

# Abstract

This one-group quasi-experimental study explored the association of interactive vaulting with the social and behavioral skills of children with special needs. Parents of the seven children in the interactive vaulting program completed the *Behavioral Rating Inventory of Executive Functioning* (BRIEF-2) pre- and post-tests. Paired t-tests of the results of the BRIEF-2 indicated that the social and behavioral skills of the children declined during the interactive vaulting intervention. However, none of the changes in the pre- and the post-test were statistically significant at the p < p0.05 level.

# Introduction

Interactive vaulting, a type of equine-assisted activity and therapy (EAAT), is an activity when a rider moves on and around the horse (Professional Association of Therapeutic Horsemanship, International [PATH, Int.], 2018). EAAT is a wide term that describes activities and therapies involving human interaction with horses, which includes interactive vaulting, therapeutic horseback riding (THR), and hippotherapy (Lanning, Matyastik Baier, Ivey-Hatz, Krenek, & Tubbs, 2014). Through interactive vaulting, participants learn to balance in different positions on a moving horse. Interactive vaulting introduces team building activities, social interaction, and nurtures independence for children with special needs (PATH, Int., 2018). While there have been a number of research studies completed with children participating in EAAT and THR, there have not been studies conducted specifically on the effects of interactive vaulting.

Past research has indicated that there are significant improvements in the behavior, socialization, focus, and gross and fine motor skills of children with autism participating in THR (Jenkins & DiGennaro Reed, 2013; Gabriels et al., 2012; Gabriels et al., 2015; Lanning et al., 2014). A similar study showed that THR is effective for improving physical skills of posture and balance of children with cerebral palsy (Zadnikar & Kastrin, 2011). However, the effects of interactive vaulting as a whole are still unknown, and thus, the effects of interactive vaulting on children with social and behavioral needs are unknown.

The goals of this research project were to fill the research gap and to explore the effects of interactive vaulting on the social and behavioral skills of children participating in this activity. Improvements of the social and behavioral skills of the children were calculated through analyzing the changes between the BRIEF-2 pre-test and post-test completed by the parents of the interactive vaulting program participants.

It was hypothesized that a positive relationship would be found between interactive vaulting and the social and behavioral skills of the participants.

#### **Research Question**

What is the relationship between the interactive vaulting and the social and behavioral skills of the children participating in this activity?

### Methods

Subjects: The parents of the seven children that participated in and completed both the fall 2018 and spring 2019 interactive vaulting sessions at Rocking Horse Ranch in Greenville, NC, participated in this study.

**BRIEF-2:** The Behavior Rating Inventory of Executive Function, Second Edition (BRIEF-2) consists of 63 items in which respondents use a Likert scale to rate each statement. These 63 items are grouped into nine clinical scales, which are used to understand behaviors related to the domains of executive functioning. The scales are Inhibit, Self-Monitor, Shift, Emotional Control, Initiate, Working Memory, Plan/Organize, Task-Monitor, and Organization of Materials. The clinical scales are then grouped into the following three indexes: Behavior Regulation Index (BRI), Emotion Regulation Index (ERI), and Cognitive Regulation Index (CRI).

- BRI includes the Inhibit and Self-Monitor scales
- ERI includes the Shift and Emotional Control scales
- CRI includes the Initiate, Working Memory, Plan/Organize, Task-Monitor, and Organization of Materials scales

The Global Executive Composite (GEC) comprises the summed scores of the BRI, ERI, and CRI (Isquith, Gioia, Guy, Kenworthy, & PAR Staff, 2019). For the nine clinical scales and the indexes, a lower score is considered a positive change, or a decrease in negative skills or behaviors. The BRIEF-2 was completed by the parents before and after their child's participation in the interactive vaulting program at Rocking Horse Ranch. The pre-test and post-test measures were compared using paired, repeated measures t-tests, with a significance level of p < 0.05, to determine if statistically significant differences in the measured scales occurred after the two sessions of interactive vaulting.

# Effects of Interactive Vaulting for Children with Social and Behavioral Needs

Grace Lee, Lynne F. Murphy, and Heather Panczykowski

# Table 1

Comparison of Behavioral Regulation Index T-scores from Pre-Test to Post-Test									
	Pre-Test		Post-Test						
	Mean	SD	Mean	SD	Difference	t-value	p-value		
Inhibit	65.86	11.782	68.86	11.725	3.00	1.348	0.226		
Self-Monitor	59.57	4.392	67.57	8.018	8.00	2.231	0.067		
BRI Total	64.29	9.105	69.57	9.624	5.28	2.049	0.086		

# Table 2

Comparison of Emotional Regulation Index T-scores from Pre-Test to Post-Test

	Pre-Test		Post-Test				
	Mean	SD	Mean	SD	Difference	t-value	p-value
Shift	69.00	11.804	72.00	6.952	3.00	0.785	0.463
<b>Emotional Control</b>	62.71	12.093	65.86	10.637	3.15	1.252	0.257
ERI Total	66.71	11.131	70.00	7.832	3.29	1.152	0.293



**Image 2** (below) An interactive vaulting student practices the "box" position.



**Image 1** (above) An interactive vaulting student practices the "basic seat" position on the practice barrel.

Table 3 Comparison of Cognitive Regulation Index T-scores from Pre-Test to Post-Test

	Pre-	Pre-Test		-Test				
	Mean	SD	Mean	SD	Difference	t-value	p-value	
Initiate	59.14	13.031	65.14	8.494	6.00	1.120	0.306	
Working Memory	65.71	8.920	69.00	7.853	3.29	1.068	0.327	
Plan/Organize	58.71	10.874	64.43	8.423	5.72	1.541	0.174	
Task-Monitor	62.14	8.355	62.14	10.542	0.00	0.00	1.000	
Organization of	55.14	8.821	60.14	9.353	5.00	1.063	0.329	
Materials								
CRI Total	62.14	9.082	66.57	9.217	4.43	1.266	0.252	
Table 4								
Comparison of Global Executive Composite T-scores from Pre-Test to Post-Test								
	Pre-Test		Post-Test					
	Mean	SD	Mean	SD	Difforance	t volue	n valua	

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	Pre-Test		Post-	Test				
	Mean	SD	Mean	SD	Difference	t-value	p-value	
GEC Total	65.57	10.212	70.29	7.740	4.72	1.663	0.147	



An interactive vaulting student practices team work with the "plank" position.

**Image 3** (above)

Acknowledgements: The authors gratefully acknowledge the assistance of MSOT students Lindsey Fleury and Mary Vieregge for conducting and compiling the BRIEF-2 Parent forms.

#### Results

Paired, repeated measures t-tests were run on the BRIEF-2 pre- and post-test results to show the changes in the behaviors of the children before interactive vaulting and after interactive vaulting. These t-tests were run with a significance level of p < 0.05, to determine if statistically significant differences in the measured scales occurred after the two sessions of interactive vaulting.

For each clinical scale and index, the pre-test mean and standard deviation, the post-test mean and standard deviation, the difference between the means, t-value, and p-value were calculated and compiled into tables. An increased mean score indicates an increase in negative behaviors.

In the BRIEF-2 scoring results, each clinical scale mean score increased, and thus the overall indexes mean score increased. Thus, the children participating in interactive vaulting showed an increase in negative behaviors and a decline in performance from the pre-test to the post-test of the:

Inhibit scale, Self-Monitor scale, and the BRI Total (Table 1) • Shift scale, Emotional Control scale, and the ERI Total (Table 2) Initiate scale, Working Memory scale, Plan/Organize scale, Task-Monitor scale, Organization of Materials scale, and the CRI Total (Table 3)

GEC Total (Table 4)

However, analysis using a paired t-test indicated that none of these changes in the scales or indexes were statistically significant at the p < 0.05 level (Tables 1-4).

## Discussion

While prior research has studied THR and EAAT therapies in broad or generalized terms, research specifically on the effects of interactive vaulting for children with special needs was still needed. This study served as a pilot to begin to fill that research gap.

- There were several limitations to this research study.
- Small sample size
- Lack of a control group

• Month-long break between the fall 2018 and spring 2019 sessions Regarding the break between sessions, Ward et al. (2013) discovered that following a break in their THR study program, the improvements in communication and behavior skills of the participants were reinstated. In future research, in which the limitations are addressed, the full impact of interactive vaulting might be more accurately represented in the BRIEF-2 pre- and post-test results.

This research has shown a negative trend in the social and behavioral skills for children with special needs during their participation in an interactive vaulting program, according to their parents who completed the BRIEF-2. It is possible that the parents could not limit their responses on the items to just interactive vaulting. Thus, they would continually base their answers to the BRIEF-2 items on situations that only they see in their home and other settings, not in the interactive vaulting setting. If the BRIEF-2 form was completed by the interactive vaulting instructor, these scores may have been different, as the instructor only saw the children in the interactive vaulting setting. Additionally, a limitation of the BRIEF-2 was that each item was a negative statement. These statements could have encouraged the parents to primarily think of the negative behaviors rather than the positive behaviors of their children when completing the form. Consideration of other instruments may be used to ensure accuracy of results.

#### **Conclusion and Further Direction**

The results of the present study show that the children that participated in interactive vaulting experienced a decline in social and behavioral functions, according to the parent data. Additionally, no statistically significant relationship was found between interactive vaulting and the social and behavioral skills of the children participating in this activity. While this result was unexpected, our research shows that the intervention of interactive vaulting may not be effective alone. As many of the participating children were interested in attending each interactive vaulting lesson and engaged in this group activity with the horses, there is an opportunity for positive change. Further research should include a large sample, a control group, a longer time period for the intervention program, exploration and comparison of BRIEF-2 forms completed by both the parents and instructor, and consideration of additional research instruments. Additionally, future research on an improved interactive vaulting program has the potential to more fully understand how this equine assisted therapy may improve the social and behavioral skills of children with special needs.