O'Haire, Guérin, & Kirkham, 2015).

Two recent Italian studies (Calcaterra et al., 2015; Vagnoli et al., 2015) have provided additional information about the effect of pet therapy on hospitalized children. Among children in the immediate post-operative period, Calcaterra et al. (2015) found lower pain perception in the pet therapy group versus those who received standard postoperative care in a pilot study. Children exposed to pet therapy in the recovery area were more likely to report lower pain perception, but there was no significant difference in salivary cortisol between groups. Vagnoli et al. (2015) studied the effect of the presence of a dog during venipuncture in on distress, pain perception, and blood cortisol level in children ( $N = 50$ ), ages 4–11 years old, and on anxiety in their parents. Children who were accompanied to their venipuncture visit by a dog demonstrated a lower level of observable distress than those who were accompanied only by their parents and had significantly lower levels of serum cortisol. In contrast to Calcaterra and colleagues' findings, there was no difference in self-reported pain or parental level of anxiety, between the control and intervention groups.

There has been recent study of the use of pet therapy for children and families affected by pediatric cancers (Chubak et al., 2017; Chubak & Hawkes, 2016; McCullough et al., 2018; Silva & Osório, 2018). Chubak and Hawkes (2016) surveyed the top 20 pediatric oncology hospitals in the United States (US) to identify current practices for program implementation in this setting. Eleven of these hospitals allowed children with cancer to participate in the pet therapy program. Program characteristics included the necessity of a written pet therapy policy, restriction to dogs only, safety precautions including hand hygiene of handler, and health requirements for the dog. Program implementation work was further expanded in pediatric oncology in subsequent work (Chubak et al., 2017).

Two recent studies have examined psychosocial and quality of life indicators in children with cancer and their caregivers. In a multi-site randomized trial, McCullough et al. (2018) evaluated the effect of a regularly scheduled pet therapy program on state anxiety, heart rate and blood pressure, and quality of life indicators among children newly diagnosed with cancer ( $N = 106$ ), and their parental stress level over a four-month period of time. Families were randomly assigned to receive either the standard care and pet therapy or standard care group. Children in both the intervention and control groups experienced decreases in state anxiety over time, but there was no significant difference between groups at any time point. Among parent participants, those in the intervention group showed significant reductions in overall parenting stress over time ( $p = .008$ ), while no difference was observed for those in the control group. Silva and Osório (2018) studied the effect of three 30-min goal-directed animal-assisted therapy groups in a sample of 24 children diagnosed with cancer in Brazil, over a period of up to 4 weeks. Children who participated in the animal-assisted therapy group reported experienced decreased levels of pain, stress, and irritation over the period of time in the study. No significant change occurred in depressive symptoms or physiological indicators.

#### *Pet therapy and anxiety in hospitalized children*

In a recent randomized study, Barker, Schubert, Green, & Ameringer, (2015) explored the impact of a 10-minute pet therapy visit on pain and anxiety in hospitalized children between the ages of 8 and 18 years of age ( $m = 11.3$  years of age). Children were hospitalized for 31 different unspecified conditions, with the most commonly reoccurring being

appendicitis and abdominal pain. The study also evaluated whether the child's attachment level to family had a mediating effect on the response to the animal visit. Participants ( $N = 40$ ) were randomly assigned to either the intervention group, which consisted of a 10-minute pet therapy visit ( $n = 20$ ), or the control group ( $n = 20$ ), which involved the child completing an age-appropriate jigsaw puzzle. There were no significant differences between or within the intervention or control groups in terms of self-reported pain or anxiety, suggesting that the pet therapy treatment did not significantly impact pain or anxiety in this sample. However, baseline anxiety levels were low, with 60% of participants reporting no anxiety. This low baseline could provide some explanation for the lack of significant changes in the outcome variables.

Similarly, another quasi-experimental pilot study ( $N = 15$ ) compared the effect of a pet therapy intervention with a jigsaw puzzle on stress response in hospitalized children. There was no significant change in anxiety or medical fear following a pet therapy experience in this small sample of children ages 7–17 (Tsai, Friedmann, & Thomas, 2010). While reason for hospitalization was not included in this study, six participants (40%) had been previously hospitalized overnight. Physiologic measures were also included in this study; interestingly, systolic blood pressure decreased in the pet therapy group. Similar to Barker and colleagues' findings, anxiety levels in this group were generally low at baseline.

#### *Summary and study purpose*

While there has been an increase in the research related to effects of pet therapy, there is a limited body of research specifically related to hospitalized children. In their critical review of the literature of pet therapy in children's hospitals, Chur-Hansen, McArthur, Winefield, Hanieh, and Hazel (2014) highlight the paucity of evidence available in this specialty area. Among children receiving care in the hospital, research is limited and findings are not consistent in relation to the effect of pet therapy on outcomes such as anxiety, pain, and physiologic outcomes such as heart rate and blood pressure. Many of the current studies have been limited to smaller samples, have lacked an active control group, or have been conducted outside of the United States (US). Additional rigorous studies are needed to determine the efficacy of this complementary therapy in hospitalized children and adolescents in the US. Therefore, further research is needed to evaluate the effectiveness of pet therapy in addressing select psychological outcomes among typically developing children receiving care in the hospital. The main research question that guided the study was: What is the effectiveness of a brief pet therapy intervention in comparison to a puzzle activity on state anxiety among children receiving care in a US hospital? Because pet therapy is part of our program to help children cope with the stress of hospitalization, additional aims of the study included identifying parent perceptions of coping education received while in the hospital and degree to which parents felt their children coped with the stress of hospitalization.

#### *Design and methods*

This quasi-experimental study compared state anxiety in children who received a brief pet therapy intervention with a comparative group who completed a jigsaw puzzle with a research assistant. The study took place on the inpatient pediatric unit of a state-designated Children's Hospital affiliated with a large academic medical center in the Mid-Atlantic region of the United States. The children's hospital provides comprehensive services to children including a pediatric cancer center, day hospital, outpatient services, pediatric emergency department, and pediatric intensive care unit (PICU). Pet therapy visits are offered to pediatric patients through a system-wide pet therapy program and include a dog and handler team who are trained, tested, and qualified through independent non-profit registering agencies.

Study approval was obtained from the health system's institutional review board (IRB). All study team members completed Collaborative Institutional Training Initiative (CITI) training related to human subjects protection and the application of ethics in research.

### Sample

A convenience sample of children and adolescents who were hospitalized at the study site were invited to participate in the study. Participants were limited to English speaking children between the ages of six and 17 without cognitive impairment who were hospitalized in the general pediatric inpatient unit. Therefore, those receiving care in the outpatient areas, pediatric day hospital, or pediatric intensive care unit were excluded from participation. Additional exclusion criteria were consistent with the institution's pet therapy policy and included allergy to or fear of dogs, need for any type of isolation precautions, open sores or burns, neutropenia, splenectomy, bone marrow transplants, and certain types of infection. Children who had received a prior pet therapy visit during the current hospitalization were also excluded. The sample consisted of children without cognitive impairment or developmental delays, of whom 27% lived with a chronic illness. Reasons for hospitalization included conditions requiring medical ( $n = 67$  [73%]) or surgical ( $n = 25$  [27%]) management. Among children receiving care for medical conditions, the most common specified reasons for admission included management of a chronic illness, acute infection, neurologic, and gastrointestinal conditions. See Table 1 for a complete description of the sample.

An *a priori* power analysis, based on moderate effect size ( $d = 0.5$ ) and  $p < .05$ , indicated that a sample of 84 participants, with 42 in the intervention group and 42 in the control group, was required for the study (Cohen, 1992).

### Procedures

Families for both the control and intervention group were approached by a member of the research team and invited to participate in a study related to anxiety in children. If the parent and child expressed interest, the child was then screened for study eligibility. The study, along with its voluntary nature, was explained to eligible families and written consent was obtained from a parent and assent obtained and documented from the child. Participants were assigned to either the pet therapy or comparison group based upon the day on which data collection was occurring. Randomization was not feasible due to the open nature of the pediatric unit and the general excitement

among the children when the therapy dog and handler teams enter the unit. Instead, data collection was scheduled for 2 days of each week – 1 day when pet therapy visits were scheduled and the other where no pet therapy visits were scheduled and participants were grouped accordingly. The parent was present for all study related activities, including the consent process, the duration of the pet therapy visit and puzzle completion, and completion of questionnaires.

Following explanation of the study and the consent and assent process, participants in both groups were invited by the research staff to complete the State-Trait Anxiety Scale for Children (STAIC) S-Anxiety Scale (Spielberger, 1973), also referred to as the "How I Feel Questionnaire". In the comparison group, the research assistant then sat with the child and parent and worked with the child to complete a simple age-appropriate jigsaw puzzle depicting an underwater scene. This visit lasted eight to 10 min and during this time, the research assistant interacted with the child and parent and provided brief coping skills education designed by the childlife specialist. This education included reminding the child of strategies that could be used during the hospital stay to help cope with stressful situations such as reflecting on the experience of working on the puzzle and thinking about the peaceful underwater scene. Following the visit and puzzle activity, the child again completed the STAIC S-Anxiety Scale and the parent completed a 22-item researcher-generated background questionnaire. Completion of the questionnaires concluded study-related activities for the parent and child.

The process of study participation was similar for the pet therapy group. Following initial completion of the STAIC S-Anxiety Scale, participants in the pet therapy group received an eight to 10-minute visit from a therapy dog and handler team along with the research assistant. After the participant interacted with the dog and handler, the research assistant provided brief coping skills education to the child. As with the puzzle group, this coping education included reminding the child of strategies that could be used during the hospital stay to help cope with stressful situations such as thinking of the enjoyable experience of interacting with the therapy dog. Following the visit, the child again completed the STAIC S-Anxiety Scale and the parent completed the background questionnaire, which concluded study activities for the parent and child.

### Measures

Study data were collected using the STAIC S-Anxiety Scale (Spielberger, 1973) also referred to "How I Feel Questionnaire" and a researcher-generated background and coping questionnaire.

#### State-Trait Anxiety Scale for Children (STAIC) S-Anxiety Scale

The STAIC S-Anxiety scale (Spielberger, 1973) consists of 20 items that ask children how they feel at a particular moment in time. The S-anxiety scale is designed to measure temporary anxiety states, defined as "subjective, consciously perceived feelings of apprehension, tension, and worry that vary in intensity and fluctuate over time" (Spielberger, 1973, p. 1). The STAIC S-Anxiety Scale is designed as a self-administered questionnaire and is typically completed in eight to 12 min for initial evaluation and repeat administrations typically require five to 7 min. The scale was developed specifically for use in children between the ages of nine and 12, but can be used in younger children if the scale items are read out loud to them and in older children (Spielberger, 1973). Licenses to use the scale for the study were purchased from the publisher. The scale demonstrated excellent reliability in the study sample with a Cronbach alpha of 0.88 during the pre-intervention administration and 0.86 in the post-intervention administration of the scale.

#### Background Questionnaire

A 22-item researcher-generated background questionnaire was constructed to elicit basic demographic and background information as well as the parent's satisfaction with the study interventions and

**Table 1**  
Demographic description of study participants by group.

Variable	Control group	Experimental group
N	43	50
Age	6–16 years	6–17 years
	10.05 ± 3.17	11.00 ± 3.46
Sex	19 (44) male	21 (42) male
	24 (56) female	29 (58) female
Reason for hospitalization		
Surgery	10 (23)	15 (30)
Medical condition	32 (76.2)	34 (69.4)
Acute Infection	8 (25)	6 (17.6)
Chronic Illness Management	7 (21.9)	5 (14.7)
Neurologic	4 (12.5)	4 (11.8)
Gastrointestinal	3 (9.3)	4 (11.8)
Lives with chronic illness	12 (28%)	13 (28%)
Prior hospitalization	20 (47%)	19 (38%)
Pet ownership	31 (72%)	40 (80%)
Dog ownership	26 (65%)	34 (68%)

Note: All values are  $m \pm sd$  or  $n$  (valid %). Lives with Chronic illness = the child lives with a chronic illness; Previous Hospitalization = child has been hospitalized on at least one other occasion; Pet Ownership = family owns a pet; Dog Ownership = family owns a dog.

perceptions of their child's coping during hospitalization. The questionnaire included items such as reason for hospitalization, presence of a chronic illness, pet ownership, and parent perception of the child's coping. Four questions related to coping were included in the analysis: two elicited information about type of coping education provided and two 5-point Likert-type items elicited parent perception of the importance of receiving coping education and degree to which the parent felt the child had coped effectively with the stress of hospitalization.

#### Dog-handler study teams

Consistency of dog-handler teams was important in the study design. The childlife specialist on our research team identified two dog-handler teams who regularly visit the pediatric unit and to whom the children tend to respond very positively. The coordinator of our pet therapy program worked with the certifying agencies to ensure consistent visits with these particular dog-handler teams throughout the period of data collection. Both handlers were female and the dogs were a Labrador and a golden retriever. After approximately 2 months of data collection, the golden retriever suffered a leg injury requiring surgery, so that team was replaced by another dog-handler team. These two teams remained consistent through the remainder of the study. The same childlife specialist or research assistant accompanied the dog-handler teams during the intervention.

#### Data analysis plan

Data were cleaned and entered on an ongoing basis throughout the study. The sample was compared descriptively between control and intervention groups using *t*-test and chi square analysis. Descriptive analysis provided an overview of factors related to state anxiety levels. Because STAIC S-Anxiety scores did not follow a normal distribution, non-parametric analyses were employed to evaluate changes in the construct of state anxiety. Wilcoxon matched-pair signed rank test was used to evaluate change in anxiety before and after each intervention within group. Mann-Whitney *U* test was employed to evaluate differences in anxiety between groups pre and post and to evaluate the difference in anxiety change scores between groups. Data were analyzed with IBM SPSS Statistics, Version 23, (Armonk, NY), and  $p < .05$  was considered significant.

## Results

The sample, described in Table 1, was similar between intervention groups with no significant differences in age, sex, chronic illness, history of previous hospitalization, and pet ownership. There was no significant difference in baseline anxiety level between the experimental ( $med = 31$ ) and control groups ( $med = 30$ ).

#### State anxiety

State anxiety was measured at baseline and within five minutes following the control or experimental intervention. Because state anxiety scores were not normally distributed, non-parametric techniques were employed for data analysis.

#### Bivariate relationships

State anxiety was positively correlated with the child's age ( $\rho = 0.298$ ,  $p < .001$ ), indicating that older children tended to have higher levels of baseline anxiety. Baseline state anxiety was negatively correlated with parent perception of how well the child had coped with the stress of hospitalization ( $\rho = -0.239$ ,  $p < .05$ ). This finding suggests that parent's perception of their child's ability to cope with the stress of hospitalization, as measured by a single five-point Likert item, was higher when the child's self-reported state anxiety was lower.

Independent samples Mann-Whitney *U* tests were conducted to evaluate whether there was a difference in baseline anxiety across various demographic factors. There was no significant difference in baseline anxiety based upon sex, presence of a chronic illness, or history of previous hospitalization. However, children admitted for a surgical reason were significantly more likely ( $p < .05$ ) to have a higher level of baseline anxiety ( $med = 32$ ,  $min-max = 22-45$ ) than those admitted for medical reasons ( $med = 30$ ,  $min-max = 20-48$ ).

#### Change in state anxiety

Wilcoxon matched-pair signed rank tests were conducted to measure whether there was a change in state anxiety level in the control and intervention groups, as illustrated in Table 2. Within the pet therapy group, there was a significant difference in state anxiety scores before the intervention ( $med = 31$ ,  $min-max = 20-46$ ) and after the intervention ( $med = 25$ ,  $min-max = 20-40$ );  $p < .001$ . Similarly, in the comparison group, there was a significant difference in state anxiety score before completing the puzzle ( $med = 30$ ,  $min-max = 20-48$ ) and after completing the puzzle ( $med = 28$ ,  $min-max = 20-40$ );  $p < .001$ . These findings suggest that both the puzzle and the pet therapy visits decreased children's experiences of state anxiety. However, while there was no significant difference in baseline state anxiety scores between the intervention and control groups ( $p = .537$ ), post-intervention state anxiety scores were significantly lower in the pet therapy intervention group than in the puzzle comparison group ( $p = .002$ ). Additionally, change in anxiety scores was calculated based upon decrease from baseline to post-intervention. Median change score for the puzzle group was a decrease by two points and for the pet therapy group was a decrease of six points. A Mann-Whitney *U* test confirmed that this represented a statistically significant difference ( $p = .004$ ) in anxiety change score between the two groups. These findings suggest that while both the pet therapy and comparison interventions positively affected participants' state anxiety level, the pet therapy intervention more effectively reduced anxiety levels.

Thirty-four (68%) participants in the pet therapy arm of the study owned a dog. Using an independent samples Mann-Whitney *U* test, we evaluated whether the change in anxiety before and after the pet therapy intervention was the same across categories of participants who did or did not have a dog at home. The null hypothesis was retained for this question ( $p = .539$ ), indicating that children who did have a dog at home and those who did not have a dog at home responded similarly to the pet therapy intervention. This finding suggests that children respond positively to a brief pet therapy intervention whether or not they are accustomed to interacting with a pet dog at home.

#### Coping

Data related to coping, reported by a parent, were analyzed using descriptive statistics. We collected information related to coping education provided in the hospital and how well the parents felt their child coped with the stress of hospitalization.

In the overall study sample, parents reported on coping education they received as well as the value of this education in helping them and their children cope with the stress of hospitalization. Seventy (80.5%) parent participants reported that hospital staff had helped

**Table 2**  
Anxiety comparison across groups.

	Pre-anxiety <i>med</i> (min-max)	Post-anxiety <i>med</i> (min-max)	<i>p</i> -Value
Puzzle comparison group	30 (20–48)	28 (20–40)	<0.001*
Pet therapy intervention group	31 (20–46)	25 (20–40)	<0.001*
<i>P</i> value difference	0.537**	0.002**	

\* Wilcoxon matched-pair signed rank test used to calculate *p*-values.

\*\* Mann-Whitney *U* test used to calculate *p*-values.

them and their child learn strategies for coping with the stress of hospitalization. Eleven parent participants (12.6%) were unsure as to whether they had received coping education and six (6.9%) reported they did not receive coping education. Among parent participants who reported receiving coping education, the majority ( $n = 44$ , 62.9%) reported distraction techniques were the most helpful, followed by support ( $n = 29$ , 41.4%) and therapeutic play ( $n = 22$ , 31.4%). Percentages do not add up to 100 because certain participants selected more than one strategy. In regards to the value of providing children and families with education about coping, 60 out of 85 respondents (74.1%), reported coping education was either a high priority or essential in the care of their families during hospitalization.

Parents responded to a single item on the background questionnaire related to their perception of their child's coping during the hospital stay. There was no significant difference in the response to this item, based upon whether the child received the pet therapy or puzzle intervention. Parents in both groups reported that their child had coped well with the stress of hospitalization, with 86.96% of parent respondents in the pet therapy group and 77.5% of parents in the puzzle group agreeing or strongly agreeing with the statement related to coping. Because this information was collected immediately following the intervention, it is not possible to attribute any difference in coping ability to either activity.

#### Parent satisfaction

Parents in the pet therapy group reported benefits to both their children and themselves from the pet therapy program. Within the pet therapy group ( $n = 50$ ), 45 (95.7%) of parent respondents felt that their child benefited from the pet therapy program and 45 reported they also benefited from the visit. Two respondents (4.3%) were not sure if there was benefit to child or parent. All parent respondents ( $n = 46$  [100%]) reported that they would like another pet therapy visit if they or their child were hospitalized again and 100% would recommend the pet therapy program to a friend who was in the hospital. Parents of children in the pet therapy group did not respond to the question related to the puzzle intervention.

Among families who received the puzzle intervention ( $n = 43$ ), 37 (86%) of parents responded to whether they felt the puzzle activity helped to relax their child. Among these respondents, 30 (81.1%) reported the puzzle was relaxing, five (13.5%) were unsure, and two (5.4%) felt it was not relaxing to the child. Parents of children in the pet therapy group were instructed not to respond to the questions related to pet therapy.

## Discussion

Families of children who are hospitalized identify stress, anxiety, and pain as key factors that contribute to an overall negative hospital experience (Muscara et al., 2015). Findings from this study add to the body of knowledge related to non-pharmacologic strategies to increase well-being in both children receiving care in the hospital and their families. Strengths of this study include an adequate sample size, standardized intervention, and the presence of an active comparative intervention.

#### Anxiety

Study findings suggest that a brief pet therapy visit more effectively reduces state anxiety than a comparative activity of completing a jigsaw puzzle. These findings are congruent with results of a recent meta-analysis (Waite, Hamilton, & O'Brien, 2018) that supported the positive effect of pet therapy on anxiety, distress, and pain in 22 studies, including 13 that involved children in medical settings. Other studies, however, including those by Barker et al. (2015) and by Tsai et al. (2010) contrast with our study findings and have found no significant decrease in state anxiety following pet therapy. The effect of pet therapy on state

anxiety may be mediated by other factors such as trait anxiety level, presence of a chronic condition, new diagnosis of a serious illness, and other medical, psychological and social factors.

The higher levels of state anxiety in the surgical patients are congruent with the current literature related to the psychosocial experiences of children hospitalized for surgery. A recent systematic review of 11 studies from six countries identified negative psychosocial experiences associated with surgery including anxiety, fear, and depression along with negative behaviors such as eating disturbances and clinginess (Gabriel et al., 2018; Williams et al., 2015). In the preoperative period, children may experience anxiety related to anticipation of the surgery, as well as its potential risks and outcomes. Postoperatively, anxiety and distress can persist as children cope with limited mobility, pain, and possibly concern related to the effectiveness of surgery for older children and adolescents. The needs and experiences of children and parents during hospitalization are highly interconnected. Parents, too, experience anxiety, stress, trauma, and exhaustion associated with their child's hospitalization for surgery (Gabriel et al., 2018; Li & Lam, 2003). Children look to their parents as the primary influence on their own emotion regulation and can experience more distress if this is exhibited by the parents (Gabriel et al., 2018). For this reason, strategies such as pet therapy, that provide support or distraction to both children and their parents are highly valuable in effective functioning of the entire family during this stressful time.

The positive relationship between age and state anxiety level is expected because older children and adolescents are likely to have an increasingly comprehensive awareness of their illness or surgical condition. These children will be more likely to have their own fears related to their illness as well as to share in their parents' fears and concerns (Gabriel et al., 2018). The disruption of the routines of school and interactions with peers and friends can further stress the older child. Younger children, on the other hand, have a more limited understanding of their disease and the healthcare environment and are highly dependent on parents for emotional reaction (Bakoula, Kolaitis, Veltsista, Gika, & Chrousos, 2009).

#### Coping

Our study provides information about types of coping education that parents find most helpful to their children. Parents identified distraction as the most effective strategy for coping with the stress of hospitalization. Pet therapy is a distraction technique that requires active, pleasant engagement on the part of the child. Other forms of distraction include toys, crafts, puzzles, and games including card and video games.

#### Parent experience

The patient and family experience has attained an increasingly important position in the healthcare research agenda because satisfaction is now directly linked to reimbursement from Medicare, Medicaid, and other commercial insurers. In addition, the current literature on family-centered care suggests that the family, rather than the child, is the focus or recipient of care in pediatric setting (Uniacke, Browne, & Shields, 2018). Findings from this study suggest that parents experienced high levels of satisfaction with the pet therapy program. While the primary focus of this study was not directly related to patient satisfaction, incidental findings suggest that pet therapy could be a helpful adjuvant to the patient and family experience. There is currently a very limited body of literature assessing the association between pet therapy and patient satisfaction, but preliminary findings do suggest it has the potential to positively affect Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores (Harper et al., 2015) and perceptions of waiting room experiences (Buettnner, Wang, Stevens, Jessup, & Magrinat, 2011). Further research is needed in pediatrics to more comprehensively evaluate the effect of pet therapy on the overall patient and family experience.

Because of its linkage to revenue and need to include family in interventions, healthcare facilities may want to consider more closely studying and increasing the allocation of resources for activities that are linked to a positive patient and family experience, such as pet therapy.

### Limitations

The findings from this study need to be interpreted in the context of several limitations. This was a convenience sample and it is not known how families who chose to participate in the study may have differed from children and families who did not participate. Also, while there were no significant differences between the pet therapy and puzzle groups in relation to age, gender, chronic disease, pet ownership, and baseline anxiety, because we did not use randomization, it is possible that other biases could have been introduced since participants knew which group they were assigned upon enrollment. In addition, we did not collect information related to circumstances that may have affected baseline anxiety levels in participants such as exposure to an invasive procedure, a visit from family, or length of stay. We also did not collect data related to medications the child may have received prior to study participation that could have affected anxiety levels.

While the main variable of interest in this study was state anxiety, parent report of child coping was collected immediately following the interventions in the form of researcher-designed questions on the background questionnaire. This brief parent report does not represent a validated coping measure nor does it evaluate the longer term effect of our interventions on children's coping.

The majority of research, including this study, related to pet therapy in children focuses on baseline and immediate post-intervention data. This type of study design does not provide information about whether the immediate benefits of pet therapy are sustained after the early post-intervention period. Also, much of the data in pet therapy studies are collected by self-report. Many of the conditions pet therapy aims to address, such as pain and anxiety, are intrinsically subjective constructs.

Finally, while the study sample was diverse in relation to reasons for hospitalization, age, presence of chronic condition, it was conducted at a single site so this may limit generalizability of findings.

### Clinical implications

Incorporating a brief pet therapy visit into routine pediatric care can be a relatively low cost, non-pharmacologic intervention to decrease anxiety and promote patient satisfaction in children and families receiving care in the hospital setting. Nurses and childlife specialists routinely assess children and families for stress, anxiety, and effectiveness of coping strategies. Study findings provide empirical support for a brief pet therapy visit as a tool to decrease anxiety in hospitalized children and promote family satisfaction. When resources for providing pet therapy visits are limited, clinicians may consider prioritizing children who are most affected by anxiety or are having difficulty coping with the stress of hospitalization.

There is a great need for future studies that explore longer term effects of pet therapy on patient outcomes that continue after the novelty of the visit wears off as well as rigorous evaluation of pet therapy interaction beyond a brief visit (Waite et al., 2018). Future study of anxiety could additionally include further investigation into biomarkers, salivary cortisol measurement, or other physiologic parameters such as heart rate and blood pressure.

### Conclusions

Pet therapy can be an effective complementary therapy to decrease anxiety in children receiving care in the hospital. Additional development and implementation of evidence-based pet therapy programs can have a positive effect on children and families. Rigorous study of psychological and physiological outcomes associated with these programs both

in the immediate and long-term periods is needed to continue to expand the evidence-base for this potentially powerful tool.

### CRedit authorship contribution statement

**Katherine Hinic:** Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing, Project administration, Supervision. **Mildred Ortu Kowalski:** Conceptualization, Writing - review & editing, Funding acquisition. **Kristin Holtzman:** Methodology, Investigation. **Kristi Mobus:** Methodology, Investigation.

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### Declarations of interest

None.

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