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**Talking with Horses: Equine Assisted Activities to Promote Social Engagement in
Individuals with Autism Spectrum Disorder**

UNIVERSITY OF SAN DIEGO
Hahn School of Nursing and
Health Science Beyster Institute
of Nursing

DOCTOR OF NURSING PRACTICE PORTFOLIO

by

Amy C. Ezhaya, MSN, RN, PMH-BC

A Doctoral of Nursing Practice Portfolio presented to the
FACULTY OF THE HAHN SCHOOL OF NURSING AND HEALTH
SCIENCE UNIVERSITY OF SAN DIEGO

In partial
fulfillment of the
requirements for
the degree

DOCTOR OF NURSING

PRACTICE

May 2023

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Acknowledgments

I would like to thank REINS Therapeutic Riding Center and specifically, Kaitlyn Siewert, thank you for allowing me to conduct my project at your site and believing in my ambitions to help create partnerships among local nonprofits and primary care providers. Your responsiveness, optimism, and guidance helped to bring this project to life. With your help, I hope this project continues to improve the quality of care provided to our children with Autism.

Finally, I wish to thank my husband, for supporting me every step of the way throughout this journey. Your belief in me even when I did not believe in myself made all the difference. Without you, the success of completing this lifelong dream of becoming a PMHNP and my terminal degree would feel empty. I know with you by my side I can conquer any obstacle. Thank you.

**Talking with Horses: Equine Assisted Activities to Promote Social Engagement in
Individuals with Autism Spectrum Disorder**

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Amy Ezhaya is now at the Veterans Administration, Togus Maine Psychiatric Mental Health Department.

There are no conflicts of interest to disclose.

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Abstract

Purpose of Project: The purpose of this evidenced-based project is to gather data on how therapeutic horseback riding (THR) facilitates social engagement in individuals with autism spectrum disorder (ASD). The project aims to provide alternative treatment options and disseminate information to providers on the importance of community partnerships.

Background: In 2020, it was estimated that 1 in 54 children had ASD, which is a 170% increase since 2000. Often, those diagnosed with ASD also experience co-occurring mental health diagnoses placing a large burden of care on our healthcare system. THR is a growing alternative treatment option and has been found to have significant benefits for individuals living with ASD.

Methods: This project was designed to examine the effects of a 16-week THR program on communication skills in individuals with ASD. Individuals living with ASD participated in the project at a local THR center. The Social Responsiveness Scale, Second Edition (SRS-2) was conducted to capture the baseline social skills score, and a postintervention survey was conducted to capture any changes from the baseline.

Evaluation/Results: The SRS-2 scores, which included five subscales (communication, awareness, cognition, motivation, and repetitive behaviors) were used to evaluate the participants. The results showed a significant difference in the pre and postintervention scores with marked improvement in social skills after the 16-week intervention.

Implications for Practice: Due to the significant results, THR should be carefully considered as an alternative treatment option for people with ASD, and community partnerships should be sought out by future providers.

Keywords: therapeutic horseback riding, autism spectrum disorder, community partnerships, social skills

Introduction

Autism spectrum disorder is a neurodevelopmental condition that includes multiple impairments in social interactions, limited communication abilities, and sometimes aggressive or repetitive behaviors (American Psychiatric Association, 2013). The majority of those diagnosed with autism also experience cooccurring diagnoses of ADHD, oppositional defiant disorder, and anxiety (Sissons et al., 2022). Current treatment options are heavily focused on the use of medications to treat these cooccurring symptoms. However, many researchers in the autistic community want to shift the current practices from medication management to alternative treatment modalities that are reflective of the neurodiverse nature of ASD (Srinivasan et al., 2018). This calls for a range of psychosocial interventions that focus on improving the quality of life and overall well-being in people with ASD, as opposed to symptom management alone (Sissons et al., 2022).

As mentioned previously, social impairments are a core characteristic of ASD, such deficits can be debilitating, affecting multiple areas of psychosocial development (Zhao, 2021). Such impairments often lead to social isolation and withdrawal behaviors, which have a direct impact on increasing rates of anxiety and depression in this population (Zhao, 2021). Therefore, it is important to consider alternatives to the use of medications to treat ASD. One area of increasing interest is in animal-assisted interventions (AAI; Stergiou et al., 2020). This type of alternative goal-directed intervention connects people with ASD and animals, such as horses and dogs (Stergiou et al., 2020). Furthermore, research shows that therapeutic horseback riding (THR) has significant benefits to the cognitive, behavioral, and social components of ASD, finding marked improvement in communication skills (Zhao, 2021). In addition, THR has been proven to increase functional ability, psychological well-being, and self-efficacy (Sissons et al.,

2022). THR should be carefully considered as an alternative therapy to medication use in people with ASD.

Background and Evidence for Problem

In the United States in 2020, it was estimated that 1 in 54 children had ASD, which is a 170% increase since 2000 when the rate was 1 in 150 (Baxter et al., 2018). To complicate matters ASD has no known etiology and the number of affected individuals is increasing at a steady rate each year (Trzmiel et al., 2019). Additionally, the multifaceted nature of ASD leads to higher than normal incidence rates of stress, anxiety, and depression among those with ASD versus other disorders (Gabriels, 2018). The complicated behavioral components of living with ASD can make it a lifelong debilitating disorder (Peters & Wood, 2017). Treatment should vary to fit each individual's needs, and methods should be personalized to ensure success (Gabriels, 2018).

Currently, medication management is used to treat the symptoms associated with ASD and is regarded as the most effective treatment, being considered the standard of care throughout the world (Peters & Wood, 2017). Although widely used and deemed effective, the rising rates of ASD contribute to an already overburdened mental health care system. This influx is creating a public health problem that calls for alternative interventions that should include community partnerships. Rather than treatment with medications alone, a multimodal approach can provide the best outcome for people with ASD (Sissons et al., 2022). Parents of children and adolescents with ASD often seek alternative methods of treatment such as THR (Trzmiel et al., 2019). Additionally, studies suggest that people with ASD that participate in THR at least 1 day every week experience improvements in social interaction, stress reduction, and improved social and motor skills (Peters & Wood, 2017). Due to the rising incident rates and an increased burden on

the mental health care system, if ASD goes untreated, it is likely to lead to other comorbidities such as depression, anxiety, and decreased overall quality of life (Gabriels, 2018).

Problem Statement

In individuals diagnosed with autism (P), does participation in weekly therapeutic horseback riding lessons (I), compared to no participation in a therapeutic riding program (C), affect their social and communicative skills (O) over the course of 6 months August 2022 to December 2022 (T).

Search Methods

Given the interest in utilizing alternative treatment methods to improve outcomes for those living with ASD, the primary intervention concepts studied in this clinical question are therapeutic horseback riding and social skills. A MeSH search was conducted via PubMed in which the following terms were included and were limited to the last 5 years with a Boolean connector: (“autism spectrum disorder”[Mesh]) AND “therapeutic horseback riding”[Mesh]. Finding these terms in PubMed also made it easier to search in CINAHL with the following subject headings and Boolean terms in a 5-year limitation: autism (MH Exact Subject Heading) AND therapeutic horseback riding (MH Exact Subject Heading).

A comprehensive search was performed for eight papers across databases PubMed, CINAHL, and Up to Date, from 2018–2023. Themes were extracted from randomized control studies, systematic reviews, and meta-analyses. Inclusion criteria of diagnosis, intervention, and study design were used while The Johns Hopkins Evidence-Based Practice Model determined the quality of evidence (high, medium) at levels I, II, and III, excluding levels IV through VII.

Several studies have indicated multiple varieties of alternative interventions for the treatment of ASD. Additionally, these studies identify social communication as an important outcome to capture. The major studies have been comprised into a literature summary table in Table 1.

Table 1

Hierarchy Levels and Evidence Summary Table

Sources of Evidence	Rehn, A. K., (2023)	Zhao, (2021)	Stergiou, A., (2020).	Gabriels, R. L., (2018).	Peters, B. C., (2017)	Srinivasan, (2018).	Sissons, J.H., (2022).	Trzmiel, T., (2019).
Level I: Systematic Review or Meta-Analysis of RCTs; Practice Guidelines	X		X	X	X	X	X	X
Level II: Single randomized controlled trial (RCT)		X						

Note. Search Terms/# sources read: “autism spectrum disorder (2 articles),” “autism and therapeutic horseback riding (4 articles),” “autism and communication (2 articles)”

Synthesis

A theme identified by the authors was the benefit of therapeutic horseback riding interventions on social skills in people with ASD. For example, Zhao et al. (2021) found that a 16-week therapeutic horseback riding program was more effective in improving social interaction skills and communication skills in people with ASD; participants had positive influences on overall social skills and communication based on SRS-2 scores than those in the control group. Additionally, Stergiou et al. (2020) found that parents with autistic children

desired nonpharmacological interventions as treatment options and authors Srinivasan et al. (2023) concluded when therapeutic horseback riding is combined with hippotherapy equine-based interventions are even more effective.

A randomized control trial (Gabriels et al., 2018) on participants diagnosed with an autism spectrum disorder who enrolled in a therapeutic horseback riding program found that 6-months after the intervention those in the THR group had sustained significant improvements made in social and communication behaviors, along with an increase in the number of words and different words spoken.

Some limitations of the studies reviewed included a need for larger sample size studies and the need for more homogenous samples of individuals because individuals diagnosed with ASD can have large variations in age, gender, and functional skills (Srinivasan, 2018). A meta-analysis of 15 studies conducted by Trzmiel et al. (2019) found improvement was reported in the following domains: socialization, engagement, maladaptive behaviors, and problem-solving. However, the authors ultimately decided that it would be impossible to draw universal conclusions on effectiveness due to the multitude of variations among therapeutic riding protocols and measurement instruments used across the various studies (Trzmiel et al., 2019).

Evidence-Based Intervention

Supported by the literature, the evidence-based intervention will be the utilization of therapeutic horseback riding to address social communication deficits among individuals diagnosed with ASD. The Social Responsiveness Scale, Second Edition (SRS-2) was selected to measure the desired outcome. The SRS-2 is a respondent-based measure of the severity of social deficits and symptoms related to autism spectrum disorder (Gabriels et al., 2018). The SRS-2 scores are standardized by comparing the characteristics of a large sample population of people

diagnosed with ASD, grouped by age and gender (Gabriels et al., 2018). The test asks parents and caregivers to rate the presence of symptoms they have noticed over time and in various environments. The SRS-2 was chosen for the high internal consistency and retest temporal stability in males and females with ASD (Gabriels et al., 2018).

Establish Benchmark

Data will be benchmarked against preintervention data (August 2022) and postintervention data (December 2022). Internal data of the organization will be used to identify participants who meet the inclusion criteria. The inclusion criteria of a DSM-V diagnosis of ASD and the number of days enrolled in the program will be used to try and capture as many participants as possible. The postintervention data should conclude with a decreasing trend in SRS-2 scores compared to baseline data. Currently, the organization does not use a method to track improvements among its participants and is unable to capture the desired outcomes that are supported by external evidence. After data collection in December 2022, ideally, there will be enough evidence to support a change in practice for the treatment planning of those diagnosed with ASD due to the decrease in SRS-2 scores, and an increase in the quality of life for those who participate in THR. Community organizations will have captured data that will encourage providers to partner with them in the future, making it easier for those diagnosed with ASD to access alternative treatment options.

PICO Question

With a focus on creating community partnerships among primary care providers and local therapeutic riding facilities, the following intervention-based PICOT question has been formulated: In individuals diagnosed with autism (P), does participation in weekly therapeutic horseback riding lessons (I), compared to no participation in a therapeutic riding program (C),

affect their social and communicative skills (O) over the course of 6 months August 2022 to December 2022 (T).

Evidence-Based Practice Model

The model selected for guiding this practice change is The Johns Hopkins Nursing Evidence-Based Practice Model (JHNEBP). This model was chosen due to its user-friendly tools and straightforward PET approach: practice question, evidence, and translation (Dang & Dearholt, 2018). The JHNEBP model ensures that the research findings are high quality and best practice by using the evidence appraisal tools for non-research and research. In addition, the model is reciprocal in its approach where practice and learning build upon each other, always working toward advancing the nursing practice (Dang & Dearholt, 2018). Due to the model's dedication to the advancement of evidence-based practice (EBP) and to the field of nursing, this model encompasses the outcomes this project is trying to achieve in the field of psychiatric mental health nursing (Gawlinki & Rutledge, 2008).

The strengths of the JHNEBP model include the fact that it was developed in collaboration with the Johns Hopkins Hospital and the Johns Hopkins University School of Nursing (Dang & Dearholt, 2018). This interdisciplinary and collaborative approach lends to the model's ease of use and real-world applicability (Dang & Dearholt, 2018). Additionally, it ensured that the model addressed the following domains of professional nursing: nursing practice, education, and research (Dang & Dearholt, 2018). The most helpful feature of the model is the straightforward “PET” process, an acronym that stands for practice question, evidence, and translation (Melnyk, 2019). The simplicity of the process allows for ease of implementation and the incorporation of the latest and best evidence available (Melnyk, 2019).

The tools are simple and easy to use, and the tool for appraising the literature includes research and non-research evidence appraisal tools, which is essential in the field of psychiatric nursing.

Project Implementation and Process Plan

The following implementation plan and timeline are designed to follow the JHNEBP model.

Implementation Plan Outline

- a) Implementation team
 - a. PMHNP Student
 - b. DNP Faculty Advisor
 - c. Program Director at THR facility
- b) Method for identifying key stakeholders, champions, and barriers
 - a. Key stakeholders
 - i) Psychiatric Mental Health Nurse Practitioners
 - ii) Primary Care Providers
 - iii) Program Director at THR facilities
 - iv) Patients with ASD
 - v) Family Members
 - b. Champions
 - i) Psychiatric Mental Health Nurse Practitioners and Program Directors at THR facilities
 - c. Barriers
 - i) Patient Access
 - ii) Staffing shortages
 - iii) Buy-in from Primary and Psychiatric Mental Health Care Providers
 - iv) Identifying Community Partners

c) Actual evidence-based practice plan change protocol

- a. THR program director to screen for individuals with an ASD diagnosis.
- b. PMHNP student to work with THR program director at a local non-profit to identify and select those participants who would meet inclusion criteria for intervention
- c. If an individual meets inclusions criteria, then assess willingness to incorporate THR into a weekly routine.
- d. Enroll interested individuals with ASD into the study where they will consent to participate in THR for at least 30 minutes per week, for 16 weeks.
- e. Administer the pre-intervention survey to the participant's caregiver prior to the start of the intervention.
- f. Collect post-intervention survey after the participant has completed the 16-week program.
- g. Promote alternative therapies (THR) as treatment interventions to help address social communication deficits in individuals with ASD in outpatient clinics.

d) Evaluation plan

- a. Desired Outcomes: Individuals with ASD participated in THR every week for at least 30 minutes at a time over the course of 16 weeks and had a decrease in SRS-2 scores and improved social communication skills.
- b. Individuals with ASD had increased overall well-being and quality of life when they participated in a THR program that lasted up to 1 hour per week.
- c. Non-pharmacological interventions for individuals with ASD are valid strategies for symptom management because THR for up to 1 hour (e.g., a 15-minute warm-up and 45-minute training) showed improvement in socialization and a decrease in maladaptive behaviors.
- d. This data will be collected through pre- and post-intervention surveys.
- e. Quantitative data will be collected on social responsiveness and maladaptive behaviors.
- f. Social responsiveness and maladaptive behaviors will be measured using the SRS-2 scale before and after each 16-week session.

e) Dissemination plan

- a. In-service event scheduled for key stakeholders at community partner site to discuss implementation plan and goals of the study.
- b. Staff training and communication of goals with THR staff.
- c. 1:1 session with individuals with ASD to discuss the benefits of an alternative-based treatment plan. This can include family members.

f) Sustainability

- a. Highlight the benefits of alternative treatment plans for individuals with ASD by capturing data from participants' outcomes and sharing the findings with the key stakeholders.
- b. Available continuing education and informational sessions.
- c. Maintain open communication, consistent follow-up, and individualized patient care plans with clear short-term achievable goals for participants in the study.

g) Timeline

- a. June 1, 2022-August 1, 2022
 - i) Identify sites that would be willing to partner with the study.
 - ii) Identify key stakeholders and needed staff (Director and staff at THR facility, PMHNP student).
 - iii) PMHNP student to participate in THR volunteer orientation and participate in THR community weekly.
 - iv) Obtain patients' consent and needed IRB approvals.
- b. August 1, 2022-December 1, 2022
 - i) Educate staff and patients on intervention.
 - ii) Enroll individuals into the 16wk program.
 - iii) Create an intervention schedule with the THR facility.
 - iv) Collect data, document outcomes, and analyze pre and post-data.

- c. December 1, 2022-January 2023
 - i) Continue to analyze data.
 - ii) Create and implement a sustainability plan.
 - iii) Present findings to USD faculty and staff, THR board and staff, and at a national conference.

Evaluation Plan

Data Management

Given that the benchmarking and evaluation data will not require the need for patient-identifiable data, all data on SRS-2 scores will be evaluated in the WPS data system. This system automatically captures the submitted data via email and calculates the SRS-2 score based on the system's internal algorithm. All quantitative data evaluation is to remain on the organization's secure system, with no patient-identifiable data used when evaluating results.

Sustainability Plan

Several factors are to be evaluated to determine sustainability efforts during the 6-month period of the intervention. For instance, if there is a marked improvement in social communication among participants in the 16-week program, sustainability efforts will focus on the combination of promoting more outpatient mental health referrals to THR facilities and increasing enrollment at THR for individuals diagnosed with ASD. Additional sustainability efforts to ensure THR enrollment is the dissemination of information to primary and mental health outpatient providers on the findings of obtain from this study. This will be the first step in the transformation of treatment planning protocol for individuals with ASD. Additionally, further policies and procedures are to be amended to also reflect the need to incorporate community partnerships with THR facilities for individuals with ASD to ensure that this evidence-based intervention is a go-to option for treatment planning. Finally, efforts must be made to present

THR as a treatment option to individuals with ASD earlier in the care planning process to support patient outcomes and to ensure the optimal well-being of individuals with ASD.

Evaluation of Evidenced-Based Interventions and Outcomes

Pre and post SRS-2 score data will be evaluated based on the combination of process outcomes and primary outcomes. Process outcomes are to focus on weekly participation in the THR 16-week program among the total number of individuals diagnosed with ASD. Primary outcomes are focused on the stated benchmark data of reducing SRS-2 scores overall and with marked improvement in social skills.

Cost and Benefit Analysis

When zooming out to a system-wide level that includes a cost-benefit analysis of outpatient mental health care facilities; then, the intervention will ultimately provide a favorable cost-benefit result if this intervention were to run for at least 6 months. At an estimate, for every dollar spent, there will be a “4.20” cost avoidance. Additionally, there is estimated to be a 95% return on investment if the implementation of THR sessions for at least 30min per week is achieved between August 2022 to December 2022.

The high rate of return is reflected in the low initial startup cost for mental health outpatient clinics. In comparison, medication management can be costly due to the number of follow-up visits needed and the additional labor time required by providers and staff. When comparing the low startup costs of partnering with community organizations, against the continuous labor and materials costs of treatment planning that focuses on medication management, the utilization of THR programs should be a highly sought and preferred treatment option for providers. Additionally, unlike other interventions, there is no initial purchasing of products to be done or expensive training to be held. Furthermore, after the first

year of implementation, there are no recurring costs. Instead, there is an expected high yield of savings and a possible projected increase in income for both outpatient clinics and community partners. This is due to the lowered number of medication follow-up appointments and the increased space for new patient intakes for outpatient clinics and the increase in new clients for the local THR facilities.

Primary cost avoidance in the analysis considered the disproportionate burden of care ASD can have on the healthcare system. The time cost of caring for an individual with ASD is significantly greater than other diagnoses due to the lifelong implications of ASD and the fact that costs do not decrease with increasing age, but increase (Lin, 2014). For instance, on average psychotherapy on an outpatient basis can cost up to \$100 per hour, and many individuals may require on average 2 hours every 2 weeks (Lin, 2014). This is a huge cost to maintain over a lifetime for a family and for a healthcare system.

Due to the lifetime consequences, it is important to consider the nonfinancial benefits of this project as well. For instance, increased patient satisfaction with outpatient office visits due to the alternative treatment options provided and working with knowledgeable providers and staff who use the best evidence-based practices. Other nonfinancial benefits identified included the consideration that there would be increased access to mental health services for new patients due to the 50% reduction in follow-up visits for medication refill services for established patients.

Intangible benefits ultimately include patient appreciation for improved treatment options that enhance the quality of life for the patient. Decreased need for prescription medications and follow-up appointments would contribute to a more efficient treatment model for outpatient mental health clinics. Additionally, there are other health benefits from weekly THR that cannot be obtained in a traditional treatment option environment, such as being outside in nature,

exposure to like-minded individuals, and community, and interacting with animals. Overall, this would lead to increased health and wellness outcomes. Table 2 lists further details of costs associated with the implementation of a weekly THR program for individuals with ASD.

Table 2
Cost Analysis

Costs: Your proposed project intervention(s)		Costs: Comparison (e.g., usual care or the current state)	
Financial	Nonfinancial	Financial	Nonfinancial
Education and staff development (\$0) <ul style="list-style-type: none"> performed by the student. 	Support and buy-in from key stakeholders at the project site.	Current state: Pt education and discharge instructions are focused on medication management. Little to no time spent on referrals to community partners and alternative treatment options. Currently, no pt. handouts are provided on local THR programs (\$0).	Lack of knowledge by providers on the connection between increased social skills and patient outcomes for individuals with ASD.
Facility costs (\$0) <ul style="list-style-type: none"> Conducted onsite during a team meeting. 	Time developing the project.	No trainings have been conducted for staff on the connection between increased social skills and patient outcomes for individuals with ASD (\$0).	Fewer treatment options are available to pt.
Salary (\$418) Additional time needed with pt. for education <ul style="list-style-type: none"> Nurse practitioner: \$120/hr x1 hr (2) = \$240 RN: \$50/hr. x 1 hr. (3) = \$150 Admin: \$28/hr. x 1 hr. (1) = \$28 	Pt. motivation to participate in the THR program Pt. adherence to the weekly sessions for at least 30mins/wk for 6 months	No information is provided to pt. on alternative therapies such as THR (\$0).	Current treatment options include medication management which may cause adverse and unwanted side effects to the pt. such as weight gain and sexual dysfunction.
Materials (\$200.40) <ul style="list-style-type: none"> USD Printing services Color double-sided \$0.40/sheet Infographic poster (1): \$0.40x1=\$0.40 SRS-2 Screening 1pg: \$0.40(100)= \$40.00 			Nonadherence to medication management due to cost burden and access results in an increase in hospital admission rates.
			Nonadherence to medication management and

- Pt. Handouts 4pg:
\$0.40(100)
x4=\$160

Total cost: \$618.40

lack of treatment options results in an increased suicide rate, oppositional defiant behaviors, and violence toward caregivers.

Table 3
Benefit Analysis

Financial	Benefits Nonfinancial	Intangible
<p>A treatment plan that incorporates weekly THR sessions for 16 weeks will decrease patients' overall SRS-2 scores and increase their quality of life. This will result in:</p> <p>Reduce the cost of chronic illnesses: Psychotherapy on an outpatient basis can cost up to \$100 per hour, and many individuals may require on average 2 hours every two weeks. Avg # visits/yr.=26 (outpatient) Avg cost of mental health treatment = \$5200 per patient per year</p> <p>Weekly sessions in THR would decrease the need for medication refill appointments, # of follow-up appts by at least 50%. Saving an estimated \$2600 on outpatient visits per patient per year.</p>	<p>Increased patient satisfaction with outpatient office visits.</p> <p>Knowledgeable providers and staff who use the best evidence-based practices.</p> <p>An outpatient mental health service that provides alternative treatment options instead of medication management alone.</p> <p>Increased access to mental health services for new patients due to the 50% reduction in follow-up visits for medication refill services for established patients.</p>	<p>Patient appreciation for improved treatment options that enhance the quality of life.</p> <p>Decreased need for prescription medications.</p> <p>Improved efficiencies The decreased number of pt. visit focused on medication refills and more quality time spent with the patient.</p> <p>Other health benefits from weekly THR</p> <p>Overall increased health and wellness outcomes.</p>

Cost Benefit Analysis	$\text{CBA} = \$2600 / \$618.40 = \$4.20$ For every dollar spent there will be “\$4.20” cost avoidance
Return on Investment	$\text{ROI} = \frac{\text{Program benefits } (\$2600) - \text{Program Costs } (\$618.40)}{\text{Program Costs } (\$618.40)} \times 100$ 95% return on investment

Implementation of Evidence-Based Intervention

IRB approval was obtained from the University of San Diego in August 2022 and a letter of support was obtained from the local THR facility REINS. The project began implementation in August after IRB approval was granted. Support to proceed with the evidence-based intervention was also obtained by the director of REINS and the staff who would participate in the program.

A stakeholder meeting was held at the REINS facility where important project information such as assigned roles, timeline, and identification of participants was discussed. Education was provided to key stakeholder groups during volunteer orientation and training was also posted on the organization’s website for sustainability. The SRS-2 survey was reviewed by the organization’s director to ensure content was valid and concise for participants to understand. Participants were identified by the director of the organization and consent was emailed to caregivers willing to be involved. Once consent was obtained presurvey were sent to caregivers of identified individuals with a diagnosis of ASD. Presurvey data were submitted via email. SRS-2 scores were calculated to form the baseline data for the project.

The primary stakeholder team met monthly from August to December 2022 to ensure all deadlines outlined in the timeline were met, and to ensure the consistency of program participation. The intervention ran from August to December for a total of 16 weeks. Participants

were expected to participate weekly during this timeframe for a minimum of 30 minutes per session. 1:1 private sessions were provided for all participants to ensure a focus on social interaction. Key team members consisted of trained volunteers from the organization and PATH-certified instructors who ran the THR sessions.

At the end of the 16-week session post surveys were sent out to the participant's caregivers. The same SRS-2 form was used for pre and post data collection. The WPS platform was used to scrub data of any personal identifiers and to analyze the scores. The scores were considered in their totality and divided into five subscales based on diagnostic criteria for ASD: social motivation; social awareness; social cognition; social communication; restricted interests and repetitive behavior. Pre and post data were compiled and compared.

Evaluation Results and Sustainability Plans

When reviewing data, the number of submitted surveys and SRS-2 scores were used to calculate the percent of change from baseline to postintervention among five DSM-5 compatible subscales (Social Awareness, Social Cognition, Social Communication, Social Motivation, and Restricted Interests and Repetitive Behavior). Given that ASD is a disorder that affects several subsystems, the SRS-2 assessment was the best choice to evaluate the impact of equine therapies on more than one skill domain. Inclusion and exclusion criteria data were considered by the THR organization. The participant's data who met the criteria were gathered from the organization.

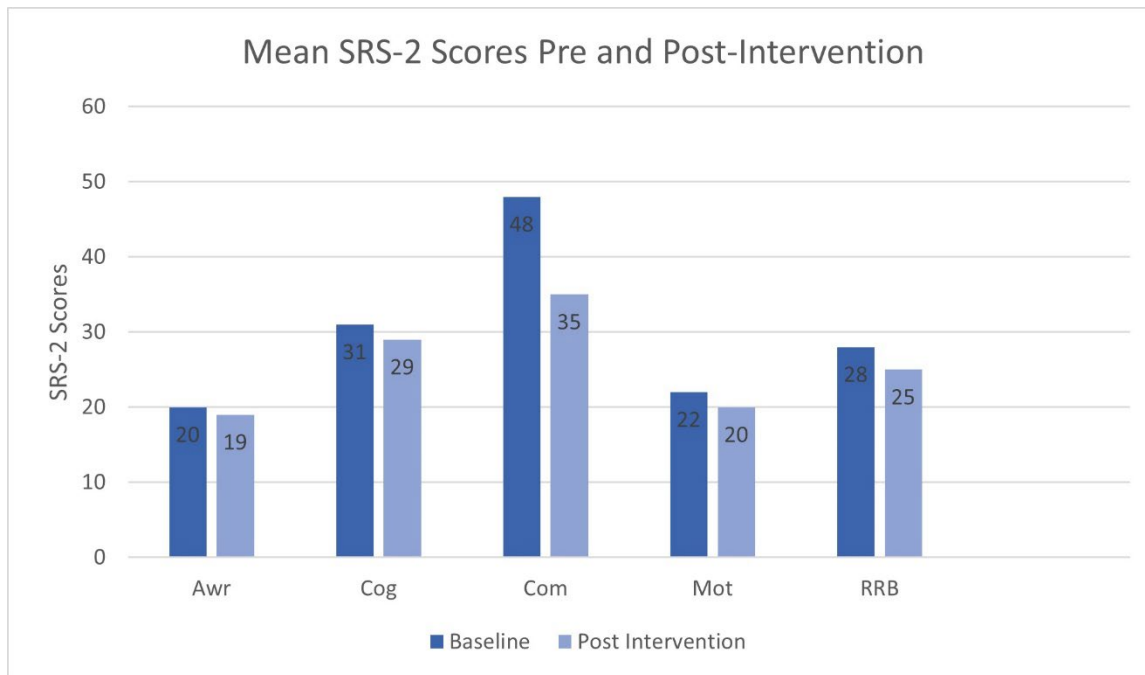
The identified process outcome of weekly participation in the THR 16-week program among the total number of individuals diagnosed with ASD was achieved after the identification of the participants and their enrollment into the intervention in August 2022. The mean duration of weeks for all participants of the delivered intervention was 16. Almost all participants were provided sessions at a frequency of one session per week, with the exception of 2 adults who

were provided with therapy twice a week. The median session duration was 60 min with an average session time of 61 min (SD = 34.7 min, range 30–180 min). The average number of sessions in the intervention was 14.8 (SD = 9.8 sessions, range 4–40 sessions). All participants were engaged with the use of live horses and provided THR treatment. The delivered intervention adhered to the standard guidelines for equine-assisted activities as set forth by the Professional Association of Therapeutic Horsemanship (PATH), which is a nationally recognized organization. All instructors conducting the interventions were PATH certified as well. Volunteers were used to help facilitate social engagement, behavioral interventions, guidance/help during the sessions, and safety purposes. Interventions focused on horsemanship skills, fine motor skills, social communication, and emotional and cognitive skills.

The identified primary outcome of indicating an increase in social engagement was achieved after THR interventions were fully implemented. An upwards trend was noted between August 2022 to December 2022. Overall, participation in the 16-week THR program identified positive trends in all five of the DSM-5 compatible subscales with a marked improvement in the social communication category. From baseline to postintervention there was a 27% change in SRS-2 social communication scores (see Figure 1).

Figure 1

Mean SRS-2 Scores Pre and Post Intervention



Plan for Sustainment

This project sought to answer the question: In individuals diagnosed with autism (P), does participation in weekly therapeutic horseback riding lessons (I), compared to no participation in a therapeutic riding program (C), affect their social and communicative skills (O) over the course of 6 months August 2022 to December 2022 (T). After evaluating the evidence and reviewing the clinical significance of this problem, not only is implementation key, but also sustainment. The plan for sustainment includes efforts to continue to highlight the benefits of using a THR program to address this problem by capturing data from the patient's outcome and sharing the findings with the key stakeholders.

A critical first step captured by this project was to assess whether THR programs were a feasible and useful treatment modality. Equally, if not more important, is the accurate estimation

of the treatment effect via data collection. Both goals were achieved by this project proving THR is both a feasible and an effective treatment modality for individuals with ASD. Therefore, valuable next steps include the promotion and integration of alternative and complementary therapies for individuals with ASD in standardized healthcare practices. This includes the availability of continuing education needs for interdisciplinary teams, and in-services and informational sessions during huddles.

Furthermore, the utility of any therapy depends on its immediate effects, and, more importantly on its long-term carryover effects and the ability to generalize learned skills to other life experiences. Therefore, it would be important for preliminary projects such as this to evolve with the assessment of the long-term effects of equine therapy on individuals with ASD, and the generalization of treatment effects to settings that do not involve horses. Lastly, one of the most important components of sustainment is to maintain an open line of communication with patients that includes consistent follow-ups and individualized patient care plans. Patient feedback and outcomes will be the biggest determiner of whether THR practices for individuals with ASD change or not. They have to be active participants in their care plan and have the desire to implement interventions in their day-to-day lives.

Conclusion

ASD is a neuro-developmental disorder that encompasses several core impairments in social interaction, and communication, and often includes the presence of restricted, repetitive, and stereotypical behaviors (Gabriels et al., 2018). If ASD goes untreated, it is likely to lead to other comorbidities that can lead to rapid deterioration in social functioning and quality of life. Individuals with ASD often experience high incidences of anxiety and depression, irritability, and hyperactivity. If ASD symptoms such as these persist, these challenging behaviors can

continue throughout adulthood placing a high burden of care on caregivers and the healthcare system. Historically, medication management has been the treatment method of choice for the management of challenging behaviors associated with ASD. However, based on the evidence highlighted by this project it is important to consider alternative treatment modalities to decrease the undue burden of care on the healthcare system and shift this care to a more holistic approach through the use of community partnerships. THR-based interventions increased social engagement among participants and allow individuals with ASD to be active participants in their treatment plans, leading to greater self-efficacy and an overall sense of well-being (Gabriels et al., 2018).

In conclusion, this evidence-based project suggests that to obtain the primary outcome of an increase in social engagement in individuals with ASD, equine-based interventions should be provided for at least 1 month, although more robust improvements were seen after 6 months. A longer duration leads to more favorable outcomes due to the amount of time it takes for the individual to get adjusted to the treatment modality such as overcoming anxiety around horses and the novel activities being asked of the individual. Interventions were provided at the frequency of 1 session/week with each session ranging from 30 to 60 min in duration. The interventions provided focused on addressing the core function of social communication among individuals with ASD. It is important to note that, because ASD is a spectrum disorder the many challenges faced by individuals with this diagnosis can have a vast range of presentations. Therefore, the outcome measures can be difficult to standardize, and recommended treatment modalities should always be tailored to each individual's needs.

Although there is considerable variability among participants overall the primary outcome of improving social engagement among individuals with ASD was achieved. The SRS-

2 treatment subscale results showed a decrease in scores pre and post-intervention, with the largest percent change being seen in the DSM-5 subscale of social communication with a 27% change from baseline to post-intervention. These results suggest that THR may be an effective complementary intervention to enhance social and verbal core symptoms of ASD. An important next step in the sustainability of this project might be to examine the longer-term effects of the intervention and the generalization of the therapy to other contexts. Additionally, this project's findings have clinical practice implications for individuals with ASD that can be added to the current standard of practice which has been outlined in the implications for clinical practice section below.

Implications for Clinical Practice

We recommend that clinicians encourage individuals with ASD to participate in THR at least 30 minutes per day 1 to 2 days per week or at least 60 minutes per week.

- Individuals with ASD that participated in THR for 30–60min sessions at least 1–2 times per week or (at least a total of 60 minutes per week) had improved social communication and interaction (Srinivasan et al., 2018).
- Individuals with ASD's social engagement increased when they participated in a THR program that lasted up to 1 hour 2 times per week (Gabriels et al., 2018).
- Nonpharmacological interventions for individuals with ASD are valid strategies for the management of challenging behaviors because physical activity for up to 1 hour (e.g., 15-minute warm-up and 45-minute training) showed improvement in relieving restricted and repetitive behaviors (Trzmiel et al., 2019).

We recommend clinicians promote alternative and complementary therapies (e.g., therapeutic riding, equine-assisted therapy, and hippotherapy) as treatment interventions in

addition to mainstream healthcare interventions such as medication to increase social engagement in individuals with ASD.

- The evidence for use of complementary therapies for individuals with ASD strongly suggests that THR may have a positive effect on the cognitive, social, emotional, behavioral, and physical domains of individuals with ASD. (Rehn et al., 2023).
- Including hippotherapy as a component of a THR program for individuals with ASD was effective in improving cognitive and psychological function (Zhao et al., 2021).
- THR may improve aggressive or violent behavior in individuals with ASD and in turn reduce the number of medications needed to manage care, although further research is needed (Peters & Wood, 2017).
- Multiple studies noted a high use and desirability of nonpharmacological interventions for individuals with ASD, which suggests a need for providers, to be knowledgeable about complementary and alternative therapies commonly used to treat ASD among various cultural groups and their effects (Sissons et al., 2022).

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