

Evaluation of an equine therapy program in students with Autism spectrum disorder

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ABSTRACT

Equine Assisted Therapy (EAT) has the main objective of using horseback riding as a tool in a therapeutic process to improve, among other facets, motor skills and postural control and even psychological well-being. The purpose of this research was to determine if equinotherapy (horseback riding with a therapeutic aim) favours the motor, communication and social development in subjects with ASD. A case study was performed with 5 subjects between 8 and 31 years. The program was carried out over 32 sessions of 60 minutes each, a day a week. The recording techniques were a questionnaire, observation and a field diary. Among the most salient results, we point out improvements in balance, posture, fine and gross motricity, and an optimal muscle relaxation that gradually leads to a removal of stereotypies. Regarding the aspect of social communication, a major improvement in non-verbal communication, and new bonding of friendship, love and respect for animals. This study is a contribution to the scientific evaluation of equine therapy as an effective treatment in persons with ASD.

Keywords: Therapeutic horseback riding; Autism; Psychomotricity; Social skills; Qualitative study.

Cite this article as:

Portela-Pino, I., Bouzo-González, S., & Pino-Juste, M. (2020). Evaluation of an equine therapy program in students with Autism spectrum disorder. *Journal of Human Sport and Exercise*, 15(4), 783-793. doi:<https://doi.org/10.14198/jhse.2020.154.06>

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Submitted for publication September 2019

Accepted for publication October 2019

Published December 2020 (in press October 2019)

JOURNAL OF HUMAN SPORT & EXERCISE ISSN 1988-5202

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doi:10.14198/jhse.2020.154.06

INTRODUCTION

Equine Assisted Therapy (EAT) is a subtype of Animal Assisted Therapy (AAT) centred on therapeutic activities with horses and with the main aim of using horseback riding as a tool in the therapeutic process (Hakanson et al., 2009; Rothe et al., 2005). It is used to improve, among other facets, motor skills and postural control, even though its efficiency has been proven in other aspects. In fact, Buela-Casal and Zych (2010) defend, discussing the efficiency of animal assisted psychotherapy, that the interaction with animals has a positive effect on the cardiovascular activity, reducing blood pressure, and even increasing the survival rate of patients that have suffered a heart attack. In the same way, it has been proven that having a pet has a positive influence in the psychological well-being of a person and even reduces the use of health services. Having a pet during childhood is correlated with increase self-esteem, better non-verbal communication and improved social skills, even offering protection against school failure.

In children suffering from cerebral palsy, it has positive effect on the normalization of muscle tone, postural control and produces psychological benefits (Debusse et al., 2005), improves trunk/head stability (Shurtleff et al., 2009) and improves balance, symmetry, and body alignment, and also the inhibition of pathological patterns of movement (Ionatamishvili et al., 2003; Tauffkirchen, 1978). It has a positive effect on self-efficacy, confidence and self-esteem (Debusse et al., 2009).

After therapy, the effects of equinotherapy are maintained on the long term. Therapy is not only effective in improving gross motor functions but also highly benefits self-perception and social acceptance (Frank et al., 2011). The therapy significantly improves the symmetry of muscle activity after 8 minutes of work on the back of a horse (Benda et al., 2003; Bertoti, 1988; Casady y Nichols- Larsen, 2004; Sterba et al., 2002).

Studies performed with subject suffering from Down syndrome mainly note the great improvement in the postural control of head or trunk (Champagne and Dugas, 2010). In persons with multiple sclerosis, the results have been spectacular, reducing postural instability and improving balance (Silkwood-Sherer y Warmbier, 2007) and also their quality of life (Brewerton et al., 2010).

In patients with spinal cord injury, equinotherapy significantly reduces spasticity of the lower limbs (Lechner et al., 2003; Lechner et al., 2007).

In patients with schizophrenia, equinotherapy has a positive impact on balance and the ability to plan and organize, on selective, divided and sustained attention, and also y socialization skills (Serra Mayoral et al., 2011).

In regard to the group subject of this study, the development of the motor function through equinotherapy is very significant in autism (Aldridge, 2012) and can have an immediate impact on autonomy, suggesting the need of more work to also impact cognitive, affective and social aspects (Freire, 1999). According to that author, hippotherapy can improve social relationships because it favours a better perception of the external world and its impact on the tonic-postural adjustments (Freire, 2003). There seem to be similarities in the behaviour of autistic individual and some attitudes by the horse (Roberts, 2002). Loud noises, changes in the familiar and unknown surroundings can cause insecurity in both cases, and a great deal of their communication relies on body language. According to Wilson and Turner (1998) the horses' instinctive ability to perceive the intentions of the rider relaxes the animal when guided by a person with autism.

In regard to the motor function, Ajzenman et al. (2013) evaluated the effects of hippotherapy in children with autism spectrum disorder (ASD). The results showed a marked decrease of postural sway after the intervention. Besides, significant improvements were shown in adaptive behaviours (receptive communication and coping) and in participation, self-care and social interactions.

In regard to the effect of therapeutic horseback riding on the social functioning in children with autism, Bass et al. (2009) showed that the participants in the intervention exhibited greater sound seeking, sensory sensitivity and social motivation, as well as less inattention, distractibility and sedentary behaviours.

Authors such as Tabares et al. (2012) analysed the effects of hippotherapy on hormonal changes of the autistic population. They measured cortisol and progesterone levels, and indirectly those of oxytocin, before and after the hippotherapy sessions. They found that hippotherapy reduced the salivary levels of the hormones, reaching the conclusion that the sessions improved social attitudes.

Equinotherapy as a strategy of psychological intervention in adolescents helps to significantly improve dissociated and disruptive behaviour, to favour integration and to improve the behaviour (Quevedo-Blasco et al., 2010), social interaction and sensory processing (Ward et al., 2013), to reduce aggressiveness (García-Gómez et al., 2014), to produce speech improvements (Macauley, 2007), to increase the quality of the father-son relationships (Kern et al., 2011), motivation (Taylor et al., 2009), to control irritability, lethargy, stereotypic behaviour, self-regulation, hyperactivity, expressive language skills, motor skills and verbal praxis skills (Gabriels et al., 2012), to improve communication, imitation, perception, emotion and motor adjustment (Hameury et al., 2010).

Following these evidences, our objective was to design and evaluate an equinotherapy program to endorse and prove its benefits both in the areas of emotional development and communication, and also for the motor development of the persons with autism because the exercise programs develop the physical fitness levels of children with autism (Huseyin, 2019).

METHOD

Table 1. Connection between objectives and competences.

MOTOR DEVELOPMENT AREA	
Objective	Competences
Increase relaxation skill.	Muscle relaxation capacity.
Correct sensory integration.	Reduction of stereotypies.
Improve postural attitudes.	Improve posture and balance.
To strengthen muscles.	General motricity (fine and gross).
Improve horse-riding skills.	Improve posture and balance.
To strengthen muscles.	General motricity (fine and gross).
SOCIAL COMMUNICATION AREA	
Objective	Competences
Encourage touch and contact.	Proximity to other subjects of the same age. Reinforce relationship attempts. Development of communication skills.
Develop learning dexterities.	Generalization and automatization of alternative communication systems.
To get in touch with emotions.	Improve self-control of their own emotions.

Description of the program

The intervention program was performed for 9 months, in sync with the school year. It was implemented over 32 sessions, one day per week, 60 minutes per session.

The following tables details the objectives and competences of the program.

Participants

The study sample was five subjects. Four males and one woman, with ages ranging from 8 to 31 years. Neither had functional oral language, but sometimes they would repeat phrases without communication intent. They perfectly understood verbal, oral language and the instructions. Their responses manifested as non-verbal language based on occasional visual contact. They did not show excessive tactile defence to new interactions, but they all showed well-defined stereotypy: sway, arm flapping, twirling, emission of self-stimulating sounds... even attempts at self-lesion at particularly stressing moments. The males could walk autonomously, although showing a concrete gait pattern, the posture was not fully erect, dragged their feet when walking and three of them showed a slight overweight. The girl had a great physical dependency for walking, requiring the hand of a caretaker or family member, showing low motor development, both gross and fine.

Instruments

With the aim of triangulating the information, several data-gathering techniques were used. The data-gathering process started with an exhaustive analysis of anamnesis, evaluations and previous medical diagnoses. The families, the principals of the education centres and the different therapist working with the children were interviewed.

A questionnaire with a pretest-posttest design was used to evaluate the impactor of the program on the motor aspect. The instrument was constructed taking into account the characteristics of a person with ASD as set by the DSM-V, adapted to the hippotherapy activities being performed.

During the sessions, an observational register was kept and at some concrete moments, photographs were taken to register a specific evidence. Finally, the evaluation was completed by a field diary registering the comments and inputs of each member of the multidisciplinary team.

Procedure and data analysis

The study was conducted according to the ethical standards established by the Declaration of Helsinki (Hong Kong revision, September 1989) and in agreement with the Good Clinical Practice recommendations of EEC (document 111/3976/88, July 1990) and in accordance with Spanish law regulating research.

The questionnaire was filled in individually, before the first horseback riding session, after telling the families and receiving their informed consents.

The present study is based on an interpretative analysis, so the research included a methodological dimension characterized by the content analysis from a triangulation of qualitative and quantitative data. A process of categorical analysis was used to handle the information gathered.

For this stage of the process, the problem and aims of the study were taken as reference and the triangulation of the data was used. The data were gathered from the questionnaire presented before and after the program, the field diary, the photographs and the details recorder in the daily observational register. The information

gathered was qualitatively analysed in parallel to the field work to classify the different aspects under an objective and systematic categorization inside a message. In such way the dimensions of analysis emerged, appearing through a complex inductive process while the research was being performed. The analysis of the information was organized around two dimensions: psychomotricity and socialization. And in each one a series of related subcategories were analysed.

RESULTS

Motor development

The next table shows that all evaluated items in the questionnaire improved considerably.

Table 2. Means of the acquired results in motor development.

RELAXATION	Mean Pre	Mean Post
Dynamic coordination	1.8	2.6
Motor dissociation	1.8	2.6
Visuomotor coordination	1.2	2.6
Spatial orientation	1.4	2.4
Time structure	1.6	2.6
Total	1.56	2.56
POSTURAL ATTITUDES	Mean Pre	Mean Post
Tonic-postural control	1.4	2.4
Balance	1.8	2.4
Lateralization	1	2
Total	1.4	2.27

Relaxation

We can attest that our subjects markedly improved their muscle relaxation capacity, increased their sensory integration and significantly reduced their stereotypies. The improvement in visuomotor coordination stands out, being very low in the pre-test and much higher in the post-test. The data are confirmed by the annotations in the field diary *“fifteen minutes after starting the activity the hypertonia had been reduced and the participants showed relaxation and enjoyment of the activity. The stereotypies of the subject were reducing with the progression of the session”* (COUNSELOR).

The activities most inducing to reaching these objectives were the “walks in the field”. According to the data from the field diary *“a little while after starting to walk in the field we observe the participant to calm down with the cadence of the horse walking”* (HORSE RIDING INSTRUCTOR).

Postural attitudes

According to the field diary, all participants improved their posture and balance both on the horse and on the ground, strengthened their muscles and improved their fine and gross motricity.

But the greater benefits were in fine motricity because all of them could hold the reins with both hand, favouring the elimination of stereotypies, *“the cadence soothes them... now they can take the reins with both hands... they leave behind stereotypies such a biting themselves... arm flapping... finger crossing and taking them into the mouth...”* (HORSE RIDING INSTRUCTOR).

Horseback riding technique

The objective of improving the horseback riding technique aimed to improve posture and balance, muscle strengthening and improving both fine and gross motricity.

Even though autonomy and independence were encouraged, they were always in the company of a volunteer or professional holding the horse and another therapist by the side. Specially in the second semester we tried for a few minutes that they would guide alone the horse through the track. During the last sessions, in an indoor track and leading the horse by a rope, the most advanced patients practiced the gallop. From the data in the field diary we can add *"With three of them the saddle could be used since the first session. One has to use breastplate during the first sessions because hypertonia prevented them from keeping the feet in the stirrups"* (HORSE RIDING INSTRUCTOR).

"The activity of "static suspension" (keep the posture while the horse is moving) froze them so I offer my hand to hold and they make a failed attempt at suspension, because their legs go back" (PHYSIOTHERAPIST, 2nd session).

Every patient but one managed to be correctly seated and balanced during gallop guided with a rope by a monitor. According to the observational register *"The activity of suspension riding was performed by all regardless of the help by the physiotherapist or a volunteer, the horse lead by a rope, or course, guided by the instructor. The degree of balance, control and autonomy in this action has been very good in all cases except LNS"*. (COUNSELOR).

All the participants considerably improved their equestrian attitude both relating to the use of elements and riding in itself. *"The learned to prepare, take care of and clean the animal; (...) at the beginning they required a lot of help because fear or anxiety would block them... the action of getting off the horse was more easily integrated that getting on, possibly due to the release of the tension created by the activity in itself, and the level of relaxation present at the end of the sessions... they can stay on the mount during walk, trot and gallop (by a rope, with the monitor leading the animal) and lead the animal by themselves..."* (COUNSELOR).

Table 3. Means of the acquired results in social communication.

TOUCH AND CONTACT	Mean Pre	Mean Post
Visual contact	1.4	2.8
Body gestures	1	2.2
Physical contact	1.6	2.8
Relation with age pairs	1	1.8
Total	1.25	2.4
LEARNING DEXTERITIES	Mean Pre	Mean Post
Actions asking about or showing objects of interest	1	2.4
Participation in social games during therapy	1	2
Acknowledgement and verbal or body communication with the horse	1	2.8
Ability to have a conversation with another person	1	1.2
Total	1	2.1
EMOTIONS	Mean Pre	Mean Post
Intent on sharing the experience	1.2	2.6
Intent on sharing personal achievement with others	1.2	2.4
Emotional reciprocity	1.2	2.8
Understanding the feelings of others	1.8	3
Total	1.35	2.7

Social communication

The following table shows that the evaluated items of the questionnaire on the objective in the area of social communication greatly improved.

Touch and contact

The aim of encouraging touch and contact was an attempt to increase the proximity of the participants to other subject and reinforce their attempts at relationships, and also develop their communication skills. In those competences the participants also showed great improvement, as seen in table 3. But the data are partially corroborated by the entries in the field diary, because all the participants showed a great “tactile defence” in the first contact with the animal and during the first two sessions, but “*by the third session they were able to hold their horse, stroke it, give it a reward (bread) at the end of the session with a congratulations pat*” (HORSE RIDING INSTRUCTOR). In regard to proximity to the members of the interdisciplinary team, it was good, except in the case of two of the subjects that “*got angered when trying to promote their independence and autonomy of movement by gradually reducing the support during the transfers or when allowing them to lead the horse by themselves*” (HORSE RIDING INSTRUCTOR). They worked on touch and contact seeing an improvement in the contact with the therapist when riding a horse. The relationship with their peers of the same age was the object of several exercises, getting them to greet each other with a gesture or visual contact when meeting in the track.

Learning dexterity: alternative systems of communication

The objective aimed to improve the generalization and automatization competence of the alternative systems of communication. In this area, the pre-test mean was the lowest. But, in three of the items taken into account the rating increased, especially in a significant way in relation with recognition and non-verbal communication with the horse. The ability to have a conversation with another person also improved, but less than the other items, especially if we take into account that they were autistic subjects with almost not established oral language.

According to the field diary in regard to the execution of communication activities focused on learning, an important factor is that the five subjects lacked functional oral language, but “*a significant improvement to their capacity for communication using non-verbal language was observed. At the beginning, it was hard for them to have visual contact with the professionals working with them, (...) but as the program progressed all of them improved their attention and the comprehension of the indications of the therapist and participated with interest in the activities*” (COUNSELOR).

Emotions

The objective of getting in contact with emotions was centred on the competence of improving the self-control of their own emotions. As can be seen, the improvement is significant in all the objectives. According to the field diary “*the relationship with the horse and the riding classes encourage their interest in contacting with new people and share with them the experiences of the activities*” (COUNSELOR). Examples of this “intentional communication” were: “*search for visual contact, some expressions of joy and friendliness, grab the hand of the therapist and guide them towards the animal to start the session*” (COUNSELOR).

DISCUSSION AND CONCLUSION

In agreement with other studies (Benda et al., 2003; McPhail, 2006; Snider et al. 2007), it has been proven that the contact with the horse has a positive influence in the areas of motor development and social communication of persons with ASD. Besides, it is proven that hippotherapy can be considered an integral

therapy, not only benefiting the physiotherapeutic functions, but also offering benefits in the psychological area (Murphy et al., 2008).

In regard with the first objective set, to improve the ability to relax, the program increased muscle relaxation and sensory integration, and reduce stereotypies in all participants. It must be pointed out the improvement in visuomotor coordination, spatial orientation and time structure. As Aldridge (2012) says, an increase in sensory organization corresponds to an increase in visual contact and the association with the surrounding environment.

The second objective, to improve postural attitudes, resulted in a better posture and balance of the participants, and also a strengthening of the muscles and a general improvement in fine and gross motricity. The results agree with the finding by Freire (2003) who points out the importance of hippotherapy in tonic-postural adjustments. In the area of psychomotricity, the results of this study are similar to those of Hameury et al. (2010) that found that after the equinotherapy sessions the children were more stable and behaved more calmly, obtaining an optimal sensory integration. The results by Gabriels et al. (2012), proving that equinotherapy causes significant improvements in measurements of irritability control, lethargy, stereotypic behaviour, self-regulation, hyperactivity, expressive language skills, motor skills and verbal praxis skills, were also corroborated.

In the aspect of social communication, there were improvements in the relationship with other subjects of the same age and in the performance of communicative activities, but with results not as high as in other areas. Despite that, the participant lowered their tactile defence to the animal, better accepted the presence of the interdisciplinary team and recognized their partners of the same age using gestures or visual contact; we should highlight the attempts at communication of the participants, with their faces and eyes searching the visual contact and the approval of the instructors. That agrees with the statement by Martínez Abellán (2008) that animals help persons with communication difficulties to have a better relationship with others.

In regard to execution of communication activities aimed at learning, hippotherapy contributed to improve their non-verbal communication skills; as the sessions progressed, they were able to pay attention and understand progressively better the indications by the instructors. In addition, they learned to understand the needs and intentions of the horse and interact with it the right way. All the participants reached a good communication with the animal, even those suffering of greater problems for interpersonal communication. That fact mirrors the contributions by Roberts (2002) pointing out the similarities between the behaviour of autistic individual and some attitudes by the horses. On the other hand, it must be said that none of them improved their abilities to have a conversation with another person, suggesting that hippotherapy is not especially useful in that area. But works such as those by Macauley (2007) and Sams et al. (2006) show important advances and improvements in the communication of autistic children after hippotherapy. In the present case, the subjects lacked functional oral language, so the improvement in relation to that objective in itself was evaluated through aspects related to non-verbal communication.

In regard to the objective of connecting with emotions, the results march other studies such as Taylor (2009) and Sams (2006) who point out that, following the sensory integration approach, the fact that the therapy is performed in a natural environment makes the animals respond spontaneously and in a natural way to the behaviour of the children, something that helps their mutual relationship. In this intervention the patients showed a significant improvement in their communication intention and greater self-control because they were better connected to their emotions.

The results of this study support the biocentric perspective of development. All the subjects with autism participating responded positively to the presence of animals in their surroundings. That also helped the therapists to establish a good relationship with the participants, encourage them to actively participate in the activities, enjoy them and share their achievement with others. The participants for their part learned to interpret the behaviours of the horse and give the right response, process that helped them to improve their comprehension of the more complex behaviours of other persons. The present study aims to contribute to the scientific evaluation of equine therapy as an efficient treatment for patients with ASD.

Obviously, it would be important to perform similar studies to increase the subject population and strengthen the empirical evidences for these conclusions.

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