Introduction

With increasing age, many functional abilities can decrease secondary to physiological changes. Most commonly, there is a loss of muscle and bone mass which contribute to poor mechanical performance. Further, there is a decline in neurologic control which can negatively affect balance, or if age is still the primary factor. These fall-related injuries can significantly decrease quality of life, as healing time is delayed and fear of falling prevents many from returning to activity altogether. Because of this, the ability to reduce functional limitations in older adults is a significant public health concern. Improved balance and lower extremity strength have been shown to improve balance in older adults irrespective of lower extremity strength.

Methods

Participants:
- 48 independent living older adults (21 male, 27 female)
- Aged 50-74 yrs
- Free of medical conditions known to affect balance
- Not prescribed medication known to affect balance

Lower Extremity Strength:
- Isokinetic Dynamometer (Biodyex etc., Biodex, etc.)
- Isometric maximum voluntary contractions (MVC's) of the Quadriceps and Hamstrings
- 3 MVC's each: knee flexion (MVC-flx) at a joint angle of 60 degrees and extension (MVC-ext) at 90 degrees
- Highest torque (Nm) produced accepted as MVC.

Balance Assessment:
- SWAY balance application
- 5 balance stances (Figure 1) lasting 20 seconds each
- Eyes closed for entire 20 second stance

Overall Results
Mean MVC were 78.2 (26.3) Nm and 160.0 (61.8) Nm for MVC-flx and MVC-ext respectively. Mean SWAY score was 56.1 (10.6). A significant negative correlation was found between both the SWAY balance score and MVC-flx (r=-0.295, p<0.05) and MVC-ext (p=0.289, p<0.05). However, after controlling for age and sex, balance and strength associations were no longer significant (p>0.05). Age was the only observed significant independent variable within the regression model (r=-0.442, p<0.01).

Conclusions

Hamstring and quadriceps strength did not have an effect on standing balance in adults aged 50-74. The negative correlation found between SWAY and lower extremity strength may result from the SWAY Balance Mobile Application measuring balance differently than traditional methods. Additionally, the negative correlation between balance scores and age may indicate that age is the predominant factor in reduced balance observed in older adults irrespective of lower extremity strength.

References