ARKANSAS STATE UNIVERSITY
College of Nursing and Health Professions

The Effects of Hippotherapy on Motor Performance in an Individual with Autism

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Who Am I

- BS Physical Therapy University of Tennessee Health Science Center (1989-1990)
  - Inpatient Therapist Northeast Arkansas Rehabilitation Center (1990-1991)
    - TBI
    - CVA
    - Total Joints
    - Amputations
  - Director of Physical Therapy (6 months later ☺) (1991-1992)

Who Am I

- Advanced Masters Orthopedic and Neurological Physical Therapy University of Tennessee Health Science Center (1993-2001) (Why so long????)
  - Outpatient Industrial Therapist (6 hours)
  - Director of Outpatient Services (1993-2000)
  - Human Developmental Center
  - KIDS First

Who Am I

- Instructor of Physical Therapy (2000-2001)
  - PTA and MPT Classes
- Assistant Professor of Physical Therapy (2001-2006)
  - Pediatrics, Adult Neurological, Orthopedics, Anatomy, Kinesiology, Research, Integumentary, You name it ☺
- Specialist in Education (EdS) Arkansas State University (2004-2006)

Who Am I

- Associate Professor of Physical Therapy (2006-2012)
  - See Previous Slide (+ Interim Chair)
  - DPT initiated 2009
- Doctorate in Education (EdD) Arkansas State University (2006-2008)
- Colon/Rectal Cancer (2011) ☹
- Professor of Physical Therapy (2012)

Who Am I

- 6 years old Mule stepped on my foot
- Graduate student interested in hippotherapy 2002
- Level I course American Hippotherapy Association 2007
- Level II course American Hippotherapy Association 2009
- Standards and Practice Chair American Hippotherapy Association

Who Are You???

- Name
- State you are from
- Area of Expertise/Interest
- Years in the Field
- Why are you here today ☺

What was that all about

- To remind us why we do, what we do
  - To help change a person's life and their family
  - To give hope to the hopeless-some may say
  - To prove folks wrong
  - To watch amazing things happen using a horse

Introduction

Autism is a developmental disorder that affects nearly 1 in 110 children in the US. Symptoms of autism include difficulty processing sensory information, decreased coordination, delayed gross motor development, decreased ability to function in social settings, a decreased ability to motor plan, and speech deficits.

Autism

- What do you see
- Where/When do you see it
- Anybody found the Holy Grail yet??
  - Medication
  - Therapy
  - Intervention

Introduction

Research is currently being conducted by faculty and students from the physical therapy department at Arkansas State University to determine if hippotherapy is an effective treatment option for children with a diagnosis of autism.

What Is Hippotherapy?

- Hippotherapy is the use of natural movements of a horse for a treatment tool in individuals with disabilities and is utilized by occupational therapists, physical therapists, and speech therapists.
- The word hippos is derived from the Greek word meaning “horse” which gives therapy on a horse the name Hippotherapy.

What Is Hippotherapy?

- Hippotherapy has been utilized for many indications in children and adults.
- These indications include: abnormal muscle tones, impaired balance, abnormal reflexes, impaired coordination, impaired communication, poor oral motor functioning, impaired sensorimotor function, postural asymmetry, poor postural control, impaired mobility, and delayed speech and language.

Therapeutic Benefits of Hippotherapy

Decreased Sensory Organization/ Processing

Vestibular input from the movement of the walking, trotting, running horse.
Tactile input from petting the horse, feeling the saddle.
Proprioceptive input from feet sitting in the stirrups as well as compressive forces through the spinal column as the rider sits in the saddle.
Rhythmic movements can often be soothing for a patient with difficulties regulating their systems.

Increased difficulty with socialization

Patients are able to bond with the horse during treatment sessions as well as physical therapist. As sensory organization increases, speech often improves, as well as increased eye contact and association with the environment.

Decreased motor skills including balance, coordination, postural control, and motor planning

Horse riding requires increased core strength, increased strength in hip/pelvic stabilizers, and increased coordination in order to maintain an upright position on the saddle. Furthermore, the patient is constantly having to adjust and react as the horse moves through its normal gait pattern. These skills are strengthened additionally by therapeutic exercises performed by the patient on the horse.

Decreased Body Awareness

As a patient achieve increased levels of sensory organization they are able to better understand where their bodies are in space, allowing them to achieve more appropriate movement patterns and attain improved gross motor skills.

Hypothesis Tested

- Hippotherapy will result in no difference in gross motor performance measured by four components of gross motor function when compared to traditional physical therapy.

Methods

- Sample
  - The subject included in this study was an 11 year old female from Northeast Arkansas. This child has been medically diagnosed with Autism, Immune Deficiency Disorder, epilepsy, and cystic fibrosis.
  - This subject did have seasonal allergies and wore a face mask during hippotherapy sessions.

Methods

- Sample
  - The population sample was a sample of convenience.
  - The exclusion criteria for this study were atlantoaxial instability, Gran mal seizures uncontrolled by medications, acute herniated disc, and active mental health disorders that would be unsafe.

Methods

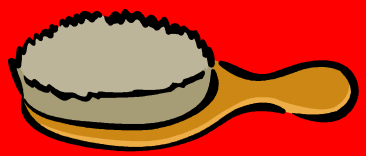
- Design of the study
  - This study used an A~B single subject repeated measures design.
  - !5 weeks of Treatment A and 15 weeks of Treatment B were proposed
  - The measurements used were catching a small tossed ball with two hands 10 feet away, catching a small bounced ball with one hand 10 feet away, throwing a small ball at a target, and a component of standing on one leg with hands on the hips and no allowance of hooking.

Intervention Treatment A

- Patient received hippotherapy one day per week for approximately one hour
  - 30 minutes of grooming and tacking
  - Proper mounting and dismounting of the horse
  - 30 minutes of riding, including therapeutic exercise, ball tasks
  - 10 minutes of testing

Equipment Used

- Lead Rope
- Halter or Bit
- Saddle Pad (Western, English, Trail, Dressage)
- Saddle (Western, English, Trail, Dressage)
- Grooming Brushes
- Helmet
- Gait Belt
- Steps to Mount Horse
- Horse Handler & 2 Side Walkers



Treatment A

- 30 minutes:
  - Grooming with horse brush and comb
  - Tacking horse with pad and saddle

- 30 minutes:
  - Riding a horse with exercises on horse
  - Circles. Straights, Poles, Cones, Barrels
  - Walk, Trot
  - Starts and Stops

Exercises on the Horse

- All exercises are done in forward sitting:[1]
  - Facilitates a posterior pelvic tilt
  - Familiar sensory input from visual and vestibular systems
- "Make a tower"
  - Elongation of the trunk
  - Encourages upright position
- "Twisting Airplane"
  - Trunk rotation
  - Upright position

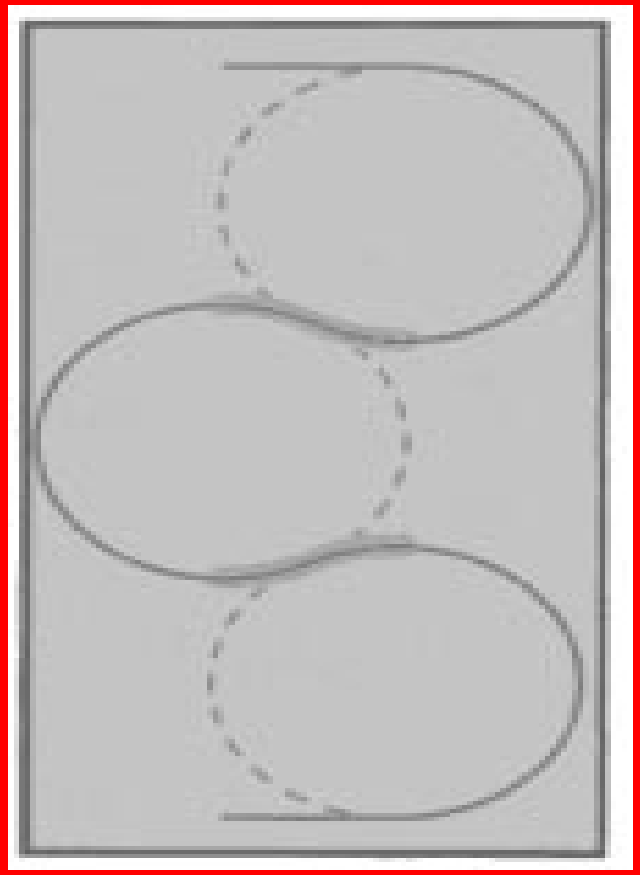
Exercises on the Horse

- **“Holding the Stick” (hold in middle/shoulder width apart)**
  - **Trunk rotation**
  - **Trunk extension**
- **“Catching/Throwing a Ball”**
  - **Side walkers stand in front of, to the side of, and slightly behind subject on horse and the subject catches/throws the ball to either side.**
  - **Trunk rotation**
  - **Ball skills**
- **“Wood Chops” (PNF pattern Bilateral Asymmetrical D1 UE’s)**
  - **Upper trunk flexion/extension and rotation**
- **“PNF” Bilateral Symmetrical D1/D2 flexion /extension patterns**
  - **Trunk extension**

Exercises on the Horse

- The horses direction was also changed in the following ways:
  - Serpentine
  - Figure Eight
  - Circle around Arena

- What does this do?
  - Elicits a weight shift across midline and stimulates lateral flexors
  - Requires asymmetrical responses



Exercises

- Patient was given verbal cues such as “sit up straight”, “keep your tummy tucked in”, and “keep your toes straight” to help improve posture
- Manual cues to keep core tight
- 3 horses were used
  - Cowboy
  - Buddy
  - Allie

Intervention Treatment B

- Patient received traditional therapy one day per week for approximately one hour
  - Stretching
  - Balance Activities
  - Sensory Diet
    - Brushing
    - Rocking
    - Rolling
    - Tactile Tasks

Intervention Treatment B

- Patient received traditional therapy one day per week for approximately one hour
  - Swinging
  - Vestibular Ball
  - Bolster
  - Approximation/Compression

Testing

- Instrumentation
  - The instrumentation for this study consisted of catching a ball with two hands (component 1), catching a bounced ball with one hand (component 2), throwing a ball at a target (component 3), and standing on one leg with hands on hips and eyes open (component 4). Each of these components was measured individually by number of catches, number of target hits, or seconds. These measurements were taken so that changes could be measured over the 15 week period.

Methods

- Data Collection
  - For treatment A the subject was seen for a one hour session once a week for 5 weeks. Subject missed10 of the 15 weeks during Treatment A. (Illness,Weather, Fall, Socioeconomical)
  - Each hippotherapy session was split up into two 30 minute parts. The first 30 minutes consisted of grooming and tacking the horse .
  - The second 30 minutes consisted of exercises on the horse.

Methods

- The traditional physical therapy sessions Treatment B were provided by the subject's regular physical therapist at the subject's home for 15 weeks. This physical therapist was also present and tested the subject at each hippotherapy session.
- The subject was seen for 15 consecutive weeks for Treatment B.

Methods

- After each hippotherapy (Treatment A)and traditional physical therapy (Treatment B) was completed the subject was tested with the components mentioned above.
- The same small ball was used each time for all components tested. The subject was tested in the same location for each hippotherapy session by the same physical therapist each time in the barn classroom, and tested by the same physical therapist for traditional physical therapy at the subject's home in the living room following each session.

Methods

- Data Analysis
  - The data was analyzed using descriptive statistics consisting of a minimum, maximum, and a mean for comparison between the A and B design. Each of these statistics were used to compare individual components of the data. For example, the minimum, maximum, and mean for treatment A's component 1, was configured to compare with treatment B's component 1 and it's minimum, maximum, and mean. All of the components were configured individually and compared for 5 visits of treatment A and 15 visits of treatment B. The data consists of 4 components of comparison.

Results

The results for component one with Treatment A including 5 visits consisted of a mean of 6.4 catches (Table 1).

Treatment B's 15 visit component one has a mean of 1.53 catches which is 4.87 catches below treatment A (Table 2).

Component 1 Catching a Tossed Ball

Treatment A Hippotherapy

TABLE 1			
N=5	MINIMUM	MAXIMUM	MEAN
10	2	10	6.4
8			
4			
2			
8			

Treatment B Traditional

TABLE 2			
N=15	MINIMUM	MAXIMUM	MEAN
5	0	5	1.53
2			
3			
1			
1			
2			
1			
2			
1			
1			
1			
1			
0			
1			
1			

Results

Component two in Treatment A has a mean of 0.2 (Table 3).

Treatment B component two has a mean equal to 0 (Table 4).

There were no bounced balls caught in treatment B component two and 1 ball caught in treatment A.

Component 2 Catching a Bounced Ball

Treatment A Hippotherapy

TABLE 3			
N=5	MINIMUM	MAXIMUM	MEAN
0	0	1	0.2
1			
0			
0			
0			

Treatment B Traditional

TABLE 4			
N=15	MINIMUM	MAXIMUM	MEAN
0	0	0	0
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			
0			

Results

Component three for Treatment A has a mean of 5.4 target hits (Table 5).

Treatment B a mean of 1.07 target hits (Table 6).

Component 3 Hitting a Target

Treatment A Hippotherapy

TABLE 5			
N=5	**MINIMUM**	**MAXIMUM**	**MEAN**
2	2	7	5.4
6			
6			
6			
7			

Treatment B Traditional

TABLE 6			
N=15	**MINIMUM**	**MAXIMUM**	**MEAN**
3	0	3	1.07
2			
3			
1			
1			
1			
1			
0			
0			
1			
1			
0			
0			
1			
1			

Results

Component four consisted of three trials given to the subject to stand on one leg with hands on the hip and eyes open to allow for the subjects full ability to be obtained. The average was then taken from the three trials and used towards finding the mean for the component.

The mean of Treatment A was 26.67 seconds (Table 7) and Treatment B was 3.65 seconds (Table 8).

All of the minimums and maximums from the data collected of the components were higher in treatment A except for catching a bounced ball with one hand, the minimum was zero for both treatment A and B.

Component 4 Standing on One Leg

Treatment A Hippotherapy

TABLE 7			
N=5	MINIMUM	MAXIMUM	MEAN
31.33	18	34.33	26.67
24			
34.33			
25.67			
18			

Treatment B Traditional

TABLE 8			
N=15	MINIMUM	MAXIMUM	MEAN
10.33	1.67	10.33	3.65
4.33			
4			
3			
3.67			
2			
1.67			
8			
2.33			
2			
2.33			
2.33			
3.67			
3.33			
1.67			

Discussion

- Treatment A, which consisted of Hippotherapy for 5 visits in 15 weeks, appears to have shown benefits when compared to 15 visits in 15 weeks of traditional physical therapy in a subject with Autism.
- This leads to believe that Hippotherapy is beneficial in a subject with Autism when compared to traditional physical therapy by way of descriptive statistics.
- Not Statistically Significant at the .05 level.

Discussion

- Limitations
  - The limitations in this study include uneven amount of visits, environmental, socioeconomic, physical and inclement weather conditions.
  - Environmental limitations may have made a contribution to the subject's performance.
  - The subject was in a barn for testing of treatment A and inside her home in treatment B. The barn may have been visually more open than the subject's home, and it contains more olfactory and sensory stimuli.

Discussion

- Limitations
  - Socioeconomic factors come into play due to the subject not living in the area where Hippotherapy was performed.
  - The subject lived around 30 minutes away and the family had one means of transportation.
  - Physical limitations apply due to the subject suffering from a fall outside of this study during Hippotherapy causing her to miss two sessions.
  - Inclement weather played a major factor in limiting the amount of Hippotherapy sessions needed to have an equal number of visits for comparison.

Different Next Time

- Different Tester
- Spring start versus Winter Start
- Indoor versus Outdoor arena
- Scholarship/Sponsorship
- More weeks/More points/More Data

Different Next Time

- Cortisol response
  - Swab technique
  - Clinical Laboratory Sciences and Nursing
- Full Testing Battery Pre, Mid, and Post
- Family response
  - Social work

Different Next Time

- Your thoughts and ideas ???

In the Future

- Children with a variety of medical diagnoses
  - Autism
  - Neurological
  - Orthopedic
  - Genetic
  - Developmental Delay

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Questions

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Thank You