

The Impact of an Equine Facilitated Learning Program on Youth with Autism Spectrum Disorder

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The purpose of this study was to assess the impact of an equine facilitated learning program on youth with Autism Spectrum Disorder (ASD) who were paired with typically developing peers. Even though there has been an increasing interest in the field of animal assisted interventions and the benefits for youth with ASD, to date there is no research on using equine facilitated, peer assisted learning programs, emphasizing ground work rather than riding, with youth with ASD. An exploratory, mixed methods case study design was used with 3 youth with ASD and 3 youth without disabilities. An equine program based on a natural horsemanship framework that emphasized groundwork was implemented over 10 weeks of after-school sessions. Data from behavioral observations, parent interviews, and the Social Responsiveness Scale indicate that the three youth with ASD improved their social awareness and social cognition, with two of the youth also improving their social motivation. Implications for future research and practice are discussed.

Keywords: equine facilitated learning, human animal interaction, autism spectrum disorder

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Youth with Autism Spectrum Disorder (ASD) are often challenged in the areas of social interactions and developing relationships (American Psychiatric Association, 2013). Problems with social communication, awareness, and cognition are typical characteristics of youth with ASD (National Research Council, 2001). These youth may demonstrate impaired communication skills, repetitive behaviors or speech, a lack of responsiveness, stereotyped movements, resistance to change, and unusual sensory responses (Individuals with Disabilities Education Improvement Act [IDEIA], 2004). Research has documented that children with ASD frequently engage with animals more easily than with human (Burrows, Adams, & Spiers, 2008; Celani, 2002; Grandin & Johnson, 2005). Therefore, in this study we assessed the impact of an equine facilitated learning program on youth with ASD to determine if their interactions with horses contributed to improvement in social competence.

Benefit of Animals with ASD

The benefits of therapy animals with children are multifaceted and vary in different contexts (Fine, 2010). For example, Burrows, Adams, and Spiers (2008) identified several functions that canine therapy animals can have in the family system of a child with autism. The dog can act as a physical anchor for the child, serving as a protective safety measure; as a companion to facilitate learning new interactional skills; as a family respite to siblings and parents; and lastly, as a way to encourage an approachable presence by others to the child with autism. Others have suggested that animals, including horses, can serve as “transactional objects” allowing a child to bond first to the animal and then to other people (Fine, 2010; George, 1988; Katcher, 2000).

When given a choice, individuals with ASD may also choose to interact with animals rather than humans (Celani, 2002).

Redefer and Goodman (1989) found that the presence of a dog promoted more prosocial behaviors and decreased self-absorption in children who displayed autistic features, and the children showed fewer autistic behaviors. An even larger study was conducted by O’Haire, McKenzie, Beck, and Slaughter (2013) in which a child with ASD was grouped with 2 typically-developing peers and video-recorded during three free-play sessions with toys and three free-play sessions with guinea pigs. They found that children with ASD demonstrated more social approach behaviors (e.g., talking, making tactile contact) and received more social approaches from their peers in the play sessions with the guinea pigs than in the play sessions with toys. Children’s preference for working with animals was further confirmed by Sams, Fortney, and Willenbring (2006) in which they compared traditional occupational therapy techniques with therapy incorporating llamas with children with autism. The group receiving the llama techniques demonstrated greater use of language and greater improvement in social interactions than those receiving traditional therapy.

The Impact of Horses on Children with ASD

Research also suggests that horses can have an even stronger impact than other animals for children with ASD for several reasons. First, the size of horses creates a unique perception by children, who are usually awed by their size and power. Second, because they are prey animals they have highly effective communication systems based on body language and can easily pick up on human emotions and intentions, characteristics that children with ASD generally lack. Additionally, horses are herd animals and have strong social bonds that are based on cooperative living patterns, but they also have their own place in the herd

and understand and accept the implications of their role in relation to others. Awareness of such subtle social nuances is also a characteristic lacking in children with ASD. Horses’ inherent fear and need for safety, security, and clear communication demands that humans interacting with them model a calm and confident presence with a focus on the here-and-now. Such skills are generally lacking in children with ASD, so horses can serve as role models to help teach these skills (Burgon, 2011).

A recently published book and documentary by Rupert Isaacson (2009), entitled *The Horse Boy*, highlighted the healing role of horses in the life of the author’s son, who has autism. Isaacson noted that although the horses didn’t cure his son of autism, they opened up opportunities for his son to connect with the rest of the world in a way that nothing else had. Other researchers have documented the effectiveness of horses in therapeutic interventions, such as equine facilitated learning programs, on promoting social competence and social-emotional development in youth. Although some of these studies do not specifically target children with ASD, they do indicate success in showing improvement in interactional skills and social competence, which are skills all children need to function within society.

Burgon (2011) conducted a qualitative study with seven at-risk young people who participated in a therapeutic horsemanship program. The themes that emerged from the results of that study were related to self-confidence building, sense of mastery or self-efficacy, empathy, and opening positive opportunities. Results indicated participants developed empathy toward the horses and learned they could monitor their own behaviors and change them by modeling confident leadership with the horse. Trotter, Chandler, Goodwin-Bond, and Casey (2008) compared equine assisted counseling (EAC) to a school-based counseling intervention.

Their results indicated that EAC was effective for improving adaptive skills, such as leadership, adaptability, and social skills in children and adolescents. As reported by the participants and their parents, the program had a positive impact on the participants' internalizing behaviors particularly, which facilitates their abilities to internally cope with their problems, leading to fewer feelings of loneliness, nervousness, and anxiety. A recent study by Pendry and Roeter (2013) found positive effects on youth who completed an 11-week equine facilitated learning program on aspects of social competence, such as improvement in self-awareness, self-management, personal responsibility, decision making, goal directed behavior, and relationship skills. Additionally, Pendry, Smith, and Roeter (2014) found that the equine learning program resulted in participants' lower average stress hormones throughout the day, and particularly in the afternoon, suggesting that such an intervention might be a preventive measure associated with healthier development in adolescents.

Therapeutic Riding and ASD

Equine interventions that specifically include a riding element appear to benefit children with ASD across several domains of functioning. For example, Mason (2004) identified the role that sitting on a horse has on the vestibular system and other sensory processing systems of children with autism. In this study, it was found that riding increased the children's muscle tone, flexibility, and coordination, as well as their language skills, self-esteem, and social skills. The researchers also noted the potential impact on pro-social behaviors gained from interactions between the rider, the horse, and the instructor. Taylor et al. (2009) explored the effects of hippotherapy on the volition of three children (ages 4-6) with autism by using

a single-subject A-B-B design. Volition was measured by the Pediatric Volitional Questionnaire, which defines volition as a means of assessing and explaining the motivation of children towards particular everyday activities. The improvement among the three children was inconsistent – one showed significant and consistent increase in volition; one did not show any improvement until the end; and one showed improvement after starting the program but then remained constant through the remainder.

Bass, Duchowny, and Llabre (2009) evaluated the effects of therapeutic riding on autism by using an experimental design with 34 children who all met the criteria for DSM-IV-TR autism spectrum diagnosis. They found that the children in the experimental group improved in sensory integration and directed attention, demonstrated improved social motivation and sensory activity, and decreased inattention and distractibility. Ajzenman, Standeven, and Shurtleff (2013) conducted a pilot study looking at both structural and behavioral aspects of hippotherapy on six children (ages 5-12) with autism. They researched the impact of the horse's movement during hippotherapy activities on postural control, as well as its impact on adaptive behaviors and engagement in age-appropriate activities. Their results indicated a decrease in postural sway, and increases in overall adaptive behaviors (e.g., receptive communication and coping), participation in self-care, low-demand leisure, and social interactions. Holm et al. (2014) examined different doses of therapeutic riding with three boys, aged 6-8 years, with autism in a single subject design. The children participated in 1, 3, or 5 times/week of therapeutic riding to determine its impact on parent-identified behaviors typically associated with autism (e.g. tensing of muscles, pounding on surfaces, echolalia). Their findings indicated that the higher number of sessions was associated with more

change, but also that the improvement was retained even after withdrawal of treatment (which for this study was defined as reverting back to 1 session/week). An important finding was that the behaviors generalized to home and community, as reported by the parents.

An interesting study by Kern et al. (2011) examined the effects of therapeutic riding on the severity of symptoms of autism but also looked at changes in sensory processing, quality of life, and parental treatment satisfaction. Twenty participants (aged 3-12 years) completed the entire 6 months program of riding. Even though this particular program emphasizes riding, they also built in relationship type activities with the horses (e.g., grooming, saddling, feeding them). Their results showed a significant decrease in severity of symptoms even after as little as 3 months, but more importantly, improvements were noted in quality of life by the parents over the entire 6-month course, suggesting that just enrolling in the program may have created a positive change in the participants and in their family's perception of quality of life.

Need for Our Study

We can conclude, then, that research supports that animals have a positive impact on children, including children with ASD. We can also conclude that horses might even have a more significant impact on children with ASD than other animals, but the majority of research in the last decade has focused on the value of therapeutic riding and/or hippotherapy with children with ASD, or on non-riding programs, such as equine facilitated learning programs on children in general, but not targeted for children with ASD. What has not been clearly documented is the impact that an equine facilitated learning program that emphasizes groundwork rather than riding, might have on

children with ASD. Groundwork with horses, such as grooming and moving and leading the horse through obstacles, involves focusing, listening, communicating, and interacting with the horse and with other humans even more than riding. In most therapeutic riding programs, the riders usually have lead walkers who steer, or assist in steering, the horse for them. However, in groundwork activities, the child is solely responsible for the movement and behaviors of the horse so the need for effective interactive skills is particularly emphasized. Therefore, the purpose of our study was to document the impact that an equine facilitated learning program that emphasized groundwork had on youth with ASD who were paired with typically developing peers. The groundwork activities included grooming the horse, learning to read and understand the horse's movements (e.g., ears moving, tail twitching), desensitizing the horse to touch and unfamiliar sounds, walking them with lead ropes through an obstacle course, and learning to move the horse forward and backward with a finger touch or by wiggling the lead line. We paired them with typically developing peers because of the positive impact such a relationship could provide to the children with ASD. Interactions with nondisabled peers can have a positive impact on the development of social interaction and communication skills of children with ASD and have been shown to improve social communication, interactions, and awareness (Carter, Hughes, Copeland, & Breen, 2001; Carter, Moss, Hoffman, Chung, & Sisco, 2011; Koegel et al., 2012). Research on interventions that involve nondisabled youth and youth with ASD, has also shown that these peer mediated/assisted interventions can improve the social interaction skills, and expand the friendship networks and social connections of youth with ASD (Carter et al., 2011). Social and relational skills are integral components of social competence, which is

viewed as a larger construct that encompasses a diverse set of skills and abilities, related to perceptions, social awareness, social cognition, and emotional regulation (Bierman & Welsh, 1997; Dirks, Treat, & Weersing, 2007). Possessing social competence is seen as critical for success in school and community for all children (Gresham, 1986; Semrud-Clikeman, 2007).

Definitions

In order to provide a common understanding of the field of equine interventions, we provide the following definitions, which are provided by the Professional Association of Therapeutic Horsemanship (PATH), International. PATH International is the professional association that accredits therapeutic riding programs, including therapeutic learning programs and hippotherapy, among other types of equine programs.

Therapeutic riding, as defined by PATH, International is:

... an equine-assisted activity for the purpose of contributing positively to the cognitive, physical, emotional and social well-being of individuals with special needs. (Learn about EAAT, 2014)

Although many therapeutic riding programs focus primarily on riding, they also include varying degrees of ground work with horses, such as grooming, leading and walking with a horse, or causing a horse to move within a round pen.

Equine Facilitated Learning (EFL), as defined by PATH, International is:

... an educational approach to equine-assisted activities. EFL content is developed and organized by credentialed practitioners with the

primary intent to facilitate personal growth and development of life skills through equine interactions. (Learn about EAAT, 2014)

These programs usually provide a combination of riding and groundwork activities.

On the other hand, The American Hippotherapy Association, Inc. defines hippotherapy, in which the focus is on riding as:

... a physical, occupational or speech therapy treatment strategy that utilizes equine movement. The word hippotherapy derives from the Greek word hippos, meaning horse. The term hippotherapy refers to the use of the movement of the horse as a treatment strategy by physical therapists, occupational therapists and speech/language pathologists to address impairments, functional limitations and disabilities in patients with neuromotor and sensory dysfunction. This treatment strategy is used as part of an integrated treatment program to achieve functional goals. (Learn about EAAT, 2014)

Method

This exploratory, mixed methods case study (Creswell & Plano-Clark, 2007; Merriam, 1998) was designed to examine the impact of an equine facilitated, peer-assisted learning program on youth with ASD, with attention to their social competence. We chose a case study design because our question was exploratory. There is no research that documents the interaction, involving ground work activities, between children with ASD and a horse. We also chose recorded observations so we could track any changes that occurred during the

sessions. The participants' social skills and interactions with the horses, and with others, were examined by observing them at the beginning, middle, and end of the program. The parents' perspectives on the youths' social responsiveness were explored using both a standardized measure and qualitative interviews.

Participants

Four students diagnosed with ASD and four peers without disabilities were recruited through the local public middle and high schools to participate. One participant was dropped from the study due to incomplete data. Two counselors from the local middle and high schools were asked to nominate students with ASD using a set of criteria that included youth who: a) were between the ages of 11 to 15 years old; b) had the physical ability to participate in an equine assisted program, c) had the ability to follow verbal/physical instructions, and d) could verbally communicate. The counselors were also asked to nominate peers without disabilities who: a) were between the ages of 11-15 years old; b) had the temperament and patience to work with youth with ASD; c) expressed comfort in working with horses; and d) had the ability to physically complete the program. The four typically developing peers were not from the same school as the participants with ASD. We intentionally selected peers who were a grade or two older than the participants with ASD and had no previous history with them, assuming this would replicate a "real life" situation where they had to initiate and practice interpersonal skills with strangers.

The participants with ASD had the diagnosis of moderate ASD and met the DSM-5 criteria for Autism Spectrum Disorders (American Psychiatric Association, 2013) as well as the criteria in the Individuals with Disabilities

Improvement Act (2004). The three participants with ASD were males with a mean age of 12-6 (12-1, 14-0, 11-4) and the 3 peers without disabilities were females with a mean age of 13-8 (12-1, 14-2, 15-2). The gender of each group (all males for the ASD group, and all females for the typically developing peers) was based on nominations and availability and not intentional. The study was approved by the university's Institutional Review Board and the Institutional Animal Care and Use committee. All parents consented to have their children participate, and to be interviewed, and all participants assented.

Materials and Procedure

In this mixed methods case study, both qualitative and quantitative data were collected. Behavioral observations were captured using digital recordings and behaviors were coded for frequency. Parents completed the Social Responsiveness Scale (SRS) (Constantino & Gruber, 2012) and were interviewed before and after the program implementation.

Behavioral observations. Research assistants assigned to each participant/peer pair observed them at the beginning of the program (week 2), in the middle of the program (week 6), and at the end of the program (week 9). Each participant/peer pair and their horse handler were video-recorded for an hour using a small, hand-held digital camera, as the youth completed the tasks outlined for each session (e.g. grooming the horse, leading the horse). At the completion of the program, two research assistants viewed each of the one-hour videos and coded the participants' with ASD social and behavioral interactions. The observation protocol was built on and aligned with the subscales of the SRS resulting in the following categories: social awareness, social cognition, social communication, social

Table 1: Categories Observed and Examples of Social/Behavioral Indicators

Observation Categories	Examples of Social/Behavioral Indicators Coded
Social Awareness	Behaviors or communication indicating ability to pick up on social cues; using any sense (kinesthetic, listening, vision) to pick up on social cues
Social Cognition	Behaviors or communication indicating ability to interpret social cues once they are picked up
Social Communication	Behaviors or communication that show expressive social interactions; these may include some or all of the following: expressing emotion appropriately, imitating appropriate actions/words, expressing empathy (comfort, words, etc.) toward others or the horse, relating to others, handling mood changes appropriately, demonstrating a give and take conversation, making eye contact, politeness, staying with an activity (not wandering aimlessly), laughing appropriately, answering questions clearly and appropriately, talking in normal tones, respecting personal space, showing flexibility, and/or being emotionally present (not distant)
Social Motivation	Behaviors and communication that show the extent to which the student is motivated to engage in social-interpersonal behavior; is not anxious, inhibited
Restricted Interest/Repetitive Behavior	Behaviors and communication that are bizarre, show perseveration, inflexibility, unusual sensory interest (mouthing, spinning, or strange interactions with items), inflexibility when stressed, touching others in odd ways, talking about the same thing over and over, doesn't like changes in routine
Confidence	Behaviors or communication that indicate a sense of empowerment or strength; verbal or behavioral indications that the student is proud of himself, physical use of the body to show confidence (arm up, arms up, thumbs up, standing up straight)
Humor	Behavior or communication that indicates sense of humor; verbal or nonverbal behavior indications that the student told a joke or made an appropriate funny comment; laughing appropriately at someone's joke; smiling at a joke or funny statement

Note. Social awareness, cognition, communication, motivation, and restricted interest/repetitive behavior descriptions adapted from SRS manual (Constantino & Gruber, 2012).

motivation, and restricted interests/repetitive behavior. Two additional categories of “humor” and “confidence” were added. All of the categories of interest were operationally defined using the criteria from the SRS as well as the research literature on social responsiveness and social competency (Semrud-Clikeman, 2007). Table 1 provides descriptive examples of the behaviors/social indicators that were coded for each category.

One of the researchers and two graduate students completed a norming session to agree on what behaviors might be rated for each category. After viewing two hours of video and reaching inter-rater reliability of .85 (number of agreements/number of agreements + disagreements), the research

assistants independently viewed all of the participants' videos. A second researcher or research assistant viewed the videos and coded behavior on all participants. Data recording occurred at the end of each 10 minute segment during each 60 minute video, resulting in 6 data sets for each participant with ASD for each hour of video. At the end of each 10 minute segment, the observer provided a rating of what was observed for each category of behavior using the Likert-type scale of: 1 = Not observed, 2=Observed some indication, 3=Observed several occurrences, and 4=Observed consistently throughout segment. Observers viewed the 10 minute segment as many times as needed so that the data recorded would be as accurate

as possible. Inter-rater reliability was tested by the researcher using observational data collected from one hour of video taken from the beginning, one hour in the middle, and one hour at the end of program, resulting in agreements of .85, .88, .87 (number of agreements/number of agreements + disagreements).

Social responsiveness. The Social Responsiveness Scale (Constantino & Gruber, 2012) was completed by each parent of the ASD group before and at the end of the program. The SRS contains 65 items that provide an indication of the level of functioning across five domains: social awareness, social cognition, social communication, social motivation, and restrictive/repetitive behaviors. The internal consistency of the SRS is high (Alpha .95) (Constantino, 2002; Constantino & Gruber, 2012).

The SRS items are responded to using a Likert scale with the following options: 1- Not true, 2- Sometimes true, 3-Often true, and 4-Almost always true. An example of one of the prompts is “Has difficulty making friends, even when trying his or her best.” Some prompts, such as, “Is able to communicate his or her feelings to others” are reversed scored. The subscales scores include raw and standardized scores (t scores) with the total SRS standardized score ranging from 90 to 30 (mean of 50; standard deviation of 10) indicating social responsiveness functioning levels (59 and below: within normal limits; 60-65: mild deficiencies; 66-75: moderate deficiencies; 76-90: severe deficiencies). The higher the SRS standardized scores are, the more impairment is indicated.

Parent interviews. Researchers conducted pre- and post-program interviews with parents of the ASD group. Interviews were recorded for analysis. The pre-interviews were semi-structured and included the following questions:

- What are your goals for your child for the program in terms of developing social interaction skills? In relation to peers/adults/community/sibling and/or family members?
- What do think are your child’s strengths/weaknesses?
- Talk about how your child takes/or doesn’t take initiative, particularly in regards to social interactions?
- What tends to happen when he/she is challenged by a particular task/ or when he/she get frustrated?
- In what areas does your child demonstrate independence, and what areas is he/she more dependent?
- Do you have any concerns about safety regarding any of your child’s behaviors?
- Are there any other specific behaviors, personality traits, or characteristics that you think we should know about your child?

Post-program interviews were also semi-structured using the same questions, but more focused on any changes that the parents observed. We started the interview by asking the parents to think about how their child is doing now, after completing the program. We then asked the following questions:

- Do you think your child attained any of the goals you identified for him/her for the program in terms of developing social interaction skills? In relation to peers/adults/community/sibling and/or family members?
- Talk about any changes you see now in your child’s strengths/weaknesses.
- Do you notice any changes now in how your child takes/or doesn’t take initiative, particularly in regards to social interactions?
- Do you notice any changes now when your child is challenged by a particular task/ or when he/she get frustrated?
- Talk about any changes you see now in how your child demonstrates

- independence, and what areas is he/she more dependent?
- Do you have any concerns now about safety regarding any of your child's behaviors?
 - Are there any other specific behaviors, personality traits, or characteristics that you think we should know about your child now?

Procedure

Each of the students with ASD was paired with a peer without disabilities, a horse handler, and a horse. Pairings of students and horse assignments were made by the equine instructor in consultation with one of the researchers. Criteria for pairing the students was based on best fit using information received from applications completed by the parents. The assignment of horses and horse handlers was made by the equine instructor based on the personality of the horse and the personality and experience of the horse handlers. All of the horses were owned by the local university and were experienced therapeutic riding horses that are part of a PATH, International Premier Accredited therapeutic riding program at the university. Horse handlers were volunteer undergraduate or graduate students with horse experience and had previous experience with the established therapeutic riding program. The person who provided the equine lessons was a PATH International certified therapeutic riding instructor and equine specialist in mental health/learning.

The 10-week program consisted of weekly after-school sessions that lasted about 75 minutes. The participants were bused to the arena from their school, and parents picked them up at the end of the session. Although horse experience was not required for the program, some of the participants had some riding experience, usually with a relative's or friend's horse. None of the

participants had any experience with groundwork, which was the focus of our program. We based our program on a natural horsemanship approach that emphasized primarily groundwork activities with horses, such as grooming, leading horses through obstacle courses, and learning how to move horses toward/away from the person and around obstacles through gentle touch. Natural horsemanship is based on concepts of trust and relationship building with horses before engaging in any kind of activities. Since horses are prey animals and naturally fearful of unfamiliar surroundings and people, it is important to first establish an environment of trust and safety. Once this relationship is established between the horse and the human, the horse is more receptive to learning, creating a mutually positive environment. The curriculum centered on weekly themes that were grounded in establishing trust and safety. Themes included identifying and showing respect, using nonverbal communication and body language, differentiating between assertive and aggressive behavior, building teamwork, establishing and recognizing boundaries, and gaining confidence with challenges. Each lesson started with an overview of safety rules, a description of the equine lesson and a demonstration, and followed with grooming their horse in pairs and practicing the equine lessons in pairs. Riding was not really the focus of the program, but since most children enjoy riding, it was an optional activity that we provided toward the end of three of the lessons. All children chose to ride, and while one participant of the pair rode, the other participants engaged in brief word games or a small group activity with one of the staff on site. Parents completed the Social Responsiveness Scale and were interviewed at the beginning of the program and again at the end.

Results

Quantitative Data

Results from the quantitative measures included observed frequencies from videotaped sessions, which were coded and rated by observers, and parents’ responses on the Social Responsiveness Scale (pre and post). A detailed analysis of these results follows.

Observed frequency of social responsiveness, humor, and confidence. The ratings assigned by each observer to each of the six, 10 minute segments over the hour of observation were averaged, resulting in one rating for that category (e.g., social communication) for that hour. The two observers’ ratings for each category and hour were then averaged resulting in the participants receiving one rating for each category for the beginning, middle, and end of program for each category (Table 2).

Participant 1 increased his frequency of observed behaviors in the categories of social awareness, social cognition, social motivation, and confidence. His social communication behaviors were consistently observed throughout the program. This participant began the program with consistently observed behaviors related to humor, with a slight decrease at the end of the program. Over the program, Participant 1

exhibited low or no frequency of restricted interests and repetitive behaviors.

Participant 2 showed increases in the observed frequency of his behaviors in all subscale categories except restricted interests and repetitive behaviors, neither of which were observed during the program. He showed the highest increase in behaviors in the category of confidence (2.6, 3.7, 3.9), and similar strong increases in the categories of social communication and social motivation.

Participant 3 exhibited more frequent behaviors related to social awareness, social cognition, social communication, humor, and confidence over the program. His behaviors related to social motivation were observed consistently at the beginning and end of the program, with a drop in frequency during the middle of the program. Behaviors related to restricted interests and repetitive behaviors were observed less frequently at the end of the program.

Social responsiveness. Total score results and treatment subscale results were obtained from the administration of the SRS with parents pre- and post-program (Table 3). The scores indicate severity of ASD symptoms from the parents’ perspectives. A positive outcome would be a reduction in the value of the scores from the pre- to post-program. Although the total score results for Participant 1 showed a slight increase in severity of ASD symptoms (72 to 74), his

Table 2: Frequency Ratings¹ for Social Responsiveness Categories of Behavior across the Beginning, Middle, and End of Program

Participants	Social Awareness			Social Cognition			Social Communication			Social Motivation			Restricted Interests and Repetitive Behaviors			Humor			Confidence		
	B ²	M	E	B	M	E	B	M	E	B	M	E	B	M	E	B	M	E	B	M	E
Participant 1	3.6	3.9	4.0	3.6	3.9	4.0	4	4	4	2	3.4	3.5	1	1.8	1	4	4	3.6	2.6	2.8	3.5
Participant 2	3.4	3.6	3.8	3.2	3.8	3.8	2.7	3.2	3.7	2.9	3.4	3.9	1	1	1	3.1	3.5	3.6	2.6	3.7	3.9
Participant 3	3	3.25	4.0	2.5	3.25	3.0	3.0	3.5	3.3	4.0	3.2	4.0	2	2	1.3	1.5	2.25	2.3	1.5	2.5	3.3

¹ Not observed – 1; Observed some indication – 2; Observed several occurrences – 3; Observed consistently – 4;

² Beginning of Program – B; Middle of Program – M; End of Program – E

Table 3: Total Scores and Treatment Subscale Results¹ from the Social Responsiveness Scale Pre-/Post-Program

Treatment Subscale Results						
	Total Score Results	Social Awareness	Social Cognition	Social Communication	Social Motivation	Restricted Interests/ Repetitive Behaviors
	<i>Pre/Post</i>	<i>Pre/Post</i>	<i>Pre/Post</i>	<i>Pre/Post</i>	<i>Pre/Post</i>	<i>Pre/Post</i>
Participant 1	72/74	67/64	63/61	74/75	71/73	69/76
Participant 2	88/82	73/70	87/74	83/81	77/71	96/91
Participant 3	90/84	76/73	92/83	86/86	75/71	94/82

¹ t-Scores Interpretation: Severe: ≥ 76 ; Moderate: 66-75; Mild: 60-65; Normal: ≤ 59

treatment subscale results indicate a reduction in severity of symptoms in the categories of social awareness and social cognition. Participants 2 and 3 both reduced the symptoms of ASD (88 to 82, 90 to 84, total scores respectively) and improved in all subscale categories except for a slight increase in symptoms related to social communication for Participant 3.

Qualitative Data

Qualitative data analysis included identifying themes from parent interviews (pre and post). The researchers recorded the interviews and then coded them for themes (Rubin & Rubin, 1995). A summary of each parent's comments is included in Table 4.

Parents' perspectives. Themes that emerged pre-program indicated parents' concerns with their children's social skill deficits. These included: lack of engagement in social interactions; frustration/low coping skills when confronted with a challenge; inability to express emotions appropriately; and lack of awareness of others and environment. During the post interviews, parents consistently revealed themes that indicated a change in the children's skills. These included: an increased willingness to ask for help; increased interactions with

peers; and showing less frustration when challenged. The parents of Participant 1 also noted that he had established empathy with animals, he was not getting into as much trouble at school, and there was a dramatic increase in asking for help. At the start of the program, Participant 1's inability to ask for help was very frustrating to these parents. They noted that he would never ask for help with homework, and then would get very frustrated when it was wrong. The parents of Participant 2 expressed surprise that they now observed their child expressing confidence when he took charge of a situation and would problem solve – something they had not previously seen in him. The parent of Participant 3, which was the most severely withdrawn of all three participants, and had the most difficulty in respecting social boundaries, reported that he was more aware of boundaries and consequences of his action, and learned that “you have to ask first” before touching someone.

Discussion

The purpose of this study was to assess the impact of an equine facilitated learning program on youth with ASD using qualitative and quantitative measures. The qualitative and quantitative results indicate that the

Table 4: Summary of Parent Interviews

Participant Parents	Pre-program Themes	Post-program Themes
Participant 1 parents	Not open to social interactions Lacks social skills Low coping skills when challenged If asks for help but not assisted right away he might have a tantrum Not always aware of environment/internally focused	Dramatic increase in asking for help/clarification appropriately Very talkative when picked up after program/open to sharing – not talkative when picked up after school Having an easier time at school, and not getting into trouble as much Able to establish an empathic relationship with animal which was great
Participant 2 parents	Doesn't engage in social interactions Gets frustrated when peers do not like him and they get frustrated with him Doesn't like the unfamiliar Is not socially aware Breaks down if challenged Can't express his frustrations	Got to do something he felt good about, and it raised his confidence/self-worth Interacted with peers much more Ask for help appropriately Expressed confidence when he took charge of a situation and solved the problem – we were surprised
Participant 3 parents	Doesn't know physical, social, cultural boundaries Highly influenced by peers Hard to communicate appropriately Can't handle frustrations – gets angry Wants friends, but doesn't have many	More aware of boundaries as a result of working on boundaries with horses Talks now about safety issues Pays attention to consequences of behavior Before program he would have a tantrum first and then ask for help; now he asks for help first.

participants improved in many areas of social competence. From the parents' perspectives (from interviews and the Social Responsiveness Scale) and the observations conducted, there were increases in the participants' social awareness, social cognition, social communication, social motivation, humor, and confidence.

The horse handlers, who did not code videos or collect data, often anecdotally commented to the researchers that the participants seemed to improve their conversational skills (with them and the peer participants). They also commented that they gained confidence grooming, handling, and leading the horses. An interesting observation was that they commented specifically about how the participants with ASD became more comfortable understanding humorous comments (e.g., appropriate jokes in context) offered by

themselves or others. This was particularly important because appropriately engaging with peers in social interactions and grasping subtle nuances of casual joking, was one of the main concerns expressed by the parents of the ASD group. Such social skills are typically a difficult task for children with ASD and reinforces their social isolation. Hence, observing this kind of casual exchange was a positive indicator of increased comfort with others.

Participant 2 began the program exhibiting shyness and very few non-verbal or verbal indications that he was enjoying himself. As the program continued, he began to joke with and ask questions of Participant 1, his assigned peer, and his horse handler. He made more eye contact and at the end of the program strode confidently with the horse across the arena, with his arm held high clutching the lead rope, completing all of the

required tasks. He had a big smile on his face as he returned to the starting position.

Of note was the decline in “humor” of Participant 1 at the end of the program. Participant 1 consistently demonstrated humor-related behaviors but demonstrated less humor-related behaviors at the end of the program. In reviewing the video from that session, we attribute this possibly to the seriousness and intensity of the content of that session. For that session participants were required to lead their horse through several activities requiring them to work as partners with their peers and demonstrate that they had learned the proper techniques and strategies. Hence, they were required to demonstrate horsemanship skills, clear verbal and nonverbal communication, leadership skills, and teamwork. It appeared that Participant 1 took this lesson very seriously and was intent on completing all the activities correctly, adding to his more serious demeanor during this particular session.

The typically developing peers who were assigned to each participant with ASD were older than the ASD participants and had no history of knowing them previously. We believe this was probably a positive factor because social interactions with a stranger in an unfamiliar environment was probably a more challenging task for the ASD group than if they had known their peer partners.

Limitations

An obvious limitation of this study is the case study format, and lack of control group, which prevents us from concluding a cause and effect relationship between the positive outcomes on the variables of interest and the intervention. However, the multiple sources of data reinforce consistent patterns of improvement. There is no way of knowing whether these improvements in behaviors will be long term or will transfer to other contexts. A longitudinal follow up, with

interviews from parents and others in different contexts (e.g., teachers) would help determine if the skills the participants learned could be generalized to other situations. However, the comments from parents in the post interviews did suggest that this was happening, at least for the short term. We cannot attribute improvements directly to the equine intervention. The lack of a comparison treatment group has been noted as an inherent limitation in much of the human-animal interaction research (Marino, 2012). The special time together, the consistency and predictability in how the lessons were delivered, the gender of the participants, or potential bias in parental reports could have also impacted the results. However, the power of horses with children with ASD is very well documented, and even though the documentation is often anecdotal it is hard to deny that there is something special in that relationship.

Implications for Future Research and Practice

This study contributes to and confirms existing research; but more importantly, creates additional questions for future researchers. It supports other research that indicates children with ASD can benefit from equine interventions, but also provides a unique contribution by focusing on groundwork rather than riding and pairing of youth with ASD with typically developing peers. Future research could build on this study by adding a comparison group where children with ASD are paired with typically developing peers in a different type of program without horses or are compared to a program that included dogs or different types of animals. This would not only tease out whether animals contribute a unique quality to the intervention, but more specifically, whether there is something particularly unique about horses. Additionally, a 6-month

or longer follow-up would help determine the long term impact of the intervention. Also, a mid-point interview with the parents might be helpful to determine at what point they started to identify changes. Most equine programs tend to be 8-10 weeks, but there is no research that compares lengths of program. Perhaps one or two sessions would be equally effective as ten.

Diversity in gender of participants should also be explored. We found that most of the children in our area identified with ASD tended to be male. A future study that included mixed gender for both the children with ASD, as well as the typically developing peers, would also be helpful.

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