



# The Effects on Velocity and Acceleration of Proactive Balance Training in Older Adults

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## Introduction

Fall risk increases with advancing age. Injurious falls and fall-related fatalities in older adults have risen significantly in the past decade, raising concerns about the efficacy of programs to prevent falls. Fear of falling can seriously impact quality of life. The purpose of this study was to implement an aggressive harness pro-active balance training program for fall prevention.

## Methods

This program was implemented through an interactive Kinect gaming system and the use of a multidirectional harness system to determine if balance could be improved by looking at max acceleration and velocity of the subjects' movements over the span of the 10 week case series.

## Subjects

In order to be included in this study, subjects had to meet a specific inclusion criteria:

- Be 50 years old or older
- Self-report being able to walk and move around and within both their home and community independently
- Self-identify as having some balance difficulties
- Admit to self-limiting their participation in normal activities due to perceived balance problems

## Procedure

For this study, subjects had to:

- Come in for an initial Pre Test Evaluation where they were fitted for their harness and taught how to play each Kinect game
- Participate in at least 1-2 weekly "gaming" sessions where the subjects had to play the games for 1-1.5 hours while strapped in the harness for safety
- Have their movements tracked for the Pre Test, Day 4, Day 7, and Post Test using Cortex software with markers placed on key areas of the body (R. and L. ankles and wrists, and the sacrum)
- Follow a progression of floor surface difficulty
- While playing based on a predetermined algorithm (regular floor -> gym mat -> swim raft)
- Participate in a Post Test session to be completed 2 weeks after the last gaming session

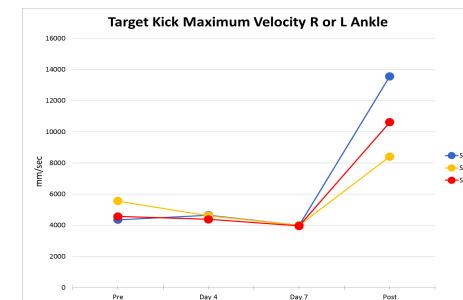


Picture 1

Subject playing an interactive Kinect game while in the multidirectional harness system

## Results

Maximum velocity and acceleration were examined for key markers for each gaming session (e.g. Right or Left ankles for 20,000 Leeks (L), Reflex Ridge (R), and Target Kick (S) and dominant hand for Table Tennis(T)). Movement velocity and acceleration stayed uniform from Day 1 to Day 7 except for daily increases in velocity in L. At post-testing, velocity increased in S and L for all subjects, but only for one person in T and R. Acceleration increased for 3/3 subjects in S, 2/3 in L and R, and 1/3 for T :



## Conclusion

Overall, it can be concluded that the aggressive harness proactive balance training had a positive impact on the subjects from Pre Test to Post Test. At post-testing, one subject improved for all games, while the others improved for about half of the games. This shows an increased confidence in the subjects' balance abilities which will translate to their real world experiences.

Sources:  
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