ANIMAL ASSISTED SPEECH-LANGUAGE THERAPY FOR AUTISTIC CHILDREN: A PILOT STUDY

by

Allyson N. Gillen, HBSc

A THESIS

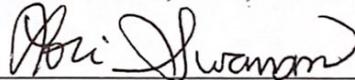*Submitted in partial fulfillment of the requirements for the degree of*

Master of Science in Communication Sciences and Disorders

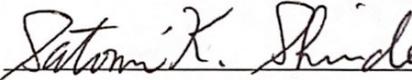Sheri Stronach, Ph.D., CCC-SLP   4/12/22   Date

Lori Swanson, Ph.D., CCC-SLP   4-12-22   Date

Satomi Shinde, Ph.D.   4-12-22   Date

Vice Chancellor, Graduate Studies   Date

UNIVERSITY OF WISCONSIN
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ABSTRACT

Animal-Assisted Therapy (AAT) – a goal-directed intervention in which an animal that meets specific criteria becomes an integral part of the treatment process – can be a beneficial treatment option for individuals in many settings. Yet, research is not readily available for use of AAT in pediatric speech-language therapy sessions, specifically pragmatic language sessions for autistic children. This study combined AAT and speech-language therapy for autistic children to examine motivation, participation, and attention/on-task behavior along with any impacts on the child's overall goal attainment. A multiple baseline across participants study was conducted to explore the effects of AAT in speech-language therapy sessions in relation to the child's on-task behaviors in their sessions. Results showed a positive impact on on-task behaviors and participation within sessions when therapy dogs are present versus when they are not. In terms of overall goal attainment, the children made continued gains towards their individualized goals when the therapy dog was used to supplement their reinforcement schedules. These results support the need for further research on the use of AAT in speech-language therapy with autistic children as the positive impacts noted provide preliminary evidence for the benefit of the presence of therapy dogs in reinforcement schedules within speech and language therapy sessions for autistic children.

INTRODUCTION

Autism Overview

Autism spectrum disorder (ASD) is defined by the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5;* American Psychiatric Association, 2013) as having persistent impairments in each of three areas of social communication and interaction plus at least two of four types of restricted, repetitive behaviors. These include persistent limitations in social communication and social interaction across multiple contexts as well as current demonstration of (or a history of) restricted, repetitive patterns of behavior, interests, or activities. Additionally, signs of autism must be present in the early developmental period but may not fully manifest until social demands exceed limited capacities or may be masked by learned strategies in later life. These symptoms can cause clinically significant impairments, limitations, and restrictions in social, occupational, or other important areas of current functioning. While ASD is often framed within a model of disability, autism can also be defined as a form of neurodivergence – a difference in neurological function that does not need to be fixed or cured (DeThorne & Searsmith, 2021). Within this neurodiversity framework, identify-first language is preferred (i.e., autistic individual versus individual with autism) and thus will be used throughout this paper.

Many autistic children have co-occurring developmental, medical, or psychiatric conditions, for example intellectual disability (or global developmental delay), anxiety, sleep disorders, and language disorders (Lai et al., 2014). While there are strengths associated with ASD, autistic individuals are also prone to display various symptoms and behaviors that can have a negative impact on their day-to-day life and overall health (Miles, 2011). However, there

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is no consistent pattern of behaviors or markers the occur in all autistic individuals (*DSM-5;*

American Psychiatric Association, 2013).

Developmental profiles of early language in autistic individuals vary greatly and many

children are delayed in the standard milestones, specifically those of words and phrases (Tager-

Flusberg, 2016). Some autistic children present with typical language development while others

present with a language delay or disorder. This delay may include an impaired understanding and

use of grammatical markers (Wittke et al., 2017). Appropriate screening and assessment

instruments are needed to accommodate varying ages, cognitive abilities, and gender

presentations (Lai et al., 2014; Tager-Flusberg, 2016).

Regarding speech and language development for autistic children, early identification

provides the opportunity for early intervention which can aid in the areas that are delayed (Lai et

al., 2014; Tager-Flusberg, 2016), potentially including speech sound development, language

skills such as use of grammatical forms, and social communication development. For those

children that need it, speech-language therapy is used in early intervention with children

diagnosed with ASD to aid in increasing learning skills and overall communication. A variety of

language development profiles have been found in autistic children (Durrleman & Durage, 2016;

Lai et al., 2014; Tager-Flusberg, 2016; Tek et al., 2014). If communication is impaired in autistic

individuals, this means that there could be impairments in, not just speech and language, but

nonverbal aspects of communication including gestures and facial expressions as well. Early

social communication may be characterized by substantially reduced rates of social interaction

and establishing joint attention with more typical rates of requesting (Miles, 2011). Pragmatic

language deficits can be present throughout the individual's life and can affect the use of

language in social interactions (Miles, 2011; Tager-Flusberg, 2016). Autistic individuals are

frequently delayed in their standard milestones of language development (Tager-Flusberg, 2016) and with early intervention, most do develop functional speech after receiving these services through natural environmental settings. The most significant gains are in receptive and expressive language (Tager-Flusberg, 2016) when early intervention methods are taken.

Animal Assisted Therapy Overview

Animal assisted therapy (AAT) is a goal-directed intervention in which an animal meets specific criteria is an integral part of the treatment process. AAT is directed and/or delivered by a health/human service professional with specialized expertise and within the scope of practice of his/her profession. AAT is designed to promote human physical, social, emotional, and/or cognitive functioning. AAT is provided in various settings and may be group or individual in nature (Bert et al., 2016; Delta Society, 1996; Granger & Kogan, 2006). AAT differs from animal-assisted activity (AAA), which is not goal directed and not implemented by a health/human service professional. However, animal assisted activity has also been shown to have positive impacts on many populations, including autistic children (e.g., Germone, 2019). Animals have been used in a variety of different therapeutic settings, including occupational therapy, speech-language therapy, physical therapy, and mental health sessions (Altschiller, 2011; Granger & Kogan, 2006). As the many benefits of AAT were witnessed and studied, this approach has become a more widely accepted therapy tool (Altschiller, 2011; Bert et al., 2016; Granger & Kogan, 2006).

AAT is used to aid and improve clients of all ages' physical, social, emotional, and/or cognitive functioning (Cole et al., 2007; Roth, 2000). This unique approach to traditional therapy can take place in multiple different facilities and locations. Today, AAT is being used in hospitals, nursing homes, schools, government agencies, and outpatient rehabilitation centers

(Friesen, 2010; Granger & Kogan, 2006). In school settings, AAT has been successfully used in special education classrooms and the everyday classroom environment (Friesen, 2010; Granger & Kogan, 2006). One study showed how therapy animals can be used in the school to help the students remain calm to work on their daily schoolwork and also used as a reward for good behavior (Friesen, 2010). For example, a group of children working at a sensory table may interact with the animal while taking turns, assisting them with their social skills. Therapy dogs were also used with timid readers; when children read to the dog rather than another child or teacher, they began to try reading new words (Friesen, 2010).

A person also experiences many physical benefits in working with a therapy animal. It has been shown that working with therapy animals can help calm a person's nerves, which, in turn, lowers their heart rate and lowers their blood pressure (Cole et al., 2007; Creagan, Bauer & Thomley, 2015; Marcus et al., 2012). Therapy animals help reduce stress, which can be linked to anxiety in patients and their overall physical health (Friedmann, 1995; Marcus et al., 2012). Friesen (2010) has found that when a child works with a therapy animal, they are often more attentive, responsive, and cooperative. Interacting with a therapy animal lowers behavioral, emotional, and verbal distress in children and adults (Friesen, 2010; Creagan, Bauer & Thomley, 2015; Macauley, 2006). Overall, therapy animals can create a less stressful environment for the patient who, in turn, helps in elevating their mood (Creagan, Bauer & Thomley, 2015; Macauley 2006; Marcus et al., 2012). Patients have said that they feel happier and often become less stressed after receiving a visit from a therapy animal.

Various studies have been conducted to evaluate the effectiveness of AAT. When looking at a study done in the United Kingdom at a children's hospital, surveys showed a positive impact on staff and patients after the therapy animal had visited (Uglow, 2019). Patients reported being

distracted from their illness and pain enough to relax. It is also stated that having a therapy animal present aids in establishing rapport, facilitating communication, and increasing the individual's responsiveness and social interactions (Macauley, 2006). Individuals with aphasia were shown to improve their speech-language abilities after the implementation of AAT. In Macauley's (2006) study, AAT was also shown to be more enjoyable than traditional therapy methods for the individuals involved. It was also statistically demonstrated that participants were more motivated to participate in therapy sessions when they knew the therapy animal would be present. Therapy animals led the patients to report that they felt more comfortable in the new exercises they attempt to perform throughout their therapy sessions (Giorgi, 2016; Macauley, 2006). As a possible supplement to standard procedures for individuals recovering from a stroke, it was shown that having a therapy animal present positively impacted their subjectively reported mood (Machová et al., 2019). Members of the experimental group showed a heightened co-operation with therapists when the therapy animal was present. This human-animal bond is a mutually beneficial and dynamic relationship between people and animals that can positively influence the health and well-being of the individual involved (Creagan, Bauer & Thomley, 2015; Cole et al., 2007; Mills & Hall, 2014).

It is also important to note that there can be psychological impacts that occur when working with a therapy animal. Animals enhance the quality of life and family functioning for the individuals who interact with them (Pamungkas, 2015; White, 2021). The positive effects on quality of life can then be correlated to lessened anxiety and stress levels (O'Haire, 2013; Pamungkas, 2015; White, 2021). With less pressure, communication skills demonstrated by the autistic individuals showed improvements in the presence of therapy animals (Pamungkas, 2015; White, 2021). This is shown when animals are involved in interactions as they provide a neutral

focal point during social interactions (Pamungkas, 2015; White, 2021). When looking at human-animal interactions, the animal acts as a social catalyst which aids in the willingness of the client to engage in social interactions (Pamungkas, 2015; Wijker et al., 2020). Therefore, the quality of social interactions increases as the anxiety decreases. These findings demonstrate that while AAT research continues, there remains a compelling necessity for targeted research using AAT with autistic children.

AAT and Autism

AAT has been studied as a therapy tool across various disciplines. However, research on AAT with autistic children has been largely anecdotal, and the effects on the clients that the therapy animals encounter during AAT have sparsely been quantified. In fact, AAT has been shown to benefit various individuals in their therapy sessions by providing a pleasant external attention focus (Creagan, Bauer & Thomley, 2015; Macauley, 2006; Odendaal, 2000). This can be seen in the various studies that measure physical changes, such as blood pressure and heart rate, while the therapy animal is present versus when it is not (Machová et. al, 2019). Pet Partners, a nationally recognized therapy animal organization, compiled data from various studies across disciplines and settings and found that AAT improves an individual's physical, social, and emotional wellbeing (Chastain Griffin, 2020). Collectively, these findings testify to the positive effects of therapy animals, yet there remains a need for additional research to be conducted on targeted populations and therapy modalities. Investigating the impact of animal assisted therapy with autistic children is fundamental to developing new ways to connect and facilitate therapy.

In a pilot study conducted by Fung and Leung in 2014, it was noted that autistic children experienced positive social interactions with their typically developing peers when a therapy dog

was present. In looking at a key identifier of individuals with autism, it has been shown that children who exhibit no social interest can also benefit from the social effects of a therapy dog. It was shown to increase verbal behaviors rather than nonverbal behaviors in the pragmatic skills of the participants (Fung & Leung, 2014). In addition, other studies utilizing therapy dogs have demonstrated that their use contributed to stimulating social behaviors and language use in both verbal and non-verbal autistic children (Berry et al., 2013; Boral, 2007; Germone at al., 2019).

Furthermore, consideration should be given to the emotional responses that occur when an individual is working with an animal. Animals provide a non-judgmental source for an individual to express themselves; they will typically not make the individual have adverse emotions towards their form of expression that is the most beneficial for themselves, and the animal will not react negatively to individual's words or actions (Odendaal, 2000; Zilcha-Mano, 2011). These emotional responses happen in typically developing individuals as well as those on the autism spectrum (Odendaal, 2000; Zilcha-Mano, 2011). In terms of autistic children, this can then aid them in feeling more at ease and open to pursuing positive social behaviors and interactions (Germone at al., 2019; O'Haire et al., 2013; Zilcha-Mano, 2011). Related studies looked at the behavioral impacts on autistic children in interactions with therapy animals. Overall, there was positive engagement and goal-oriented behaviors that were demonstrated in the presence of animals which increased positive emotional displays for the autistic children (Germone at al., 2019; O'Haire et al., 2013; White, 2021).

Therefore, one approach to aid in the on-task and goal-oriented behaviors of autistic children would be incorporating the use of AAT during their direct speech-language therapy sessions. The purpose of the current study was to explore the impact on goal progress, attention/on-task behavior, and social validity when canines were used to supplement

reinforcement schedules within direct child speech-language intervention. The specific research questions were:

1. Do participants continue to make progress towards their intervention goals with the introduction of animal-assisted speech-language therapy?

2. Is there a change in on-task behaviors during traditional speech-language therapy sessions compared to when canines are utilized to supplement reinforcement schedules within direct speech-language therapy sessions?

3. Do autistic children and their parents report positive outcomes following the introduction of AAT?

The hypothesized outcome was an increase of on-task behaviors with the introduction of AAT alongside a positive impact on the child's overall goal attainment during the study's progression with positive outcomes reported by both children and their parents.

Methods

Participants

For participant recruitment, fliers were given to graduate clinicians at the University of Wisconsin – River Falls Speech-Language and Hearing Clinic, and at Westside Elementary School to hand out to client's parents or guardians who fit the recruitment criteria of being elementary school-aged and having a diagnosis of autism spectrum disorder with communication profiles in the language partner and communication partner range as determined by the SCERTS model (Prizant et al., 2006). The children were also required to have had positive experience and behaviors towards dogs previously. Families and clients who were interested and fit the study criteria were then formally invited to participate in the study.

A total of three children between the ages of 8 to 10 years of age were recruited, met all inclusion criteria, and participated in the study. An additional seven children were recruited between the ages of 7 to 12 years and diagnosed with autism spectrum disorder in accordance with the DSM-5 but did not meet the full inclusion criteria thus were dismissed and excluded from the study. Prior to the onset of the study, the participating clients took part in a standardized evaluation consisting of the Clinical Evaluation of Language Fundamentals – 5th Edition CELF-5 (Wiig et al., 2013; Appendix D), given by an outside graduate student clinician (Katherine Stremcha, B.S.) under the supervision of a licensed speech-language pathologist to determine the clients social and communication levels regarding the study. The parents/caregivers were also asked to complete the Social Communication Questionnaire (SCQ; Rutter & Lord, 2003) to further measure social communication levels. The children who participated in the study were not receiving any other speech-language therapy services outside of the designated study.

Demographic information is displayed in Table 1. Information that was recorded included the child's gender, age, race/ethnicity, language spoken in their home, year in school, educational setting, and the presence of family pets in their home. To protect their anonymity, the child participants will be referred to by pseudonyms.

Table 1. Demographic Data and Results of Initiation Evaluation.

	Charlie	Nicole	Noah
Race/ethnicity	White, Non-Hispanic	White, Non-Hispanic	White, Non-Hispanic
Age	8 years	10 years	10 years
Language spoken at home	English	English	English
Year in school	3rd grade	4th grade	4th grade
Educational setting	General education	General education	General education
Pets in the home	No	Yes, 1 dog	Yes, 1 dog
CELF-5 Standard Score – Core	50 (<0.1 percentile)	72 (3rd percentile)	122 (93rd percentile)

Language Score (CLS)			
CELF-5 Standard Score – Receptive Language Index (RLI)	59 (0.3 percentile)	63 (1st percentile)	129 (97th percentile)
CELF-5 Standard Score – Expressive Language index (ELI)	55 (0.1 percentile)	75 (5th percentile)	110 (75th percentile)
CELF-5 Standard Score – Language Content Index (LCI)	63 (1st percentile)	61 (0.5 percentile)	124 (95th percentile)
CELF-5 Standard Score – Language Memory Index (LMI)	53 (0.1 percentile)	73 (4th percentile)	113 (81st percentile)
SCQ Score	25	15	15
SCERTS Level	Language partner	Language partner	Conversational partner

- *CELF-5: Clinical Evaluation of Language Fundamentals – 5th edition*

- SCQ: Social Communication Questionnaire (cutoff scores at or above 15 indicate high probability of the individual being on the autism spectrum and warranting further testing)

- SCERTS Model: Social Communication, Emotional Regulation, Transactional Supports model

CELF-5 scaled scores give a measure for each specific subtest and are used to compare the child's score against typical performance in the same-aged norm group (Wiig et al., 2013). A composite score on the CELF-5 look at multiple areas and have a mean score of 100 with 1 standard deviation (SD) being +/-14. When considering the scores of each participating child, Charlie demonstrated receptive language abilities 2 SD below the mean as seen on the RLI, expressive language abilities 2 SD below the mean as seen on the ELI, language content abilities 2.5 SD below the mean as seen on the LCI, and language memory abilities 3 SD below the mean

as seen on the LMI. These scores indicate that Charlie presents with a severe language disorder according to the CELF-5.

When considering the scores of Nicole, she demonstrated receptive language abilities 2 SD below the mean as seen on the RLI, expressive language abilities 1.5 SD below the mean as seen on the ELI, language content abilities 2.5 SD below the mean as seen on the LCI, and language memory abilities 2 SD below the mean as seen on the LMI. These scores indicate that Nicole presents with a moderate language disorder according to the CELF-5.

Finally, when considering the scores of Noah, he demonstrated receptive language abilities 2 SD above the mean as seen on the RLI, expressive language abilities 0.5 SD above the mean as seen on the ELI, language content abilities 1.5 SD above the mean as seen on the LCI, and language memory abilities 1 SD above the mean as seen on the LMI. These scores indicate that Noah presents with above average language abilities according to the CELF-5. Noah demonstrated deficits in articulation of /r/ phonemes at the conversational level as noted on his IEP along with clinician noted difficulties in turn-taking during the CELF-5 assessment which were further confirmed when the implementing therapy clinician rewatched the recorded evaluation session.

Handler-Canine Team

A single speech-language pathology graduate clinician (Allyson Gillen, HBSc) at the University of Wisconsin – River Falls worked directly with the therapy dog and its handler. The graduate clinician has completed additional animal-assisted therapy training and has worked with therapy dogs in therapy sessions previously as certified therapy dog handler. The sessions were supervised by a certified and licensed speech-language pathologist (Kristin Carlson, M.S.T.

CCC-SLP) as part of graduate clinical training. Sessions took place within a facility suited for facilitation of therapy dogs and handlers within the clinic.

Child participants were supervised by adult clinicians and therapy dog handlers for 100% of interactions with the dogs. The therapy dogs participating in this study were a ten-year-old, male, Pudelpointer named "Earl", and a five-year-old, male, Pudelpointer named "Albert". Both were socialized to the clinical setting and had completed the Pet Partners certification and recertification processes (see https://petpartners.org/ for more information on the Pet Partners Certification process).

Under the Pet Partners certification, the dogs must have no history of aggression or seriously injuring either people or other animals. This exclusion includes animals who have been trained to aggressively protect and/or have been encouraged to bite. The dog must demonstrate good basic obedience skills and welcome, not merely tolerate, interactions with strangers. The therapy dogs must pass 24-part evaluation every two years to maintain their certification and continue to practice as a therapy dog team. This evaluation includes the following:

1. A handler questionnaire form
2. Accepting a friendly stranger – dog must willingly greet a stranger
3. Accepting petting – dog must willingly accept being pet
4. Appearance and grooming – dog must be in good health
5. Out for a walk – healing next to handler
6. Walking through a crowd – healing next to handler and ignoring distractions
7. Reaction to distraction – dog must not react to distracting situations
8. Sit on command
9. Down on command
10. Pass between three strangers – dog will remain where they are and not become anxious or distracted

11. Pass between strangers when walking – will remain in a heal next to the handler and not break to greet other people
12. Stay in place
13. Come when called
14. Reaction to neutral dog – dog will react politely or not at all to another dog
15. Overall handling – handler will present animal to another individual and the dog will be comfortable/not react to being physically handled by a stranger
16. Exuberant and clumsy petting – dog will have no reaction or react positively to being pet in a more aggressive manner
17. Restraining hug – dog will have no reaction or react positively to being put in a tight hug
18. Staggering and gesturing individual – dog will have no reaction and exhibit confidence when approached by someone who is acting in an un-usual manner
19. Angry yelling – dog will have no reaction to an individual who exhibits angry emotions
20. Two-finger tap – dog will have no negative reaction to being tapped unexpectedly from behind
21. Bumped from behind - dog will have no negative reaction to being bumped unexpectedly from behind
22. Crowded and petted by several people – dog will have no negative reaction to being pet by several individuals at once
23. Leave it – dog will ignore a toy/incentive when directed to
24. Offered a treat – dog will gently take a treat from another individual when directed to

In addition, the therapy dog must complete a bi-annual, full veterinarian health check to ensure optimal physical and emotional health, are up to date on all vaccinations, and is current on all flea, tick, and parasite preventative treatments. Upon completion of this test and registration with Pet Partners, the dog and handler are awarded an insurance policy to practice as a therapy

dog team. So, if something unforeseen were to happen, they would be covered by the insurance that the dog continually carries when they are working under their certification.

Pet Partners handlers are also trained to read their animal's particular body language and recognize when their animal is stressed, anxious, concerned, overstimulated, or fatigued, demonstrate positive interactions with their animal by praising, cueing, encouraging, and reassuring the animal as needed, and can cue or redirect their animal without raising their voice, forcefully jerking on the leash, or offering the animal food or toys. Handlers serve as an advocate for the safety and well-being of their animal and must pass a criminal background check.

Intervention

The present study strictly adhered to all protocol items outlined previously. Participants were given a total of 9 weekly one-hour, animal-assisted speech-language therapy sessions. Because there were no existing protocols for this type of therapy, the number of sessions offered were based off the optimal number of sessions for standard treatment. The children were then provided a varying amount of speech-language therapy sessions with the inclusion of a therapy dog using the multiple baseline therapy model (i.e., 4 weeks without dog - 5 weeks with dog, 5 weeks without dog - 4 weeks with dog, 6 weeks without dog - 3 weeks with dog). All therapy sessions consisted of speech-language focused, goal-directed interventions for autistic children as defined by the SCERTS intervention model that is individualized to each client. The acronym "SCERTS" refers to the focus on three categories in relation to children with autism. "SC" - Social Communication – the development of spontaneous, functional communication, emotional expression and secure and trusting relationships with children and adults. "ER" - Emotional Regulation – the development of the ability to maintain a well-regulated emotional state to cope with everyday stress, and to be most available for learning and interacting. "TS" – Transactional

Support – the development and implementation of supports to help partners respond to the person's needs and interests, modify the environment, and provide tools to enhance learning. Specific plans are developed to provide educational and emotional support to families, and to foster teamwork among professionals (Prizant et al., 2006). Example of the activities included within the sessions with and without inclusion of the therapy dog are outlined in Table 2. Each participating child had goals specifically targeted towards their speech and language needs, as outlined in the results section, using pseudo names. Therapy dogs were introduced as a supplement in each child's reinforcement schedules.

Fidelity

A treatment manual was developed outlining a structure and implementation for the speech-language therapy sessions during AAT sessions as well as traditional speech-language therapy sessions. A fidelity checklist was then developed to meet the criteria for the study and the intervention (See Appendix A). Session videos were then coded to determine if the criteria for structure and implementation were being followed as it was described.

The fidelity checklist consists of 22 items, of which 15 were specific to intervention with autistic children and 6 were specific to AAT in speech-language therapy based on prior clinical experience. Each of the questions were rated on a 3-point scale (2=full adherence, 1=partial adherence, 0=no adherence). Full adherence to outlined structure and implementation methods were referred to as 100% compliance. Partial adherence referred to the attempts made to the listed methods, and no adherence was when there was no attempt observed.

When scoring the fidelity checklist prior to therapy dog introduction for the participating children (total possible being 30 points), the lowest score received for intervention was 26 and the highest being 30 (median = 28). Post therapy dog introduction for the participating children

(total possible being 42 points), the lowest score for intervention was 39 and the highest was 42 (median = 40.5).

Intercoder reliability coefficients range from 0, meaning complete disagreement, to 1, meaning complete agreement. Typically, coefficients of 0.90 or greater are considered highly reliable. The blinded third-party coders each coded the first and last session for each participating child, which accounted for 23% of the total number of sessions. An intraclass correlation coefficient (ICC) was calculated using SPSS, the ICC = .999; $F(17) = 2734.97$, $p < .001$ indicating extremely high reliability.

Table 2. Activities for Therapy Dogs in Speech-Language Pathology Sessions.

Goal	Animal-assisted speech-language therapy	Typical speech-language therapy
Following directions	Giving commands to the dog: Come, eat, sit, down, stay, fetch, off, up, speak, high-five, dance	Directions posed by clinician regarding current play scheme
	Have the dog do any tricks that they might know how to do – rollover, dance, etc.	Rules of a (board) game
Making choices	Would you like to pet the dog, brush the dog, play fetch, go for a walk, get a drink?	Give the child two choices to choose from
Answering questions	What's in the dog's bag? (Hat, ball, treat, bear, shirt, whatever the child is interested in)	Questions posed by clinician regarding current play scheme
	Answering questions about the dog (yes or no questions or longer) - What color is Earl?	Answering questions about family members (yes or no questions or longer) - Who is your mom?

	- Is Earl big? Is Earl little? - Can Earl bark? - What is Earl's favorite treat?	- Is your dad older or younger than you? - Do you have a sibling? - What is your siblings favorite candy/treat?
	Making a list: - What did Albert bring today? (items in the bag) - Let's go for a walk and see what you and Albert see along the way (items in the halls or outside the windows)	Making a list: - What did you bring to school today? - Scavenger hunt
	Ask the child what they are doing with the dog: Hugging, walking, petting, brushing	Having the child describe what they are doing
Identifying & describing images/objects	Identifying body parts on the dog: Eyes, ears, tail, hair, teeth, feet, legs	Identify body parts on delf, doll, or clinician
	Picture cards: Identifying items on the cards and velcroing the card to the dogs vest or showing the dog	Picture card drill with visual aid
Expanding symbolic play	Dressing the dog: Snap, zip, tie, Velcro (noises they make)	Dress up with clinician
	Play dress up with the dog (costumes for the child and dog – role play)	Doll/action figure houses
	Hide and seek with the picture cards (can you and Earl find the cat)	Hide and seek with clinician and picture cards
Taking Turns	Play the game "I Spy" with Earl, taking turns with what is being looked for (handlers must help)	"I spy" with clinician, taking turns with clinician
	Playing board games (dogs can move pieces with their paws and assistance)	Board game turns

Procedure

A multiple baseline across participants research design was developed to examine the effectiveness of AAT in speech therapy sessions with autistic children. Ethical clearance was given by the University of Wisconsin – River Falls Institutional Review Board (Approval number IRB-FY2021-4) to work with both human and animal subjects. Adaptations of intervention procedures from the *Canine Assisted Occupational Therapy for Children on the Autism Spectrum: A Pilot Randomized Control Trial* by Hill et. al (2020) were utilized in this study, for example operational definitions for on-task, wait time, and other coding.

Cameras were set up in each University of Wisconsin – River Falls Speech-Language and Hearing Clinic therapy room and were used to record all interactions - video, and audio. The camera could be moved by the attending supervisor (Kristin Carlson M.S.T. CCC-SLP) to allow for the child to be always visible. The recordings were stored on a secure site (Vault). Each interaction in the room was recorded and coded by non-study personnel to gauge the percent of time the child was engaged in the session. The coders were required to watch the full video and then complete a fidelity checklist along with detailing the on-task behaviors and clinician tasking. Meaningful functional goals were developed for each participant following determination of the deficit areas demonstrated by each child on the CELF-5 (See Appendix D for an explanation of the CELF-5 evaluation and its components), informal language sampling done prior to beginning the study, and elicitation of concerns expressed from each client's parent(s).

At the conclusion of the study, parents/caregiver and children were asked to complete a social validity questionnaire in regard to the study to gauge their overall experience and satisfaction. Appendix E shows the questionnaire given to the parents, and Appendix F shows the

questionnaire presented to the children. The Likert-scaled questionnaires were created by the research team for this study specifically, as there was currently no established standardized social validity measure for AAT within speech-language pathology. If the children were unable to read the questions, the treating clinician read the questions to them and asked them to point to a given face that correspond with the satisfaction numbers.

Analysis/Data

Analysis was completed using multiple baseline across participants charts along with the use of Simple Video Coder by trained coders to assess on-task behaviors in each session. Each of the participants had a therapy dog introduced into their sessions at varying times. Charlie began with 4 sessions of one-on-one with the SLP, and then had 5 sessions with the SLP and therapy dog. Nicole had 5 sessions with just the SLP and 4 with the SLP and therapy dog. Noah had 6 sessions with just the SLP and 2 sessions with the SLP and therapy dog (he had 8 sessions instead of 9 due to a family emergency at the end of the study). At the conclusion of all the sessions in the study, the coders were given instructions (See Appendix C) and recordings in the University of Wisconsin – River Falls Speech, Language, and Hearing clinic to review the total second and minute amounts of on-task behavior, wait time, and other behaviors for each client. These times were then converted into percentages and correlated to each child's overall goal attainment during the duration of the study (See Appendix B for an example).

RESULTS

All three of the participating children were randomly allocated to receive animal-assisted speech therapy intervention in a multiple baseline across participants design. The participating children all completed nine speech-language therapy sessions targeting goals that were pragmatic

in nature. All parents/guardians attended the pre and post parental meetings where the intention of the study was explained, and ending surveys were completed by both parents/guardians (See Appendix E) and the participating child (See Appendix F), respectively. The treating clinician noted that the participating children were subjectively more enthusiastic and engaged and that the therapy dogs were not distracting to work with during the individualized, target-specific tasks.
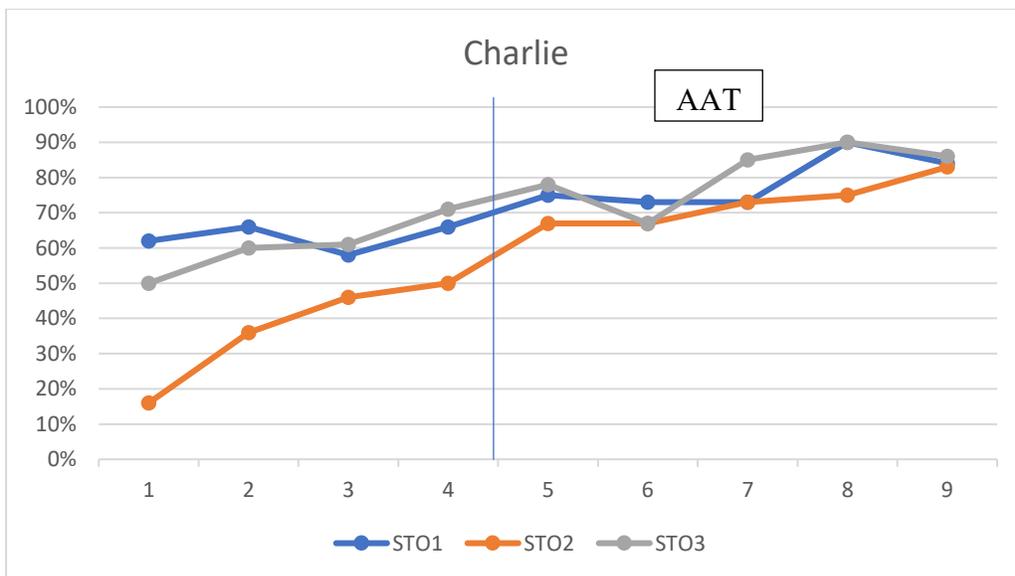
Charlie

    Intervention Progress. Charlie made steady progress towards all of his goals (See Table 3). When given a choice between two activities he enjoyed, he happily and willingly participated in his chosen one. Charlie progressed in his two-step direction following and was able to follow directions with more accuracy as the sessions progressed and was able to restate the directions to the treating clinician when asked. He began the summer with 62% accuracy in following two-step directions and ended with 84% accuracy. His target of describing objects progressed as well, although he continued to need extended time to think of a response or need when given visual prompts to choose from. He began the summer with 16% accuracy in describing objects and ended with 83% accuracy. Charlie met his goal of taking turns on 07/28/2021, increasing from 50% accuracy when he began the study to 86%, and had more accuracy towards the goal when he was asked to verbally state whose turn it was at the current moment (See Figure 1).

Table 3. Speech-Language Individualized Session Goals for Charlie.

Charlie	
Long Term Goal	Charlie will increase his expressive/receptive language and pragmatic language abilities.
Short Term Objective 1	Given a set of 2 written instructions, Charlie will follow them in sequential order with 80% accuracy across 3 consecutive sessions.

Short Term Objective 2	Given an image, Charlie will define and describe the image in grammatically correct sentences with 80% accuracy across 3 consecutive sessions.
Short Term Objective 3	During structured activities, Charlie will take 3-5 turns with the clinician across 3 consecutive sessions.

Figure 1. Charlie Intervention Session Data.

Attentional Coding. Charlie's first session demonstrated on-task behavior of 25.00%, wait time of 12.27%, and other (i.e. leaving the room) of 1.11%. His last session without the therapy dog (Session 4) demonstrated on-task behaviors of 19.78%, wait time of 10.32%, and other of 17.89%. Charlie's first session with the therapy dog (Session 5) then showed an increase in on-task behaviors of 38.28%, a wait time increase of 26.72%, and a decrease in other of 6.53%. Comparing it to Charlie's final session, he demonstrated an increase in his on-task behavior resulting in 50.24%. The wait time demonstrated by the clinician for Charlie to respond

remained relatively the same at 12.20%. Other increased to 30.34% as the clinician planned

activities out in the hallway with the trained therapy dogs and the cameras did not capture that

timeframe (See Figure 2 & Table 4). Charlie's on-task behavior during traditional therapy

averaged 17.64%. His on-task behaviors during AAT sessions increased to an average of 51.31%

across all AAT sessions.

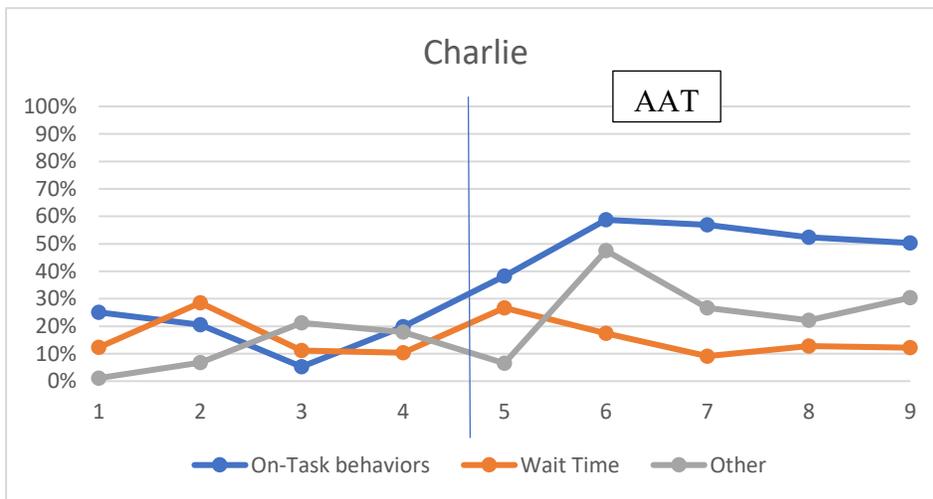**Figure 2.** Charlie Pre-therapy dog introduction and post-therapy dog introduction percentages.

Table 4. Pre-therapy dog and post-therapy dog introduction session percentages.

Charlie									
	Session 1	Session 2	Session 3	Session 4	Session 5*	Session 6	Session 7	Session 8	Session 9
On-Task behaviors	25.00%	20.53%	5%	19.78%	38.28%	58.72%	56.88%	52.43%	50.24%
Wait Time	12.27%	28.51%	11.10%	10.32%	26.72%	17.35%	9.10%	12.71%	12.20%
Other	1.11%	6.70%	21.23%	17.89%	6.53%	47.53%	26.72%	22.17%	30.34%

*First session with therapy dog.

Social Validity. Charlie rated his experience in the study with the therapy dogs 6 out of 6 possible points. Charlie's parents rated the experience 28 out of a possible 28 points. His mother stated "When our son was at his last speech session and realized that he wouldn't be seeing Ms. Ally or the therapy dog anymore he was sad. He even gave Ms. Ally and the therapy dog a hug all on his own and he was willing to take a picture with them."
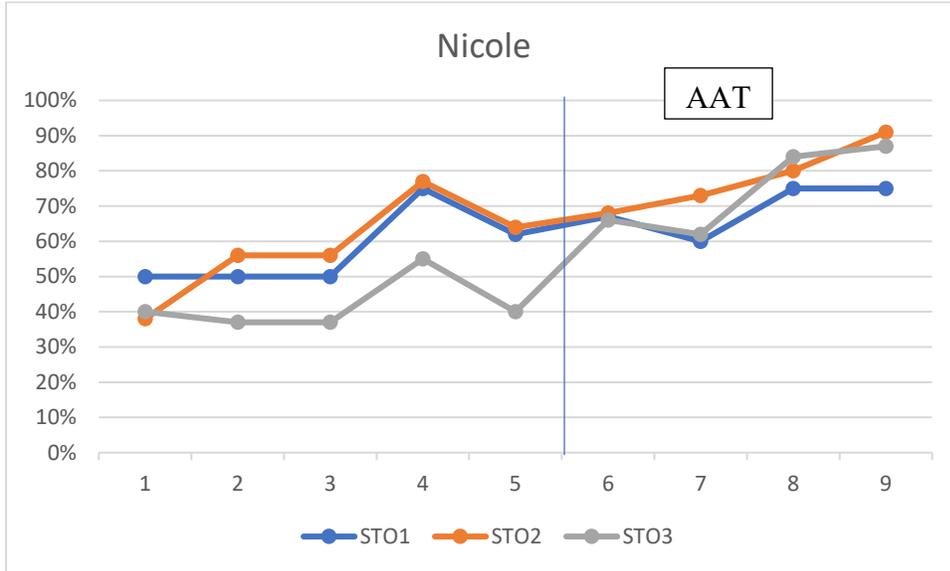
Nicole

    Intervention Progress. Nicole made progress towards all of her goals (See Table 5) in a relatively quick manner once the therapy dogs were introduced into the sessions and she was given immediate target-specific feedback. When given a choice between two activities she enjoyed, she happily and willingly participated in her chosen one. With visuals and the addition of the therapy dogs, Nicole was able to attend to activities for longer periods of time while following two-step directions, describing objects, and taking turns with the clinician as well as, the therapy dog. She began the study with 50% accuracy in following two-step directions and ended with 75% accuracy. Nicole began the study with 38% accuracy in describing objects and ended with 91% accuracy. Finally, she began the study with 40% accuracy in taking turns and ended with 87% accuracy (See Figure 3).

Table 5. Speech-Language Individualized Session Goals for Nicole.

Nicole	
Long Term Goal	Nicole will increase her expressive/receptive and pragmatic language abilities.
Short Term Objective 1	Given a set of 2 written instructions, Nicole will follow them in sequential order with 80% accuracy across 3 consecutive sessions.
Short Term Objective 2	Given an image, Nicole will define and describe the image in grammatically correct sentences with 80% accuracy across 3 consecutive sessions.
Short Term Objective 3	During structured activities, Nicole will take 3-5 turns with the clinician across 3 consecutive sessions.

Figure 3. Nicole Intervention Session Data.

Attentional Coding. Nicole's first session demonstrated on-task behavior of 45.79%, wait time of 32.53%, and other (i.e., leaving the room) of 3.18%. Her last session with the therapy dog (Session 5) showed on-task behaviors at 42.68%, a wait time of 11.03%, and other at 24.83%. During the first session with the therapy dog (Session 6), Nicole demonstrated a slight increase in on-task behaviors at 45.80%, wait time of 32.60%, and other of 1.98%. Nicole demonstrated an increase in her on-task behavior in the final session, resulting in a total of 51.71% on-task. She also demonstrated a decrease in needed wait time from the clinician for Nicole to respond in her last session with a total of 7.81%. Other increased to 63.76% as the clinician planned activities out in the hallway with the trained therapy dog and the cameras did not capture that timeframe (See Figure 4 & Table 6). Nicole's on-task behavior averaged 43.45% across all traditional therapy sessions. Her on-task behaviors during AAT sessions increased to an average of 50.74% across all AAT sessions.

Figure 4. Nicole Pre-therapy dog introduction and post-therapy dog introduction percentages.
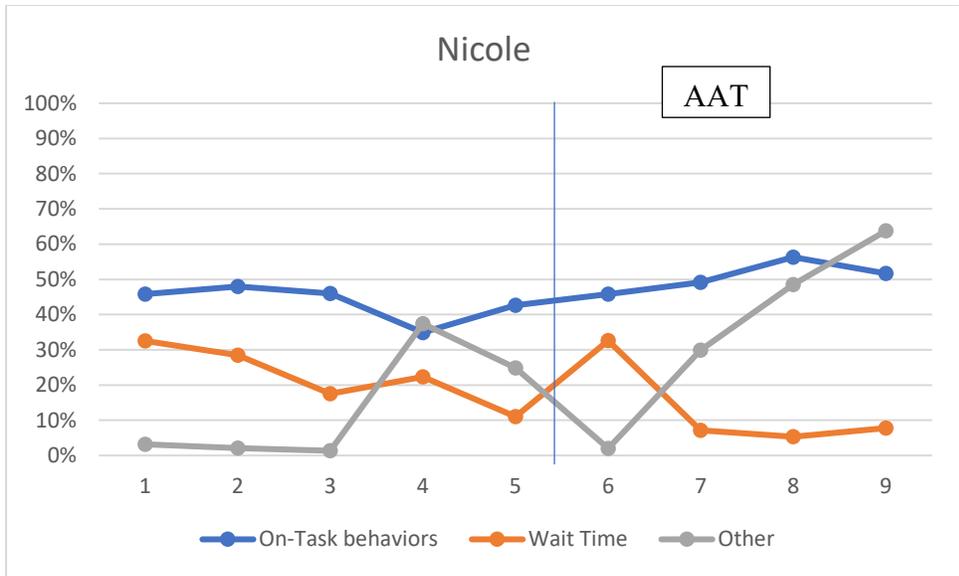
Table 6. Pre-therapy dog and post-therapy dog introduction session percentages.

Nicole									
	Session 1	Session 2	Session 3	Session 4	Session 5*	Session 6	Session 7	Session 8	Session 9
On-Task behaviors	45.79%	47.93%	34.92%	34.92%	42.68%	45.80%	49.13%	56.30%	51.71%
Wait Time	32.53%	28.45%	22.30%	22.30%	11.03%	32.60%	7.10%	5.31%	7.81%
Other	3.18%	2.07%	37.38%	37.38%	24.83%	1.98%	29.92%	48.51%	63.76%

*First session with therapy dog.

Social validity. Nicole rated her experience in the study with the therapy dogs 6 out of 6 possible points. Nicole's parents rated the experience 25 out of a possible 28 points stating, "If your child is presented with the opportunity to work with a therapy dog while receiving speech, I would highly recommend it."
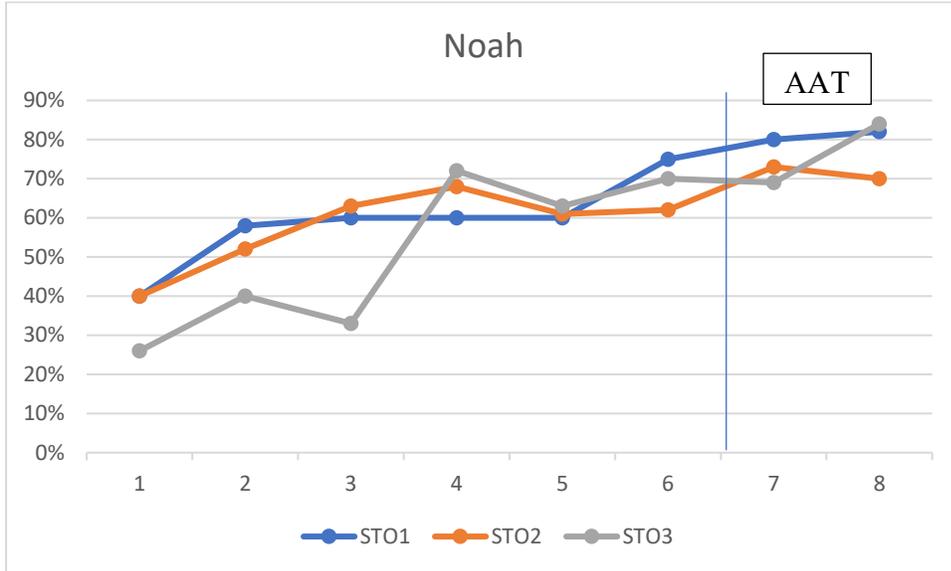
Noah

   Intervention Progress. Noah made progress towards all of his goals (See Table 7) in a relatively predictable manner which grew once the therapy dog was introduced into his sessions. When given a choice between two activities he enjoyed, he will happily and willingly participate in the chosen one. With the addition of the therapy dogs, along with his favored Mario activities, he was able to attend to the given tasks for longer periods of time with reduced frustration. With prompting, he was able to produce /r/ and /r/ blends correctly in all word positions. He began the study with 40% accuracy in /r/ at the conversational level and ended with 70% accuracy. Noah also began the study with 26% accuracy in /r/ blends at the conversational level and ended with 84% accuracy. He demonstrated improvement in his independent turn taking abilities with the clinician, as well as, with the therapy dog. He began the summer with 40% accuracy in taking turns and ended with 82% accuracy (See Figure 5).

Table 7. Speech-Language Individualized Session Goals for Noah.

Noah	
Long Term Goal 1	Noah will increase his pragmatic language and articulation skills.
Short Term Objective 1	During structured activities, Noah will engage with the clinician taking 3-5 turns across 3 consecutive sessions.
Long Term Goal 2	Noah will increase his articulation of /r/ and /r/-blends.
Short Term Objective 1	With minimal clinician cueing, Noah will correctly articulate /r/ at the conversational level with 80% accuracy across 3 consecutive sessions.
Short Term Objective 2	With minimal clinician cueing, Noah will correctly articulate /r/-blends at the conversational level with 80% accuracy across 3 consecutive sessions.

Figure 5. Noah Intervention Session Data.

Attentional coding. Noah's first session demonstrated on-task behavior of 15.16%, wait time of 0.34%, and other (i.e., leaving the room) of 17.20%. In his last session without the therapy dog (Session 6), Noah demonstrated on-task behaviors of 41.53%, wait time of 14.85%, and other of 3.85%. The first session with the therapy dog (Session 7), he showed an increase in his on-task behaviors to 69.87%, a decrease in his wait times to 11.17%, and an increase in other to 6.93%. Noah demonstrated an increase in his on-task behavior in the final session, resulting in a total of 73.90% on-task. The wait time demonstrated by the clinician for Noah to respond was less than 1.00% at both baseline and the end of the intervention. Other, referring to the time spent out of the view of the cameras in the hallway participating in various activities, decreased from 17.09% to 3.09% as Noah did not request walk breaks during the session when the therapy dogs were present in the larger room (See Figure 6). Noah's on-task behavior during traditional therapy averaged 31.17% , which increased to an average of 74.89% across all AAT sessions.

Figure 6. Noah Pre-therapy dog introduction and post-therapy dog introduction percentages.
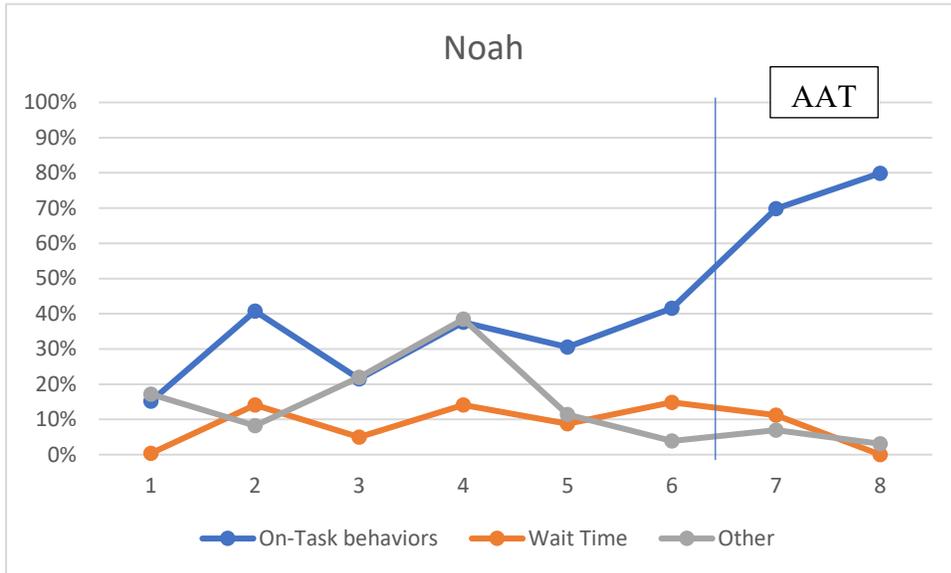

Table 8. Pre-therapy dog and post-therapy dog introduction session percentages.

Noah								
	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Session 7*	Session 8
On-Task behaviors	15.16%	40.73%	21.52%	37.54%	30.53%	41.53%	69.87%	79.90%
Wait Time	0.34%	14.10%	4.96%	14.13%	8.77%	14.85%	11.17%	0.02%
Other	17.20%	8.21%	21.95%	38.45%	11.40%	3.85%	6.93%	3.09%

*First session with therapy dog.

  Social validity. Noah rated his experience in the study with the therapy dogs 6 out of 6 possible points. Noah's parents rated the experience 28 out of a possible 28 points. His mother stated "When the therapy dogs were introduced into the speech session, our son opened up even more. Not only was he learning his speech sounds, but the dogs helped him with his social skills. He was so proud that he was able to teach one of the dogs how to roll dice."

DISCUSSION

The aim of this study was to determine if the addition of therapy dogs to speech-language therapy sessions for autistic children would impact their progress towards their speech-language goals, their on-task behaviors, and their reported enjoyment of and benefit from animal-assisted speech-language therapy.

The on-task behaviors seen during this study increased from the first session (without a therapy dog) to the last session after the inclusion of therapy dogs in the speech and language treatment for all participating children. All children participating in this study showed improvements in their on-task behaviors along with positive effects on their goal achievement from the first session to the last session of the study. However, given the multiple baseline across participants design of this study, the results cannot be generalized to the broader population.

By solely analyzing the on-task behaviors of each participating child, an increase between the first and last session can be seen for each participant. Although, it is uncertain if there were other external or internal motivation factors influencing each child in the speech and language therapy sessions.

In addition, the wait time needed for each child to respond when asked a question or to follow a given direction decreased for all participating children. This could be attributed to the increase in their on-task behaviors as they were focusing their attention more on the task and what was being asked of them.

This study's intervention procedures were largely adapted from *Canine Assisted Occupational Therapy for Children on the Autism Spectrum: A Pilot Randomized Control Trial* by Hill et al., 2020. These researchers utilized randomization of participants into either a intervention and control group to analyze the effects of AAT on autistic children within

occupational therapy sessions. The outcomes of Hill et al.'s study demonstrated a ceiling effect with the participants on task behaviors such that on task behaviors were high throughout all sessions, along with a novelty effect on the participants wait. The increase in on task behaviors seen in the current study after introduction of AAT contrasts these findings, likely due to the heterogeneity of autistic children.

Hill et al. (2020), stated that motivation factors were difficult to assess in their study as it was not possible to identify each specific motivation strategy used in the sessions. Motivation is a key factor in the presence of a child's on-task behaviors. Motivation itself gives a purpose or direction to behavior and is made up of internal and external factors that encourage or discourage behaviors (VandenBos, 2007). Some individuals will present with intrinsic motivation, where they are motivated by their internal wants and desires to do well at a task without being given any external reward (Atkinson, 1964; Brown, 1961; Cofer & Appley, 1964). In contrast, others will present with extrinsic motivation, where they will require that reward or a promise of a reward to want to complete a task (Atkinson, 1964; Brown, 1961; Cofer & Appley, 1964). Sometimes, extrinsic motivation becomes intrinsic motivation through emotional responses to external stimuli (Brown, 1961; Cofer & Appley, 1964; Yousar, Yang & Sanders, 2015). Therefore, it has been suggested that intrinsic motivation has greater behavioral, emotional, and cognitive outcomes than extrinsic motivation.

In contrast to the limited findings of Hill et al. 2020, possibly due to the contribution of motivational factors, the current study on AAT in speech-language therapy for autistic children demonstrated an observed increase in the participants on-task behaviors and positive overall goal attainment. Both studies indicate a need for further research in AAT within their respective disciplines with more focus on emotions and cognitive engagement biological markers within a

larger randomized sample size. The therapist themselves should also be considered within further studies (Hill et al., 2020) as their effort and burnout within sessions, with and without a therapy dog present, would give more knowledge into the overall enjoyment of the autistic child's sessions.

Although it was not a focus for this study specifically, the SLP initiating the given AAT intervention notes that there was less need for management of challenging behaviors (i.e., hyperactivity, attention difficulties, etc.) when the therapy dogs were present in the sessions. Further research into the speech-language pathologist's enjoyment of sessions with and without therapy dogs with autistic children is also a consideration for future research. Ease of behavior management can lead to less burnout and better stress management of the therapist during sessions, helping to focus more on the actual target goals and activities rather than behavior management for some autistic children.

While the noted on-task behaviors and goal attainment seen in each child within this study showed positive impacts, the effort needed to maintain the child's attention on target-specific tasks was noticeably less when the therapy dog was present in the sessions. Also note anecdotal concerns from some SLPs stating the possibility of therapy dogs being distracting to the children during their sessions; however, this data suggests the opposite for these three participants. Overall, the positive impacts in these children's on-task behaviors and goal attainment showed marked improvement, which may be an indicator for future research using statistical analysis.

Limitations

The major limitation noted in this study was the multiple baseline across participants design. Given the design of the study, these results cannot be generalized to a broader

population. Another limitation was that Noah only had two sessions of AAT, making a total of 8 sessions, as the family needed to withdraw prior to the end of the study, along with a different intervention style than the other two participants as he was also work on articulation of the /r/ phoneme at the conversational level. A further limitation was the factors of on-task behavior and wait time being coded. As those are the only two areas looked at specifically during the sessions, it is difficult to say if the changing activities and increasing familiarity with the clinician played a role in the increasing on-task behaviors of the children in the study. Therefore, it is difficult to discern whether the inclusion of the therapy dogs in the sessions affected the child's engagement and therefore their on-task behaviors, or if there were other skills or motivation strategies present during the therapy sessions which attributed to this impact.

Another limitation of the study was coding. The coders were blinded to the hypothesis of the study; however, they were not blinded to the introduction of the therapy dog as they could see when the dogs were present in the recorded videos. Further qualitative data is needed into the children's experience throughout the study and during the inclusion of the therapy dogs to give further insights into the understanding of AAT and its use in speech-language therapy sessions for autistic children.

Clinical Implications and Future Research

To our knowledge, this is one of the first pilot studies conducted focusing specifically on AAT with autistic children within speech therapy sessions. Therefore, the quantifiable data provides valuable information with recommendations for future research on this topic.

Future research is required to better understand the impact of AAT for autistic children, and it's benefit within speech-language pathology. Within this pilot study, there were observable improvements in on-task behaviors and wait time alongside positive progress towards goal

achievement. It is recommended that future studies be randomized control trials, which occur on a larger sample size, consist of a wider age range, and encompass varying abilities in relation to the SCERTS model. In addition, all sessions should be coded by a blinded third party, consisting of multiple individuals coding each session. These factors will increase the ability to generalize the results to the target population of autistic children receiving speech and language services. Moreover, increasing the reliability of the results by having intervention provided by multiple speech therapists, trained to work with the therapy dog teams is recommended.

It is also recommended to track physiological responses, such as heart rate and blood pressure, in the presence of therapy dogs within the speech-language therapy sessions, and when therapy dogs are not present to create precise physical markers for the reported feelings of the children. Finally, utilizing Pet Partners trained and certified therapy dog teams would ensure the integrity of the profession along with protecting the safety and welfare of the children and therapy dogs involved. In addition, providing further context and definition for the "other" category for the coders is needed along with possibly breaking it into smaller categories or having additional cameras in the hallway (i.e., leaving the room for an activity, walk, bathroom break, etc.) to aid in further analyzing the positive and negative effects of AAT for autistic children.

CONCLUSION

This multiple baseline across participants study combined AAT and speech-language therapy for autistic children to examine their motivation, participation, and attention/on-task behavior to evaluate the impacts on the child's goal attainment. The positive trends noted demonstrated a beneficial effect on each child's on-task behaviors, participation, and goal

attainment during their animal-assisted speech-language therapy sessions. Yet, due to the limitations of this pilot study, and the small sample size, further research on the use of animal-assisted therapy in speech-language therapy sessions for autistic children is recommended. It is hoped that this pilot study will help aid the design of future research of AAT in speech therapy sessions.

AUTHOR CONTRIBUTIONS

AG and SS developed the study design. AG and SS applied for ethical approval. AG completed the data collection. AG completed the data analysis and interpretation. AG drafted the manuscript. SS critically reviewed the manuscript.

COMPLIANCE WITH ETHICAL STANDARDS

AG declares that she is the owner and provider of the animal-assisted speech therapy services provided throughout this data collection process. SS declares that she has no conflict of interest. KC declares that she has no conflict of interest. JM declares that she has no conflict of interest. JL declares that she has no conflict of interest. SV declares that she has no conflict of interest.

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APPENDICES

APPENDIX A. FIDELITY WITHIN SESSIONS

Number	Fidelity	Full adherence (2)	Partial adherence (1)	No adherence (0)
1	A visual schedule is developed with the child and referred to throughout the session			
2	The therapist references the child's goal/s to the child and/or parent throughout the session			
3	No use of speech-language therapy jargon directed to the child			
4	Verbal instructions used are appropriate to the child's speech and language ability			
5	The participant's specific goals are addressed within the session			
6	Intervention activities WHOLE tasks directed towards the child's meaningful goals; NOT repetition of a SINGLE component			
7	Evidence of appropriate grading of the task by the therapist (the child has been provided with the 'just right challenge' facilitating their engagement)			
8	Motivational strategies (e.g., providing sense of control through the use of choice, use of visuals, drawing upon the child's interests) are clearly evident throughout the session			
9	Clear, goal-focused, specific verbal feed-back is provided to the child regularly throughout the session			
10	The therapist manages the environment appropriately dependent on the individual child's needs (e.g., removing visual stimulation)			
11	The therapist positions themselves at the child's eye-level when communicating (not standing over the child)			

12	The therapist responds to any undesired behaviors presented by the child calmly and without any evidence of agitation			
13	The therapist allows for processing time once instructions are provided before offering additional information or assistance (not quickly repeating the same instruction on multiple repetitions)			
14	The therapist responds appropriately to the child's mood within the session. Therapist is able to bring her arousal level down when the child begins to go fast. Alternatively, the therapist lifts her arousal level if the child's arousal level is low in order to facilitate engagement			
15	Home practice is provided during the session to assist with generalization			
Total				

Fidelity within Animal-assisted speech-language therapy

Number	Fidelity	Full adherence (2)	Partial adherence (1)	No adherence (0)
17	The therapy dog is actively involved in a minimum of one activity within the session (e.g., a pretend play activity in which the therapy dog is an active participant.)			
18	The therapy dog is passively involved throughout the entire session, prompted by referencing from the therapist (e.g., after we finish your coloring, we can show it to [dog])			
19	All interactions initiated by the therapist with the therapy dog are related to rapport building or the child's therapy goal, not just because the child wants to interact with the therapy dog (of-task)			
20	The therapist follows through with all interactions with the therapy dog discussed			

	with the child (e.g., we can give [dog] a treat once we have finished our drawing)			
21	The child encouraged to give the therapy dog their 'reward treat' at the end of the session			
22	Discussion of home practice involves discussing with the child what they will show the therapy dog within the next session			
Total				

APPENDIX B. ON-TASK BEHAVIOR ANALYSIS (WITH EXAMPLE)

Behavior Coding Session

Subject = Nicole 06-25-2021

Code	timeON	timeOFF	minsOn	minsOff
Wait Time	742.4	773	0:12:22	0:12:53
On-Task Behavior	774.2	826.6	0:12:54	0:13:46
Wait Time	828.4	937.6	0:13:48	0:15:37
On-Task Behavior	938.7	1025.5	0:15:38	0:17:05
Wait Time	1026.3	1109.3	0:17:06	0:18:29
On-Task Behavior	1110.3	1121.1	0:18:30	0:18:41
Wait Time	1122.3	1325.3	0:18:42	0:22:05
On-Task Behavior	1326.5	1501.2	0:22:06	0:25:01
Wait Time	1501.9	1551.2	0:25:01	0:25:51
On-Task Behavior	1551.9	1613	0:25:51	0:26:53
Wait Time	1613.8	1624.6	0:26:53	0:27:04
On-Task Behavior	1627.4	1693.2	0:27:07	0:28:13
Wait Time	1693.9	1702.5	0:28:13	0:28:22
On-Task Behavior	1703.4	1759.5	0:28:23	0:29:19
Wait Time	1760.4	1767.6	0:29:20	0:29:27

On-Task Behavior	1768.2	1782.1	0:29:28	0:29:42
Wait Time	1782.8	1795.1	0:29:42	0:29:55
On-Task Behavior	1796.1	1832.3	0:29:56	0:30:32
Wait Time	1833.2	1935.3	0:30:33	0:32:15
On-Task Behavior	1934.2	1991.8	0:32:14	0:33:11
Wait Time	1992.7	2016.1	0:33:12	0:33:36
Wait Time	2021	2095	0:33:41	0:34:55
On-Task Behavior	2096	2205.6	0:34:56	0:36:45
Wait Time	2206.2	2237.2	0:36:46	0:37:17
On-Task Behavior	2238.1	2337	0:37:18	0:38:57
Wait Time	2337.8	2361.3	0:38:57	0:39:21
On-Task Behavior	2361.9	2382.4	0:39:21	0:39:42
Wait Time	2383.7	2403.5	0:39:43	0:40:03
On-Task Behavior	2404.1	2602	0:40:04	0:43:22
Wait Time	2602.4	2609.1	0:43:22	0:43:29
On-Task Behavior	2609.9	2674.7	0:43:29	0:44:34
Other	2675.9	2782.6	0:44:35	0:46:22
Wait Time	2783.3	2867.9	0:46:23	0:47:47
Wait Time	2881.2	2885.2	0:48:01	0:48:05
On-Task Behavior	2886.3	3002	0:48:06	0:50:02
Wait Time	3004.4	3006.7	0:50:04	0:50:06
On-Task Behavior	3007.5	3018.2	0:50:07	0:50:18
Wait Time	3019.9	3072.1	0:50:19	0:51:12
On-Task Behavior	3073.2	3291.5	0:51:13	0:54:51
Wait Time	3292.4	3295.5	0:54:52	0:54:55
On-Task Behavior	3296.5	3303.6	0:54:56	0:55:03

On-Task Behavior	3311.7	3314.2	0:55:11	0:55:14
Wait Time	3315.6	3321.1	0:55:15	0:55:21
On-Task Behavior	3322	3352.1	0:55:22	0:55:52
On-Task Behavior	3356.2	3388.1	0:55:56	0:56:28
Wait Time	3389.7	3394.9	0:56:29	0:56:34
Wait Time	3481.4	3490.4	0:58:01	0:58:10
On-Task Behavior	3504.6	3507.9	0:58:24	0:58:27
Wait Time	3508.8	3516.9	0:58:28	0:58:36
On-Task Behavior	3529.4	3531.3	0:58:49	0:58:51
On-Task Behavior	3652.6	3659.1	1:00:52	1:00:59
Wait Time	3680.7	3690.3	1:01:20	1:01:30
Wait Time	3865.3	3891.7	1:04:25	1:04:51
Wait Time	3937.6	3947.8	1:05:37	1:05:47
On-Task Behavior	3948.8	3962.7	1:05:48	1:06:02
On-Task Behavior	3967.6	3977.1	1:06:07	1:06:17
Wait Time	3977.9	4005.9	1:06:17	1:06:45
On-Task Behavior	4008.7	4081	1:06:48	1:08:01
Wait Time	4117	4166.2	1:08:37	1:09:26
Wait Time	4171.9	4176.5	1:09:31	1:09:36
On-Task Behavior	4288.1	4295.1	1:11:28	1:11:35
Wait Time	4296	4297.9	1:11:36	1:11:37
Wait Time	4348.1	4423.4	1:12:28	1:13:43
On-Task Behavior	4424.3	4435	1:13:44	1:13:55
Other	4438.3	4446.1	1:13:58	1:14:06

TOTAL –
On-Task Behavior: 1648.5 seconds / 27.475 minutes
Wait Time: 1173.7 seconds / 19.56167 minutes
Other: 114.5 seconds / 1.90834 minutes

APPENDIX C. CODING MANUAL PROVIDED TO CODERS

ON-TASK BEHAVIORS:

- Non-verbal behaviors directed towards task completion, including looking at the task or person talking

- Task related touching and/or manipulating

- Task related gestures, e.g., pointing to an activity or tool

- Task related showing behaviors, e.g., showing parent work

- Task related direction of facial expression, e.g., smiling at parent to show pleasure in activity Oriented physically towards the task/therapist/parent

- Verbal behaviors related to the task, including:

    - Task related talk/questions

    - Verbal behaviors to communicate pleasure in activity, e.g., laughing

* * Behaviors do not need to be performed together e.g., the child may be not looking at the therapist however, still engaged in discussion and answering questions appropriately

WAIT TIME

- All behaviors in which the child has not been given a specific task related instruction, e.g., when initially entering the session, when waiting whilst the therapist and parent have a discussion.

- Non-task related discussion initiated by the therapist or parent, e.g., therapist asking the child how their weekend was.

OTHER

- If the child was not within the room, e.g., initial greeting by therapist within the waiting room, if the child leaves the room to go to the toilet.

APPENDIX D. CELF-5 OVERVIEW (Wiig et al., 2013).

Age range: 5:0 –21:11

Publication date: Fall, 2013

Qualification level: B

Completion time: 30–45 minutes for the Core Language Score. Total assessment: variable.

Administration: Verbal response to picture stimuli

Scores/Interpretation: Core Language Score, Receptive Language, Expressive Language, Language Structure and Language Content standard scores, percentile ranks, growth scale values, and age equivalents.

Scoring options: Q-global™ Web-based Administration, Scoring, and Reporting; and manual scoring

Tele practice: Guidance on using this test in your tele practice

Benefits

- Comprehensive, with measures that include structured, interactive, and observational/interview-based tasks.

- Flexible--administer only the tests you need to address referral and clinical concerns

- Now Available! Standard scores available for Reading Comprehension, Structured Writing, and the Pragmatics Activities Checklist.

- Compare written skills to oral language skills.

- Now available in print and digital editions (on Q-global and Q-interactive)

Features

- CELF-5 provides highly accurate diagnostic information with current normative data

- Item analysis of performance on individual tests.

- Automated scoring available in real time on Q-interactive or with item or subtest raw scores entered on Q-global.

- Digital editions offer 24/7 secure, web-based access on Q-global or Q-interactive, ideal for tele practice and in-person digital test administration.

- Q-interactive and Q-global provide automated Graphical and narrative reporting data.

Tests included

- Observational Rating Scale

- Sentence Comprehension

- Linguistic Concepts

- Word Structure

- Word Classes

- Following Directions

- Formulated Sentences

- Recalling Sentences

- Understanding Spoken Paragraphs

- Word Definitions

- Sentence Assembly

- Semantic Relationships

- Reading Comprehension

- Structured Writing

- Pragmatics Profile

- Pragmatics Activities Checklist

Severity Guidelines - Individual Test Scores: CELF-5 test scaled scores provide a measure of specific aspects of language form and content, depending on the test task and student's response. Test scaled scores are used to compare the student's performance to the typical performances of the same age norm group. These scores are derived from the total raw scores for each test and are on a normalized score scale that has a mean of 10 and a standard deviation (SD) of 3. A scaled score of 10 describes the average of a given age group. Scores of 7 and 13 are 1 SD below and above the mean, respectively. About two-thirds of all students with typical language development earn scaled scores between 7 and 13 (scaled scores of 8–12), the range of average performance.

APPENDIX E. SOCIAL VALIDITY QUESTIONNAIRE

Parent/Guardian Form

Child:_____ Parent/Guardian:_____

Date:_____

This questionnaire consists of 7 items. For each item, you will need to indicate the extent to which you agree or disagree with each statement. Please indicate your response to each item by circling one of the five responses to the right of each statement/question.

Statements/Questions	Responses				
	0 (strongly disagree) 1(disagree) 2(neutral) 3(agree) 4(strongly agree)				
I enjoyed being a part of the study.	0	1	2	3	4
My child was more excited to come to therapy.	0	1	2	3	4
My child looked forward to coming to therapy when they knew the therapy dog was going to be there.	0	1	2	3	4
Having the therapy dog present was helpful for my child.	0	1	2	3	4
This was beneficial for my child in their speech-language therapy.	0	1	2	3	4
I would continue to use animal-assisted therapy.	0	1	2	3	4
I would tell others about animal-assisted therapy.	0	1	2	3	4

APPENDIX F. SOCIAL VALIDITY QUESTIONNAIRE

Client/Child Form

Child:_____ Parent/Guardian:_____

Date:_____

This questionnaire consists of 3 questions. Please fill this worksheet out based on everything that happened during therapy this summer. Ask your therapist if you need help or have any questions!
*Note that this should be read to children who are not yet readers.

Question	Responses 0 (disagree/red) 1 (neutral/yellow) 2 (agree/green)		
Did you like having the dog in therapy?	0	1	2
Did you like doing your therapy work with the dog?	0	1	2
Would you like the dog to come again?	0	1	2

ACKNOWLEDGMENTS