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Balance Training Using the Multi-directional Harness System

College of Sciences and Health Professions

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Abstract

Introduction and Purpose Individuals post-stroke frequently have impairments in balance and mobility. This study aims to increase mobility through high intensity balance training in a multi-directional harness system using video gaming to add environmental and task complexity. We hypothesize the training will improve balance, mobility, and decrease falls.

Methods In this case series, two adults post-stroke completed seven sessions of balance training using four adapted commercial video games from the X-Box Kinect™ (20,000 Leaks (L), Reflex Ridge (R), Table Tennis (T), and Target Kick (K)) on varied types of floor surfaces. These games were chosen to challenge various aspects of balance. They played the games while wearing a fall-preventing harness in a supporting framework that allowed them to move freely in a 7' by 8' area. A progression algorithm was used to advance to game difficulty, thereby maintaining high intensity, challenging training. Motion capture and clinical measures (Berg Balance Scale, Timed Up and Go (TUG), Activities-Specific Balance Confidence Scale (ABC)) were used to assess changes from the training. Motion capture data were processed using Cortex (Motion Analysis Corp™) to find the distance traveled as well as the maximum velocity of critical body segments for each game (center of mass for L and R, racket hand for T, and hemiplegic foot for K). Pre- to post-test scores were compared descriptively.

Result With a few exceptions, the participants improved in maximum velocity and distance travelled of the selected markers as well as for the TUG and Berg. ABC scores remained at similar levels and Participant 2 moved less and with a lower maximum velocity in R, while Participant 1 did not increase maximum hand speed in T.

Discussion and Conclusion Overall, balance measures improved after the training sessions with the exceptions noted above. The ABC, which represents the participant's balance confidence, did not improve. Nevertheless, both participants reported that they were moving better at home. Also, in R, Participant 2's velocity and movement distance decreased; however this may have been a reflection of more efficient movement patterns rather than poorer performance. Subject 1's numbers increased in this game as he began jumping during the game about half way through the sessions.