INTRODUCTION
Older adults (OA) > 65 years of age often display poor (dynamic) balance control during locomotion and subsequent frequent falls [1]. Approximately 30% of all individuals >65 years of age fall each year [2]. The percentage of Canadians that are >65 years of age is projected to increase to approximately 16% by 2016 [3], therefore a significant number of individuals. The ability to control stability in the medio-lateral direction is of great importance in supporting and maintaining balance during locomotion [4]. The objective of this study was to determine if static balance training using the Nintendo Wii balance board could transfer over to improve an individual’s dynamic balance control.

METHODS
Community-dwelling OA (N = 9, M_age = 68 years) performed eight 30-minute balance training sessions using the Nintendo Wii balance board over the course of four weeks. Prior to and following the balance training, participants performed a 8m walking task (5m straight + 3m change in direction) to assess gait characteristics (i.e. step length, step width, double support time, velocity) as well as dynamic stability (COM-BOS relationship). Gait and balance measurements were analysed using an NDI Optotrak Certus camera system (NDI Inc., Waterloo, Canada). IRED markers were set-up anteriorly and placed on the participants head, trunk, and lower limbs. Data was collected at 60 Hz.

RESULTS
Traditional gait parameters (i.e., step length, step width, double support time, velocity and variability of step length and width) were calculated during the walking task. Dynamic stability (i.e., lateral COM-BOS difference) during single support stance was also calculated for the 5m steady-state walking portion of the walking task. Each dependent variable was analyzed using a paired-samples t-test to calculate pre- and post-training effects. The results showed that velocity and dynamic stability yielded significant improvements from pre- to post-training (p<.001) (Figure 1), while the remaining gait parameters yielded no significant differences (i.e., step length, p=.09; step width, p=.84; double support time, p=.83). There was no significant change in variability of gait parameters (i.e., step length, p=.86; step width, p=.40). In addition to assessing gait parameters during the walking task, functional balance assessments tested via the Berg Balance Scale (BBS) as well. As expected, no differences were seen in the BBS assessment (p>.05) because this tool is not a valid tool to use with this population [5].

Figure 1. Average (SD bars) values for significant findings A) Lateral COM-BOS (cm) Stability Margin and B) Velocity (cm/s) as a function of time.

DISCUSSION & CONCLUSIONS
Preliminary findings show that static balance training using a video game based system improved velocity and dynamic stability. The balance training program was able to increase velocity without affecting step length suggesting that an increase in cadence in participants contributed to this increase in velocity. This finding has great impact on the OA community as cadence is usually unchanged as one ages [6]. Increased dynamic stability following training was most likely due to an increase in COM control and not changes due to step width (i.e. p>0.05). This suggests that training successfully forced the COM to the edges of the lateral border of the BOS. These preliminary findings show that our Wii balance training paradigm change healthy OA’s dynamic stability, making it less conservative and less stiff. Further analysis will look at stability during the turn phase (i.e. increased threat) of the walking task and assess stability during the step-wide and step-narrow stepping strategies when the BOS is altered and stability is challenged.

REFERENCES

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