Spring 2017

Efficacy of Animal-Assisted Therapy Across Pediatric Care Settings: A Systematic Review

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Abstract

With alternative therapies and complementary medicine becoming increasingly popular and supported by research, it is important for healthcare workers to be prepared to encounter and use these therapies in practice. A common problem in the pediatric healthcare setting is stress in patients and families during healthcare treatment. Animal assisted therapy (AAT), more commonly known as pet therapy, is a form of complementary alternative therapy that has been examined in this population. The purpose of this systematic review is to explore the effect of AAT on treatment outcomes in pediatric patients across clinical settings. The methods used to guide this systematic review include unbiased selection of twenty primary sources using the CINAHL, PsychINFO, PubMed, and Medline databases. Evidence from research shows mixed, but generally positive, results about effect of AAT on anxiety levels, pain, behavior, and treatment outcomes. Therefore AAT may be a beneficial alternative therapy for this population.

Introduction

Each year more than 3 million children have interactions with health care providers in various settings. Whether it is an acute one time visit, one in a series of long-term encounters, or a scheduled appointment, each interaction can have a major impact on the child and family (Pediatric Hospitalization, 2016). According to The National Child Traumatic Stress Network, up to 53% of pediatric patients and their families report experiencing some traumatic stress following illness, injury, hospitalization, or painful medical procedures (Pediatric Medical Traumatic Stress, 2016). The cascade of reactions triggered by a child's stress response can provide energy for handling emergencies and managing challenges to excel, but in excess, can be damaging to their mental and physical health (Tennant, 2005). If stress goes unrelieved, giving

the body little time to relax and recover, the child can go into a state of hyperarousal where blood pressure, breathing, and heart rate increases, blood vessels constrict, and high levels of the major stress hormone, cortisol, depress the immune system (Tennant, 2005). Along with these physiological consequences, stress can also create deficits in a child's intellectual abilities, crippling their capacity to learn (Tennant, 2005). Not only do children undergoing healthcare treatment experience pain and anxiety, they also may experience separation from family and friends. Nurses have direct twenty four hour contact with hospitalized children, and are frequently involved during healthcare appointments, and therefore can affect levels of stress, and overall outcomes, including patient and family satisfaction with treatment. Researchers have studied the effects of interventions on stress and other outcomes of pediatric patients, including the effect of AAT.

Non-pharmacological interventions are increasing in popularity and are being implemented more frequently in healthcare settings today (Sanchez et al., 2015). These provide a way for healthcare professionals to provide treatment benefits to patients without the use of either invasive procedures or pharmacological measures. Often health care professionals focus primarily on treating the physical symptoms of an illness. Non-pharmacological interventions create opportunity for increased focus on other symptoms arising from health complications, such as emotional distress and anxiety (Al-Yateem et al., 2015). Among these complementary therapies is Animal-Assisted Therapy (AAT), a non-pharmacological, non-invasive intervention which as the name implies, involves a specially qualified animal as the integral part of the treatment process (Sanchez et al., 2015). AAT is present across a wide span of pediatric health-care settings for use in alleviating pain and stressors associated with a variety of medical conditions (Al-Yateem et al., 2015; Braun, Stangler, Narveson, & Pettingell, 2009; Calcaterra et

al., 2015; Hamama et al., 2011; Lima, Silva, Amaral, Magalhaes & Sousa, 2014; Tsai, Friedmann & Thomas, 2010; Vagnoli et al., 2015). When children are in a state of physical or emotional stress, their bodies react with an increase in heart rate and blood pressure as well as a release of cortisol. Evidence shows that AAT has a positive effect in decreasing blood pressure and cortisol levels, and improving behavior and mood in children (Lima et al., 2014; Vagnoli et al., 2015). The purpose of this systematic review is to identify, describe, and critically appraise evidence about the effect of AAT on outcomes in hospitalized pediatric patients. Recommendations for practice and research will be offered. The major PICOT question for this paper is: In hospitalized pediatric patients, how does AAT, versus no AAT, affect treatment outcomes?

Methods

The researchers utilized the following databases: Cumulative Index to Nursing and Allied Health Literature database, MEDLINE Medical Literature Analysis and Retrieval System Online, and PubMed, made available through the University of Akron to obtain primary sources about the effect of AAT on pediatric patients across care settings. Search keywords included: "Pediatrics," "Animal Assisted Therapy," "Intervention," and "Outcomes." The inclusion criteria included studies that were published between January, 2011 and April, 2016, samples of pediatric patients, ages three to eighteen, animal therapy, interventions, and AAT involving canines, felines, horses, or other species of animal. The final inclusion criterion was that the studies must have been published in a scientific journal. Exclusion criteria included subjects over eighteen years of age and non-primary source articles. The researchers identified twenty significant and relevant studies that conformed to all criteria. To ensure fair and critical analysis

of the issue being studied, the researchers included studies matching the inclusion criteria regardless of whether the findings did or did not support the researcher's stance on the topic.

Review of Literature

Stress and Anxiety in Pediatric Patients across Healthcare Settings

Intervention studies address gaps in knowledge (Schmidt & Brown, 2015). In this case, intervention studies aim to indirectly affect anxiety in pediatric patients and families and indirectly affect patient outcomes. As previously described, a combination of health problems and complications along with hospitalization causes anxiety and traumatic stress in pediatric patients and their families (The National Child Traumatic Stress Network, 2004). Although hospitalized stress and anxiety can occur in patients of all ages, it is especially important to look at its effect on children. This is because experiences through development from birth, through childhood and adolescence support foundations for health and resilience throughout adulthood. From birth through adolescence growth is rapid and includes foundational developmental of coping mechanisms, decision-making abilities, and capacity for independence (Al-Yateem et al., 2015). Considering that acute and chronic health problems, and their associated treatments and/or hospitalizations frequently cause pain, fear, anxiety, and stress (Al-Yateem et al., 2015; Case, Barber & Starkey, 2015; Tsai et al., 2010; Vagnoli et al., 2015), there is a high potential for disrupting the normal rapid growth and development during this critical time period. Case et al. (2015) studied 152 pediatric patients and their families during stays at a New Zealand hospital and found that children's levels of stress and, emotional, behavioral, and social problems were elevated during the stay. The researchers also found that pediatricians perceived that the majority of the patients could benefit from psychosocial intervention (Case et al., 2015). The research

suggests that underlying stress, anxiety, and pain are a prevalent and under-examined problem for pediatric patients across healthcare settings, calling for a distinct intervention.

Intervention Studies Related to Stress and Pain

Many researchers have studied the effect of AAT on pain and stress in the hospitalized and non-hospitalized pediatric patient. Most measured pain using a visual analog pain scale or the Wong Baker Scale. (Braun et al., 2009; Calcaterra et al., 2015; Vagnoli et al., 2015) The measurement of stress is more difficult and done by measuring blood cortisol levels or with standardized tools such as the Amended Observation Scale of Behavioral Stress, the State Trait Anxiety Inventory for Children, and the Child Medical Fear Scale. (Calcaterra et al., 2015; Tsai et al., 2010; Vagnoli et al., 2015)

Pain Studies. In general, researchers have reported mixed results about whether or not utilization of AAT can decrease the levels of pain and stress in pediatric patients. Some found that AAT improved outcomes in children (Braun et al., 2009; Calcaterra et al., 2015; Lima et al., 2014). For example, in a randomized controlled study, Calcaterra et al. (2015) found that when treatment was supplemented with AAT, patient's pain perception was lowered, they awoke from anesthesia faster, there was an increase in cerebral oxygenation, and no adverse outcomes resulted from administration of AAT. While the results found in this study supported AAT, a small sample size limited the generalizability of these results. Braun et al. (2009) found that hospitalized children exposed to AAT had a pain reduction, as measured on the visual analog scale, four times greater than subjects who did not receive any AAT intervention. The researchers compared the effect of a 15-20 minute session of AAT on pain, blood pressure, heart rate, and respiratory rate in a group of hospitalized children. Again, while this study supports AAT, limitations included a small sample, lack of randomization, no comparison to other AAT

animals, and the strain that participating in therapy had on the AAT animal utilized. (Braun et al, 2009). Finally, Lima, Silva, Amaral, Magalhaes, and Sousa (2014) examined the effect that a dog's presence had during potentially painful care activities on children with profound intellectual and multiple disabilities. They found that the addition of a dog into the care regimen reduced the duration of some and at times all of the common indicators of pain. However, again, small sample size limits the generalizability of these results. (Lima et al., 2014)

The small samples of studies described in the previous paragraphs and their findings suggest a positive effect of AAT on pain. However many researchers compared the effect of AAT to other interventions such as play therapy and found no differences in outcomes. Their results seem to contradict those of the studies previously described. Barker, Knisley, Schubert, Green, and Ameringer (2015) examined the effect of a 10-minute session of AAT versus a 10-minute jigsaw activity and found no significant decreases found in pain for either group. These findings, however, are limited by already low baseline anxiety and pain levels making it difficult to detect further reduction in post-test (Barker et al., 2015). Additionally, Vagnoli et al. (2015) examined the effect of AAT certified canines during a venipuncture and blood draw and concluded no difference in pain ratings between the group that received AAT along with a parent and those that were accompanied by only a parent (Vagnoli et al., 2015). Limitations included small sample and lack of data collection about any delayed adverse reactions to the venipuncture.

Anxiety Studies. Much like the contested claims that AAT decreases pain levels in children, the effect of AAT on stress or anxiety levels of children in a healthcare setting is disputed by the findings of several researchers. Some researchers have found no effect of ATT on anxiety, such as Barker and associates (2015) and Tsai et al. (2010). Barker et al. (2015) who compared the effect of a 10-minute AAT session and a 10-minute puzzle activity control group

and Tsai et al. (2010) who compared the effect of a 6-10 minute AAT session and a 6-10 minute puzzle activity in hospitalized children. Both found no difference in the effects between interventions on either group's level of anxiety or level of medical fear. Limitations of the study conducted by Tsai et al. (2010) include small sample and lack of randomization limiting the generalizability of these findings. While these studies do not support that AAT decreased stress levels more effectively than other play interventions in children, Vagnoli et al. (2015) found that the level of distress decreased in a group receiving AAT intervention, compared to a group receiving no AAT. While not explicitly measuring levels of stress and anxiety, several researchers measure blood pressure and heart rate and found that exposure to AAT decreased blood pressure. (Calcaterra et al., 2015; Tsai et al., 2010) In addition, Lima et al. (2014) found that AAT decreased heart rate. All other researchers either did not examine the effect of AAT on vital signs (Barker et al., 2015; Vagnoli et al., 2015) or found no significant changes in blood pressure and heart rate (Braun et al, 2009).

Intervention Studies Related to Psychiatric Care

Another topic of interest for researchers is the outcome of AAT on children with psychological disorders and children who have undergone psychologically traumatizing experiences. While the efficacy of AAT in relieving pain and stress in children is contested, findings about the effect of ATT and mental health and psychiatric applications are consistent in that evidence supports that AAT can be an effective complementary therapy when administered alongside standard therapy modalities. Researchers of pediatric psychiatric care have explored the outcome of AAT in children diagnosed with psychiatric disorders (Stefanini, Martino, Allori, Galleotti & Toni, 2015), ADHD (Schuck at al., 2015), children who have experienced sexual and physical abuse (Balluerka et al., 2014; Dietz, Davis, and Pennings, 2012; Hamama et al., 2013),

and children with emotional and behavioral disorders (Bassette & Taber-Doughty, 2013). In these populations, medication regimens are often expensive with poor adherence (Schuck et al., 2015), which supports increase interest in complementary and alternative medicines and therapies.

Trauma and abuse. Many researchers have studied ATT in children with trauma and abuse histories and have consistently found a decrease in trauma symptoms (Balluerka, Muela, Amiano, & Caldentey, 2014) with a significant decrease in PTSD symptoms (Dietz, Davis et al., 2012; Hamama et al., 2011). For example, in a randomized control trial, Balluerka et al. (2014) studied adolescents with traumatic childhood experiences in residential care and found that AAT, in the form of spending two days a week for 12 weeks on a farm with one dog and nine horses, with mixed group and individual therapy, resulted in higher attachment scores. The researchers also examined the interaction and attachment between child, animal, and therapist to predict future relationships outside the clinical therapeutic setting. Further, Dietz et al. (2012) conducted a randomized controlled trial of 153 children diagnosed with Child Sexual Abuse (CSA) and examined the effectiveness of AAT using 3 groups: canines, canines with stories, and canine puppets. The researchers found that when looking at trauma symptoms, using the Trauma Symptom Checklist for Children, participants in the group with canines with stories, compared with the others groups, had significant decreases in each category, including anxiety, depression, anger, PTSD, dissociation, fantasy dissociations, sexual concerns, sexual preoccupation, and sexual distress, with PTSD having the most notable decrease. Finally, in a mixed longitudinal and cross sectional design, Hamama et al. (2012) examined the effect of a 3 hour intervention once a week for 12 weeks on nine teenage girls with histories of physical or sexual abuse. They found significant decreases in PTSD symptoms, as well as notably reduced risks to developing

PTSD. Conversely they found no ATT effect on subjective well-being, coping with stressful life events, and depressive symptoms (Hamama et al., 2011).

Socialization. Researchers have also studied AAT in children admitted to psychiatric hospitals for acute mental disorders (Stefanini et al., 2015), children with Attention Deficit Hyperactivity Disorder (ADHD) (Schuck, Emmerson, Fine, & Lakes 2015), and other emotional behavioral disorders (Bassette & Taber-Doughty, 2013). In general, researchers have found that the use of AAT in various settings positively affected socialization skills in children diagnosed with mental disorders. For example, in a randomized controlled trial of 24 children diagnosed with ADHD, Schuck et al. (2015) found that the intervention group receiving AAT two times a week for 12 weeks had decreased rates of problematic behavior when compared to the non-AAT group. Social skills were also improved in the intervention group when using the Social Skills Improvement System-Rating Scales, Parent Form (SSIS-RS), suggesting that AAT can improve social skills in children with behavioral disorders (Schuck et al., 2015). In a pilot multiple probe single case study including 3 elementary aged students, Bassette and Taber-Dougty (2013) evaluated the effects of reading to a dog during class in children with emotional and behavioral disabilities. They found that all three students improved ability to stay on task. Finally, in a pre-post experimental design and randomized controlled trial of 34 children diagnosed with a psychiatric disorder, Stefanini et al. (2015) studied the effects of interactions with a dog for 45 minutes a week over the course of 3 months. They found significant improvements in format of care with less time spent in the hospital, as well as an increase in global functioning in the intervention group. Those with AAT showed increased participation and interaction with their animals, possibly contributing to the increased socialization with adults and peers (Stefanini et al., 2015).

Limitations. Across the studies, researchers experienced many limitations, the first being a small sample size (Balluerka et al., 2014; Bassette & Taber-Doughty, 2013; Hamama et al., 2013; Schuck et al., 2015; Stefanini et al., 2015) with the largest sample size being 153 children (Dietz et al., 2012), followed by 46 (Balluerka et al., 2014). A small sample prevents generalization of information because it is not representative of the population being examined (Schmidt & Brown, 2015). Similarly, convenience sampling does not always reflect the population of interest and may provide for bias (Schmidt & Brown, 2015). However, random sampling was not feasible for any of these studies, so convenience sampling was the alternative. Another limitation includes not having blind raters scoring the before and after effect, possibly causing bias in the results, such as with Schuck et al. (2015). Additionally, a limitation that is difficult to control is researchers' inability to control for participants' other activities; this raises the question of whether or not it was the intervention causing the improvement, or some extraneous variable (Balluerka et al., 2014; Bassette & Taber-Doughty, 2013). Finally, a limitation of every study that should be evaluated for stronger evidence is the long-term effectiveness of AAT (Balluerka et al., 2014; Bassette & Taber-Doughty, 2013; Dietz et al., 2012; Hamama et al., 2013; Schuck et al., 2015; Stefanini et al., 2015). Long-term effectiveness must be evaluated to provide stronger support for the use of AAT.

Intervention Studies Related to Chronic Disorders

In addition to being examined as an adjunct treatment for pain and stress, researchers have also examined AAT in children with chronic diseases such as Autism Spectrum Disorder (ASD) (Fung, 2011; Holm et al., 2014; Silva et al., 2011), Cerebral Palsy (Kwon, Chang, Yi, Lee, Shin, & Kim, 2015), emotional and learning disabilities (Bassette & Taber-Doughty, 2013), and language impairments (Boyer & Mundschenk, 2014).

Autism Spectrum Disorder Studies. Researchers report mixed findings about the effectiveness of AAT on children with ASD. For example, Silva et al. (2011) examined the effect of AAT on children with ASD as measured by the frequency and duration of positive behaviors, such as smiling and physical contact, and negative behaviors, such as frowning and aggressive manifestations. The researchers found that one-to-one structured activities accompanied by a therapy dog increased positive behaviors and significantly decreased negative behaviors when compared to a control group with no therapy dog present. While these results support AAT, limitations of this study include a small sample, a case study design, and the possibility that results were attributable to a novel addition to typical therapy and not the AAT animal specifically (Silva et al., 2011). Conversely, Fung (2011) compared AAT and play therapy and found no significant differences in social behavior or non-social behaviors in children with ASD receiving AAT versus play therapy. In this study, children with ASD were given a 20 minute AAT session and their responses to group therapy during this session were compared to a group that played with a doll rather than a therapy dog. Although findings show that AAT is not more effective than play therapy, findings are limited by a small sample, a limited number of therapy sessions, and an inability to create identical groups of subjects as not each case of ASD is identical in symptomology.

Chronic Disease Studies. Researchers have studied AAT for children with emotional and behavior disabilities and chronic diseases; some findings support the use of AAT (Bassette & Taber-Doughty, 2013) while others found no significant benefit to AAT (Boyer & Mundschenk, 2014). For example, Bassette and Taber-Doughty (2013) examined the effect of AAT on the ability to read aloud and stay on-task in children with emotional and behavioral disabilities. They found that when children with an emotional or behavioral disability were

instructed to read aloud to an AAT certified canine, there were improvements in on-task behavior. The results are limited by a small sample, a case study design, and a possible observer effect as a researcher was present recording data during the measurement period. Boyer and Mundschenk (2014) compared the effect of AAT, compared to play therapy, in children with language impairments. The children, in conjunction with their typical therapy, received AAT three times a week for 15 minutes each session. The researchers found that those with AAT showed moderate improvement in social interaction, compared to those with play therapy. The primary limitation in this study is a small sample of only three children, which limits the generalizability of the results (Boyer & Mundschenk, 2014).

Equine AAT Studies. While the studies in this review of literature have thus far involved only canine and feline animals, researchers have also studied AAT as equine therapy or hippo-therapy. They have found that hippo-therapy can have a positive effect on children with ASD (Holm et al., 2014) and children with cerebral palsy (Kwon et al., 2015). Holm et al. (2014) described hippo-therapy as targetting posture, balance, and mobility using horse riding as the therapeutic modality. Holm and associates (2014) examined the effects of hippo-therapy on children diagnosed with ASD during riding sessions, at home, and in the community. They found that hippo-therapy sessions three or five times per week increased overall verbalizations and improved ability to follow directions, physical strength and coordination, and the ability to respond to the horse's movements during sessions. The results are limited by a small sample, potential bias in data collection by parents of subjects, and the subjects' previous experience in riding. Kwon et al. (2015) examined the effect of hippo-therapy on children diagnosed with cerebral palsy. They found that a 30-minute hippo-therapy session twice a week for eight weeks led to a significant gain in sitting, crawling, kneeling, standing, walking, running, and jumping

abilities. The results are limited by the inability to control the participants' other therapeutic activities during the study period.

Cost Efficiency of Animal Therapy

As seen in the previous review of literature, AAT has many applications and has been found to be effective in improving various outcomes in the care of pediatric patients. However, the cost-effectiveness of these AAT interventions has rarely been examined. The Children's Health Spending Report (2014) found that the annual expenditure per capita for all children aged 0-18 on healthcare in 2012 was $2,437. Johnson et al. (2008) found that, "Dog visits are no more costly than human visits because all organizations provide dog visits on a volunteer basis" (p.231). While these AAT sessions are generally provided free of cost to the patient, there are still many costs associated with training, managing, and operating an AAT program. Kamioka et al. (2014) examined the cost of AAT and found that,

> "The total calculated costs of initial canine training was $10,000, lost investment income on initial training costs was 5% per annum compounded quarterly, animal maintenance was $1000 per year, the expected canine service period was 8 years, and paid human assistance ranged from $8 to $12 per hour" (p.384).

As Johnson et al. (2008) found, these expenses are not the responsibility of patients and so hospitals or the organizations that operate AAT programs are responsible for them. Additionally, the vast majority of animal-assisted therapy programs currently operating in the United States are 501(3)c federally tax-exempt organizations, and rely on grants, donations, and other contributions to continue to train, manage, and operate their programs. We have found no organizations that currently charge patients receiving AAT for their services, and so the cost-effectiveness of AAT at the individual patient level is exceptional.

Timeline for Project Completion

We planned to submit our honors proposal to the Honors College in October of 2016, and received approval for continuation of the project. Our research group planned to and did enroll in the senior honors independent study project by splitting our credit hours between the fall and spring semesters of our senior year. Our plan for further development of the project was to continue working on our review of literature, along with critically analyzing our research articles during the fall of 2016 and spring of 2017. We planned to and did keep our sponsor, Diane Lorenzen, updated on our progress throughout this time period, as well as kept contact with our two readers, Sheau-Huey Chiu, a Pediatric Nursing professor, and Kate Patton, a physical therapist involved in the Doggie Brigade at Akron Children's Hospital. All sponsor and reader revisions were made appropriately, signatures for the final submission were obtained, and the final project was submitted to the Honors College for consideration in the thirteenth week of the spring semester, 2017.

Critical Appraisal of the Evidence

Validity and Reliability of Methods and Findings

Validity and reliability are two important factors when considering research and implementing a change in practice. According to Brown (2015), reliability is the degree to which the research produces consistent results over time, whereas validity is whether or not research done measures what it was intended to measure. Internal validity measures the results of the study, while external validity measures whether or not the tools and research can be applied in another setting. Neither validity nor reliability can stand alone in measuring the accuracy of a study; both are significant (Brown, 2015).

Reliability of studies is important in defining if results were consistent over time. The tools used to measure pain and anxiety include a visual analog pain scale or the Wong Baker Scale, as well as the Amended Observation Scale of Behavioral Stress, the State Trait Anxiety Inventory for Children, and the Child Medical Fear Scale (Braun et al., 2009; Calcaterra et al., 2015; Tsai et al., 2010; Vagnoli et al., 2015). These tools are considered to be reliable methods of gathering subjective data, as they are still used in the clinical setting. These studies which utilized different tools produced mixed results in whether or not AAT was an effective form of treatment for the pediatric population. Braun et al, Calcaterra et al, and Lima et al found that AAT lowered the perception of pain, resulted in quicker anesthesia recovery time, and better oxygenation, all without any negative outcomes. Social behaviors and gross motor function improved, school attendance and global functioning improved, ADHD and PTSD symptoms became less severe, and improvements in treatment of child sexual abuse survivors using AAT had a significant advantage over other treatment modalities (Bassette & Taber-Doughty, 2013; Boyer & Mundschenk, 2014; Dietz, Davis, & Pennings, 2012; Fung, 2011; Hamama et al., 2011; Kwon et al, 2015; Schuck et al, 2015; Stefanini et al, 2015).

However, Barker et al. (2015) found no significant difference in pain reduction with the use of a 10-minute session of AAT, while Balluerka et al (2014) found only an improvement in attachment security, with no significant improvement in family preoccupation, parental interference, self-sufficiency and resentment towards parents, or childhood trauma. Holm et al (2014) also found that target behaviors worsened during the excitement of AAT, but the effect of the riding sessions were positive in the home. Tsai et al (2010) found that only systolic blood pressure decreased with the use of AAT, while diastolic blood pressure and heart rate both increased, concluding that AAT had no significant effect on medical fear or state of anxiety.

Vagnoli et al (2015) found there was a decrease in cortisol levels while using AAT, but no significant difference in pain rating, whereas Lima et al (2014) found consistent behavioral and cardiovascular results that indicate a significant decrease in pain. This inconsistency in results implies a limited reliability. Therefore, further research is needed in order to declare whether or not the intervention is reliable.

Validity refers to whether or not the research done measures what it was intended to measure. The studies used consistently measured the same variable: was AAT effective? Although the reliability was mixed, the validity was consistent. The types of designs included in this systematic review are: randomized controlled trials (Al-Yateem et al., 2015; Barker et al., 2015; Calcaterra et al., 2015; Dietz et al., 2012; Kwon et al., 2015; Schuck et al., 2015; Stefanini et al., 2015; Vagnoli et al., 2015), trials without randomization (Balluerka et al., 2014) and quasi-experimental trials (Braun et al., 2009; Tsai et al., 2010), and descriptive and/or qualitative studies (Bassette & Taber-Doughty, 2013; Silva et al., 2011; Lima et al., 2014; Fung, 2011; Boyer & Mundschenk, 2014; Holm et al., 2014; Case et al., 2015). According to the Hierarchy of Evidence (Brown, 2015), randomized controlled trials are considered a level two source of information and have a high degree of validity. Factors including sample size and bias affect the results of these studies. Trials without randomization and quasi-experimental trials are level three designs, while descriptive and/or qualitative studies are considered level six.

Internal validity refers to the validity of the studies specifically. There are several factors affecting the validity of the internal studies, the most common being possible bias due to reporting of results from a parent/guardian or other biased party (Case et al., 2015; Fung, 2011; Hamama et al., 2011; Holm et al., 2014; Schuck et al., 2015). Other factors affecting internal validity are short exposure time to the intervention, lack of access to random sampling, inability

to control other activities of participants (Barker et al, 2015; Balluerka et al, 2014; Braun et al, 2009; Kwon et al, 2015; Lima et al, 2014; Stefanini et al, 2015). External validity refers to whether or not the results can be applied to other populations. Small sample sizes also make it difficult to generalize findings to other populations. With the limited reliability related to small sample size as well as further limitations to be mentioned, external validity is not strong enough to suggest an implementation of AAT in other populations without further research.

Limitations

In conducting this systematic review, numerous limitations were noted across all current literature. The most common limitation identified in the studies included in this review is a small sample size. Of the nineteen studies examined, thirteen self-reported the limitation of a small sample size (Bassette & Taber-Doughty, 2013; Boyer & Mundschenk, 2014; Braun et al., 2009; Calcaterra et al., 2014; Fung, 2011; Hamama et al., 2011; Holm et al., 2014; Lima et al., 2014; Schuck et al., 2015; Silva et al., 2014; Stefanini et al., 2015; Tsai et al., 2010; Vagnoli et al., 2015). The second most common limitation on validity found in this cohort of studies is a possible bias in results due to reporting of results from a parent/ guardian or other biased party (Case et al., 2015; Fung, 2011; Hamama et al., 2011; Holm et al., 2014; Schuck et al., 2015). Several other studies' validity is limited by sampling methods, including non-random sampling, poor uniformity across groups, or convenience sampling (Balluerka et al., 2014; Boyer & Mundschenk, 2014; Braun et al., 2009; Dietz et al., 2012; Fung, 2011; Tsai et al., 2010). Additionally, results of several other studies are limited by their method of data collection, in which there is a possible observer effect or other outside agent causing change (Balluerka et al., 2014; Barker et al., 2015; Bassette & Taber-Doughty, 2013; Holm et al., 2014; Kwon et al., 2015; Silva et al., 2011). Finally, many studies did not examine the cost-effectiveness of the

intervention (Balluerka et al., 2014; Bassette & Taber-Doughty, 2013; Boyer & Mundschenk, 2014; Braun et al., 2009; Calcaterra et al., 2015; Hamama et al., 2011; Holm et al., 2014; Kwon et al., 2015; Schuck et al., 2015; Stefanini et al., 2015; Vagnoli et al., 2015). Furthermore, the practice implications of many studies are limited because they have a strictly outpatient setting (Bassette & Taber-Doughty, 2013; Boyer & Mundschenk, 2014; Calcaterra et al., 2015; Case et al., 2015; Dietz et al., 2012; Fung, 2011; Hamama et al., 2011; Holm et al., 2014; Kwon et al., 2015; Lima et al., 2014; Schuck et al., 2015; Silva et al., 2011). The practice implications of other studies are limited by their inpatient setting (Al-Yateem et al., 2015; Balluerka et al., 2014; Barker et al., 2015; Braun et al., 2009; Stefanini et al., 2015; Tsai et al., 2010; Vagnoli et al., 2015).

In addition to those previously discussed, several individual studies have unique limitations. One study's validity is limited by a short time of application of intervention (Fung, 2011). Another study found that utilizing a low accuracy tool resulted in the benefit of the intervention being difficult to discern (Barker et al., 2015).

Research involving children presents certain challenges as the U.S. Department of Health and Human Services sets forth special protections for Children as research subjects. However, a majority of the studies examined take place outside of the United States and do not face these barriers to pediatric-targeted research (Al-Yateem et al., 2015; Balluerka et al., 2014; Calcaterra et al., 2015; Case et al., 2015; Fung et al., 2011; Hamama et al., 2011; Kwon et al., 2015; Lima et al., 2014; Silva et al., 2011; Stefanini et al., 2015; Vagnoli et al., 2015).

Synthesis of Evidence

According to research, the current practice across healthcare settings in regard to animal assisted therapy in the pediatric population is geared toward the hope of providing non-

pharmacological benefits in the areas of stress and anxiety, pain, mental health, and some chronic conditions (Al Yateem et al., 2015; Braun et al., 2009; Calcaterra et al., 2015; Hamama et al., 2011; Lima et al., 2014; Tsai et al., 2010 & Vagnoli et al., 2015). Current AAT practice including playful visits with trained animals and handlers has proved to have a positive effect on pediatric patients across healthcare settings. After critically analyzing a multitude of the available research on this topic, a change in AAT practice is not indicated at this time. A majority of the studies concluded that AAT provided mild positive changes in the above mentioned target areas (Balluerka et al., 2014; Braun et al., 2009; Bassette & Taber-Doughty, 2013; Boyer & Mundschenk, 2014; Calcaterra et al., 2015; Hamama et al., 2013; Lima et al., 2014; Schuck et al., 2015; Stefanini et al., 2015; Tsai et al., 2010), with only a few that were inconclusive to any benefit at all (Barker et al., 2015; Vagnoli et al., 2015). Due to a lack of consistency across studies, and limitations that are difficult and almost impossible to avoid due to the vulnerability of the pediatric population, a change in practice does not seem to be strongly indicated by the current research in this area of science and medicine. The review of literature showed that pediatric patients generally do acquire a benefit from AAT, but there is a need for stronger, more consistant evidence and new research to combat the low-level evidence based practice that is currently in place.

Recommendations

Research Recommendations

Working with and conducting research on the pediatric population can prove to be difficult due to the limitations and boundaries that need to be followed for their protection. These limitations can make it difficult to collect information and draw conclusions. Limitations of research studies such as small convenience samples and potential bias are inevitable when

targeting research on children due to their vulnerability and high protection across health care settings. Current research and practice of AAT acknowledges the aforementioned limitations and highlights the need for continued research. When receiving care in the healthcare setting, there are many extraneous factors that can bring a child's baseline comfort, pain relief, and satisfaction up (Balluerka et al., 2014; Barker et al., 2015; Bassette & Taber-Doughty, 2013; Holm et al., 2014; Kwon et al., 2015; Silva et al., 2011), which can interfere with having a clear picture of the actual effect that the AAT had on benefitting the patient. To isolate the effect AAT provides for a pediatric patient, new research studies should provide a controlled environment with only AAT involvement in order to solidify results. In this way, the research would focus specifically on the effect AAT has on the pediatric patient, leading to clearer results. Also, there is currently no research that addresses the long-term effects of AAT. A study that follows the pediatric patient over a course of time after receiving AAT in the healthcare setting, inquiring about any lasting effects of the therapy, if any, would be beneficial in improving understanding in this area.

Practice Recommendations

According to the findings of this systematic review, AAT has the strongest and most consistent positive effect in the mental health setting (Balluerka et al., 2014; Bassette & Taber-Doughty, 2013; Dietz et al., 2012; Hamama et al., 2013; Schuck at al., 2015; Stefanini et al., 2015). This result implies that AAT should be a commonly utilized practice amongst the pediatric mental health population.

In conclusion, further research into the efficacy of AAT across pediatric care settings is necessary to solidify the knowledge base. Based on the low level of evidence that current research and practice provides in this area, there were only a few recommendations to further practice that could be made at this time. Once more studies are conducted, and challenges

associated with this population are overcome, stronger evidence based recommendations for practice will be in reach.

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Appendix A

APA formatted reference	Purpose statement. Research question	Clinical Practice Setting, Sampling methods, Sample size	Design. Level of Evidence	Findings, Conclusion	Practic Implica
1. Barker, S. B., Knisely, J. S., Schubert, C. M., Green, J. D., & Ameringer, S. (2015). The effect of an animal-assisted intervention on anxiety and pain in hospitalized children.	Purpose Statement: "This study sought to address a number of weaknesses in previous studies of AAI with hospitalized children" (p 108) Research question: What is the effect of a 10-minute AAI on anxiety and pain	Setting: Acute-care hospital in Virginia Sampling method: Convenienced randomized group assignment Sample size: 40 children.	Design: Randomized Control Trial Level of Evidence: 2	"No significant differences were found between or within the treatment and control groups in anxiety or pain levels, which suggests the AAI did not help either pain or anxiety." (p 108)	Researc implica further larger s and mo to the i are nee confirm finding

Anthrozoös, *28*(1), 101-112. doi:10.2752/08 9279315X14129350722091	in pediatric patients in an acute-care hospital?				
2. Fung, S. C. (2011, January). The Role of Therapy Dog in Facilitating Social Interaction for Autistic Children: An Experimental Study on Animal-assisted Play Therapy. *Role of Therapy Dog in Facilitating Social Interaction for Autistic Children*, 350 p.	Purpose Statement: "This study investigates the effectiveness of Animal-Assisted Play Therapy in facilitating social interaction for autistic children" Research Question: "Is there an increase in the amount of social interaction of autistic children with the therapist in the AAPT group after treatment? Is the magnitude of increase in social interaction resulting from the intervention higher for the AAPT group in compared to those participants in the OAPT group?"	Setting: Two special schools for autistic children in Hong Kong. Sampling method: Non-random convenience sampling Sample size: 10 autistic children	Design: Single-subject and group comparison design. Level of evidence: 6	Based on the Wilcoxon Signed Ranks test, the AAPT group, the change of social behavior was found to be significant after the intervention; the occurrence of social behavior increased after the AAPT intervention. Whereas in the OAPT group, the change of social behavior was not significant after the intervention. Based on the Mann-Whitney U test, however, social behavior was reported to not have a significant change after the intervention.	Practic Implica -"The u talents the ther should full pla -"The t should in all a through treatme -"Activ be then therapy 162) i.e obedien dog ca -AAT s used or popula commu proble Resear Implica -Increa sample -Do no strange the foll session -all spe produc

					be reco future a -Condu animal speech facilita of autis -Code t behavio therapi bias.
3. Balluerka, N., Muela, A., Amiano, N., & Caldentey, M. A. (2014). Influence of animal-assisted therapy (AAT) on the attachment representations of youth in residential care. *Children And Youth Services Review, 42* 103-109. doi:10.1016/j.childyouth.2014.04.007	Purpose Statement: This study evaluates the influence of AAT on the attachment representations of a group of adolescents in residential care who suffered traumatic childhood experiences and exhibited mental health problems. Research Question: Will youths who have suffered traumatic childhood experiences show positive changes in their attachment representation?	Setting: Protective residential childcare in Spain Sampling method: Non-random convenience sampling Sample size: 46 teenagers	Design: Control trial without randomization. Level of evidence: 3	AAT exerts a statistically significant improvement regarding the dimension of attachment security, but not the other dimensions: family preoccupation, parental interference, self-sufficiency and resentment toward parents, and childhood trauma.	Practic implica is an ef of thera youths residen have su childho and sho as an in to posit contrib patients psycho develop Researc Implica -Allow interve to be o residen withou interve possibl this co variabl -Gain a popula

					random can be
4. Kwon, J., Chang, H. J., Yi, S., Lee, J. Y., Shin, H., & Kim, Y. (2015). Effect of hippotherapy on gross motor function in children with cerebral palsy: a randomized controlled trial. *Journal Of Alternative And Complementary Medicine (New York, N.Y.)*, *21*(1), 15-21. doi:10.1089/acm.2014.0021	Purpose statement: "To examine whether hippotherapy has a clinically significant effect on gross motor function in children with cerebral palsy (CP)." (p 15) Research question: Does hippotherapy provide motor benefits for children with cerebral palsy?	Setting: Outpatient therapy center in Korea Sampling method: Convenience randomized sampling Sampling size: 92 children.	Design: Randomized controlled trial Level of evidence: 2	Results: Differences in improvement differed between the intervention and control group, providing that hippotherapy positively affects gross motor function and balance in children with CP.	Practic Implica Practic implica include implem hippoth childre cerebra Resear implica Future implica to cont particip activiti evaluat effectiv
5. Schuck, S. B., Emmerson, N. A., Fine, A. H., & Lakes, K. D. (2015). Canine-assisted therapy for children with ADHD: Preliminary	Purpose statement: The purpose of this study was to provide findings from an ongoing randomized clinical trial using a canine-assisted intervention for 24 children with ADHD." (p 125)	Setting: Outpatient group therapy sessions in Massachusetts Sampling method: Convenience sampling Sample size: 24 children	Design: Randomized controlled trial Level of evidence: 2	Results: Children who received CAI experienced greater reductions in the severity of ADHD symptoms.	Practic implica Canine therapy with A be enco reduce behavi Resear implica

findings from the Positive Assertive Cooperative Kids study. *Journal Of Attention Disorders, 19*(2), 125-137. doi:10.1177/1087054713502080	Research Questions: 1. "Do both treatment groups exhibit improvements in outcomes following intervention?" (p 126) 2. "Are there differences in outcomes between CAI and non-CAI groups?" (p 127) 3. "Are improvements associated with treatment efficacy maintained over time?"(p 127)				-Develo method child e during -Childr behavio rated b raters. -Exami physiol respons stress
6. Boyer, V. E., & Mundschenk, N. A. (2014). Using animal-assisted therapy to facilitate social communication: A pilot study. Canadian Journal Of Speech-Language	Purpose statement: "The purpose of this clinical investigation was to determine if animal- assisted therapy (AAT) was effective in promoting social communication between children with LI and typically-developing peers by comparing the use of a live cat to a toy cat and a	Setting: Developmental preschool therapy center Sampling method: convenience sampling Sampling size: 3 children	Design: Pilot study; single subject alternating treatment design Level of evidence: 6	Results: AAT increased social interaction for children with LI; continuations were produced in greater percentages towards the end of the study (10% increase) compared to the beginning	Practic implica ren wit be eval conside AAT. A be prov docume d in the session for fam cannot Researc implica Researc want to includi child's

Pathology And Audiology, 38(1), 26-38.	preferred activity." (p 26) Research Question: "Will social communication in children with language impairments increase with exposure AAT?				for a to social i -A cat animal study; may wa the effe commo animals horses
7. Holm, M. B., Baird, J. M., Kim, Y. J., Rajora, K. B., D'Silva, D., Podolinsky, L., & ... Minshew, N. (2014). Therapeutic horseback riding outcomes of parent-identified goals for children with autism spectrum disorder: An ABA' multiple case design examining dosing and generalization to the home and community. Journal Of	Purpose statement: The purpose of this study was to examine the effects of therapeutic riding on behavior goals set for children with autism spectrum disorder. Research question: "How will varied exposure time to the intervention of therapeutic riding influence behaviors of children during the session, at home, and in the community?	Setting: Therapeutic Riding Center, Donegal, PA. Sampling method: Convenience Sample size: 3 children	Design: ABA single subject design Level of evidence: 6	Results: "70 % of goals were better during Intervention compared to Baseline, and 63 % of goals remained better during Withdrawal compared to Baseline. Dosing of therapeutic riding was associated positively with the magnitude of changes in target behaviors, but not the number of behavioral changes. Additionally, even though target behaviors worsened during the excitement of the riding sessions, the effect of the sessions generalized positively to the home and	Practic implica Consid therape as an o attempt improv for chil ASD. Researc implica -Larger -study factors closely -Not se but sim docume behavi the par more p outcom of bein disappo meetin

Autism And Developmental Disorders, 44(4), 937-947. doi:10.1007/s10803-013-1949				community" (p 946)	
8. Al-Yateem, N. S., Banni Issa, W., & Rossiter, R. (2015). Childhood Stress in Healthcare Settings: Awareness and Suggested Interventions. Issues In Comprehensive Pediatric Nursing, 38(2), 136-153 18p. doi:10.3109/01460862.2015.1035465	Purpose Statement: To discover the awareness of pediatric health professionals as to the stress experienced by pediatric patients who require health care. Research Question: How aware are pediatric healthcare professionals to increased stress in children requiring healthcare, and if they are aware, what ideas do they have about interventions for this problem?	Setting: Wards, outpatient departments, inpatient departments, and ICU in two pediatric hospitals in the United Arab Emirates Sampling Methods: Convenience Sampling Sample Size: 117	Design: Cross-sectional, mixed-method. Level of Evidence: 2	Almost one third of participants thought that their healthcare setting did not pose risk for causing stress and anxiety for their patients. The other two thirds of participants clearly identified current hospital settings as adult-oriented and not suitable for child care.	Practic Implica -Increa of hosp stress i patients healthc profess -Interv making environ child fr as colo colorfu outfits, play ar -Take t provide informa health i to both child. -Impro commu skills w to pedi patients Researc Implica -use ra samplin

					conven samplir -"Futur needs t on the needs c pediatr profess on imp strategi develo friendly setting
9. Case, R. L., Barber, C. C., & Starkey, N. J. (2015). Psychosocial needs of parents and children accessing hospital outpatient pediatric services in New Zealand. Journal Of Pediatrics & Child Health, 51(11), 1097-1102 6p. doi:10.1111/jpc.12949	Purpose Statement: "The aim of this study was to examine the psychological and psychosocial service needs of parents and children in a New Zealand hospital pediatric outpatient clinic" (pg. 1097). Research Question: What is the prevalence of stress, emotional, and psychological problems in parents and their children that undergo medical	Setting: New Zealand hospital, pediatric outpatient clinic. Sampling Methods: Convenience Sampling Sample Size: 152 :	Design: Qualitative Study Level of Evidence: 6	"Parents' stress levels were significantly higher than those in a normative population. Children's levels of emotional, behavioral and social problems were significantly elevated. Pediatricians perceived that a large proportion of families could benefit from psychosocial intervention, and the majority of families were interested in pediatric psychological	Practic Implica -Increa prevale identify emotio mental pediatr and car interve improv -Comm parents service to enha for ther their ch Researc Implica -change conven samplir include outpati which t

	interventions vs the normative population that does not undergo medical intervention?			services" (pg. 1097).	do not appoint -if age survey directly feeling emotio during appoint
10. Braun, C., Stangler, T., Narveson, J., & Pettingell, S. (2009). Animal-assisted therapy as a pain relief intervention for children. Complementary Therapies In Clinical Practice, 15(2), 105-109 5p. doi:10.1016/j.ctcp.2009.02.008 (Braun, Stangler, Narveson, & Pettingell, 2009) (Braun et al., 2009)	Purpose Statement: To determine the effect that Animal Assisted Therapy has on pain in pediatric patients. Research Question: "What is the impact of AAT as a pain intervention for children ages 3–17 years, what is the impact of AAT on vital signs, and is there a relationship between the pain response and select demographic variables including age, gender, previous AAT experience, or having a pet at	Setting: One acute care pediatric unit in Minnesota Sampling Methods: Convenience Sampling Sample Size: 57 children	Design: Quasi-experimental Level of Evidence: 3	Pain levels of the group undergoing AAT were almost four times lower than the control group upon post-assessment. No significant changes in vital signs or differences between demographics were noted.	Practic Implica -use of therapy in redu pediatr -anima is a pos alterna pharma interve therefo AAT c the am medica pediatr are taki relief. Resear Implica -small would expand -use of therapy -avoid samplin making qualifi specifi

	home?" (pg. 106).				-see eff on chil reporti high pa instead
11. Stefanini, M., Martino, A., Allori, P., Galeotti, F., & Tani, F. (2015). The use of Animal-Assisted Therapy in adolescents with acute mental disorders: A randomized controlled study. Complementary Therapies In Clinical Practice,21(1), 42-46 5p. doi:10.1016/j.ctcp.2015.01.001	Purpose Statement: To compare the effects of animal therapy and a standard protocol in children and adolescents receiving treatment for acute mental illnesses at a psychiatric hospital. Research Question: What are the effects of AAT intervention vs standard protocol intervention on pediatric patients with acute mental disorders?	Setting: Pediatric Psychiatric Hospital in Italy Sampling Methods: Convenience Sample Size: 34 hospitalized children and adolescents	Design: Pre-post experimental design with randomized controlled trials Level of Evidence: 2	A significant improvement in global functioning, reduction in format of care, and improved school attendance was seen in the group receiving AAT, but not in the control group.	Practic Implica -imple animal therapy psychia hospita provide benefit -increa skills a for a m environ Resear Implica -do this larger s -study just on
12. Tsai, C., Friedmann, E., & Thomas, S. A. (2010). The effect of animal-assisted therapy on stress responses in hospitalized children.	Purpose Statement: "This study examined the effects of AAT on cardiovascular responses, state anxiety, and medical fear in hospitalized children" (pg.1)	Setting: Pediatric Units of participating hospitals throughout the US. Sampling Methods: Convenience sampling. Sample Size: 15, aged 7-17 years old.	Design: Quasi-experimental, repeated measures. Level of Evidence: 3	Findings: AAT decreased Systolic blood pressure, Increased both diastolic blood pressure and heart rate, and AAT had no significant effect on medical fear or state anxiety.	Practic Implica may be decreas hospita pediatr Resear Implica sample necessa

Anthrozoos, 23(3), 245-258 14p. doi:10.2752/175303710X12750451258977	Research Question: How does AAT affect stress responses in hospitalized pediatric patients?			Conclusion: "AAT is more effective than a visit by a person at alleviating some signs of physiological stress in inpatient pediatric settings" (pg. 12)	finding signific general -suppo research effect o hospita pediatr
13. Dietz, T. J., Davis, D., & Pennings, J. (2012). Evaluating Animal-Assisted Therapy in Group Treatment for Child Sexual Abuse. Journal Of Child Sexual Abuse, 21(6), 665-683 19p. doi:10.1080/10538712.2012.726700	Purpose Statement: "The current study evaluates and compares the effectiveness of three types of group therapy for CSA survivors on trauma symptoms including anxiety, depression, anger, PTSD, dissociation, and sexual concerns" (pg.2) Research Question: How effective are different types of group therapy in treatment of trauma symptoms in CSA survivors?	Setting: Medical and Rehab settings in group therapy sessions of 6-10 subjects in child advocacy centers in southern United States Sampling Methods: Convenience sampling. Sample Size: 153 children, aged 7-17 years old.	Design: controlled experimental study. Level of Evidence: 2	Findings: "For the No Dogs group, there was a trend for a decrease in PTSD scores from pre- to posttest… For the Dogs No Stories group, all of the subscales, with the exception of sexual concerns and anger, showed a significant decrease from pre- to posttest…In the Dogs With Stories group, all of the subscales showed a significant reduction from pre- to posttest." (pg. 12) Conclusion: While all modalities of group therapy showed improvements in treatment of CSA survivors, the use of AAT and telling	Practic of AAT telling therapy effectiv of grou treatme survivo Researc studies include group a to bette baselin differe

				stories showed the largest improvements.	
14. Vagnoli, L., Caprilli, S., Vernucci, C., Zagni, S., Mugnai, F., & Messeri, A. (2015). Can presence of a dog reduce pain and distress in children during venipuncture?. Pain Management Nursing, 16(2), 89-95. doi:10.1016/j.pmn.2014.04.004 (Vagnoli et al., 2015)	Purpose Statement: "to investigate the effectiveness of animal-assisted intervention as distraction for reducing children's pain and distress before, during, and after standard blood collection procedure." (pg. 1) Research Question: How does exposure to AAI affect anxiety and pain levels during venipuncture?	Setting: Outpatient setting of hospitals in Florence, Italy. Sample Size: 50 children, aged 4-11 Undergoing pediatrician-requested blood tests for routine exams Sampling: Convenience sampling	Design: Randomized Control Study Level of Evidence: 2	No significant differences in pain ratings and in the level of parental anxiety does reduce distress in children. cortisol levels reduced with AAI therapy	AAI is option anxiety childre venipu Additio in diffe and co be bene further efficac
15. Lima, M., Silva, K., Amaral, I., Magalhães, A., & Sousa, L. (2014). Can you help when it hurts? Dogs as potential pain relief stimuli for children with profound	Purpose Statement: "assessing, in two children with PIMD, pain relief induced by contact with a therapy dog immediately after a potentially painful care moment" (pg. 1)	Setting: Home Environment in Porto, Portugal. Sample Size: 2 Sampling Methods: Convenience	Design: single qualitative case study Level of Evidence: 5	"In both participants, contact with the therapy dog brought about consistent behavioral and cardiovascular changes that point to an apparent decrease in pain level." (pg. 3)	Practic Implica -use of dogs to childre painful Resear Implica -use a l size -avoid samplin

intellectual and multiple disabilities. Pain Medicine, 15(11), 1983-1986. doi:10.1111/pme.12551	Research Question: How does contact with a therapy dog affect pain and pain relief in children with chronic conditions?				-attemp hospita care en
16. Calcaterra, V., Veggiotti, P., Palestrini, C., De Giorgis, V., Raschetti, R., Tumminelli, M., & ... Pelizzo, G. (2015). Post-operative benefits of animal-assisted therapy in pediatric surgery: a randomized study. Plos One, 10(6), e0125813. doi:10.1371/journal.pone.0125813	Purpose Statement: "The purpose of this study was to better understand the impact of an animal-assisted therapy program on children response to stress and pain in the immediate postsurgical period." (pg. 1) Research Question: What effect does animal-assisted therapy programs have on stress and pain responses in children in the immediate post-surgical period?	Setting: Pediatric Surgery Unit in Italy Sampling Method: convenience sampling of children having internal surgery. Sample Size: 40 children, aged 3-17 years.	Design: randomized, controlled, pilot study. Level of Evidence: 2	"Lower pain perception was noted in the animal-assisted group in comparison with the standard-group." (pg. 2) "Animal-assisted therapy facilitated rapid recovery in vigilance and activity after anesthesia, modified pain perception and induced emotional prefrontal responses" (pg. 2)	Practic Implica is effec withou outcom used as comple therapy immed period. Resear Implica Creates results stress, respons a large replica method
17. Silva, K., Correia, R., Lima, M., Magalhães, A., & de Sousa, L. (2011). Can	Purpose Statement: To provide additional quantitative evidence on the ability of dogs to	Setting: Usual treatment location, the Portugese Association for Developmental Disorders and Autism.	Design: Case study, two treatment conditions. (1) One-on-one interaction with therapist with	"In the presence of the dog, the participant exhibited more frequent and longer durations of positive behaviors	Practic Implica use in t session patients benefic

Dogs Prime Autistic Children for Therapy? Evidence from a Single Case Study. Journal Of Alternative & Complementary Medicine, 17(7), 655-659 5p. doi:10.1089/acm.2010.0436	positively affect behavior of children with Autism Spectrum Disorder. Research Question: Can dogs prime autistic children for therapy?	Sampling Method: Convenience sampling Sample Size: 1 boy, aged 12	therapy dog present, and (2) One-on-one interaction with therapist without therapy dog present (Control). Level of Evidence: 5	as well as less frequent and shorter durations of negative behaviors." (pg. 3) Results indicate the potential for AAT to be used as a means for more productive therapy for children with ASD.	option therapi Researc Implica larger s similar would to conf results study.
18. Bassette, L. A., & Taber-Doughty, T. (2013). The effects of a dog reading visitation program on academic engagement behavior in three elementary students with emotional and behavioral disabilities: A single case design. Child & Youth Care Forum, 42(3), 239-256. doi:10.1007/s10566-013-9197-y	Purpose Statement: "Evaluate the effects of a dog reading visitation program on academic engagement behaviors of elementary aged children with emotional and behavioral disabilities." (pg. 1) Research Question: How does canine visitation affect reading performance in children with emotional and behavioral disabilities?	Setting: Special Education Classroom in the US. Sampling Method: Convenience Sampling, recommendation of special education instructor. Sample Size: 3, aged 7, 11, and 11.	Design: Three participant case study under intervention and control conditions. Level of Evidence: 5	"The results indicate all three students experienced moderate to significant improvements in on-task behavior when participating in the dog reading program" (pg. 11) Presence of a canine companion can improve behavior in children with emotional and behavioral disabilities.	Practic Implica Utiliza canine in spec classes benefic childre emotio behavi disabili Researc Implica Further greater eviden necessa confirm finding

29. Hamama, L., Hamama-Raz, Y., Dagan, K., Greenfeld, H., Rubinstein, C., & Ben-Ezra, M. (2011). A preliminary study of group intervention along with basic canine training among traumatized teenagers: A 3-month longitudinal study. Children And Youth Services Review, 33(10), 1975-1980. doi:10.1016/j.childyouth.2011.05.021	Purpose Statement: "The current study aimed to reduce the psychological distress of teenage girls who were exposed to traumatic event (physical or sexual abused), through using dogs-assisted therapy." (pg. 1) Research Question: Can AAT reduce the psychological distress of teenage girls who have experienced trauma?	Setting: Public park in group therapy sessions in Judea and Samaria Sampling Method: Convenience, recommendation from counselor. Sample Size: 18 girls, aged 14-16.	Design: Dual- (1) Cross sectional comparison to control group. (2) Longitudinal Level of Evidence: 2	"From a longitudinal perspective, the intervention group have shown a rapid decline at the level of PTSD symptoms… All the other results were found to be non-significant" (pg. 4) Group Therapy, regardless of intervention is an effective treatment for PTSD, and inclusion of AAT may be of some benefit.	Practic Implica Additio with gr for PTS may be Researc Implica Further of AAT treatme in pedi is nece strengt