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Does Animal-Assisted Therapy Reduce Anxiety in Pediatrics?

Kimberly Carroll
Philadelphia College of Osteopathic Medicine

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Kimberly Carroll, PA-S

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Abstract

Objective: The objective of this selective EBM review is to determine whether or not animal-assisted therapy reduces anxiety in pediatrics.

Study Design: Three randomized controlled trials (RCTs) published between 2015 and 2017 were reviewed. All studies compared the effects of animal assisted therapy to a control group consisting of a simple distracting game or medical treatment alone on the self-reported anxiety levels of patients receiving medical treatment under the age of 18.

Data Sources: All sources were published in English in peer reviewed journals within the last 10 years (2008-present). They were found using databases such as PubMed, Cochran library, and EBSCOhost Web.

Outcomes Measured: Level of anxiety. Two articles measured anxiety with the State-Trait Anxiety Inventory (STAI) questionnaire filled out by the patient. One article measured anxiety with a self-reported, 11-point numeric rating scale (NRS) that examined how nervous, afraid, or worried the patient reported feeling.

Results: None of the three articles found there to be a significant decrease in anxiety following animal-assisted therapy when compared to the control group for children receiving medical treatment (McCullough A, Ruehrdanz A, Jenkins MA, et al. *J Pediatr Oncol Nurs*. 2018;35(3):159-177, Branson SM, Boss L, Padhye NS, Trötscher T, Ward A. *Journal of pediatric nursing*. 2017;36:84-91. doi: 10.1016/j.pedn.2017.05.006, Barker SB, Knisely JS, Schubert CM, Green JD, Ameringer S. *Anthrozoos*. 2015;28(1):101-112. doi: 10.2752/089279315X14129350722091).

Conclusions: It does not appear that animal-assisted therapy generally reduces anxiety in pediatric patients, though it was reported to be an enjoyable and safe experience and should still be considered for those who would like to try it at facilities who offer AAT (McCullough A, Ruehrdanz A, Jenkins MA, et al. *J Pediatr Oncol Nurs*. 2018;35(3):159-177, Branson SM, Boss L, Padhye NS, Trötscher T, Ward A. *Journal of pediatric nursing*. 2017;36:84-91. doi: 10.1016/j.pedn.2017.05.006).

Key Words: Animal-assisted therapy, animal-assisted intervention, children, pediatrics, adolescence

Introduction:

Medical treatment, procedures, and hospitalizations commonly induce feelings of anxiety, particularly in children. Children are frequent consumers of medical care, visiting doctors' offices and hospitals for annual physicals, immunizations, sick visits, broken bones, allergic reactions, and a myriad of other emergent and non-emergent reasons. Pediatric patients frequently experience emotional distress when placed in medical environments or are surrounded by medical personnel regardless of how invasive or painful their care is due to their developmental immaturity.[1] Healthcare-induced anxiety is not typically given a formal diagnosis, making cost estimation difficult. Nonetheless, anxiety sparked by the trauma experienced in a medical setting can set the stage for psychological disorders such continued anxiety, depression or behavioral problems as well as school absences and poor academic performance.[1,2] Therefore, the costs resulting from healthcare anxiety can be associated with the cost of treatment from these resultant conditions, decreased productivity, and impaired functionality.[1,2] Pediatric patients account for a large number of healthcare visits each year. Data has shown that from birth to age 21, children visit primary care providers an average of 31 times per year for annual physicals exam appointments alone.[1] In 2012, pediatric patients accounted for 5.9 million hospital stays,[3] and research from 2005 showed that 12.4 million children under the age of 18 visit an emergency room each year.[4]

Anxiety that is acutely related to healthcare is largely due to the lower cognitive ability and continuing development of children as compared to adults.[1] Pediatrics often fear the unknown, such as unfamiliar medical facilities and workers, and prior trauma related to medical care can lead to fear of additional trauma, causing anxiety at future encounters.[1] Feelings of

helplessness in these settings can manifest as anxiety and behavioral responses that can ultimately delay, prolong, or impair the care provided.[1]

Treatment of medically induced anxiety is virtually non-existent. On some occasions a toy or game may be provided to the child as a distraction from their current situation or acute event. (i.e. teddy bear, puzzle, driving toy car to surgery). In some cases, animal-assisted therapy has been utilized, with its popularity increasing in more recent years.

Animal-assisted therapy (AAT), also known as animal-assisted intervention (AAI), is the use of animals, typically canines, to provide support to patients as they endure new medical problems or manage preexisting diagnoses. AAT has been more widely researched in the adult population and has shown to reduced anxiety among this population, so its use in pediatrics is of interest, though it has not been as thoroughly investigated. Additionally, since the root of the anxiety being discussed in this paper is healthcare-induced, a treatment method that does not include further medical intervention (i.e. medication) would be beneficial.

Objective:

The objective of this selective EBM review is to determine whether or not animal-assisted therapy reduces anxiety in pediatrics.

Methods:

Studies selected for use included those which had participants under the age of 18 who were currently receiving medical care and were enrolled in a randomized controlled trial that examined the effects of animal-assisted therapy on anxiety levels. Those who were assigned to the intervention group were required to receive standard medical treatment in addition to at least one session of animal-assisted therapy while the control group did not spend any time in animal-assisted therapy and either received standard medical treatment alone or medical treatment in

addition to a distracting toy or game. All articles were required to have been written in the last 10 years (2008-present) for inclusion and were selected based on if they were patient oriented and relevant to the clinical question at hand. Articles were excluded if they were prior to 2008. All sources are published in peer reviewed journals and were originally printed in the English language. The author of this review paper, Kimberly Carroll, PA-S, performed the research utilized below. Research was performed using databases such as PubMed, Cochran Library, and EBSCOhost Web. Key words used to find these articles included animal-assisted therapy, animal-assisted intervention, pediatrics, children, and adolescents. Statistics reported or used in the selected articles included mean (SD), median, F-score, IQR, p-value, and confidence interval (CI). Criteria for the selection of participants for each specific study are summarized below (Table 1).

Table 1 - Demographics & Characteristics of included studies

Study	Type	# of Pts	Age (yrs)	Inclusion Criteria	Exclusion Criteria	W/D	Interventions
McCullough (2017)[5]	RCT	106	3-17	Age 3-17, cancer necessitating outpatient treatment ≥1x/mo, primary language English or Spanish	Significant cognitive impairment, fear of dogs, allergic to dogs	7	AAI x 10-20 minutes; ~1 session/week x 4 weeks
Branson (2017)[6]	RCT	48	7-17	Age 7-17, A&O x3/3, understand English, consent from guardian, assent, able to complete study instruments and provide saliva.	Fear of dogs, allergic to dogs, Addison's or Cushing's disease, contact isolation, hormone replacement, NSAID use	0	AAI x 10 minutes; 1 session only
Barker (2015)[7]	RCT	53	8-18	Age 8-18, understand/speak English.	Fear of dogs, allergic to dogs, contact	13	AAI x 10 minutes; 1 session only

					precautions, pediatric ICU, cognitive impairment, hearing/language difficulties, discharge anticipated in next 48 hours.		

Outcomes Measured:

All included studies measured level of anxiety after intervention with AAT using self-reported assessment scales. McCullough et al.[5] examined baseline level of anxiety in both the intervention and control groups, then continued to measure level of anxiety in both groups weekly, after AAT for those in the intervention group, as well as at study completion in order to determine the effect of AAT on anxiety over time. Participants met with a therapy dog once a week for 10-20 minutes for a total of 4 months, while those in the control group solely received standard medical care. Level of anxiety for participants age 13-17 was measured using the State Trait Anxiety Inventory (STAI) inventory questionnaire, which required patients to answer two 20-item scales to determine their state and trait anxiety levels. For participants age 3-4, parents or staff assisted in administering and completing the questionnaire.

Branson et al.[6] also utilized the STAI to measure anxiety levels. Patients in the AAT group spent 10 minutes with a therapy dog in AAT while those in the control group were given a stuffed animal for 10 minutes to play with. Anxiety levels were measured directly before and immediately after intervention in both groups. This study sought to investigate the immediate effects of AAT, as only one AAT or control session was utilized per patient during data collection.

Barker et al.[7] also studied self-reported anxiety immediately before and after a single session of AAT or doing a control activity in order to examine the immediate effects of AAT on anxiety. Participants in this study also spent 10 minutes in AAT with a therapy dog, though the control group spent their 10 minutes playing with a jigsaw puzzle. Anxiety levels were determined using a numeric rating scale (NRS) from 1-11 that examined how nervous, afraid, or worried a patient was, with higher scores indicating higher levels of anxiety or stress.

Results:

All three articles found that anxiety decreased in both the AAT and the control groups, though there were never significant differences between the groups (table 2).[5,6,7] The reduction in AAT groups was not considerably larger than that found in the control groups. In fact, two studies found that while post-AAT anxiety scores were lower than in control groups, the control groups actually had slightly greater average changes in anxiety from baseline.[5,7] Lower post-AAT scores may be accounted for by their similarly lower baseline anxiety levels compared to controls.

Table 2 – Outcomes of included studies

Study	Baseline – Mean (SD)		Study End – Mean (SD)		Mean Change per Session	
McCullough et al.[5]	AAT	30.6 (7.7)	AAT	28.8 (6.7)	AAT	-0.4*
	Control	32.4 (8.1)	Control	29.3 (5.4)	Control	-0.47*
Barker et al.[7]	AAT	1.78 (2.54)	AAT	1.25 (2.67)	AAT	-0.53§
	Control	3.55 (3.66)	Control	2.63 (2.48)	Control	-0.93§
Branson et al.[6]	AAT	32.0 (6.69)	AAT	ǂ	Condition	-8.19*
	Control	31.38 (5.62)	Control	ǂ	Pre-STAIC	0.6*

*unstandardized coefficient (B); §post-pre change; ǂnot reported

McCullough et al.[5] examined the relationship between AAT and anxiety after each session as well as the overall effect after 4 months of treatment. The study did not find there to be significant changes in anxiety following individual sessions of AAT on nor did it find there to

be significant differences in anxiety between groups over time or in average change per session. Data collected was statistically significant ($p < 0.001$) with results not likely owing to chance (table 3).

Table 3 – Validity & Precision of included studies

Study	Group	p-value	CI (95%)	Partial Eta Squared
McCullough et al.[5]	AAT	<0.001	✢	✢
	Control	<0.001	✢	✢
Barker et al.[7]	AAT	0.03	✢	✢
	Control	0.03	✢	✢
Branson et al.[6]	Condition	0.31	[-24.13, 7.76]	0.02
	Pre-STAIC	0.00	[0.29, 0.91]	0.47

✢not reported

Barker et al.[7] indicated significantly lower post-condition anxiety scores in the AAT group, different from other studies where post-condition scores were noted to be similar between groups. The same was not true of the mean change from baseline, which did yield similar results in both groups. Data was statistically significant ($p = 0.03$) with only a 3% chance of post-condition results being the product of chance.

Branson et al.[6] was unique in taking the effect of pre-condition STAIC scores into consideration to see how it affected post-condition scores. Results indicated that 47% of the variability in post-condition anxiety reports could be attributed to pre-condition scores, while only 2% of the variability could be attributed to the condition itself (table 3). Data regarding the relationship between pre- and post-STAIC scores was statistically significant ($p = 0.00$), though results regarding the relationship between the condition and post-condition anxiety was not ($p = 0.31$). The confidence interval for the condition was wide ([-24.13, 7.76]) indicating that the estimate was imprecise, unlike estimates related to pre-condition scores which were precise ([0.29, 0.91]). Similar to other studies, Branson et al.[6] did not find there to be significant

reduction in in anxiety after intervention nor did it find the AAT group to have a greater decrease in scores compared to controls.

In McCullough et al.[5], participants were seen and received AAT on an outpatient basis while Branson et al.[6] and Barker et al.[7] patients were hospitalized and remained inpatient for the duration of the study. Hospitalized participants in both studies had a variety of diagnoses while McCullough et al.[5] included only those with a recent diagnosis of cancer (within the last 16 weeks). Also, McCullough et al.[5] utilized five pediatric hospitals to collect data while Branson et al.[6] and Barker et al.[7] only included a single site for research. Patients were required to need at least monthly outpatient follow up as well as have a diagnosis of cancer to be considered for inclusion in the study by McCullough et al..[5] In Branson et al.[6], participants were selected from the medical-surgical department but were excluded from consideration if they had a diagnosis of Cushing's or Addison's disease, were currently taking NSAIDs or hormone replacement therapy, or were on contact isolation. Barker et al.[7] excluded patients who were likely to be discharged within 48 hours, were in the ICU, or were on contact isolation. All three studies included pediatric patients of similar ages. Branson et al.[6] and Barker et al.[7] included those age 7-17 and 8-17 years old respectively, while McCullough et al.[5] included a broader spectrum of ages, with participants ranging from 3-17 years old. McCullough et al.[5] incorporated younger patients in order to obtain an adequate number of participants after experiencing low enrollment with a narrower age range initially.

All studies compared AAT with a control group who did not receive AAT. The control group varied by study, with the McCullough et al.[5] participants receiving only standard medical care while the other two studies included active control groups, such as playing with a stuffed animal or doing a jigsaw puzzle as a distraction.[6,7]

Safety, tolerability, and adverse events were not discussed in any of the articles, likely due to the nature of the variables and the fact that in all three studies, participants were excluded if they were allergic or afraid of dogs.[5,6,7] Additional safeguards were put in place to ensure patient safety during animal interactions in two of the studies, such as hand washing before and after AAT,[5,6] though no additional information regarding safety was provided by Barker et al..[7] Branson et al.[6] did not allow the dog to go off-leash or for the handler to relinquish control of the animal during AAT. Additionally, if the dog were to go on the bed, a clean sheet was placed between the dog and the patient. McCullough et al.[5] ensured a safe environment by requiring that participating dogs passed health and behavioral testing and that dog handlers were adequately trained in AAT and study logistics. None of the studies mentioned any adverse events such as allergic symptoms, new illness, deteriorating health status following animal exposure, aggression of the dog towards the patient, or injury to the patient from playing with the dog.

Discussion:

Limitations to the studies included were largely unavoidable. For instance, blinding was not possible due to the nature of the intervention being investigated. Branson et al.[6] did utilize allocation concealment though McCullough et al.[5] did not. Barker et al.[7] did not address allocation concealment all together. Low baseline anxiety (flooring effect) and relatively small sample sizes universally limited the validity of the studies.[5,6,7] Furthermore, the use of the STAIC outside of its intended age range in McCullough et al.[5] may have had an impact on the accuracy of the data reported by younger participants. Overall limited research available on this topic restricted the author in her selection of studies for this review.

Conclusions:

Current research does not show that AAT significantly reduces anxiety in pediatric patients, though most of the studies several studies did note that participants reported enjoying their time in AAT. While there is not sufficient data at this time to recommend AAT as a clinically significant adjunct to care in targeting anxiety, it is a safe and pleasant practice that should still be considered.[5,6,]

Several factors may have contributed to and possibly confounded the outcomes described in each article. In Branson et al.[6], parents remained in the room during AAT and were even encouraged to engage in the therapy. Variable levels of parental participation and presence during AAT may have skewed scores. McCullough et al.[5] mentions that children in the control group who encountered therapy dogs in the hospital were not deterred from interacting with them, something that many have influenced the results of this long-term study. Only one study specifically accounted for the effects of pre-intervention anxiety levels in their data,[6] something that should also be incorporated in future studies as to more clearly examine the relationship that exists solely between AAT and anxiety.

Additional research with more uniform study design and more stringent data analysis and recognition of covariates is recommended to examine the effects of AAT on anxiety in children. Further investigation with higher baseline anxiety, a variety of diagnoses, multiple sessions of AAT, inactive control groups, and minimal parent participation is suggested.

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