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Furry Friends & Brighter Futures: Enhancing the Life Skills of Toddlers with Autism Through Animal Assisted Therapy

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**Furry Friends and Brighter Futures: Enhancing the Life Skills of
Toddlers with Autism Through Animal-Assisted Therapy**

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NURS 4500: Nursing Research and Senior Thesis

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Table of Contents

Abstract.....3

Introduction.....4

Problem Statement.....5

Purpose Statement.....6

Problem Question.....6

Hypothesis.....7

Literature Review.....7

Research Proposal.....17

Conclusion.....23

References.....25

Appendix A.....29

Abstract

Autism Spectrum Disorder (ASD) encompasses a broad spectrum of challenges that impact social interaction, communication, and behavior. While Applied Behavior Analysis (ABA) stands as a common therapeutic approach, there is a growing recognition of the need for personalized interventions. Animal Assisted Therapy (AAT) emerges as a promising avenue for enhancing social interactions. This study focuses on the utilization of dogs in AAT for toddlers aged 12 to 36 months with confirmed ASD diagnoses. The experimental group will undergo a combined intervention involving standard ABA therapy alongside weekly AAT sessions, whereas the control group will receive standard ABA therapy alone. Pre- and post-assessment tests (CSBS, VABS-3, ADOS-2) will measure changes in social, communication, and behavioral skills. Statistical analysis will be used to evaluate outcomes. Ethical considerations prioritize participant safety and informed consent. This study aims to provide evidence for the effectiveness of AAT as an early intervention for toddlers with ASD, potentially improving their long-term outcomes in education, employment, and independent living.

Furry Friends and Brighter Futures:

Enhancing the Life Skills of Toddlers with Autism Through Animal-Assisted Therapy

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by various challenges related to a person's ability to interact, communicate, learn, and behave (National Institute of Mental Health, 2022b). ASD is a "spectrum" disorder because it encompasses a wide range of functioning levels that manifest differently in each individual. According to the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*, a classification system and diagnostic tool published by the American Psychiatric Association (APA), ASD can be diagnosed by the following main criteria: (a) Persistent deficits in social communication and social interaction, and (b) Restricted, repetitive patterns of behavior, interests, or activities (American Psychiatric Association, 2013). Social communication and interaction behaviors may include little or inconsistent eye contact, difficulty with social-emotional reciprocity, lack of appropriate facial expressions, movements, or gestures, and deficits in developing, maintaining, and understanding relationships (National Institute of Mental Health, 2022b). Restrictive and repetitive behaviors may include phrase or motor repetition, rituals and fixated patterns of verbal or nonverbal behavior or interests, and hyper- or hypo-reactivity to environmental sensory input and stimuli (Centers for Disease Control and Prevention, 2022).

Among the various therapeutic modalities available, a common type of therapy used to treat ASD is Applied Behavior Analysis (ABA). ABA is an evidence-based approach that focuses on understanding and modifying behavior through observation, aiming to identify patterns and consequences to create effective interventions with the use of positive reinforcement (American Psychological Association, 2017). However, ABA therapy may not be suitable for

everyone, thus highlighting the importance of considering alternative approaches that better align with the individual's unique needs and preferences. Animal-assisted therapy (AAT) is a therapeutic intervention that involves the utilization of animals to promote the emotional, social, cognitive, or physical well-being of individuals with acute or chronic diseases (Cherry-Sánchez et al., 2018). In a systematic literature review conducted by O'Haire (2017), it was found that in 22 of 28 empirical studies on animal-assisted intervention (AAI) for autism published between 2012 to 2015, there was a statistically significant enhancement in social interaction (O'Haire, 2017). Moreover, an additional systematic literature review done by Rehn et al. (2023) revealed a positive correlation between participation in animal-assisted therapy and favorable trends across cognitive, special, emotional, behavioral, and physical domains (Rehn et al., 2023). While various animals including horses, cats, and birds have been employed in this therapy, this study will specifically concentrate on the utilization of dogs.

Problem Statement

Autism spectrum disorder presents significant challenges for individuals, particularly in the domains of social interaction and communication. The condition's effects on these core areas of functioning profoundly influence a person's ability to form meaningful relationships, engage in interactions, and navigate social contexts effectively. If not treated at an early age, adolescents may encounter difficulties in transitioning to independent living, notably in the areas of pursuing an education, securing employment, and ultimately establishing themselves as functional people in society (Posar & Visconti, 2019). In the United States, ASD currently affects about 1 in 36 children, is 3.8 times more prevalent among boys than among girls, and occurs in all racial, ethnic, and socioeconomic groups (National Institute of Mental Health, 2022a). In contrast to individuals in other disability groups, those with ASD face greater challenges in sustaining

employment and advancing their education. According to Shattuck et al. (2012), only 37.5% pursued higher education, and 55.1% secured employment within six years of leaving high school. Additionally, more than half of recent high school graduates with ASD showed no involvement in work or further education.

Early diagnosis of ASD is crucial to allow for timely access to specialized interventions and therapies (National Institutes of Health, 2017). In their meta-analysis, Van't Hof et al. (2021) determined that the average age at which ASD is diagnosed worldwide is approximately 5.04 years, with diagnoses occurring anywhere between 2.6 and 19.5 years. Additionally, Crane et al. (2015) observed that parents typically waited one year from the initial onset of concerns about their child's development before seeking professional help, with an average delay of about 3.5 years from the time parents first consulted a healthcare professional about their concerns to the final confirmation of an ASD diagnosis. Research on the effects of AAT as an early intervention for children ages one to three is limited. Toddlerhood is a critical period for language acquisition, social learning, and behavioral pattern development (MedlinePlus, 2017). Introducing AAT during toddlerhood is likely to contribute to developing these skills, which, in turn, will improve independent living and quality of life outcomes.

Purpose Statement

This research proposal aims to conduct a quantitative experimental study to assess the effectiveness of providing AAT as an early intervention to community-dwelling toddlers diagnosed with ASD to improve their social, communication, and behavioral skills.

Problem Question

What is the effect of AAT as an early and additional intervention along with ABA therapy for toddlers diagnosed with autism spectrum disorder? Additionally, how does receiving AAT

plus ABA during toddlerhood impact their employment, education, and independence in their young adult years?

Hypothesis

Incorporating weekly animal-assisted therapy for 12 weeks as an early and additional intervention along with applied behavioral analysis therapy in toddlers diagnosed with autism spectrum disorder will result in higher scores on the Communication and Symbolic Behavior Scales (CSBS), Vineland Adaptive Behavior Scales, Third Edition (VABS-3), and the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) compared to those receiving behavioral therapy alone. The scores will show an overall improvement in social, communication, and behavioral skills after completing the intervention.

Literature Review

The following literature review explores the effects of animal-assisted therapy as an early intervention on the social, behavioral, and communication skills of toddlers diagnosed with autism spectrum disorder. Using the Dominican University of California Library database, the following articles used for this review were retrieved from CINAHL Complete, Iceberg, PsychInfo, and PubMed. Within each database, keywords such as “animal-assisted therapy”, “toddlers”, “early childhood intervention”, “autism spectrum disorder”, “social participation”, and “communication skills” were used to conduct the search and find articles relating to the overarching topic. The criteria for articles to be included in this literature review are peer-reviewed research studies published between January 2018 and October 2023. A total of six articles were selected for this literature review and are organized under the following subheadings:

- Autism Spectrum Disorder: Impact on Life Skills

- Early Interventions in Autism Spectrum Disorder: Assessing their Influence
- Animal-Assisted Therapy in Children and Adolescents: Evaluating Effects and Outcomes

A literature review table can be found in Appendix A.

Autism Spectrum Disorder: Impact on Life Skills

To develop effective interventions for independent living, researchers have been investigating the interplay among emotional regulation, restrictive and repetitive behaviors (RRBs), and social behaviors on life skill attainment. The presence of RRBs can impact daily functioning, while social communication difficulties often result in social isolation and difficulties in forming and maintaining connections. The following two articles illustrate the impact of communication skills on RRBs and the employment experiences of people living with ASD.

Martínez-González et al. (2022) employed a structural equation modeling approach, utilizing three commonly used assessment tools in autism research and diagnosis. Their study aimed to elucidate the intricate relationship between emotional regulation and various social constructs. This investigation involved analyzing scores obtained from Lam and Aman's sociodemographic questionnaire, the Repetitive Behavior Scale-Revised (RBS-R), Social Communication Questionnaire, SCQ Form B (SCQ-B), and the Social-Emotional Rating Scale: Leiter-R-Questionnaire. The overarching goal was to discern any potential correlations between emotional regulation, social communication, and the occurrence of RRBs in individuals with ASD. The sample consisted of 239 participants with a definitive diagnosis of ASD from 18 different educational facilities in Spain. Participants with intellectual disabilities (ID) were also included in the study when ASD was the main diagnosis.

The study found that difficulties with emotional regulation are positively associated with self-injury RRBs in individuals with ASD. Thus, when people with ASD have a better capacity to regulate emotion, they tend to engage in less self-injurious behaviors. In addition, the study also discovered a relationship between social communication and stereotypic RRBs, finding that individuals with ASD who possess greater social communication skills tend to engage less in stereotypic behaviors. A strong association was also identified between emotional regulation and social communication. Findings from the study reveal that individuals with ASD with more social communication skills exhibit higher emotional stability. However, the study had several limitations. Conducted by educational and behavioral professionals who worked closely with the participants, the assessments may be susceptible to observer bias, as the professionals' physical and psychological proximity to the participants could potentially influence the accuracy and validity of their observations. Additionally, the study did not differentiate between individuals with ASD who also have ID and those who do not. This grouping was done to facilitate analysis but it is important to note that there can be differences in the severity of repetitive behaviors based on the presence of comorbid ID (Martínez-González et al., 2022).

Wei et al. (2018) conducted a longitudinal study to examine the job search process, job tenure, and instances of job loss in young adults with ASD. The study aimed to contrast these experiences with those of young adults with similar impairments and to identify any demographic factors that may influence their employment experience. The sample consisted of 660 young adults ranging from 26 to 28 years old who received special education services in the autism spectrum category during high school. The research used the National Longitudinal Transition Study-2 (NLTS2) to collect information on the transition from high school to the early post-high school period for young individuals with disabilities (Wei et al., 2018).

The study found that young adults with ASD face more challenges in job searching compared to those in other disability categories. They are less likely to seek employment, spend more time searching, and were found to be less successful in finding a job independently. The research revealed that the employment rate for young adults with ASD is 63.2% compared to 76.2% to 94.9% for other disability groups. Youth with better conversational skills were also more likely to seek employment and, once hired, hold a job longer. Additionally, the study observed several demographic disparities. Males with ASD tended to find jobs faster but were more likely to be fired, while females held onto their jobs longer once employed. Racial disparities were also identified, favoring white youth in terms of job duration and job retention. The attendance of postsecondary schools increased the likelihood of finding employment independently as well. However, the study presented limitations. The researchers' reliance on school district reports to identify participants with ASD for those receiving special education services under the autism category may have inadvertently excluded students with ASD who did not qualify for these services. Additionally, this exclusion criterion could have mistakenly omitted students with ASD who were categorized under a different primary disability. As a result, the generalizability of findings to the broader population of youth with ASD may be constrained.

The studies conducted by Martínez-González et al. (2022) and Wei et al. (2018) shed light on the life skills challenges individuals with ASD face and the need for early intervention so that they can acquire emotional self-regulation techniques and favorable social skills. Martínez-González et al.'s investigation underscores the critical role of emotional self-regulation in facilitating adaptive behaviors among individuals. Wei et al.'s study reveals the substantial employment challenges faced by young adults with ASD and suggests that interventions aimed

at coping mechanisms and social communication strategies may significantly benefit those with ASD. The study's results coupled with the findings in the following two articles underscore the importance of early support and intervention. The earlier children with ASD receive therapy aimed at developing coping mechanisms and positive social communication strategies, the higher the likelihood of overcoming challenges and leading fulfilling and independent lives.

Early Intervention in Autism Spectrum Disorder: Assessing their Influence

Over the years, research has consistently demonstrated the critical significance of early interventions in improving the long-term outcomes of individuals with ASD. Early childhood represents a period of rapid development, particularly in the domains of social, and communicative skills. During this critical window, interventions tailored to the unique needs of children with ASD can have a profound impact on their overall developmental trajectory. The articles in this category will focus on examining the effects of different types of interventions designed for infants and young children on the language and social interaction of individuals with ASD and their outcomes.

Frazier et al. (2021) conducted a longitudinal study to examine the trajectory of language development in children diagnosed with ASD who received an early intensive behavioral intervention (EIBI). The sample included 131 children meeting the ASD criteria outlined in the DSM-5. Participants, aged between one and six, were enrolled in a singular-site EIBI program at an academic center spanning from August 2002 to March 2014. The duration of enrollment in the EIBI program showed considerable variability, with the modal time being 2 years (Frazier et al., 2021).

The study revealed that children with ASD undergoing EIBI showed notable advancements in their language scores. Half of the children exhibited marked increases in total

language scores, exceeding 12 standard score (SS) points, after a year of intervention. Nearly 75% of the participants showed significant enhancements, surpassing 10 SS points, in both receptive and expressive vocabulary domains (as assessed by the Receptive One-Word Picture Vocabulary Test/Peabody Picture Vocabulary Test and the Expressive One-Word Vocabulary Test/Expressive Vocabulary Test) following one year of EIBI. The majority of language improvements occurred within the initial 18 months of EIBI intervention, with the most substantial gains, approximately 11 SS points, observed in the first 12 months. Upon exiting EIBI, the study found that 38% of children required reduced or no support in their subsequent educational placements. This outcome was associated with higher initial language scores, early improvements in language, and an earlier initiation with EIBI (Frazier et al., 2021). The primary limitation of this study was the utilization of a clinical convenience sample from a single EIBI program, which may not be fully representative of the broader population. In addition, since there was no comparison group, the observed language improvements cannot be attributed solely to EIBI.

Park et al. (2020) conducted a single-subject research study to explore the impact of family-centered early intervention on the development of social interaction skills of toddlers exhibiting signs and symptoms of ASD. The sample consisted of three toddlers aged between 24 and 36 months suspected of having ASD. The study involved assessments at baseline (phase A), intervention (phase B), a return to baseline (phase A'), and a follow-up phase. The family-centered early intervention program involved various components such as home environment modification, utilizing play video recording and training, providing tasks and feedback, offering information training, and conducting question and answer sessions. The

outcome measures were the scores on the Modified Checklist for Autism in Toddlers, Revised, and Follow-up (M-CHAT-R/F), and the Evaluation of Social Interaction (ESI).

Following the implementation of the family-centered early intervention program, the study found that all participants exhibited significant improvements during the intervention phase. Notably, Participants 2 and 3, who initially displayed limited interaction with caregivers, learned to engage in social responses, display social smiles, and use gestures in free-play situations. Participant 1 showed significant improvement in produced speech during the early stages of the intervention. The ESI score, expressed in logit, indicated meaningful improvements. Participants 1, 2, and 3 demonstrated logit score increases of 0.5, 0.2, and 0.9, respectively. In addition, all participants demonstrated improvements in M-CHAT-R/F results, particularly in areas related to joint attention, eye contact, and social smiles. Participant 3 even achieved a post-assessment score of 0, signifying that the family-centered early intervention effectively eliminated the risk of ASD. However, due to the study's limitations of a small, non-randomly selected sample consisting exclusively of male participants, these findings lack the statistical power to be generalized to the larger population.

Frazier et al.'s (2021) longitudinal study reveals that EIBI contributes to substantial improvements in language scores and Park et al. (2020)'s intervention found significant enhancements in social interaction skills among toddlers with early signs of ASD. The positive results of both studies underscore the pivotal role of such early interventions and reinforce the hypothesis that providing animal-assisted therapy during toddlerhood will further optimize communication and social interaction skills for individuals with ASD.

Animal-Assisted Therapy in Children and Adolescents: Evaluating Effects and Outcomes

Animal-assisted therapy has gained attention for its potential to enhance the well-being and development of individuals with ASD. It involves the incorporation of specially trained animals into therapeutic interventions to promote physical, emotional, and cognitive well-being, which in turn may help with facilitating engagement, communication, and social interactions among individuals with ASD. The articles in this category will explore the effects and outcomes of this therapy, specifically in children and adolescents.

London et al. (2020) conducted a phenomenological qualitative study that used in-depth semi-structured interviews to analyze the perspectives of parents with children diagnosed with ASD participating in therapy sessions integrating trained dogs. Additionally, the research sought to examine the therapeutic potential and evaluate the impact of this intervention on ASD symptoms. The participant pool comprised 17 parents, all of whom had children who engaged in occupational therapy sessions that lasted an hour and were offered once a week for five weeks. The children involved in the study had been diagnosed with ASD for a minimum of one year, and their ages spanned from four to 19 years old (London et al., 2020).

The study revealed noteworthy improvements resulting from the incorporation of dogs into occupational therapy. The majority of parents (64.7%, $n = 11$) emphasized that the presence of the dog facilitated their child's communication with the therapist. Furthermore, it was found that a significant portion of parents (76.5%, $n = 13$) observed that the dog served as a motivating factor for their child to accomplish specific tasks during each session. They noted that the presence of the dog encouraged sustained engagement in therapy, with many reporting heightened levels of motivation compared to alternative therapeutic modalities. Additionally, all parents ($n = 17$) conveyed an increase in their child's level of engagement, which was often difficult to achieve in other contexts. When prompted to reflect on the dog's role in their child's

engagement, many identified the dog as the primary contributing factor. A majority of parents (70.6%, $n = 12$) also expressed that their child faced challenges related to behavioral and emotional regulation, which manifested in episodes of violence, avoidance of social and sensory experiences, and a tendency towards isolation. However, following dog-assisted therapy, the study found that parents noted substantial enhancements in their children's self-regulation, observing a marked increase in their calmness and relaxation. The process of teaching the dog tricks not only provided a structured path for verbal communication mastery but was also recognized for its ability to stimulate interactions within the community. Most parents (82.3%, $n = 14$) attested to the dog's role in expanding their child's participation in the community. Some even highlighted that the dog not only mitigated maladaptive behaviors in their child, but also raised awareness among the public about their child's specific needs and challenges. Nonetheless, the study presented several limitations. Due to investigating the perspectives about a specific experience, the results may not be generalizable. Furthermore, the voluntary selection of participants may introduce potential volunteer bias, as they may have had pre-existing positive attitudes towards such interventions that could influence their opinions regarding the intervention's outcomes (London et al., 2020).

Ávila et al. (2020) conducted a within-subject quasi-experimental longitudinal study to investigate the efficacy of an early intervention program utilizing therapy dogs. These researchers wanted to evaluate the dogs' influence on the communication and social interaction skills of children diagnosed with ASD. The sample comprised 19 children aged between 30 months and six years, all of whom had received a confirmed or probable ASD diagnosis and were undergoing therapeutic care on an outpatient basis between April and November of 2016 (Ávila et al., 2020).

The study revealed statistically significant improvements, with participant outcomes evaluated using the Assessment and Interaction Skills (ACIS) and the Animal-assisted Therapy Flow Sheet. After the ACIS evaluation, Ávila et al. (2020) found that the median total score increased by seven points, rising from 24 to 31 points ($p < .001$), indicating enhanced communication and interaction skills. The effect size for this improvement was large ($ES (r) = 0.62$). When looking at the individual items of the ACIS, 12 out of 20 showed significant improvement, with the effect size for these improvements ranging from moderate ($ES (r) = 0.43$) to substantial ($ES (r) = 0.88$). As for the Animal-assisted Therapy Flow Sheet evaluation, the researchers recorded an increase in the frequency of making eye contact, verbal communication, and physical contact with the therapy dog. The study, however, has a few limitations. The absence of a control group makes it difficult to determine the specific impact of other treatments on the observed results. The participants were selected through a non-probability convenience sampling method which may introduce selection bias, and may not be representative of the larger population from which it was drawn. The sample primarily consisted of male children with ASD in a single therapeutic unit in northwestern Spain which also limits the generalizability of the findings to the broader population.

The findings of the studies by London et. al (2020) and Ávila et al. (2020) provide compelling evidence for the effectiveness of animal-assisted therapy in improving the lives of children with ASD. Collectively, the findings from these studies form a comprehensive framework to bridge the identified research gap, specifically addressing the limited studies on AAT as an early intervention for toddlers with ASD. Given the promising results and the need for more rigorous research in this field, further study is warranted to determine whether adding

AAT to the therapeutic regimen being provided to toddlers diagnosed with ASD confers additional benefits.

Research Proposal

Theoretical Framework

The theoretical framework used to support this research proposal is Virginia Henderson's Need Theory. Henderson's theory asserts that nursing is fundamentally about assisting individuals in meeting their basic human needs (Petiprin, 2020). Her work encapsulates a holistic approach to patient care, emphasizing the interplay between physical, psychological, and social well-being. Her theory outlines fourteen components that form the basis of nursing activities, all of which are rooted in essential human needs. These components include adequate breathing, nutrition, and hydration, waste elimination, maintaining proper posture and movement, ensuring sufficient sleep and rest, effective communication, spiritual expression, and continuous learning and development (Petiprin, 2020). Central to Henderson's theory is the belief that nurses play a pivotal role in supporting patients until they are capable of fulfilling their own needs (Petiprin, 2020). This principle highlights the transitional nature of nursing care, where the ultimate goal is to empower individuals toward self-sufficiency.

Virginia Henderson's Need Theory serves as a valuable theoretical framework for exploring the impacts of AAT on the social, communication, and behavioral skills of toddlers diagnosed with ASD. One key aspect of Henderson's theory is the emphasis on promoting independence (Petiprin, 2020). She believed that nurses should aim to help patients regain or enhance their ability to care for themselves, which aligns closely with the goals of AAT. In the context of toddlers with ASD, the goal of therapy often involves enhancing their social, communication, and behavioral skills to promote a higher level of independence and functioning

in their community. Furthermore, the dedication of nurses to patients also resonates with the intensive and dedicated approach required in therapies for children with ASD. These toddlers may require consistent and specialized care and attention to address their unique needs effectively. In the context of AAT, therapists along with trained professionals offer a consistent and supportive environment for children with ASD to improve their skills.

Henderson's nursing philosophy and the principles of AAT share a common thread of committed care and support for individuals in need. Both paradigms acknowledge the importance of providing a consistent and dedicated environment for individuals, whether through nursing care or therapeutic interventions like AAT, to promote their development, independence, and overall well-being. This alignment strengthens the theoretical foundation for exploring the effects of AAT on toddlers with ASD, emphasizing the potential benefits of this therapy in facilitating their social, communication, and behavioral skills.

Research Design

Method

The study will use a quasi-experimental design to evaluate the effectiveness of combining AAT with ABA for toddlers with ASD in community settings. All study participants will have been diagnosed with ASD and started to receive ABA therapy by the time of enrollment. The control group will continue to receive ABA therapy. The experimental group will continue to receive ABA therapy and also receive weekly AAT sessions lasting between 30 to 60 minutes. These sessions will be conducted by a licensed therapist utilizing trained and certified therapy dogs. The therapist will curate tailored activities and exercises to encourage interaction between the toddler and the therapy animal, aligning with their therapeutic objectives. Additionally, the

therapist will guide the interaction and closely monitor the individual's responses and behaviors. The intervention group will receive 12 sessions once per week over 12 consecutive weeks.

Participants' parents and guardians will complete an initial demographic questionnaire to gather information such as age, gender, ethnicity, age of diagnosis, pet ownership, and other pertinent details. The employment of pre-assessment and post-assessment tests will also take place to examine any notable changes in the participants' social, communication, and behavioral skills. The following validated scales will be used for the pre-intervention and post-intervention assessment tools: Communication and Symbolic Behavior Scales (CSBS), Vineland Adaptive Behavior Scales, Third Edition (VABS-3), and the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2).

The CSBS is used to evaluate communication and symbolic behavior in infants and young children. The CSBS has three key components: The Caregiver Questionnaire, Behavior Sampling, and Communication Sampling. The Caregiver Questionnaire uses a 7-point Likert scale for scoring, with each item rated from 1 (least advanced) to 7 (most advanced). The Behavior Sampling and Communication Sampling component collects quantitative data through systematic observation and measurement of specific behaviors, without using a Likert scale. Higher scores on the Caregiver Questionnaire indicate more advanced communication skills, while the quantitative data obtained from the Behavior and Communication Sampling can be analyzed to track progress, evaluate interventions, and provide insights into a child's communication development.

The VABS-3 is a comprehensive tool used to assess adaptive behavior in four domains: Communication, Daily Living Skills, Socialization, and Motor Skills. Within each domain, items are scored on a 4-point scale ranging from 0 (Never) to 3 (Always). The VABS-3 provides

composite scores for each domain and an overall Adaptive Behavior Composite (ABC) score, which gives an overall measure of adaptive functioning. Higher scores indicate greater proficiency in adaptive behavior, while lower scores suggest areas where the individual may need additional support.

Although the ADOS-2 is used to assist in the diagnosis of ASD, it can be used as both a pre-test/post-test tool even if the toddler has a prior diagnosis of ASD. It provides an evaluation of social communication and interaction skills associated with autism. The ADOS-2 consists of different modules, each tailored to the individual's age and level of language development. Within each module are items scoring from 0 (None or Typical) to 3 (Marked), with higher scores indicating more severe or pronounced symptoms.

Each of the aforementioned assessment tools will be administered to both groups before and after the 12-week intervention period. The size of the mean difference in scores between the two study groups will reveal to what extent adding AAT to standard ABA therapy leads to improved outcomes compared to ABA therapy alone.

Sample

A power analysis was conducted to determine the sample size for the study. The analysis considered a two-tailed test with a desired effect size (d) of 1, an error probability (α) of 0.05, and a desired power of 0.8. Using these parameters, the power analysis indicated that a sample size of 34 would be required to achieve the desired level of statistical power. The study will comprise 17 participants in the control group and 17 in the experimental group. For the recruitment of participants, this study will work with the Golden Gate Regional Center (GGRC), a prominent organization that provides support and services for individuals with developmental disabilities in the San Francisco Bay Area. GGRC will assist with identifying sites where

toddlers with ASD are actively engaged in early intervention programs, which may encompass ABA therapy. The aim is to identify two sites, one for the control group and another for the experimental group to conduct the AAT intervention. Specific inclusion criteria are as follows: age range of 12 to 36 months, have a confirmed diagnosis of ASD by a licensed healthcare professional, and enrolled in an ABA program. Exclusion criteria will be children outside the specified age range, those without a confirmed ASD diagnosis, individuals with allergies to animals or severe dog phobias, children uncomfortable or unwilling to interact with therapy dogs, and those with a history of aggressive behavior towards animals.

Data Collection

To quantitatively assess the efficacy of these interventions, a series of pre-intervention and post-intervention tests will be administered to the control and experimental groups. The independent variable in this study is the weekly AAT sessions. The dependent variables in this study are changes in social, communication, and behavioral skills as assessed by the CSBS, VABS-3, and ADOS-2. It is hypothesized there will be a positive correlation between exposure to 12 weekly AAT sessions and higher post-intervention test scores in the experimental group than those calculated at the same time for the control group. the experimental group and dependent variables.

The analysis of this data will be conducted in several stages. Within each group (experimental and control), pre-intervention and post-intervention scores on the CSBS, VABS-3, and ADOS-2 will be examined separately. Descriptive statistics will be used to provide an overview of the participants' performance in social, behavioral, and communication skills. Within-group comparisons will be conducted to evaluate changes over time. Paired-sample t-tests will be employed to assess if there are statistically significant differences between the

pre-intervention and post-intervention scores for each group. If the p-value is < 0.05 , the results are considered statistically significant. Following within-group comparisons, between-group comparisons will be performed to determine if there are significant differences in outcomes between experimental and control groups. Independent-sample t-tests will be used to evaluate whether changes in social, communication, and behavioral skills differ significantly between the two groups. Similar to within-group comparisons, if the p-value is < 0.05 , it suggests that there is a significant difference in outcomes between the experimental and control groups and rejects the null hypothesis. Following the intervention, the data from the demographic questionnaire will also be utilized to evaluate whether any of these factors contribute to the intervention's outcome.

Limitations

The duration of the intervention, set at 12 weeks, could be considered a limitation of the study. While the 12-week intervention offers valuable insights into short-term effects, there is a possibility that the study may not fully capture the potential longer-term impacts of the interventions, which is relevant for assessing sustained progress over time, the duration of effect, or after 3 months of AAT exposure. Additionally, the reliance on caregiver-reported measures, especially in the CSBS and VABS-3 assessments, may introduce subjectivity bias. Caregiver perceptions and observations may be influenced by unknown external factors, including their expectations and experiences which could be captured through semi-structured interviews in a future qualitative study.

Ethical Considerations

Approval from Dominican University of California's Institutional Review Board (IRB) will be sought before the commencement of data collection. The well-being and safety of the participating toddlers will be of utmost importance throughout the research process. Informed

consent will be obtained from the parents and/or caregivers of the children, outlining the nature of the study, the interventions involved, and any potential risks or benefits. It will be made clear that participation is voluntary, and participants can withdraw at any point. The study will also adhere to the principles of confidentiality and privacy. All data collected will be anonymized to protect the identities of the participants. The interventions will be conducted by licensed therapists who are trained and certified with both toddlers and therapy animals. The therapists will closely monitor the interactions and behaviors of the children to ensure their well-being and comfort throughout the sessions. If at any point a child shows signs of distress or discomfort, the intervention will be immediately adjusted or discontinued. The study will be conducted in compliance with relevant ethical guidelines and regulations while prioritizing the ethical treatment and welfare of all participants involved.

Conclusion

The primary goal of this research study is to investigate the effectiveness of AAT as an early intervention for toddlers diagnosed with ASD, particularly when combined with ABA therapy. ASD poses substantial challenges in social interaction and communication, significantly influencing individuals' ability to form relationships and navigate social contexts. The study addresses the critical need for early diagnosis and intervention. Delayed access to specialized therapies may impede a child's development and increase difficulties in transitioning to independent living, which in turn, impacts education, employment, and societal integration. The research proposal builds upon existing evidence revealing the positive impact of AAT on the life skills of individuals with ASD, emphasizing the importance of early intervention during toddlerhood as it aligns with the critical developmental period for language acquisition and behavioral pattern formation. A future study regarding the long-term effects of AAT as an early

intervention is also recognized. Such an extended investigation would contribute important information regarding sustained progress and potential benefits that extend beyond the initial intervention period. By filling the current gap in research on the effects of AAT for toddlers with ASD, the study aspires to contribute valuable insights that can promote more comprehensive and effective early intervention strategies, potentially improving the quality of life and independence for individuals with ASD as they grow into adulthood.

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APPENDIX A

LITERATURE REVIEW TABLE

Title of your paper: **Exploring the Effects of Animal-Assisted Therapy on the Social, Communication, and Behavioral Skills among Community-Dwelling Toddlers Diagnosed with Autism Spectrum Disorder**

Your name: Abigail Tolentino

Date: November 22, 2023

Authors/Citation	Purpose	N	Sample	Design	Major Finding(s)	Strengths	Limitations
Ávila-Álvarez, A., Alonso-Bidegain, M., De-Rosende-Celeiro, I., Vizcaino-Cela, M., Larrañeta-Alcalde, L., & Torres-Tobío, G. (2020). Improving social participation of children with autism spectrum disorder: Pilot testing of an early animal-assisted intervention in Spain. <i>Health & social care in the community</i> , 28(4), 1220–1229. https://doi.org/10.1111/hsc.12955	To explore the viability of an early intervention program utilizing therapy dogs and to assess their influence on the communication and social interaction skills of children diagnosed with ASD.	19	Children with confirmed or probable ASD receiving therapeutic care at the Child Rehabilitation and Early Care Unit of the Teresa Herrera Hospital, Spain. Aged between 30 months and 6 years.	Within-subject quasi-experimental longitudinal design.	Statistically significant improvements were observed in the ACIS score between the initial and concluding evaluations. The median score rose by seven points, going from 24 to 31 points. This indicates an enhancement in communication and interaction skills. The greatest improvements were observed in skills utilizing the body in social interactions.	The sample focused on a younger population of children. This population was lacking in research. Included a greater number of participants than previous studies done on the matter. The results of the study show that animal-assisted therapy positively affects a child's communication and social skills.	The study lacked a control group. The severity of the diagnosis was not specified. The study can not be generalized. The sample was predominantly male, took place in a small geographical area, and participants were chosen by a non-random technique.
Frazier, T. W., Klingemier, E. W., Anderson, C. J., Gengoux, G. W., Youngstrom, E. A., & Hardan, A. Y. (2021). A Longitudinal Study of Language	To examine the course of language development and treatment outcomes for children diagnosed with ASD who received an early intensive	131	Children diagnosed with ASD between the ages of one and six enrolled in an EIBI program at a medical center.	Longitudinal study.	The data revealed that starting the EIBI at a younger age was a significant predictor of a more favorable language development path.	Addresses methodological challenges in EIBI outcome research such as employing a larger sample, utilizing longitudinal data collection, detailing	The sample was predominantly male. Intervention may have been too long. Results show that the strongest improvements occurred in the first 18 months of

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Trajectories and Treatment Outcomes of Early Intensive Behavioral Intervention for Autism. <i>Journal of Autism & Developmental Disorders</i> , 51(12), 4534–4550. https://doi-org.domini-can.idm.oclc.org/10.1007/s10803-021-04900-5	behavioral intervention (EIBI).				Half the children undergoing EIBI experienced substantial increases in their overall language abilities after twelve months of intervention (> 12 SS points). Three-quarters of the children showed significant enhancements in both receptive and expressive vocabulary skills after one year of EIBI (> 10 SS points). Early start of EIBI correlated with positive educational placement outcomes.	procedures, and focusing on meaningful post-treatment outcomes. The incorporation of clinically-diagnosed participants is beneficial, as previous research faced criticism for enlisting samples with relatively elevated cognitive abilities and functional capabilities, which inadequately mirrors real-world clinical cases of EIBI patients.	EIBI intervention with little improvement afterward. Study lacked a comparison group. Study used a clinical convenience sample.
London, M. D., Mackenzie, L., Lovarini, M., Dickson, C., & Alvarez-Campos, A. (2020). Animal Assisted Therapy for Children and Adolescents with	To analyze the perspectives of parents with children diagnosed with ASD participating in therapy sessions incorporating trained dogs. Additionally, the research aims to explore the therapeutic potential	17	Parents of children who had taken part in occupational therapy sessions that incorporated dogs. Children held a diagnosis of ASD for over a year.	Phenomenological qualitative approach that used in-depth semi-structured interviews.	The majority of parents found an improvement in areas affected by ASD such as communication (n = 11, 64.7%), motivation (n = 13, 76.5%), engagement and interaction (n = 17, 100%), emotional regulation (n =	This study is pioneering in its examination of parental viewpoints on animal-assisted therapy for children diagnosed with ASD. Sample was diverse in age.	The sample consisted of volunteers and was not randomized, therefore the study may be biased. The parents were predominantly female. Small sample size.

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Autism Spectrum Disorder: Parent perspectives. <i>Journal of Autism & Developmental Disorders</i> , 50(12), 4492–4503. https://doi.org/10.1007/s10803-020-04512-5	and assess the impact of this intervention on ASD symptoms.		Parents of children aged between four and 19.		12, 70.6%), and community participation (n = 14, 82.3%).	The design of the study provided in-depth comparisons of how the child was before and after the intervention. Employing qualitative research methods provides rich and detailed information and can offer deeper insights compared to quantitative data alone.	
Martínez-González, A. E., Cervin, M., & Piqueras, J. A. (2022). Relationships Between Emotion Regulation, Social Communication and Repetitive Behaviors in Autism Spectrum Disorder. <i>Journal of Autism & Developmental Disorders</i> , 52(10), 4519–4527. https://doi.org/10.1007/s10803-021-05340-x	To investigate the potential correlation between emotional regulation, social communication, and occurrences of self-injury and stereotyped behaviors.	239	Participants were chosen from 18 different educational facilities in Spain. All participants had a definitive diagnosis of ASD. Participants diagnosed with ID were included when ASD was the primary diagnosis.	Structural equation modeling.	Challenges in emotion regulation are specifically linked to self-injurious repetitive behaviors in individuals with ASD. Consequently, individuals with ASD who demonstrate improved emotional regulation tend to engage in less of these behaviors. Social communication demonstrated an association with stereotypic repetitive behaviors, implying that individuals with ASD who	Very diverse sample. Consisted of participants from different regions of Spain, belonging to differently sized urban areas and educational centers. Large sample size. The study highlights the importance of emotional self-regulation for engaging in adaptive behaviors. The measurement models used in this study	The assessments were conducted by educational and behavioral professionals who worked directly with the participants. The validity of their observations may or may not be reliable. The study pooled ASD groups with and without ID together. It was not specified whether there were variations in the severity of repetitive behaviors in relation to ID being a comorbidity.

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					<p>are more proficient in social communication tend to exhibit fewer stereotypic behaviors.</p> <p>It was found that individuals with ASD who possess better communication abilities tend to exhibit greater emotional stability.</p>	(RBS-R, SCQ-B, and Leiter-R) were tested and proved excellent for internal consistency.	
<p>Park, H. I., Park, H. Y., Yoo, E., & Han, A. (2020). Impact of Family-Centered Early Intervention in Infants with Autism Spectrum Disorder: A Single-Subject Design. <i>Occupational Therapy International</i>, 1-7. https://doi-org.domini-can.idm.oclc.org/10.1155/2020/1427169</p>	To explore the impact of family-centered early intervention on the social interaction skills in infants exhibiting signs and symptoms of ASD.	3	Participants were infants aged between 24 and 36 months suspected of ASD.	Single-subject research design.	The intervention led to improvements in social response, smiles, and gestures. In addition, an improvement was also seen in verbal communication and body language.	<p>The study showed a significant improvement in social interaction skills even after the intervention was complete.</p> <p>The intervention was incorporated in a home setting, making it a more familiar and comfortable environment for the participants.</p> <p>Highlights the importance of early interventions when treating symptoms of ASD in infants.</p>	<p>Small sample size.</p> <p>Sample not randomly selected.</p> <p>All participants were male.</p>
<p>Wei, X., Yu, J. W., Wagner, M., Hudson, L., Roux, A. M.,</p>	To examine the job search process, job tenure, and instances of	660	Sample consisted of young adults ranging from 26 to 28 who	Longitudinal study.	Young adults diagnosed with ASD encountered significant challenges in	Sample was chosen by random selection.	The identification of a student having ASD was based on whether or not

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Shattuck, P., & Blackorby, J. (2018). Job searching, job duration and job loss among young adults with Autism Spectrum Disorder. <i>Journal of Vocational Rehabilitation</i> , 48(1), 1–10. https://doi.org/10.3233/JVR-170922	job loss in young adults with ASD. In addition, this research aims to contrast these experiences with those of young adults with similar impairments and to identify any demographic and functional factors that may influence their employment experience.		received special education services in the autism spectrum category during high school.		securing stable, long-term employment. Young adults with ASD from low-income households are less likely to be engaged in paid employment.	Large sample size. The study was a longitudinal data collection. The study expands our knowledge on the challenges young adults with ASD face with employment.	they were receiving special education services under the autism category. Therefore, the study excluded students with ASD who were not qualified for such services.