

(1) To assess the effects of aging on balance and gait velocity in the advanced elderly (90-99 years of age) or nonagenarians, and (2) to determine whether an Alter-G anti-gravity treadmill provides an appropriate aerobic training option for the advanced elderly. : Long term care facility participants (n=2): a 92 year-old male (92 y/o), and a 90 year-old (90 y/o) female.

Participants passed a cognition assessment and were medically cleared by their physician before consenting. Self-assessments were collected for each participant on the Modified Gait Efficacy Scale (MGES), Duke Activity Status Index, and the Par-Q. Baseline measurements included systolic blood pressure, heart rate (HR), and oxygen saturation levels (SaO2), the Two-Minute Walk Test, a 10 Meter Walk Test (both at a self-selected pace and fast pace), and postural stability measurements via the Biodex® Biosway platform. Training sessions were twice a week for 10 weeks (92 y/o) and 12 weeks (90 y/o) for a 10-minute supervised walking session on the Alter-G antigravity treadmill at a self-selected pace. HR, SaO2, and rate of perceived exertion (RPE) were recorded every 2 minutes. Participants increased their speed if their RPE and vitals did not contradict doing so. Distance and speed were recorded at the end of each training session. Subsequent training sessions began at the last recorded speed, or as comfortable to the participant.

The two standard deviation band method of analysis was used to determine statistically significant changes from the baseline phase through the carryover phase. Neither participant showed significant change in the 10 meter walk test at a self-selected speed (from 10.5 to 8.25 seconds), and both participants showed significant change in the 10 meter walk test fast pace (92 y/o from 4.5 to 3.3 and 90 y/o from 8 to 6.5 sec.) and as well as two minute walk distance (92 y/o from 70 to 145 meters, and the 90 y/o from 59 to 88). These positive changes were maintained when re-measured after the two-week carryover period, although not significantly.

The findings suggest that Alter-G treadmill ambulation is a safe and practical method of exercise for the advanced elderly that can be successfully used to increase gait speed, endurance, and distance. Further research is needed to generalize our findings to a larger population and explore the long-term impact training in this type of environment has on the body.

Falls in the advanced elderly correlate with increased disability, costs, and mortality. Gait speed and balance have been shown to correlate with fall risk in the advanced elderly population. The pilot study demonstrates promise in benefits that may reduce the risk for falls. Further research is needed to establish normative training protocol data for this population.

Aaslund M, Helbostad J, Moe-Nilssen R. Walking during body-weight-supported treadmill training and acute responses to varying walking speed and body-weight support in ambulatory patients post-stroke. *Physiother Theory Pract.* 2013;29(4):278-289 212p.

Brewer JF, Lewis AD, Lucas KJ, McCright J, Mitchell, JL. Reliability of the Alter-G Anti-Gravity Treadmill Two-Minute Walk Test and its Effect on Balance in the Elderly (poster). Combined Sections Meeting of the American Physical Therapy Association. San Antonio, TX, 2017.

“ @ 3 j @/ # . « a a j ..... fi ” @SY-αδ3 . ~ δ2¥“( fl¥j @l &i a @R ” ( m; šoa°j j @q œ` « C°m; .. °j @G Bionic Leg on technology usage attitudes and the Short Physical Performance Battery in older adults (poster). Texas Physical Therapy Association Annual Meeting. Fort Worth, TX. 2016.

Denning W, Winward J, Becker Pardo M, Hopkins J, Seeley M. Body weight independently affects articular cartilage catabolism. *J Sports Sci Med.* 2015;14(2):290-296.

Jensen B, Hovgaard-Hansen L, Cappelen K. Muscle activation and estimated relative joint force during running with weight support on a lower-body positive-pressure treadmill. *J Appl Biomech.* 2016;32(4):335.

Ka-Young L, Jae-Young H, Ji-Hyun K, Dong-Ju K, In-Sung C. Physiological responses during the lower body positive pressure supported treadmill test. *Ann Rehab Med.* 2016;40(5):915.

Lopopolo R, Greco M, Sullivan D, Craik R, Mangione K. Effect of Therapeutic Exercise on gait speed in community-dwelling elderly people: a meta-analysis. *Phys Ther.* 2016;86(4):520-540.

Muir S, Berg K, Chesworth B, Klar N, Speechley M. Balance impairment as a risk factor for falls in community-dwelling older adults who are high functioning: a prospective study. *Phys Ther.* 2010;90(3):338-347 310p.

Ng TP, Feng L, Nyunt MSZ, et al. Nutritional, Physical, Cognitive, and Combination Interventions and Frailty Reversal Among Older Adults: A Randomized Controlled Trial. *The American Journal of Medicine.* 2015;128(11). doi:10.1016/j.amjmed.2015.06.017.

Peeler J, Christian M, Cooper J, Leiter J, MacDonald P. Managing knee osteoarthritis: the effects of body weight supported physical activity on joint pain, function, and thigh muscle strength. *Clin J Sport Med.* 2015;25(6):518-523.

Stubbs B, Patchay S, Soundy A, Schofield P. The avoidance of activities due to fear of falling contributes to sedentary behavior among community-dwelling older adults with chronic musculoskeletal pain: a multisite observational study. *Pain Med.* 2014;15(11):1861-1871.

Webber S, Horvey K, Yurach Pikaluk M, Butcher S. Cardiovascular responses in older adults with total knee arthroplasty at rest and with exercise on a positive pressure treadmill. *Eur J Appl Physiol.* 2014;114(3):653.

Whalen S, Shughart M, Schwandt D, Whalen R, Liou E, Moore F, Inventors. Systems, methods and apparatus for calibrating differential air pressure devices. 2012.