



**Therapeutic Horseback Riding and School-Age Children and Adolescents with Autism Spectrum Disorders**

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**Why Study THR?**

- For over 40 years in the U.S. and Canada, therapeutic horseback riding (THR) has been used to enhance functioning in the following areas:
  - Physical
  - Psychosocial
  - Cognitive
- Few studies to guide consumers and majority focus on individuals with physical disabilities (cerebral palsy). (Snider, Komer-Bitensky, Kammann, Warner, & Maysoun, 2007)

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**Why Study THR with ASD Population?**

- High ASD prevalence estimates & parents struggle to find effective interventions for these children with complex issues.
- NARHA, accredits riding programs and instructors in the U.S.
- NARHA collects data from over 500 therapeutic riding centers & THR is conducted with ASD individuals **more than any other disability.**  
(Personal communication with NARHA representative, Sddita Fraddete, May 2008)
- Basis for improvement still needs to be examined thoroughly using systematic THR intervention protocols

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**BACKGROUND**

### THR historical overview

- 1952 Denmark : Madame Liz Hartel rehabilitated herself from a wheelchair due to polio to win Olympic medals with her horse in 1952 and 1956 (King, 2007).
- 1960s: Riding horses for therapeutic purposes spread from Denmark, Norway, and England to the U.S. & Canada.
- 1970: North American Riding for the Handicapped Association (NARHA) established & developed accreditation standards for riding programs and instructors. (Engel, 1997)



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**BACKGROUND**

### Hippotherapy vs. THR



- Hippotherapy
  - Conducted by an OT or PT
  - Horse viewed as a therapeutic (medical) tool to improve physical functioning in patients (Kluwer, 1982).
- THR
  - Conducted by a certified riding instructor
  - Horse helps improve horsemanship and general life skills in individuals with disabilities.

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**BACKGROUND**

### Studies of THR and ASDs

- Results from the few studies with children who have autism suggest that as few as eight weeks of THR intervention can have positive effects on improving:
  - Mood/emotion regulation
  - Adaptive behaviors-animal care & trying new things
  - Social awareness, cooperation, conversation
  - Motor coordination/planning

(Bass, Duchoeny, Llabre, 2009; King , 2007; Kohn, 1996; Leitao, 2003; Snider et al., 2007; Stoner, 2007; Tolson; 1997)

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**BACKGROUND** **JADD April 2009**  
**Bass, Duchowny, & Liabre**  
 Good Hope Equestrian Training Center/U. of Miami

Methods

- ASD dx from U. of Miami Center for Autism and Related Disabilities
- THR Group n = 19 (ages 5-10 yrs)
- Waitlist n = 15 (ages 4-10 yrs)
- Pre-Post assessments (within 12-weeks of intervention)
  - **Social Responsiveness Scale-Parent-rpt.**
  - **Sensory Profile-Parent rpt**
- 12-weeks of THR intervention

Results

- Social Responsiveness Scale
  - Significant interactions between group and time on:
    - Overall score
    - Social Motivation Subscale
  - NS: fine motor/perception, Social cognition, Social awareness
- Sensory Profile
  - Significant interactions between group and time on:
    - Overall score
    - Sensory Seeking
    - Attention/distractibility
    - Sensory sensitivity
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**BACKGROUND** *Beginning Theories:*  
*How does THR work with ASDs?* 

- Mood and emotion regulation/self-regulation:
  - Organizes the sensory system
  - Provides input to the sensory system
  - The "warmth generated by the horses muscles during movement is thought to promote muscle relaxation in the rider ...(and) this warmth may have a calming effect" (Stoner, 2007)

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**BACKGROUND** *Beginning Theories:*  
*How does THR work with ASDs?* 

- Adaptive daily living/social functioning:
  - Provides a significant cause-and-effect experience for the rider to understand the impact of their behavior on another being.
  - For example, the experience of the rider is, if they are calm and pull the reins in a certain way, the horse will respond.
  - Volunteer handlers can add to the social experience of THR for the child.

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**BACKGROUND**

*Beginning theories:*

*How does THR work with ASDs?*



- Motor coordination, organization, and planning  
*(sequencing ability, coordination, and multitasking):*
  - The continuous adjustments to the horse's movements during riding, "...involves the (rider's) use of muscles and joints, leading to increased muscle strength, tone, bilateral control, balance, and a range of motion" (King, 2007, p. 122).

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**Study Objective**

- Collect pilot data to examine the effects of 10 one-hour weekly sessions of Therapeutic Horseback Riding (THR) in school-age children and adolescents (**ages 6 to 17 years**) with Autistic Disorder or Asperger's Disorder.

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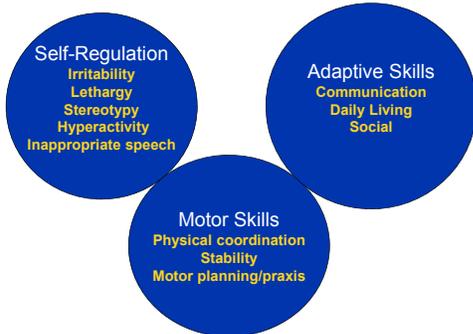
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**Primary Aims**

Evaluate effects of THR (pre-post) in 3 core areas:



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## Measures

- **Aberrant Behavior Checklist-Community (ABC-C)**  
(Aman, Burrow, & Wolford, 1995)
  - Subscale I: Irritability
  - Subscale II: Lethargy
  - Subscale III: Stereotypy
  - Subscale IV: Hyperactivity
  - Subscale V: Inappropriate Speech
- **Vineland Adaptive Behavior Scales-II (VABS-II)**  
(Sparrow, Cicchetti, & Balla, 2005)
  - Communication (receptive, expressive, Written)
  - Daily Living (Personal, Domestic, Community)
  - Social (Interpersonal/Relationships, Play/Leisure, Coping Skills)
- **Bruininks-Oseretsky Test of Motor Proficiency (BOT-II)**  
(Bruininks, & Bruininks, 2005)
  - Fine & Gross Motor Skills
- **Sensory Integration and Praxis Test (SIPT)**  
(Ayres, 1989)
  - Verbal Praxis (Response to verbal commands)
  - Postural Praxis ("Do this" with model)

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## SECONDARY AIM

- **Examine participants' on-going change/improvement trends in self-regulation during treatment in two ways:**
  1. **THR instructor rating** of participants' behaviors on the ABC-C immediately following each THR weekly lesson
  2. **Parent weekly rating** of their child's behaviors on the ABC-C exhibited since the last THR session.

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## Methods

### Site Determination

For this initial pilot study it was important to identify a site that had a long standing infrastructure in place to enable us to:

- Minimize variables for which to control
- Conduct a standard therapeutic riding research protocol

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**Methods**

**Site Determination**



The **North American Riding for the Handicapped Association** (NARHA) provides standards for certified sites regarding operations and personnel, which we used to guide our decision.

A **Premiere NARHA site** has to comply with site visits every 5 years to assess infrastructure standards for:

1. Rider safety; horse selection, care, and training; risk management; volunteer screening and training; record keeping of participant progress; and instructor certification.
2. Creating distraction-free and safe environments for horses, riders, and their families.

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**Methods**

**Site Determination**



A second determinant for site selection was that the site have the following:

1. At least two therapeutic riding instructors to provide back-up for each other to conduct therapy
2. Instructors with advanced level certifications through the NARHA.
  - a) CPR and first aide certifications
  - b) At least 120 hours of supervised teaching with a variety of disabled populations At a NARHA registered site
  - c) 10 hours of therapeutic riding continuing education.

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**Methods**

**Site Determination**

Both of these were important factors to help ensure that:

1. The therapy is conducted and evaluated in a standard manner
2. The instructor is able to adequately manage the unique behavioral management and safety needs of this autism study population.

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**Methods**

**Site Determination**

**The Colorado Therapeutic Riding Center in Longmont, CO**

- Premiere NARHA site
- In operation for 29 years
- 25 horses available to this study
- Heated in door barn with an observation area for families
- Clearly-defined initial evaluation procedures for the rider and the horse.

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**Methods**

**Inclusion Criteria**

**Participants**

- ASD (**Autism or Asperger's**) children and adolescents
- **Ages 6 – 17 years**
- ASD diagnoses confirmed by **ADOS** (Lord et al., 2000) and **Social Communication Questionnaire (SCQ)** (Rutter, Bailey, & Lord, 2003)
- IQ ≥ 40
- **No previous exposure to THR** or riding for over 2 weeks within past 3 years
- **Medical Approval from PCP**
- **Aberrant Behavior Checklist-Community Irritability subscale ≥ 11**

*(Note: ≥ 10.49 points significant change on ABC-C in psychopharmacology studies with ASD population (e.g., Pandina et al., 2007))*

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**Methods**

**Procedures**

1. Screening evaluations at TCH: Diagnostic (ADOS & SCQ) and NVIQ (Leiter-R)
2. Screened at Colorado Therapeutic Riding Center (CTRC) to:
  - Assess horsemanship skills and level of functioning (**HIS: Horsemanship Skills Indicators**)
  - Assign to appropriate THR group based on level of functioning
  - Exclude based on inability to ride/approach horse

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**Methods**

**Procedures**

- 3. **Pre and Post THR evaluations** within one month prior to and post participation in 10 weeks of THR
  - Occupational therapist (BOT-II & SIPT)
  - Psychology Graduate Students (VABS-II)(Note:  $\geq 80\%$  inter-rater reliability achieved on measures)
- 4. **Caregivers & THR instructors: ABC-C** pre- and post-10 weeks of THR and weekly during THR.
- 5. **Caregivers weekly ABC-C report** of any changes in outside treatments

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**Methods**

**Procedures**

- 6. THR weekly intervention:
  - Led by NAHRA certified Advanced Instructor
  - Followed specific skill progression and objectives
  - Horse and side-walker volunteers consistent for each participant
  - Taught in small group setting (no more than 4 participants)
  - Picture schedule of lesson activities presented
  - Could only miss 2 lessons out of 10 weeks

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**Methods**

**Timetable of Events**

- Summer THR Group 2008 (**n = 14**)
- Fall THR Group 2008 (**n = 12**)
- Spring Waitlist Control Group 2009 (**n = 16**)
- Summer THR Group 2009 (**n = 15**)

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## Study Population Demographics

Characteristic	(n = 41)
Mean Age	8.7 (6– 16 years)
Gender	Male: 35; Female: 6
Comorbid Psychiatric Diagnoses	Yes: 15; No: 26
Psychoactive Medications	Yes: 13; No: 28
Mean nonverbal IQ	95 (44 – 139)
Mean VABS II Communication Total SS Score	81.3 (49 – 110)
ASD Diagnosis	Autism: 23; Asperger's: 18
Seizures	Yes: 2; No: 39

Treatment Group n = 25

Waitlist Control Group n = 16

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## Dropped Participants (n = 6)

### Reasons:

- Afraid of the horse (n = 2)
- Timing & transportation issues (n = 3)
- Failed to show for lessons (n = 1)

### • Demographics:

Mean Age = 7.6

NVIQ mean = 63; range = 42-103

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## Results

- Treatment Group (n =25 )
- Waitlist Group (n = 16)
- ANCOVA (controlling for age, IQ & baseline scores) used to report both change for intervention group and difference between waitlist and intervention group using change as the outcome variable.
  - Significance Level ( $p \leq .05$ )
  - ABC-C subscales
    - I: Irritability
    - II: Lethargy
    - III: Stereotypy
    - IV: Hyperactivity
    - V: Inappropriate Speech
  - VABS-II (raw scores: Communication, Daily Living, Social)
  - BOT-II
  - SIPT (Verbal Praxis and Postural Praxis)

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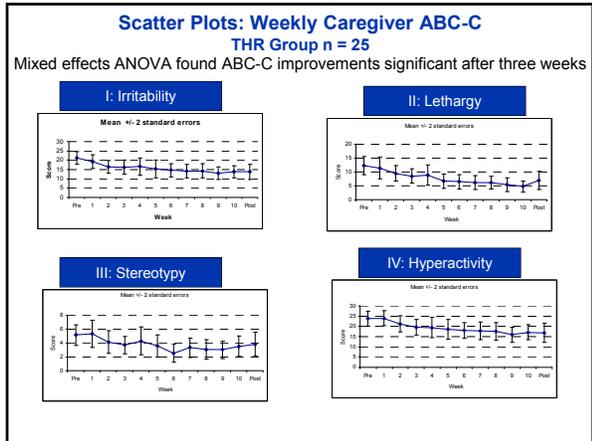
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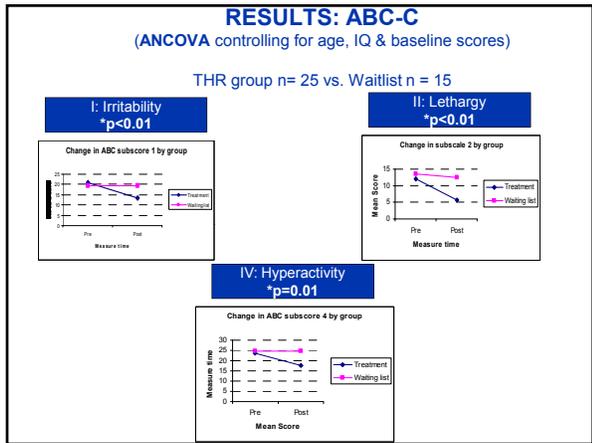
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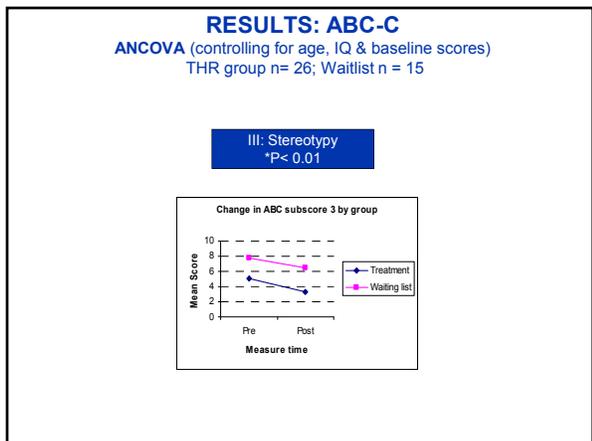
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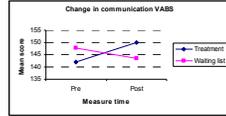
### RESULTS: VABS-II

(ANCOVA controlling for age, IQ & baseline scores)  
THR Group n = 25; Waitlist Group n = 16

Significant improvement in VABS-II communication raw score ( $p < 0.01$ ) and total adaptive score ( $p < 0.01$ )

VABS-II communication improvements significant for expressive language ( $p < 0.01$ ), but not receptive language ( $p = 0.06$ , n.s.)

Communication Raw score  
\* $p < 0.01$



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### RESULTS: BOT-II & SIPT

(ANCOVA controlling for age, IQ & baseline scores)  
THR Group n = 25; Waitlist Group n = 16

Significant improvement in BOT-II ( $p < 0.01$ )

Significant improvement in SIPT Verbal Praxis ( $p < 0.01$ )

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### Caregiver Exit Interview

#### Changes in Self Regulation/Emotions

- “The day of riding my child was quiet, calm, and more peaceful.”
- “It made an impact on my child’s aggression-he seems calmer and happier.”
- “It really helped my child’s self confidence.”
- “My child loved the interaction with the horse-he showed emotion towards the horse.”
- “When my child returned to school after riding he was more focused according to his teacher.”

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## Caregiver Exit Interview

### Changes in Adaptive Skills

- “My child really started to associate with the animal and then to the dog at home.”
- “The riding helped my child interact with his younger sister.”
- “Since starting the riding, my child has paid more attention to our family dog.”

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## Discussion



- Ten-week THR program effects significant improvement in behavioral and physical parameters in individuals with ASD
- Overall Adaptive and communication skills, motor coordination and planning and aberrant behaviors improved
- Improvements in ABC-C subscales compared with waitlist control may be due to THR therapy, not developmental changes

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## Limitations



- Need objective measures of self-regulation in addition to parent report measures (ABC-C)
- Need more specific measures of adaptive functioning or quality of life
- Location of THR site

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### Future Directions

- Address questions such as :
  - Long-term treatment effects
  - THR effects on quality of life (QOL) (school and home functioning)
  - Specify effects of THR components (e.g., is the horse important for change?)

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### Future Directions

- Expand Protocol to include:
  - Specific control group
  - Include teacher and OT report on ABC-Cs
  - Evaluate THR manual and consistency of treatment using the fidelity measure
  - Expand to study to other sites

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