



# Exploring the Effects of Virtual Reality for Improving Lower Extremity Function on a Young Adult with Cerebral Palsy: Case Study

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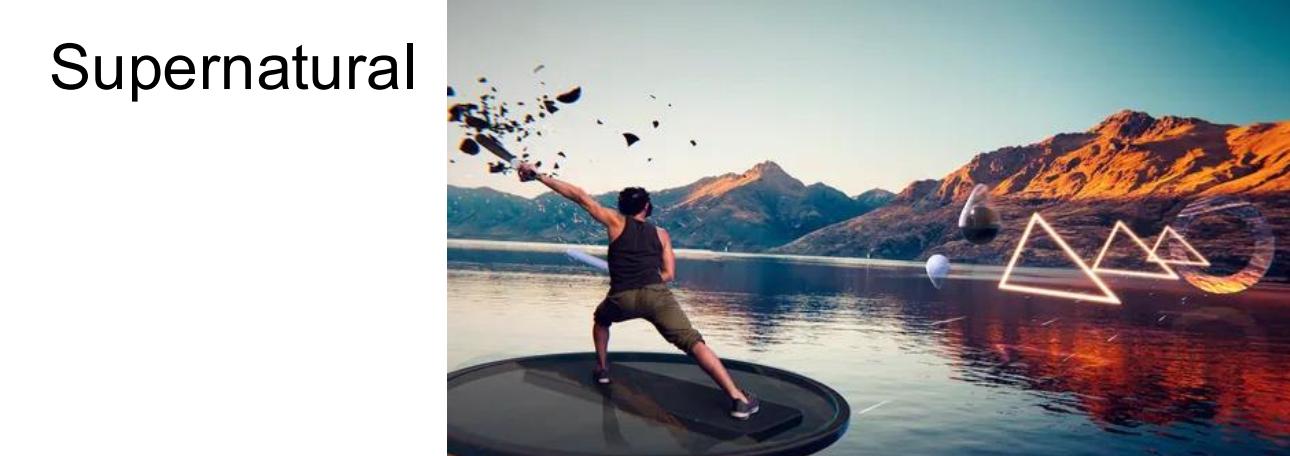
## Introduction

- Cerebral palsy (CP) is the most common physical disability in children and results from abnormal brain development or injury.
- Individuals with CP often experience lifelong challenges with movement, balance, and functional independence.
- Many young adults with CP do not meet recommended physical activity guidelines (e.g., ~150 minutes/week of moderate activity).
- Virtual reality (VR) provides a low-cost, homebased alternative that requires less direct therapist supervision, but research on young adults with CP is lacking.

## Methods

- Single-subject case study of a 20-year-old male with CP, GMFCS Level II, with right-sided hemiplegia.
- Participant completed a 5-week, at-home VR exercise program targeting balance, strength, and functional independence.
- Commercial VR games were prescribed for 30 minutes per day, 5 days a week (150-min/wk.)
- Outcomes include Manual Muscle Testing (MMT), Berg Balance Scale, and the Canadian Occupational Performance Measure (COPM) pre and post, and a case narrative analysis post intervention.

Week	Supernatural	OhShape	Squatopia
1	Low	Medium	Easy
2	Moderate	Medium	Moderate
3	Moderate	Hard	Insane
4	High	Hard (Power Up Fitness)	Insane
5	High	Intense (Power Up Fitness)	Insane



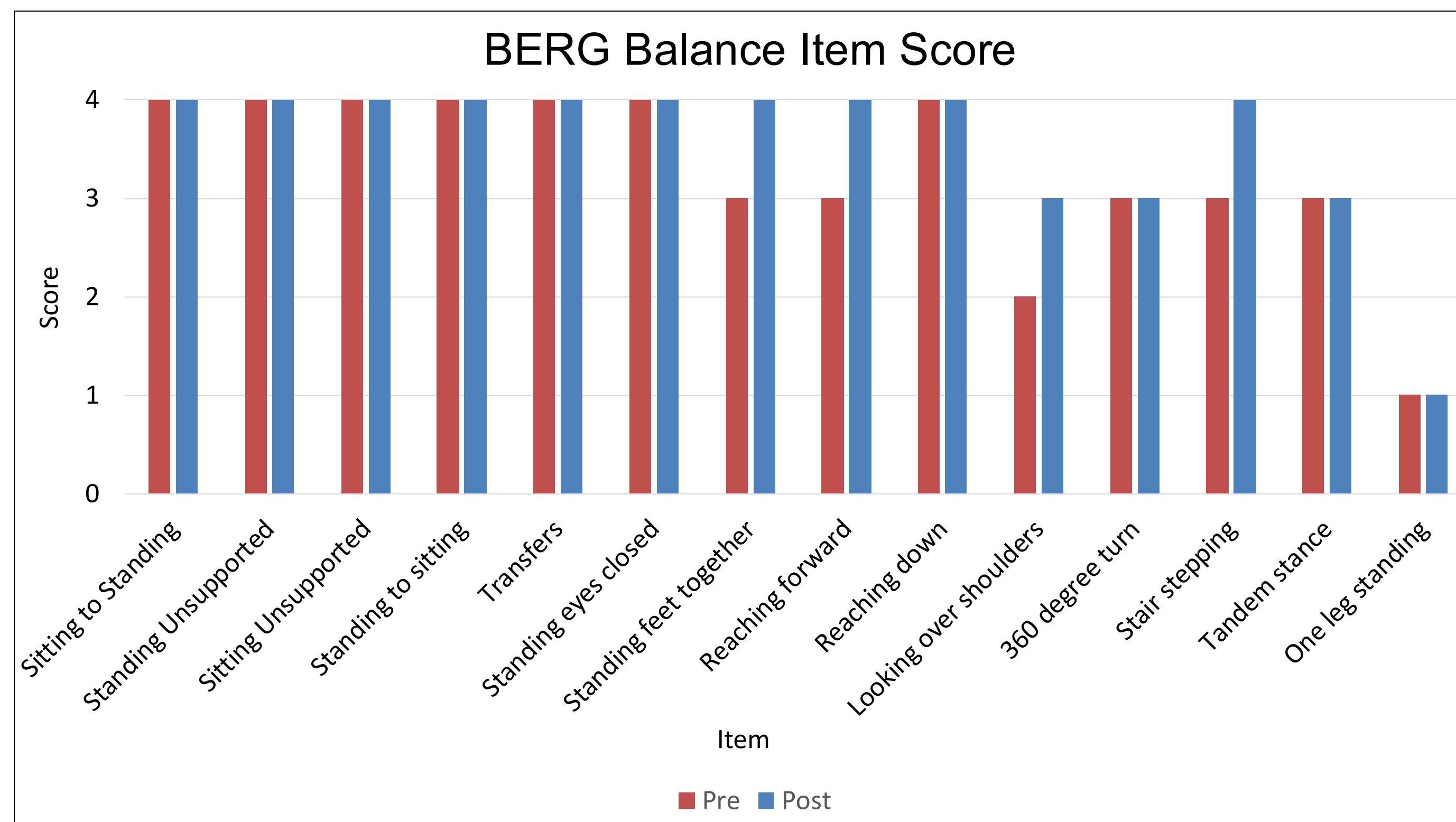
Participant playing Supernatural



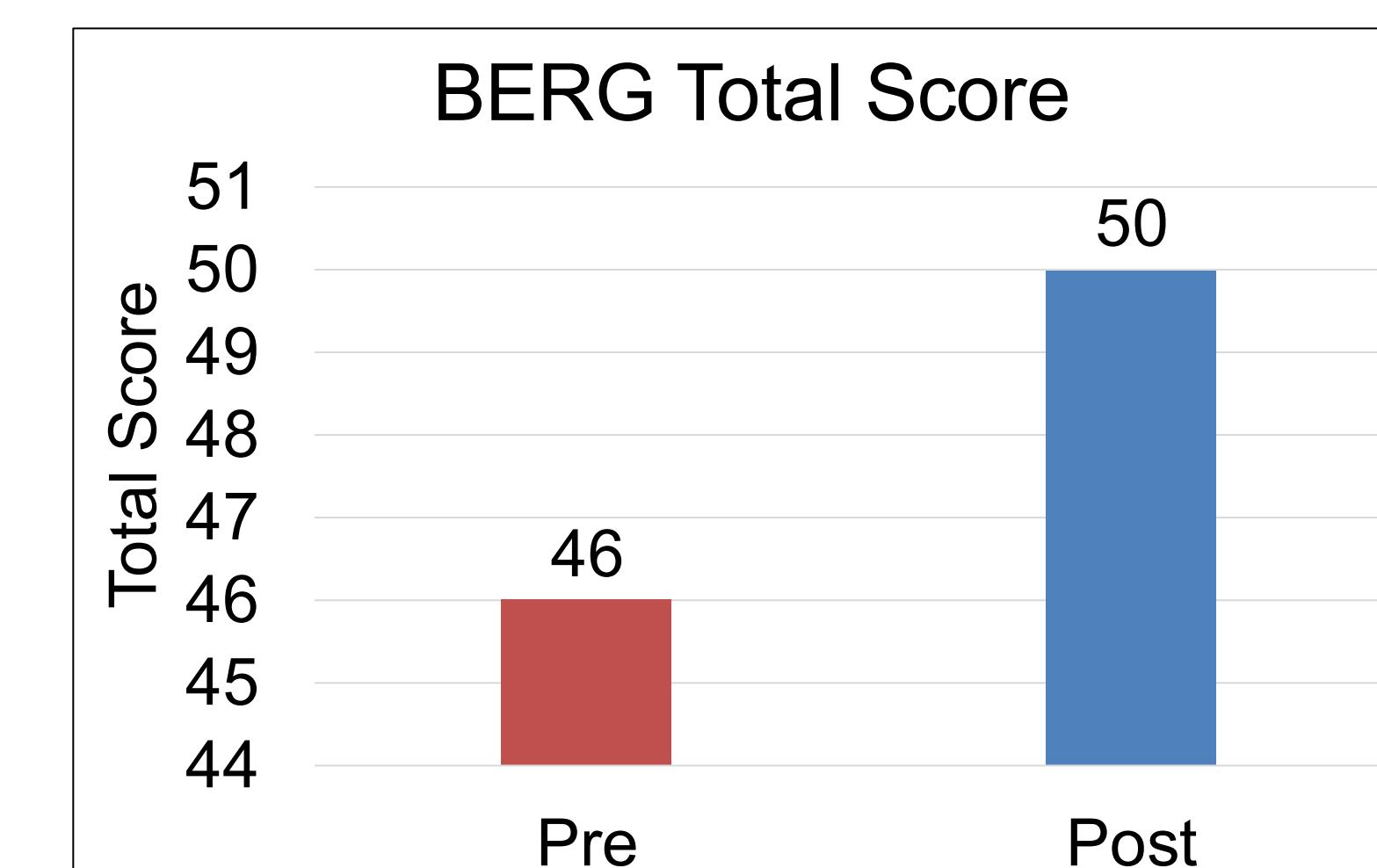
## Results

Manual Muscle Testing (MMT)				
Muscle Group	Left Side Pre	Left Side Post	Right Side Pre	Right Side Post
Deltoid	4	4+	4-	4+
Biceps Brachii	5	5	5	5
Wrist Extensors	4	5	4-	5
Wrist Flexors	4+	5	4	4
Iliopsoas	4+	4+	4	4+
Quadriceps Femoris	4+	5	4	5
Ankle Dorsiflexors	5	5	2+	3-
Gluteus Medius	4	5	4	5
Gluteus Maximus	4	5	3+	5
Hamstrings	4	5	4-	4
Ankle Plantarflexors	5	5	3-	3
		7 items improved		9 items improved

MMT using the IMACS 04 (0-5) scale showed bilateral improvements. On the affected right side, 9 of 11 muscle groups improved.



Participant's BBS score improved from 46/56 to 50/56 (8.7%), with specific gains seen in items 7, 8, 10, and 12.



## Results Continued

Theme	Codes	Quotes
Enjoyable and varied VR exercise supported strong engagement and adherence	- Described VR sessions as fun and enjoyable - Looked forward to sessions - Physical effort perceived positively - Variety prevented boredom - Game enjoyment enhanced motivation	• "It was awesome... a fun time. I really enjoyed it." • "I was kind of looking forward to it." • "I sweated more... it was a workout." • "Trying different stuff... doing the same thing would be boring." • "I like boxing more... it was more fun."

## Discussion

The participant demonstrated improvements in functional balance and bilateral muscle strength (with greater gains on the affected right side), along with high enjoyment and strong adherence to the program, supporting the feasibility of home-based VR exercise and its potential clinical benefits.

## Conclusion

These preliminary findings suggest that home-based, consumer VR exercise may be a promising tool within occupational therapy to support lifelong physical activity and participation in meaningful roles for young adults with CP.

## References



## Acknowledgement & Contact information

Special thanks to Dr. Lai and his team and the Wellness, Health, and Research Facility (WHARF) for providing the space and supplies for conducting the study.

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