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The Effects of Equine Assisted Activities on the Social Functioning of Children with Autism

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Autism is a spectrum disorder with a range of complex neurodevelopment symptoms that is four times more prevalent in males than females (American Psychiatric Association, 2007). This disorder knows no racial, ethnic, social boundaries, family income, lifestyle, or educational levels and can affect any family, and any child. The indicators of ASD are often present before age 3, and are often accompanied with deficits in the following areas: cognitive performance, learning, attention, communication, socialization, behavioral development and sensory processing. According to the Autism Society of America, autism is the fastest growing developmental disability, which is estimated to have between a ten to seventeen percent growth rate each year (Autism Society, 2010). According to a recent report by the CDC, the prevalence of Autism has risen to 1 in 110 births. This means that as many as 1.5 million Americans today are believed to have an autism spectrum disorder (Department of Health and Human Services, Centers for Disease Control and Prevention, 2009).

Equine Assisted Activities, consist of a broad variety of equestrian programs that can include therapeutic riding, driving, vaulting and un-mounted sessions that provide the individual with a disability the opportunity to achieve their individualized goals (NARHA, 2010). The EAA lessons are developed and implemented by a certified NARHA instructor to meet the student's goals, which is directly dependent on their purpose for participation (i.e.: recreation, therapeutic, &/or sports competition). These EAA programs are not considered therapy, but are viewed as therapeutic if a participant is able to show improvement within one or more of the following areas: physical, social, emotional or educational (NARHA, 2010). These EAA activities can take place on the ground and during mounted sessions, thus giving the individual a safe and meaningful equestrian experience. For an individual with Autism,

the EAA session can provide a multi-sensory experience, because these activities involve the senses of vision, hearing, smell & tactile (Sams, M. J., Fortney, E. V. & Willenbring, S., 2006). The multi-sensory equestrian environment and the relationship created between the horse and the participant can provide more than just riding skills.

The principle of this study was to further investigate the effects of EAA activities on children with Autism. Using a larger sample size and additional controls, we duplicated our 2006 pilot study to further investigate the effects on the research subjects. The objective of this study was to identify if equine assisted activities improved the social function and attention of children diagnosed with autism spectrum disorder, as well as to evaluate if the effects sustained two months after the intervention was completed.

Methods

Participants

Prior to the recruitment of the project participants, the study and forms were examined and approved through the Western Institutional Review Board (WIRB). Once approved, GHETC worked collaboratively with local agencies (Parent to Parent of Miami, APD, University of Miami CARD center) to announce and recruit prospective participants. During the recruitment efforts, parents were screened over the phone to answer questions and to insure they met eligibility criteria. From these efforts, fifty children who met the study eligibility criteria and completed the required forms within the specified time frame were recruited into the study.

The research eligibility criterion consisted of the following: child had to be between 7 and 12 years of age; diagnosis of autism spectrum disorder as specified in DSM-IV-TR (American Psychiatric Association, 2007) from the referring agency and/or the child's physician; child's physician had to complete the medical application, parents had to complete the WIRB forms and the GHETC forms, complete the consent to pre-testing, twelve weeks of

equine assisted activities and two post testing sessions for themselves, as well as the child's teacher; no significant equine therapy (child has not received hippotherapy services by a licensed therapist over the past year). If the subject had received equestrian therapy within their lifetime, participation did not exceed six months and the child had never participated in EAA activities.

Following the enrollment efforts, the pre-assessment forms were distributed & completed by the parents prior to the randomization of the experimental & control groups. Once the forms were collected from the parents the project participants were randomized into the two conditions using a randomization schedule provided by Maria Llabre, Ph.D., statistical consultant.

Intervention

During the intervention phase, the participants were provided twelve consecutive EAA activities on Saturdays, each session lasting one hour and fifteen minutes. The instruction provided the project participants training within the following program facets: mounting/dismounting, warm-up exercises, riding skills, mounted games & horsemanship activities.

Mounting/Dismounting

This facet of the intervention averaged two and a half minutes for each of these steps, which took place at the beginning and end of the mounted session. During this component, the GHETC certified instructors assisted the subjects in learning to appropriately and safely mount and dismount their program horse or pony. These processes were verbalized and visually shown to the subjects using step by step instruction and a corresponding picture book, which was developed by GHETC. The mounting/dismounting segment of the program lasted a total of five minutes and was aimed at stimulating verbal communication, proprioception and vestibular processing.

Exercises

After successfully mounting the horse, the subjects performed ten minutes of warm-up exercises to stretch their bodies in preparation of the riding class. During each session, the participants executed a series of exercises: arm circles, trunk twists, maintaining two-point, yoga stretches, opposite and same side toe touches, as well as posting at the walk. As the weeks progressed, so did the difficulty of the movements. For example, during the beginning weeks on the intervention, we asked the participants to perform arm circle exercises and posting at the walk as separate exercises. As the subjects balance and coordination improved, we incorporated posting at the walk while performing arm circles, as well as holding two point with one hand out, until they could maintain their stability without the use of their hands.

Through the direction of the riding instructors, the trained side walkers provided the riders verbal, modeling and/or physical prompts as needed to assist them in acquisition of these exercises. These procedures targeted the participants' vestibular processing while also engaging the subjects in physically demanding exercises to assist them in the development of their riding abilities.

Riding Skills

The subjects participated in twenty-five minutes of riding skills, which were specifically designed to encourage attention, sensory seeking, as well as gross and fine motor domains. Participants were instructed how to perform various English riding skills: direct rein, open guided rein, changing direction, maintaining two-point position, and use of proper riding aids (leg, seat, hand & voice or using sign language), upward and downward transitions (halt/walk/trot, trot/walk/halt), schooling patterns (figure eight, serpentine & tracking across

the diagonal and center), reading and following ring signage (Whoa, Go & Slow) to perform various riding skills, sitting trot, posting trot & identification of the correct diagonal. To increase both expressive and receptive language we incorporated activities that employed both the students' riding skills and language. For example, the project participants worked toward performing an open guided rein to maneuver their horses through lettered cones while making up a word for each letter and then using the word to develop a sentence.

Mounted Games

The individualized and group segment of the equine assisted activities session lasted twenty minutes and focused on individualized and group games while on the horse. The games were carried out by the instructor and focused on social and communication skills. The following games were incorporated as a part of the sessions: relay races, red light/green light, red rover, egg & spoon, ride a buck (holding a dollar bill under upper thigh while performing riding skills), musical letters, simon sayes, & word relays, word flash cards (individual & group).

Horsemanship

During fifteen minutes of each equine assisted activities session the subjects learned about the equine, as well as how to groom and care for their horse/pony. As a part of this instructional segment, we developed a picture book to assist the participants in the identification of the grooming tools, as well to assist them in the identification of the riding equipment (saddle pad, close contact saddle, girth, halter, bridle & reins) & their apparel (helmet & half -chaps). During this facet of the intervention, the participants were instructed how to recognize and properly utilize the various grooming tools, (e.g., curry comb, hoof pick, body brush, mane/tail comb). Participants were educated about basic horse anatomy and the corresponding human parts. As a part of this instruction, the subjects were asked to verbally express or point to the analogous part.

The EAA activities utilized were selected to target the participants' vestibular processing while also allowing the children to engage in physically challenging exercises to increase attention, and to assist in the development of their gross and fine motor domains. We provided each individual the level of support and prompts they needed: physical, modeling, verbal, & worked toward independence. Throughout each of the one hour and fifteen minute EAA sessions, participants were verbally and physically reinforced (i.e., high five, hugs) upon completion of the exercises. Instructors and volunteers alike made efforts to maintain eye contact with all participants during the sessions.

Outcome Testing

Following the twelve week period, parents and teachers of the participants in both the intervention and control conditions completed the post-test measures. The post data was collected and the 2nd post packet was mailed to the parents & teachers for the final completion & collection of the research data. In August, following the 2nd post-testing, the control participants began receiving their equine assisted activity sessions.

The surveys were collected and were reviewed for accuracy & completeness. Following this procedure, the data was entered into the University of Miami database at the Behavioral Medicine Research Center where the questionnaires were scored, and the data was analyzed.

Measures

The Social Responsiveness Scale (SRS) and Sensory Profile (SP) were completed by teachers and parents to assess social functioning at three times: pre-and-post intervention and a two month follow-up.

Social Responsiveness Scale

The Social Responsiveness Scale (SRS) (Constantino, 2002) is a 65-item questionnaire that measures the severity of autism spectrum disorder symptoms. Raw scores

may be computed for five treatment subscales: social awareness, social cognition, social communication, social motivation, and autistic mannerisms. According the SRS manual, social awareness is operationally defined as the “ability to pick up on social cues;” social motivation is defined as “the extent to which a respondent is generally motivated to engage in social-interpersonal behavior;” and social cognition is defined as “expressive social communication” (Constantino, 2002, p. 17). The measurement is administered to parents or teachers, who rate participants’ on a 4-point Likert scale ranging from 0 (*never true*) to 3 (*almost always true*). Examples of questions include: “Seems much more fidgety in social situations than when alone” (social motivation subscale); “Doesn’t recognize when others are trying to take advantage of him or her” (social cognition subscale); and “Doesn’t seem to mind being out of step with or not on the same wavelength as others” (social awareness subscale) (Constantino, 2002, p. 17).

The SRS has high overall internal consistency ($\alpha = .97$), and retest temporal stability in males and females ($r = .85$ and $r = .77$, respectively). Internal consistency for each treatment scale was also tested and yielded high Cronbach alpha scores, with social communication being the highest ($\alpha = .92$) (Constantino, 2002).

Sensory Profile

The Sensory Profile (SP) (W. Dunn, 1999) is a 125-item questionnaire that is administered to parents or teachers (School Companion, W. Dunn, 2006). The measurement uses a 5-point Likert scale ranging from 1 (*always*) to 5 (*never*). The questions address overall social functioning and the degree to which children exhibit problems in (a) sensory processing, (b) modulation, and (c) behavioral and emotional responses. The SP for parents is composed of nine subscales: sensory seeking, emotionally reactive, low endurance/tone, oral sensory sensitivity, inattention/distractibility, poor registration, sensory sensitivity, sedentary, and fine motor/perception. The School Companion is scored in four quadrants:

registration, seeking, sensitivity, and avoiding. There are also four new factor scores: need for external supports, awareness/inattention, tolerance for sensory input, and availability for learning.

Data Analysis and Results

Pretest

Means and standard deviations were computed for all subscales from the SRS and SP administered to the parents and the teachers at each of the three time points (pretest, posttest, and follow-up). This information is included in Tables 1 through 5. We first compared the groups on their means at pretest using independent group t-tests. We then compared them at posttest and at follow-up. All t-tests were conducted at the .05 level of significance.

A comparison between the treatment and control groups on the SP subscales administered to parents revealed no significant difference ($p > .05$) between the means on any of the subscales. Similar results were obtained when comparing the means between the two groups at pretest for the teachers' subscales based on the four factors and the four quadrants.

With respect to the SRS, a comparison between the treatment and control group subscale means at pretest indicated no significant difference ($p > .05$) on the parent or teacher data. We concluded that the randomization rendered the two groups comparable with respect to the outcome measures at pretest.

Posttest

For the parent data, t-tests comparing the means between the treatment and control groups at posttest indicated significant group differences on the following SP scales: Sensory seeking, emotionally reactive, inattention/distractibility, and sensory sensitivity. All p 's $< .05$. Group differences were not statistically significant at posttest on the following SP scales from the parents: low endurance/tone, oral sensory sensitivity, poor registration, sedentary, and fine motor/perceptual ($p > .05$).

For the SP teacher data at posttest, all four quadrant scores: registration, seeking, sensitivity, and avoiding; as well as all four factor scores: need for external supports, awareness and attention, tolerance for sensory input, and availability for learning yielded significant mean differences between treatment and control groups ($p < .05$).

In terms of the SRS parent data, significant group differences at posttest were observed in all but one subscale. There was no significant group difference in the awareness subscale ($p > .05$). However, the differences in cognition, communication, motivation, and mannerisms were significant ($p < .05$). For the teacher SRS data, significant group differences in the means were observed on all the subscales.

Follow-up

At the two month follow-up, parents detected significant differences in the inattention/distractibility, sensory sensitivity, and fine motor/perceptual subscales of the SP. However, the teachers no longer detected significant differences in either the four quadrant or four factor subscales of the SP. Similarly, there was no significant group difference on any of the subscales of the SRS at follow-up for either parents or teachers. In conclusion, we observed treatment effects from both teacher and parent data at posttest. These effects had subsided for most of the subscales except for three scales of the SP completed by parents.

Discussion

The results of this study indicate that EAA activities may be an valuable therapeutic option for children with autism spectrum disorders. More specifically, compared to wait list control participants, autistic children in the experimental group improved in critical areas such as sensory seeking, emotional reactive, inattention/distractibility and sensory sensitivity. The experimental subjects also demonstrated improved cognition, communication as well as motivation following the intervention. Both parents and teachers observed treatment effects at the first posttest. Although there was a significant difference following the initial posttest for

the experimental group, these effects had subsided for most of the subscales except for three scales of the SP completed by parents.

The observed increase in social functioning may be attributed to an array of reasons. Perhaps the exposure to the horse was, in some way, highly stimulating. The fact that participants had not been exposed to therapeutic horseback riding argues that this experience may have been a unique multisensory event that was directly associated either with the physical presence or natural movement of the horse. Possibly it is the relationship that was built between the subject and their horse, which empowered them to learn and enhance their functioning levels. It is also possible that the intervention affected participants' motivation levels during and after the intervention. The act of riding the horse may have been perceived as a rewarding stimulus that accounted for elevated levels of motivation and social engagement.

We are very grateful to HHRF for allowing us the opportunity to implement this much needed research. The results of this study will provide the industry valuable evidence for the effectiveness of Equine Assisted Activities in assisting children diagnosed with Autism. This study is the second of its kind to evaluate and quantify the impact of EAA on the social functioning of children diagnosed with ASD. Our results indicate that EAA services are a beneficial intervention for this population. Additional studies are needed to further assess its therapeutic effects, as well as to identify why the EAA activities provide individuals with ASD such positive results. We are very excited about sharing these results with the professional community and will notify you as soon as our paper has been accepted by a juried publication.

Table 1. Means and standard deviation for sensory profile (Parent Data)

Timepoints / Variables	Group			
	Experimental		Control	
	Mean	Std	Mean	Std
Pretest				
Sensory Seeking	64.01	10.81	61.52	12.57
Emotionally Reactive	49.17	14.23	51.80	13.55
Low Endurance/Tone	34.56	8.85	37.08	8.23
Oral Sensory Sensitivity	34.05	9.14	35.30	8.77
Inattention/Distractibility	21.33	5.02	21.88	5.70
Poor Registration	32.49	4.57	33.24	5.80
Sensory Sensitivity	17.03	3.42	16.80	3.11
Sedentary	11.60	4.45	14.04	4.24
Find Motor/Perceptual	9.16	2.44	8.76	3.31
Posttest				
Sensory Seeking	69.19	7.50	62.55	11.33
Emotionally Reactive	58.66	9.69	50.90	13.12
Low Endurance/Tone	38.56	5.07	34.63	9.61
Oral Sensory Sensitivity	33.70	8.76	33.51	8.39
Inattention/Distractibility	27.31	3.49	22.03	5.83
Poor Registration	33.44	4.38	33.12	5.77
Sensory Sensitivity	18.56	1.71	16.80	3.33
Sedentary	14.81	3.31	13.56	3.90
Find Motor/Perceptual	10.20	2.45	8.72	3.34
Follow-up				
Sensory Seeking	66.84	9.65	61.74	10.98
Emotionally Reactive	53.77	11.76	51.17	12.85
Low Endurance/Tone	36.28	7.00	35.56	8.53
Oral Sensory Sensitivity	33.74	8.57	33.43	8.23
Inattention/Distractibility	25.08	4.64	22.11	5.64
Poor Registration	33.12	4.43	33.34	5.78
Sensory Sensitivity	18.24	2.33	16.40	3.54
Sedentary	13.12	4.33	13.64	3.94
Find Motor/Perceptual	10.56	1.94	8.96	3.62

Table 2. Means and standard deviation for sensory profile (Teacher Data on School Factors)

Timepoints / Variables	Group			
	Experimental		Control	
	Mean	Std	Mean	Std
Pretest				
School Factor 1	66.52	15.61	68.33	18.31
School Factor 2	45.94	8.98	44.03	8.12
School Factor 3	55.77	12.80	56.08	11.72
School Factor 4	39.11	11.36	39.07	10.67
Posttest				
School Factor 1	78.84	14.51	68.02	16.61
School Factor 2	48.95	7.47	43.23	7.15
School Factor 3	67.08	8.95	57.01	13.14
School Factor 4	45.31	7.84	36.67	10.29
Follow-up				
School Factor 1	75.20	15.16	69.73	16.53
School Factor 2	47.20	7.83	43.39	8.06
School Factor 3	62.80	10.55	57.91	14.74
School Factor 4	43.30	8.33	37.88	10.68

Table 3. Means and standard deviation for sensory profile (Teacher Data on School Quadrants)

Timepoints / Variables	Group			
	Experimental		Control	
	Mean	Std	Mean	Std
Pretest				
Registration	55.20	12.92	55.62	14.24
Seeking	39.93	10.67	39.69	10.70
Sensitivity	52.67	9.75	52.89	8.56
Avoiding	59.51	15.29	59.38	14.27
Posttest				
Registration	64.84	11.65	54.48	14.26
Seeking	44.92	9.11	39.83	8.55
Sensitivity	60.53	7.55	52.35	8.20
Avoiding	69.86	10.83	58.24	13.40
Follow-up				
Registration	61.96	11.54	56.04	14.02
Seeking	43.24	9.83	40.16	8.64
Sensitivity	57.48	9.17	53.23	9.91
Avoiding	65.81	11.39	59.53	14.96

Table 4. Means and standard deviation for social responsiveness scale (Parent Data)

Timepoints / Variables	Group			
	Experimental		Group	
	Mean	Std	Mean	Std
Pretest				
Social Awareness	10.56	4.08	10.76	4.67
Social Cognition	16.83	5.78	16.97	7.64
Social Communication	32.07	11.12	30.31	14.39
Social Motivation	15.56	6.21	14.01	7.26
Autistic Mannerisms	17.48	7.72	16.33	8.21
Posttest				
Social Awareness	9.24	3.03	10.50	4.40
Social Cognition	13.16	5.52	18.32	6.48
Social Communication	22.44	8.99	30.68	13.92
Social Motivation	9.64	4.85	13.78	7.15
Autistic Mannerisms	11.72	5.02	17.72	7.47
Follow-up				
Social Awareness	9.61	3.19	9.94	4.16
Social Cognition	15.72	6.03	18.34	7.27
Social Communication	26.56	10.10	29.83	13.37
Social Motivation	11.68	5.98	13.54	8.06
Autistic Mannerisms	14.48	5.87	17.74	7.86

Table 5. Means and standard deviation for social responsiveness scale (Teacher Data)

Timepoints / Variables	Group			
	Experimental		Group	
	Mean	Std	Mean	Std
Pretest				
Social Awareness	11.72	2.73	11.63	4.73
Social Cognition	19.00	5.11	18.15	6.60
Social Communication	33.64	9.57	31.76	12.67
Social Motivation	16.12	6.17	15.94	7.86
Autistic Mannerisms	18.96	6.91	16.41	8.07
Posttest				
Social Awareness	9.76	2.83	12.39	4.31
Social Cognition	15.44	5.45	19.49	6.07
Social Communication	24.08	10.23	34.66	12.26
Social Motivation	11.16	5.07	16.03	6.88
Autistic Mannerisms	13.56	5.75	18.36	6.70
Follow-up				
Social Awareness	10.12	2.82	11.71	3.97
Social Cognition	16.20	4.80	18.60	6.82
Social Communication	27.40	8.48	33.08	13.20
Social Motivation	12.44	4.88	15.65	6.87
Autistic Mannerisms	15.08	7.06	17.50	6.99

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