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Exploring the Impact of Animal-Assisted Therapy on Children's Literacy Skills in Speech-Language Interventions

An Honors Thesis submitted in partial fulfillment of the requirements for Honors in Department of Rehabilitation Sciences.

By
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Under the mentorship of *Dr. Janet Bradshaw*

ABSTRACT

Animal-assisted therapy (AAT) is a therapeutic approach that uses therapy dogs to improve the clinical goals of individuals who need rehabilitative support. While AAT research within the health professions is developing, there is support showing that this type of milieu therapy has potential benefits when working with children with literacy concerns. Within the field of communication sciences and disorders (CSD), AAT can be used by speech-language pathologists to establish goal-directed therapy sessions to improve children's literacy skills. This paper will highlight current literature that explores the use of AAT within literacy interventions, the use of evidence-based measures, and the feasibility of using therapy dogs within clinical sessions.

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Introduction

Children who have speech and language difficulties require unique approaches to acquire their attention while focusing on literacy intervention. Children that exhibit difficulties with oral and written communication skills will likely struggle with activities that require them to read aloud or practice oral fluency. In the field of communication sciences and disorders (CSD), researchers have implemented various strategies to assist children with speech and language impairments that affect their literacy development. Animal-assisted therapy (AAT) is an emerging field that allows therapy dogs to serve as facilitators for communication by providing a nonjudgmental presence that encourages children to persist through difficult reading tasks as well as improve literacy skills by reading aloud to the therapy dog (Friesen, 2010).

Types of Working Animals

It is important to differentiate between the different types of working animals because they all have unique roles. Service animals must be distinguished from other working animals because they are trained to perform specific tasks for people with disabilities. These animals must be taught to respond effectively and consistently to commands such as attending to mobility needs, reminding individuals about medications, or applying sensory commands (Fine, 2018). The second prominent category of working animals include emotional support animals which are in the most basic terms considered companion animals for those who may have mental illnesses. Their presence serves to support their human through positive interactions, but they do not have the same rights as animals certified as service animals or therapy animals (Fine, 2018). The working animals discussed in our current research involve therapy animals. Therapy animals are

involved as working animals by providing support during the application of therapeutic interventions. Therapy animals are utilized for goal-directed intervention and must be accompanied by a certified handler and healthcare professional (Fine, 2018, p.144).

Legality of Working Animals

It is important to distinguish between the various types of policies that impact working animals in order to understand the legality surrounding therapy dogs and the laws that protect working animals in various settings. The Americans with Disabilities Act (ADA) is a comprehensive federal law that prohibits discrimination on the basis of disability (Fine, 2019; Huss, 2017). This law provides individuals with disabilities who have service animals access to public entities and places of public accommodation. Service animals are unique in that they are individually trained to do work or perform tasks for the benefit of the individual with the disability (Huss, 2017). The tasks they carry out must be related to the individual they are serving. State and local laws can provide further access for persons using service animals, but the ADA will always preempt these laws. Assistance animals such as emotional support animals are protected under the federal Fair Housing Act (FHA) which allows animals to assist individuals inside of their homes (Huss, 2017). The Department of Transportation (DOT) similarly reflects ADA regulations in that they require animals to be individually trained to work or perform tasks related to the person's disability. The Air Carrier Access Act (ACAA) applies to people who have disabilities who are travelling on commercial air carriers (Huss, 2017). The air carrier must assess health and safety risk factors, and they are not expected to accommodate for unusual service animals. The specific rules for service animals may vary depending on the individual's disability or the species of animal. When

considering therapy animals, they are not protected under federal law for public accommodations or housing protocol.

Distinguishing Between Animal-Assisted Interventions (AAI), AAT, and Animal-Assisted Education (AAE)

Animals can be used in a variety of ways to promote therapeutic benefit. For the purposes of this research, an important distinction should be made between Animal Assisted Activities (AAA) and AAT.

AAA is a general category of interventions that involves a companion animal assisting individuals with short-term benefits whereas, AAI are a broad category that encompass the various forms in which animals may intervene for the purpose of specific therapeutic interventions. AAT is differentiated from AAI because these animals must be accompanied by a certified healthcare professional in order to work in settings such as schools, hospitals, and nursing homes. AAT is often referred to a goal-directed intervention in which an animal that meets specific criteria is an integral part of the treatment process (Kirnan, Siminerio, & Wong, 2016). There has been consistent evidence to support that these animals serve as strong social support acting as a social catalyst for interactions (Fine, 2018). Animals can also be involved in educational settings among various age ranges and special needs classrooms. The use of animals in classroom settings is referred to as animal-assisted education (AAE).

The Strength of the Human-Animal Bond

The human-animal bond (HAB) has become popular due to mainstream media's publicity of the positive impact animals create on human lives. This has resulted in a need for clarification in current research as to why this bond exists and how it can produce

benefits. There is a fascination associated with understanding this interspecies bonding among humans and animals because of how we are able to connect with animals.

Animals often serve as members of the family and are perceived as companions. The relationship between humans and animals must be continuous, voluntary, reciprocal, and involve trust on the behalf of the animal while there is understanding of the animal's needs on behalf of the human (Fine & Beck, 2019, p.5).

Boris Levinson was a child psychologist who uncovered the benefits of utilizing a dog to facilitate communication with a child who was nonverbal in the 1950s (Fine, Tedeschi, Morris, and Elvove, 2019). His unprecedented work challenged this field to research the efficacy of AAI. He challenged the roles of human-animal interactions to be applied to various cultures and ethnic groups (e.g., individuals with disabilities and the elderly) to further develop the understanding of therapeutic utility of animals in psychotherapy. Animals were initially involved as social catalysts, but are now involved in multidisciplinary professions with diverse populations. Humans are often enamored by their relationships with animals because of the uniqueness associated with this bond. Further research is necessary to highlight the value of the human-animal bond and to establish credibility in this field of research.

Canines as an Agent of Change

The character of the dog has an extraordinary impact on the outcomes of the therapeutic intervention. Therapy dogs can be defined as a “calm, nonaggressive, obedient, well-groomed canine who has been trained to interact in behaviorally healthy ways with people and other dogs in a variety of educational and health-care settings” (Levinson, Vogt, Barker, Jalongo, & Zandt, 2017, p.39). The unprejudiced nature of the

dog allows the student to feel accepted while practicing literacy skills and not hindered by frustrations when reading aloud (Fine, 2015). Further, AAT can be beneficial for increasing vocalizations in a single child in group pediatric speech-language settings (Anderson, H.K., Hayes, S.L., & Smith, J.P., 2019). Dogs can facilitate communication by introducing an opportunity for children to converse about original thoughts and develop narratives about ideas that are not normally present in the typical therapy environment. AAT is often encouraged because the dog offers unconditional social support for children with heightened anxiety or other emotional disorders, provides enthusiasm for social behavior, and increases positive interactions in the classroom setting (Friesen, 2010). This non-judgmental character of the dog allows AAT to foster a distinctive method for intervention for children who have special education needs or impaired communicative abilities. Introducing animal-assisted reading interventions is a method that can allow students to feel support and confidence in their reading abilities because of the nonjudgmental, yet highly social nature of the animal (Linder, Mueller, Gibbs, Alper, & Freeman, 2017).

Therapy animal-handler team

The handler, the environment, the participant, and the intervention all influence the stress of the therapy animal. The handler is the animal's guide throughout therapy. The handler must understand the training protocol and be able to detect subtle signs of stress from their animal to prioritize their welfare. Therapy animals do not have control over their environment; thus, settings should be free of stressors when possible, but the animal must be adequately trained to respond appropriately to these factors. If available, the animal should be allowed to habituate to the environment prior to therapy (Ng,

Albright, Fine, & Peralta, 2019). Participants should be aware of how to engage with the therapy animals in a mature manner. If animal-assisted therapy is a risk for the participant, these interactions should be discouraged. Teaching safe interactions with the animal may assist participants in demonstrating these appropriate behaviors. Intensity and duration of the intervention are also necessary considerations because the animal may need time to rest between sessions to prevent agitation or burnout (Gee & Fine, 2019; Ng, Albright, Fine, & Peralta, 2019). The comfortability of the animal should always be recognized because each animal has different limitations.

Certification and training

Before intervention with therapy dogs can begin, the animal and handler must undergo extensive training to receive appropriate certification. Different organizations have developed guidelines that influence the credentials of the animal-handler team, but due to the quantity of different AAI organizations, standardized guidelines are difficult to obtain for the field. Typically, a therapy dog should be at least one year old, but preferably two years old to engage in therapy because that is the age of social maturity in dogs (Ng, Albright, Fine, & Peralta, 2019). Diet should also be monitored as raw-meat diets may prevent an animal from engaging in hospital settings. Medical screenings from certified veterinarians are required before an animal can participate in therapy sessions in order to ensure they are healthy. Preventive health should focus on any necessary vaccinations or medicines required by municipal law and to ensure the wellness of the animal (Ng, Albright, Fine, & Peralta, 2019). Behavioral evaluations should also be conducted to note the animal's reaction to necessary commands or abnormal environmental variables. Proper equipment including a non-retractable leash four to six

feet in length along with usage of reward-based training are preferred (Ng, Albright, Fine, & Peralta, 2019). The frequency of any unsuitable responses should be recorded to determine the temperament of the animal.

A safe and clean environment is necessary for intervention success. Therapy animals should always be registered and trained for the planned interactions. Sanitation, allergies, culture, and fear of animals should be considered when evaluating prospective participants for therapy (Fung, 2017). Introducing workshops prior to therapy that allow the educators to learn about the treatment approach and methods can be beneficial, but student safety and health should always remain top priority.

Interactions with the therapy dogs should occur in calm and relaxed environments where the child is able to foster a gentle relationship with the animal. It is necessary that education is delivered to children on how to engage appropriately with the dog to prevent any accidents. Children can be taught how to approach the dog, how to play fairly with the dog, and how to recognize if the dog is uneasy. All therapy dogs need to be appropriately tested for their temperament prior to engaging with children. Cultural considerations are also important to ensure there is mutual understanding of the relationship of the dog to the therapy context (Friesen, 2010). This requires building rapport between the animal and the child in order to understand how their customs or beliefs may influence their interactions with the animal. Clear procedures, professional training, and guidelines for the interaction should be developed and respected in the therapy setting (Friesen, 2010). It is important as a clinician to promote cultural sensitivity in these situations to ensure the interactions are optimal for both the child and the therapy animal.

Animal Welfare and Patient Welfare

Therapy animals may experience pressures when being integrated into interventions. Individuals engaged in AAI should be cognizant of how to incorporate practices that prioritize animal welfare as well as effective interventions for the client. It is the moral responsibility of the handler to observe the animals' silent communication that demonstrate their level of stress, fatigue, or discomfort. The handler and animal serve as a team, so the animal may seek a sense of security in their owner when encountering stressful situations, therefore handlers need to be aware of how to identify negative arousal and stress in their animal. Allowing the animal ample time to adjust to the therapeutic setting may be a minor task that could greatly reduce the opportunity for stress related arousal to develop (Glenk, 2017).

Animal welfare can be defined in the context of how the animal behaves in response to changes in its environment whereas animal well-being can be categorized based on the physical, affective, and natural domains (Ng, Albright, Fine, & Peralta, 2019). The physical concept explains their freedoms from thirst, hunger, or disease. The affective domain encompasses their freedom from discomfort, fear, or distress. The natural component describes freedom to behave normally using their adaptations (Ng, Albright, Fine, & Peralta, 2019). There is an ethical obligation of the therapy animal's handler to understand these domains and ensure the behavioral needs are being met.

Utilizing objective measures in animal welfare research helps to eliminate the subjective perceptions of handlers; this also helps to have accurate physiological parameters for observing stress behaviors. Cortisol can be measured as an indicator of activation of the hypothalamic-pituitary axis (HPA) meaning rises in cortisol levels may

signal stress or poor welfare (Ng, Albright, Fine, & Peralta, 2019). Human contact has shown to decrease HPA activation for dogs, but several studies have provided evidence that this may not always be applicable to therapy dogs. Cortisol measures should not be used independently, but research should also observe physical manifestations of the animal's physical and mental state through their behaviors (Ng, Albright, Fine, & Peralta, 2019). For example, tail wagging is a common observation of a therapy animal engaging in positive behavior while excessive panting may be an indicator of uneasiness.

Assessing cardiovascular changes, hormone levels, and immune system states can be valid measures for evaluating animal welfare. Combining various parameters can cultivate the most effective assessment rather than emphasizing one of these indicators of welfare status. Novel methods should be further investigated to collect quantitative evidence regarding these parameters.

Ethical considerations

Recognizing the importance and value of animals in the lives of humans can offer new opportunities for research including AAT. As researchers and clinicians, we should nurture and support animal welfare and ethics in the practice of AAI. Ensuring animal welfare is prioritized in these practices will support the healthy relationships we foster with these animals. Animal welfare can be defined in the context of how the animal behaves in response to changes in its environment (Ng, Albright, Fine, & Peralta, 2019).

To ensure ethical and lawful use of animals in research applications, approval is needed from the Institutional Animal Care and Use Committees (IACUCs) as well as from the Internal Review Board (IRB). The investigators should be aware of how to develop appropriate behavioral assessment while controlling for various factors that may

influence the animal's stress. Timing of sample collections such as levels of cortisol is important because these biomarkers need to be understood by the investigator.

Handlers should be committed to ensuring that interactions are favorable for both the animal and the participants. The decision making process for therapy should prioritize the ethics associated with the human-animal bond by fostering mutual trust. The safety of participants is relevant, but ensuring the animal's welfare is prioritized is required for safe, healthy interactions. Research has shown that animals can even benefit from the interactions with humans, but the handler should always advocate for their therapy animal by monitoring signs of stress or discomfort.

AAT in Clinical Settings

The use of AAT in clinical application is documented across multiple healthcare disciplines including nursing, psychiatry, and physical therapy (Fine, 2015; Fine, 2018; Sikstrom et al., 2020). One of the first studies to utilize AAT in speech-language therapy settings involved adults with neurogenic communication disorders. Results showed that AAT is an effective therapy strategy for people with aphasia and that increased motivation accompanies AAT treatment (Macauley, 2006). Several important designations were made regarding participants' increases in overall demonstration of emotion when communicating, increased attentiveness, and increased participation in therapeutic activities. The dog provided an innovative way for the participants to decrease the effort of speech that accompanies nonfluent aphasia while facilitating progress toward their treatment goals. One unanticipated benefit of this study indicated that there was a trend of spontaneous communication during the sessions related to the presence of the dog in the therapy setting (Macauley, 2006). Although this research

involved adults with communication deficits, the results concerning spontaneous communication could adhere to the goals for children with literacy challenges. Canines can be considered a speech elicitor because of their socially attractive natural (Fung, 2017). They often present an unprecedented experience for children to engage in communicative intentions that may not be stimulated by a traditional classroom setting.

AAT in the Field of CSD

Animals have been used in a variety of ways to promote healing and emotional support for humans (O'Haire, 2014). Research studies document the various positive, physiological effects AAT on patients (e.g., decrease in cortisol levels and blood pressure (Levine et al., 2013) and in rehabilitative support (Stapleton, 2016). Within the field of CSD, AAT can be used with trained clinicians to establish goal-directed therapy sessions for children with literacy communication concerns. CSD is a broad field that encompasses research, assessment, diagnosis, and treatment associated with speech, language, and hearing. Certified speech-language pathologists (SLPs) are qualified professionals that facilitate intervention to improve communication skills in various clinical populations (e.g., individuals with autism spectrum disorders, students with reading disabilities, patients with strokes, etc.). AAT is a structured approach that emphasizes the importance of intervention involving a trained professional and highlights treatment goals for service delivery. Animals are significant in the therapeutic process because of the importance of touch, but in order to properly engage in an interaction with therapy dogs, there must be a mutual respect between the human and the animal (Charles & Wolkowitz, 2017). Animals incorporated into therapeutic practices should be used as an element of the professional's specialty rather than simply as a companion for

emotional support. It is necessary to establish the difference between the animal as a companion and as a tool for therapy.

Canine-related interventions and Empirical Measures of Assessment

Due to their supportive temperaments, certified therapy dogs can be incorporated into therapeutic settings for children to learn and practice literacy skills. Reading programs typically involve the student engaging in therapeutic goals while reading to the dog or producing distinctive conversation about the qualities of the dog (Fung, 2017). While there are currently limited studies in the field of CSD incorporating AAT, this type of intervention is gaining more clinical interest. The use of AAT in speech-language intervention can act as a novel experience that encourages new conversations among school-aged children. However, there are few empirical studies involving therapy dogs in CSD literature, as well as limited studies that used quantitative measures to assess students' progress when working within canine-assisted activities.

The investigators will conduct a literature review in multiple databases (e.g., educational, social science, clinical health) to obtain empirical evidence to answer the following research questions:

1. How are canine-assisted reading programs used in educational settings?
2. How are canine assisted reading programs used in clinical settings?
3. Which evidence-based measures are used to evaluate students' progress in literacy skills?
4. Which strategies can be used to facilitate learning opportunities in therapeutic sessions?

Methods

This review did not qualify for university internal review board registration. The investigator conducted searches using the GALIEO platform to identify literature content from the Academic Search Complete, ERIC, Science Direct, CINHALL Complete, PsychoINFO, PsycArticles, Psychology and Behavioral Sciences, and PubMed databases. A combination of specific terms was used as keywords to identify content-specific material that included “animal assisted therapy”, “canine assisted therapy”, “canine assisted reading”, “literacy”, “therapy dogs”, “speech and language therapy”, and “reading intervention.” Additional searches were completed using American Speech-Language Hearing Association and Google Scholar search engines with the specified terms noted above.

Inclusion and Exclusion Criteria

The investigators defined literature as published content that could include book chapters, research articles, and published editorial content (e.g., magazines, news articles, reports). Literature that focused on the use of therapy dogs within therapeutic and educational contexts that assist children’s literacy skills were collected. To meet the inclusion criteria, all studies must use certified therapy dogs, school-aged children, and literacy-related measures that can be replicated. The exclusion criteria included studies that focused on AAA (rather than AAT), did not use canines (e.g., horses in hippotherapy), and did not examine literacy-related measures with children. For example, a study that used therapy dog visits to examine patient morale in children hospitals would be excluded because it did not meet the inclusion criteria of literacy-related measures. In total, seven articles qualified under the investigators’ inclusion criteria. Through

discussions, the investigators achieved a 100% consensus on inter-rater reliability on the agreement of articles that met the inclusion criteria.

Table 1

Articles that Meet Inclusion Criteria

Author	Literacy Measure	Assessment
Le Roux, M., Swartz, L., & Swart, E. (2014)	<ul style="list-style-type: none"> ● Reading rate ● Reading accuracy ● Reading comprehension 	<ul style="list-style-type: none"> ● Neale Analysis of Reading Ability
Kirnan, J., Siminerio, S., & Wong, Z. (2016)	<ul style="list-style-type: none"> ● Reading skills ● Attitudes toward reading 	<ul style="list-style-type: none"> ● Northwest Evaluation Association's Measures of Academic Progress (MAP) ● Structured interviews
Levinson, E.M., Vogt, M., Barker, W.F., Jalongo, M.R., & Zandt, P.V. (2017)	<ul style="list-style-type: none"> ● Reading achievement ● Reading attitudes 	<ul style="list-style-type: none"> ● Curriculum-based measurement for oral fluency ● Elementary Reading Attitude Survey (ERAS)
Linder, D.E., Mueller, M.K., Gibbs, D.M., Alper, J.A., & Freeman, L.M. (2017)	<ul style="list-style-type: none"> ● Reading skills ● Reading attitudes 	<ul style="list-style-type: none"> ● Dynamic Indicators of Basic Early Literacy Skill (DIBELS) ● Elementary Reading Attitude Survey (ERAS)
Anderson, H.K., Hayes, S.L., & Smith, J.P. (2019)	<ul style="list-style-type: none"> ● Spontaneous vocalizations 	<ul style="list-style-type: none"> ● Single-case ABA Design
Rousseau, C.X., & Tardif-Williams, C.Y.	<ul style="list-style-type: none"> ● Reading interest ● Reading competence 	<ul style="list-style-type: none"> ● Woodcock-Johnson III Tests

(2019)	<ul style="list-style-type: none"> ● Reading persistence ● Reading motivation 	<p>of Achievement: Test 1 and Test 13</p> <ul style="list-style-type: none"> ● Intrinsic Motivation Inventory-Reading (IMI-R) ● Observer Checklist of Reading Behaviors ● Parent Observations of Child Reading Behaviors
Henderson, L., Grove, C., Lee, F., Trainer, L., Schena, H., & Prentice, M. (2020)	<ul style="list-style-type: none"> ● Student wellbeing 	<ul style="list-style-type: none"> ● Semi-structured interviews

Results

The investigators conducted a literature review in multiple online databases (e.g., educational, social science, clinical health) that related to specified inclusion and exclusion criteria. The empirical evidence gathered was analyzed using a grounded theory approach that included visual inspection, coding, and category identification. The investigators organized the results section by a hierarchy of the research questions.

Research Question 1: How are Canine-Assisted Reading Programs Used in Educational Settings?

When considering the application of canine-assisted reading programs in educational settings, studies displayed improvements in students' reading behaviors, academic reading attitudes, and oral fluency (Henderson, Grove, Lee, Trainer, Schena, & Prentice, 2020; Levinson, Vogt, Barker, Jalongo, & Zandt, 2017). Educational settings implement a focus on how the canines can support development of literacy skills and academic achievement. The school setting is ideal for employing studies because it supports student learning outcomes while prioritizing their wellbeing. Student learning outcomes are connected to student wellbeing, specifically creating learning environments that support students by validating their learning responses and interactions with peers.

Henderson et al. (2020) noted a theme that canine influence may have a positive impact on the student's wellbeing in relation to their reading skills and social-behavioral outcomes. During the interviews, teachers discussed the program as an opportunity for students to develop increased confidence with literacy skills and improved competence in social settings. Additionally, teachers noted an increased autonomy for students due to their reading engagement. Parents noticed reading-related developments including

increases in reading abilities and improved reading engagement. Researchers determined that canine assisted reading programs serve as an avenue to provide one-on-one emotional and reading support for students who were disengaged, assisting them to re-engage with their learning in a safe environment (Henderson, Grove, Lee, Trainer, Schena, & Prentice, 2020). There was evidence of a ripple effect in the sense that social benefits extended to the child, then to other students, and further to the school community. Further, Henderson and colleagues (2020) provided students the opportunity to discuss their canine-assisted reading experiences that detailed positive emotions with improved engagement and confidence when reading. Canine reading programs provided a safe space for students to experience positive reading experiences in a judgment free zone where it is safe to make mistakes.

There is an immense amount of pressure on students to become confident, fluent readers, yet in typical classrooms, there are limited opportunities for students to receive individualized, guided practice for reading. Levinson and colleagues (2017) assessed the influence of reading aloud to handler-dog teams on children's oral reading fluency and reading attitudes in grades 2 through 5 during a ten week intervention period (Levinson, Vogt, Barker, Jalongo, & Zandt, 2017). There were no statistically significant results that indicated reading to dogs improved reading attitudes, but results suggested a positive effect of reading to dogs on performance scores on oral reading fluency (Levinson, Vogt, Barker, Jalongo, & Zandt, 2017). Both the within- and between- group comparisons indicated what researchers labeled as the dog effect. This effect was better during the first five weeks as opposed to the second five weeks which may be associated with the novelty experience of reading to the dogs. Children in grade two displayed the most

significant changes in reading achievement which supports that dog reading programs may be more effective during the early elementary grades (Levinson, Vogt, Barker, Jalongo, & Zandt, 2017).

Research Question 2: How are Canine Assisted Reading Programs Used in Clinical Settings?

A common goal for pediatric speech-language therapy is to increase the frequency and complexity in communication skills (verbal and nonverbal). It is important to highlight that verbal skills are important for literacy development. One study implemented a program that occurred in a university clinic where an AAT team intervened with a group, and their focus was on the vocalizations in one 3-year old male (BD) identified as having developmental delays (Anderson, Hayes, & Smith, 2019). Anderson and colleagues (2019) hypothesized that BD would show increases in vocalizations as a result of the AAT intervention; they defined vocalization as phonation within the same pitch and loudness expected for speech production. During the first baseline period, BD produced zero to five vocalizations (Anderson, Hayes, & Smith, 2019). During intervention, BD showed considerable increase in vocalizations that ranged from 49 to 94 vocalizations. Following intervention, BD maintained these vocalizations at a range of 70 to 100. Anderson and colleagues (2019) noted the linguistic diversity within BD's vocalizations and his improved sustained attention with the therapy dog, especially within a five to ten minute time period. Although a case study, the results also showed that AAT practices could have the potential to support the communication development and social interaction of children with significant communication disorders.

Research Question 3: Which Evidence-Based Measures Are Used to Evaluate Students' Progress in Literacy Skills?

Canine-assisted reading programs have gained attention from research due to their proposed benefit in a variety of settings. Evaluating the effectiveness of various evidence-based measures in monitoring students' progress in reading activities must be well coordinated and structured. Research in this arena must show observable changes in reading attitudes to determine if implementing these programs can improve reading skills.

Various evidence-based measures were applied for each of the current studies. As demonstrated by the literature reviewed, there are positive outcomes when utilizing therapy dogs in children literacy interventions (See Table 2). Evidence-based measures were identified across various domains including children's literacy skills and academic skills, vocalizations, reading behaviors, and reading attitudes. For example, Kirnan and colleagues (2016) implemented two experiments applying a mixed method model. Dogs were directly integrated into the reading curriculum for 169 students at a suburban elementary school in New Jersey from kindergarten to fourth grade levels. First, the advantage of this study included the use of classroom settings, which allow for asserting more control over attendance and participation in activities that encourage reading skills. Second, quantitative measures, such as the Northwest Evaluation Association's Measure of Academic Progress (MAP), was used to assess student's scores. Finally, Kirnan and colleagues (2016) used the performance scores from the mid-year reading levels as a control for comparison for the AAT intervention.

Table 2.*Intervention Results from the Seven Articles*

Articles	Setting	Intervention Results
Le Roux, M., Swartz, L., & Swart, E. (2014)	Education	<ul style="list-style-type: none"> • Reading accuracy in the dog group demonstrated improvement with small to medium effect sizes • Reading comprehension age showed significant improvements
Kirnan, J., Siminerio, S., & Wong, Z. (2016)	Education	<ul style="list-style-type: none"> • Mixed model design revealed statistically significant improvements in reading scores from the MAP for kindergarteners • Interviews observed increases in confidence and self-esteem
Levinson, E.M., Vogt, M., Barker, W.F., Jalongo, M.R., & Zandt, P.V. (2017)	Education	<ul style="list-style-type: none"> • Improvement in academic reading attitudes was not significant from ERAS scores because across both groups there was improvement at comparable rates • Analysis of oral reading fluency showed reading to the handler/dog teams had a greater effect on reading achievement than reading to peers
Linder, D.E., Mueller, M.K., Gibbs, D.M., Alper, J.A., & Freeman, L.M. (2017)	Education	<ul style="list-style-type: none"> • ERAS results showed significant improvements in academic reading attitudes • No significant improvements in reading skills from DIBELS scores but children in the dog group had comparable growth with those in the standard curriculum
Anderson, H.K., Hayes, S.L., & Smith, J.P. (2019)	CSD	<ul style="list-style-type: none"> • Increased number of vocalizations and varied communicative behaviors • Increased sustained attention
Rousseau, C.X., & Tardif-Williams, C.Y. (2019)	Education	<ul style="list-style-type: none"> • Statistically significant improvements in self-perceived interest, self-perceived competence, and reading persistence • Non-parametric tests showed significant changes in self-reported reading interest, self-perceived confidence, and time spent reading

Henderson, L., Grove, C., Lee, F., Trainer, L., Schena, H., & Prentice, M. (2020)	Education	<ul style="list-style-type: none"> Qualitative analysis showed students self-reported that reading to dogs had a positive impact across four themes: emotions, engagement, relationships, and achievement
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Research Question 4: Which Strategies Can Be Used to Facilitate Learning

Opportunities in Therapeutic Sessions?

Strategies that can be used to facilitate learning opportunities in therapeutic sessions require the child to be an active participant during literacy interventions involving canine-reading programs. When applying reading strategies, the clinician should build rapport and create a calming environment for the child in order to benefit the communicative interactions in therapeutic interventions. These strategies may involve the child reading to a dog in a classroom setting or clinical setting.

Le Roux, Swartz, & Swart (2014) investigated reading measures beyond regular performance schools by observing changes in reading rate, accuracy, and comprehension. This study was the first in the field to control for the novelty effect of attention and opportunity for students to practice reading while also controlling for the effects of reading to a non-human audience. Students consisted of 106 third-grade students from an elementary school in a low-socioeconomic community in South Africa. A pretest-posttest design was used with a battery of assessments (e.g., national-based reading and spelling tests) that included a ten-week intervention period with random assignment to four groups (i.e., dog, teddy bear, adult and control group). No significant differences were found among the three intervention and control groups at baseline for reading rate, accuracy, and comprehension (Le Roux, Swartz, & Swart, 2014). During the time period of intervention, reading comprehension scores were higher for the dog group than for the

adult group, the teddy bear group, and the control group. During the interval eight weeks following intervention, the reading comprehension scores still remained higher than the aforementioned groups (Le Roux, Swartz, & Swart, 2014).

Linder and colleagues (2017) utilized the Dynamic Indicators of Basic Early Literacy Skill (DIBELS) and Elementary Reading Attitude Survey (ERAS) to observe how the presence of a dog could influence reading skills and attitudes in a group of second grade students were randomly assigned to an intervention group and a control. In the intervention group, students engaged in six weekly one-hour long sessions at the end of the school day comprised of 30-minutes of reading aloud to a registered therapy dog-handler team, as well as, a 30-minute informational session (Linder, Mueller, Gibbs, Alper, & Freeman, 2017). The students were given a quiet space to read aloud and they were consistently paired with the same dog-handler team unless the dog or handler had an emergency cancellation. Data was collected at baseline followed by every two weeks using the Dynamic Indicators of Basic Early Literacy Skill (DIBELS) to assess literacy skills and the Elementary Reading Attitude Survey (ERAS) to assess attitudes towards academic and recreational reading. Children in the intervention group also completed an anonymous rating of the information sessions each week using a Likert scale to indicate level of enjoyment (Linder, Mueller, Gibbs, Alper, & Freeman, 2017). This program was determined to be feasible as all children in the intervention group responded with positive feedback. The DIBELS assessment showed no statistically significant changes in reading skills for the control group or the intervention group but children in the dog group had comparable growth with those in the standard curriculum. The ERAS assessment found no statistically significant changes in reading attitudes for the control group, and while

the intervention group showed no statistically significant improvements in attitudes towards recreational reading, they did demonstrate statistically significant improvements in academic reading (Linder, Mueller, Gibbs, Alper, & Freeman, 2017).

Rousseau and colleagues observed several variables including reading interest, reading competence, reading persistence, and reading motivation. They investigated whether dogs might facilitate a context conducive to reading for children when they are faced with a challenging read passage by examining children's reading motivation and reading persistence during a canine-assisted reading task (Rousseau & Tardif-Williams, 2019). Both quantitative measures (i.e., Woodcock-Johnson III Tests of Achievement, Intrinsic Motivation Inventory-Reading, letter word identification and word attack probes) and qualitative checklists were used to develop a holistic perspective of the students. The reading passages were selected based on the Lexile Framework for Reading with specific passages selected based on the challenge they would provide to the young reader without inducing stress (Rousseau & Tardif-Williams, 2019). The data-analytic strategy involved collecting quantitative data concerning reading interest for the task, perceived reading competence for the task, and reading persistence for the task (Rousseau & Tardif-Williams, 2019).

A multivariate repeated-measures analysis of variance (MANOVA) was conducted to assess reading motivation and reading persistence differences based on the presence of a therapy dog during the children's reading sessions. There was a significant effect for the reading condition that concluded scores were higher in the with-dog condition regarding self-perceived interest, self-perceived competence, and reading persistence. A Wilcoxon signed-rank test showed that the presence of a therapy dog

during challenging reading tasks produce significant changes surrounding self-reported reading interest, self-perceived confidence, and time spent reading (Rousseau & Tardif-Williams, 2019). Analysis of the parent and observer reports indicated that children's reading behaviors displayed more interest (70.6%) when reading to the therapy dog versus without the dog (41.2%). The parent survey also indicated that reading experiences differed in the home environment and reading to a dog as a new experience for the majority of the young readers.

Conclusion

The revolutionary work of early AAT researchers provided groundwork for continued studies into the effects of therapy animals. Animals were initially involved as social catalysts, but are now involved in multidisciplinary professions with diverse populations. A literature review revealed that dog-assisted literacy experiences allow therapy dogs to serve as motivation to comply with the therapeutic plans, promote social engagement, and support literacy interventions (Fine, 2018). Further, the current body of research also displays that speech-language pathologists can utilize therapy dogs as a non-judgmental audience, a speech elicitor, and a comfort companion for children requiring literacy intervention (Fung, 2017). In sum, strategic use of therapy dogs in educational and clinical settings have the potential for positive effects on the development of student's literacy skills, especially students who will benefit from literacy support. There is a significant need for continued research to apply evidence-based practices that study the impact of therapy dogs on literacy interventions within educational and clinical settings.

Challenges and Future Directions

Despite the limited number of studies using AAT to improve children's literacy skills, this topic is gaining more interest in various settings. AAT introduces unique opportunities for children in speech and language interventions to improve their literacy abilities. However, AAT research can present a few challenges. While AAT is a viable option for speech-language interventions, student needs and preferences should be evaluated before beginning treatment. When considering the parameters of AAT, it is important to clarify if the participants have allergies or preexisting conditions that could

impact their interactions with the therapy dogs. Most of the challenges involving AAT with children literacy interventions revolve around the expectations of adults and parents who desire the most beneficial method of therapy for their children. Common concerns include allergens, cleanliness, and safety among working with animals. Safety of the children is often addressed by requiring specific protocol and training for the AAT team composed of the canine and the handler (Friesen, 2010). Clean practices when involving animals can also ensure that the participant's health concerns are valued and respected throughout the therapeutic process. Health and safety should be emphasized for all those involved in the intervention. Students should be taught how to interact with the animal in a manner that is appropriate, but the handler should recognize when the animal is signaling signs of stress (Gee & Fine, 2019).

There is a need for scientifically based evidence to evaluate quantitative measures of efficacy and safety issues within the field of AAI. Challenges associated with future research endeavors are associated with the “difficulty of establishing consistent intervention protocols when animals are involved” and “applying clinical mechanisms incorporating AAIs that involve the same species and cynical diagnosis but differ substantially in protocol” (Fine, Tedeschi, Morris, & Elvove, 2019, p.34). To address these issues, clinical measures should be carefully studied in order to achieve sustainable results surrounding the benefits of AAI. Establishing animal welfare guidelines is necessary in these future efforts.

Future research should identify larger sample sizes and employ longer intervention periods to yield a better generalization of the target population. Specifically, studies that focus on treat efficacy are warranted. AAT as a treatment specialization is not

a new concept, but there needs to be promotion of the professionalization in these areas of study for it to be acknowledged in complementary medicine. To promote the dynamic model of AAT, education and specialized training need to be encouraged. In order to achieve respect and recognition in the field of AAI, collaboration among professionals that recognize the importance of AAT needs to occur in a unified effort. Clarifying the goals of future research directions can establish legitimate and clear standards of practice.

Fostering literacy and effective reading skills is critical for educational success, but children often struggle with motivation to engage in reading. Students may have low levels of confidence and self-efficacy related to their reading abilities which makes them less inclined to participate in reading opportunities. Therapy dogs are often perceived as a depiction of a nonjudgmental audience. This sense of acceptance can encourage children with literacy challenges to step out of their comfort zone when presented with difficult reading tasks. Therapy dogs can also be considered a speech elicitor because of their socially attractive nature. They often present a unique experience for children to engage in communicative intentions that may not be stimulated by a traditional classroom setting. This speech environment is a novel experience that can encourage new conversations for children. Our evidence supports AAT as a positive clinical tool that can be measured by speech-language pathologists for children's literacy intervention.

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