

Measuring the Magic

RESEARCHING HOW THERAPEUTIC RIDING IMPACTS CHILDREN WITH ASD

By Karen Karvonen

PHOTOS COURTESY OF DR. ROBIN GABRIELS AND HEARTS & HORSES, INC.



STUDY GOALS



To explore the impact of therapeutic riding on enhancing a mindfulness state in participants and examining how this could be responsible for the previously observed significant outcomes.



To evaluate the durability of the outcomes in the therapeutic riding group compared to the barn activity control group six months after the invention.



To explore the dose (five weeks vs 10 weeks) of therapeutic riding. To determine this, the study will compare the differences among three groups.

Children with ASD who are also diagnosed with a psychiatric disorder participated in a study to measure exactly how therapeutic riding lowers stress levels and leads to significant social and communication improvements.

Ancedotal accounts of children with autism spectrum disorder (ASD) making strong, sometimes seemingly miraculous, gains in their ability to regulate their emotions, communicate and engage socially are rampant in the equine-assisted services (EAS) industry. The problem is that very little well-documented evidence exists to tie those gains directly to their interactions with horses. For more than a decade, researcher and licensed psychologist Dr. Robin Gabriels and her team at the University of Colorado Anschutz Medical Campus have been conducting studies to scientifically test the validity of those anecdotal gains. Recently, they began conducting a five-year study to measure exactly how therapeutic

riding results in positive gains for youth diagnosed with ASD.

Dr. Gabriels' initial research effort was to empirically determine whether therapeutic riding leads to those anecdotal gains previously mentioned. This effort was funded by NIH-NINR and involved a four-year large-scale study of therapeutic riding based on results from a promising pilot study conducted at Colorado Therapeutic Riding Center, Inc., a PATH Intl. Premier Accredited Center in Longmont, CO. For this study, 127 participants with ASD were randomly assigned to either a 10-week, one-hour therapeutic riding group or a no-horse barn activity control group. In 2015, they published the results of this study in the *Journal of the American Academy of*

Child and Adolescent Psychiatry, titled “Randomized Controlled Trial of Therapeutic Horseback Riding in Children and Adolescents with Autism Spectrum Disorder.” Results showed that participants in the therapeutic riding group had significant decreases in irritability and hyperactivity. They also had significant improvements in social cognition, social communication and word usage skills as compared to the barn activity control group.

A pilot study of participants who returned to be evaluated six months after participating in this study interventions showed these gains persisted in the therapeutic riding group. Exploratory analyses of participants in this study who “also had psychiatric disorders like anxiety and depression had even better outcomes,” noted Gabriels, who started the Neuropsychiatric Special Care inpatient and partial hospital unit for youth with ASD at Children’s Hospital Colorado. “In our current study, we will be specifically looking at this subset of participants with psychiatric disorders (anxiety and depression) because two-thirds of children with ASD have these disorders.”

CURRENT STUDY

This previous research raised several questions: What physiological arousal factors might explain the positive outcomes observed in the participants who engaged in therapeutic riding? And how can those factors be measured in the therapeutic riding setting? This led Gabriels to embark on her current study: “Physiological Mechanisms of Action Relating to Immediate and Long-Term Therapeutic Riding Effects in A Psychiatric Population of Youth with Autism Spectrum Disorder.” In 2020, she received a \$2.5 million grant from the Eunice Kennedy Shriver National Institute of Child Health & Human Development of the National Institutes of Health to fund this randomized five-year study. For this study, her research team will look into the physiology of why therapeutic riding produced such positive results compared to the no-horse barn activity control.

Screening and enrollment of participants began in fall 2020. In 2021, the children began participating in quarterly activity sessions at Hearts & Horses, Inc., a PATH Intl. Premier Accredited Center (PAC) in Loveland, CO, and at Riding To The Top Therapeutic Riding Center, a PATH Intl. PAC in Windham, Maine. The 10-week therapeutic riding and barn activity control sessions will eventually include about 142 youth between ages six and 16 with an ASD and psychiatric diagnosis. The study will continue to recruit children and adolescents through 2023. To be included, researchers will confirm the youth’s diagnosis of ASD through testing. (Hearts & Horses, Inc., is interested in recruiting additional participants from the Northern



To measure the cortisol levels, researchers ask each participant to hold a foam roller in their mouth for a minute before and after each intervention lesson.

Colorado and Wyoming area. For more information, see “Participate in an ASD Study” on page 22.)

Participants are randomized into the following three 10-week small group (two to four participants) sessions:

- ▶ Therapeutic riding
- ▶ Barn activity that includes a life-sized stuffed toy horse and a free riding lesson at the end of the 10-week session
- ▶ Waitlist/Hybrid control group that involves five weeks of the barn activity group followed by five weeks of the therapeutic group

“The waitlist will help us control for the barn activity group, to help us determine what benefits participants can gain after being involved in that intervention. The hybrid control group will help us determine the dosing,” said Gabriels. “For instance, it will help tell us if five weeks of therapeutic riding is as effective as 10 weeks. For this study, we will also be more thoroughly examining if positive outcomes persist six months following the therapeutic riding group participants compared to the barn group participants.

STUDY GOALS

This study has three aims. The first is to explore the impact of therapeutic riding on enhancing a mindfulness state (alert and calm) in participants and examining how this could be responsible for the previously observed

PARTICIPATE IN AN ASD STUDY

The Children's Hospital Colorado/University of Colorado and Hearts & Horses, Inc., in Loveland, CO, are working together to test if measures of physiological states of arousal, heart rate and electrodermal activity can help to tell why therapeutic riding can be helpful for children and teenagers with ASD. The study is looking for children with ASD, ages 6-16 years old, from northern Colorado or Wyoming, to participate in the study. Children will receive 10 weeks of group sessions at Hearts & Horses, free of charge, with monetary compensation for pre- and post-intervention testing. If you are interested in learning more or to see if a child qualifies, please contact Hannah Christensen, study coordinator, at (720) 777-9255 or hannah.christensen@cuanschutz.edu.



A wrist band device with two attached skin patches/electrodes measures participants' activation of sweat glands in the skin triggered by emotional stimulation response to the intervention lesson.

significant outcomes. This will be accomplished by using objective physiological measurements of salivary cortisol, cardiovascular and electrodermal activity, which are biomarkers of psychological regulation.

“With cortisol, which is a stress hormone, there is typically a rise in cortisol levels in the morning and a decrease in the afternoon,” said Gabriels. “Therefore, our interventions occur in the afternoon to measure if participants who engage in the therapeutic riding group have a steeper cortisol decline, indicating less stress, compared to the control group,” said Gabriels. “After a 45-minute ride, there is a 15-minute cool down/grooming activity and a five-minute wait. That’s because it can take cortisol levels 20 minutes to decline as a result of an activity that might reduce stress and induce relaxation.”

To measure the participants' salivary cortisol levels, the study team asks participants to hold a foam rod in their mouths for one minute before and after each intervention lesson. A wrist band device with two attached skin patches/electrodes measures participants' activation of sweat glands triggered by emotional stimulation response to the intervention. Heart rate and heart rate variability (HRV) is measured by three skin patches/electrodes that transmit data to a device worn on a lanyard. In addition, parents fill out behavioral evaluation forms about the participant at the first and last weeks of the intervention. A speech therapist, who does not know what group

participants are assigned to, conducts a five-minute language sample within one month before and after the intervention session. Gabriels notes that both centers have found participants able to comply with these procedures. This indicates that physiological arousal data collection is feasible with ASD youth while engaged in therapeutic riding.

The second aim is to evaluate the durability of the outcomes in the therapeutic riding group compared to the barn activity control group six months after the invention. Demonstrating that these gains are long lasting could have important implications for children's health and the use of EAS as an adjunct treatment.

The third aim is to explore the dose (five weeks vs 10 weeks) of therapeutic riding. To determine this, the study will compare the differences among these three groups:

- (1) 10-week wait-list control group;
- (2) Hybrid intervention group (five weeks barn activity followed by five weeks therapeutic riding); and
- (3) Subsample of the therapeutic riding study population randomized to therapeutic riding or the barn activity group following psychiatric hospitalization.

NEXT STEPS

“Our proposal has the potential to advance the field of human-animal interaction, specifically EAS, by further validating that therapeutic riding helps

and how it helps those with ASD regulate their behavior,” said Gabriels. “If the physiological data can show lasting improvements six months down the road, perhaps we can reduce need for more intensive interventions such as higher medication dosages and hospital care. Hopefully our study findings will help provide alternative and additional validated intervention choices that are covered by insurance and tailored to the unique social emotional needs of youth with ASD and psychiatric diagnoses.

This study can also serve as a model for future research. “It establishes innovative and minimally invasive ways to capture physiological responses during movement with a population that can be difficult to accept physiological measurement devices,” said Gabriels. “The next step is expanding this research to other populations, particularly individuals such as children without ASD who have mental health issues.”

Finally, this study is helping to answer the question: To what can we attribute these seemingly miraculous outcomes that are often observed by caregivers and instructors after a child participates in a therapeutic riding intervention? Is it the fact that horses constantly mirror and respond to the rider's body language that fosters the children's communication off the horse? Is the sensory experience of riding itself calming to people with ASD? Or does the teamwork between rider and horse reduce anxious feelings and behavior? Interestingly, Gabriels notes that while many children with other syndromes, such as cerebral palsy, attention-deficit hyperactivity disorder, etc., respond well to a mechanical horse, children with ASD do not.

To this end, Gabriels would also like to study how therapeutic riding differs from hippotherapy by conducting a large-scale study with randomized groups comparing outcome results. “Hippotherapy relies more on the horse's physical movement while therapeutic riding involves a relationship with the horse,” she said. While such a study could not definitely say the horse-human relationship is the magical elixir that brings about these changes in children and adolescents with ASD, the research is closer to pointing to the horse-human bond as the explanation.

Dr. Robin Gabriels, PsyD, is a licensed clinical psychologist and professor in the division of child and adolescent psychiatry, departments of psychiatry and pediatrics at the University of Colorado School of Medicine and Children's Hospital Colorado. Dr. Gabriels has over 30 years' experience developing intervention programs along with assessing and treating a variety of pediatric



Participants who have been randomized in one of two different control groups engage in a barn activity that includes a giant stuffed horse.

and adult psychiatric populations, including those with autism spectrum disorder (ASD). She established the Neuropsychiatric Special Care program at Children's Hospital Colorado, one of the few nationally recognized specialized psychiatric inpatient and day treatment units for children with ASD and/or intellectual disabilities. Her research efforts have focused on the ASD population for the past 24 years and for the past 13 years, on evaluating the effects of Animal-Assisted Interventions (AAI) on youth with ASD. Dr. Gabriels successfully completed an NIH/NINR-funded R01 protocol studying the Effects of Therapeutic Horseback Riding on Children and Adolescents with Autism. She is currently the principal investigator of a five-year multi-site R01 protocol studying the physiological mechanisms of action relating to immediate and long-term therapeutic horseback riding intervention effects in a psychiatric population of youth with ASD. Dr. Gabriels is a certified trainer for the “gold standard” ASD diagnostic tool, the ADOS (Autism Diagnostic Observation Schedule). She has written articles and book chapters in the fields of ASD, asthma and art therapy, and has lectured and conducted workshops on ASD both nationally and internationally. She has published two edited books, *Autism: From Research to Individualized Practice*, (2002) and *Growing Up with Autism: Working with School-Age Children and Adolescents*, (2007). She can be reached at Robin.Gabriels@childrenscolorado.org.