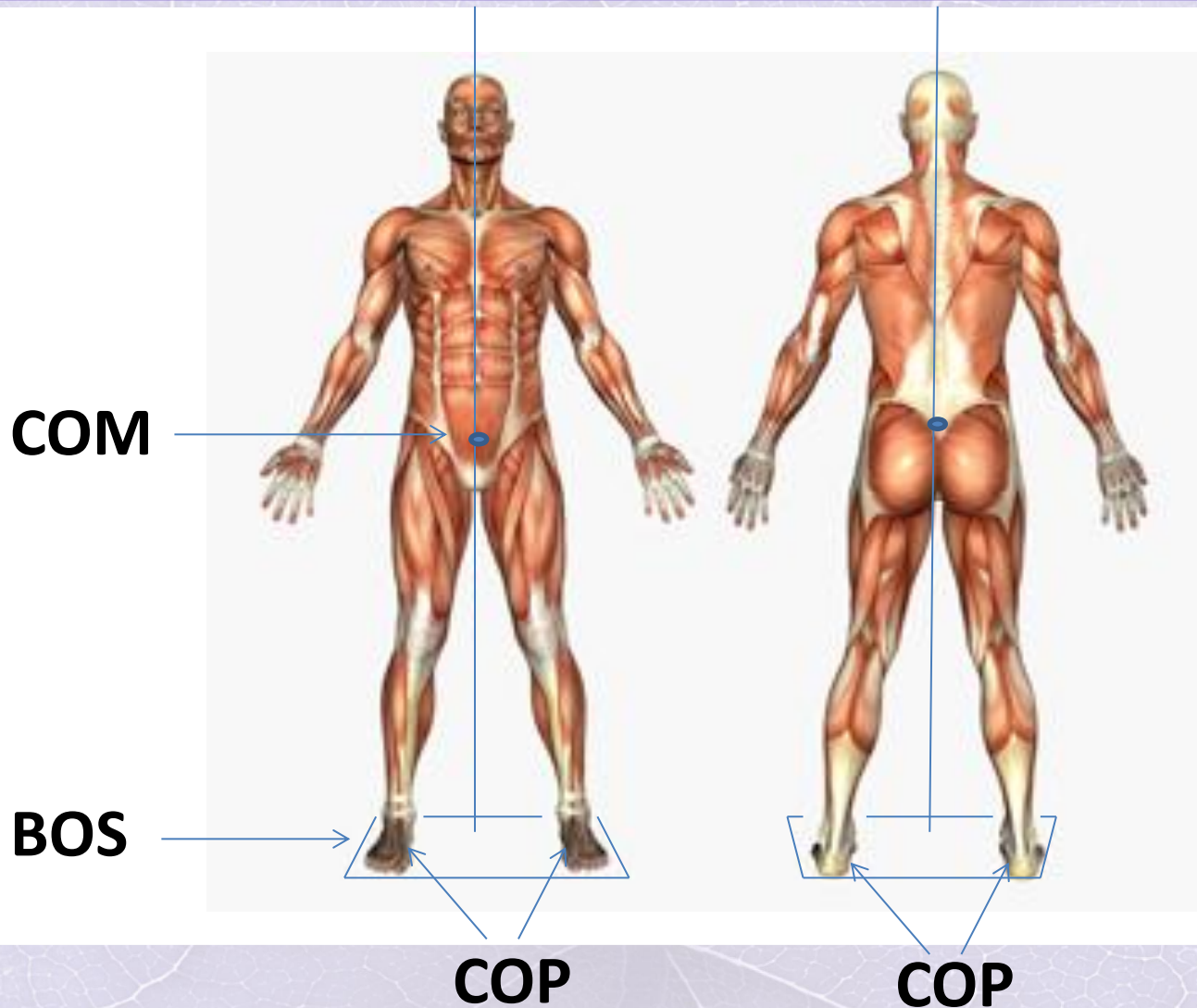


Video game based balance rehabilitation: Is the Nintendo Wii Fit an effective tool to improve balance?

Luke Denommé
Wilfrid Laurier University
&
Schlegel UW Research Institute for Aging

Staying upright: Mechanical components of balance

- Balance:
 - Ability to remain upright and prevent falling
 - Ability to maintain the centre-of-mass (COM) within the base-of-support (BOS)



Balance requires enhanced sensory feedback

- Balance requires online control of sensory information
 - Visual
 - Vestibular
 - Somatosensory
- Populations with mobility impairments have decreased sensory sensitivity and less control of their COM

Balance rehabilitation techniques for individuals with balance impairments

- Individualized balance rehabilitation programs
 - Physical therapy training
 - Independent physical activity
- Costly, time-consuming and difficult to generalize to global population

Inexpensive
Time-efficient
Effective
Structured

Research Design

Research Goals

Research Paradigm

Research Design

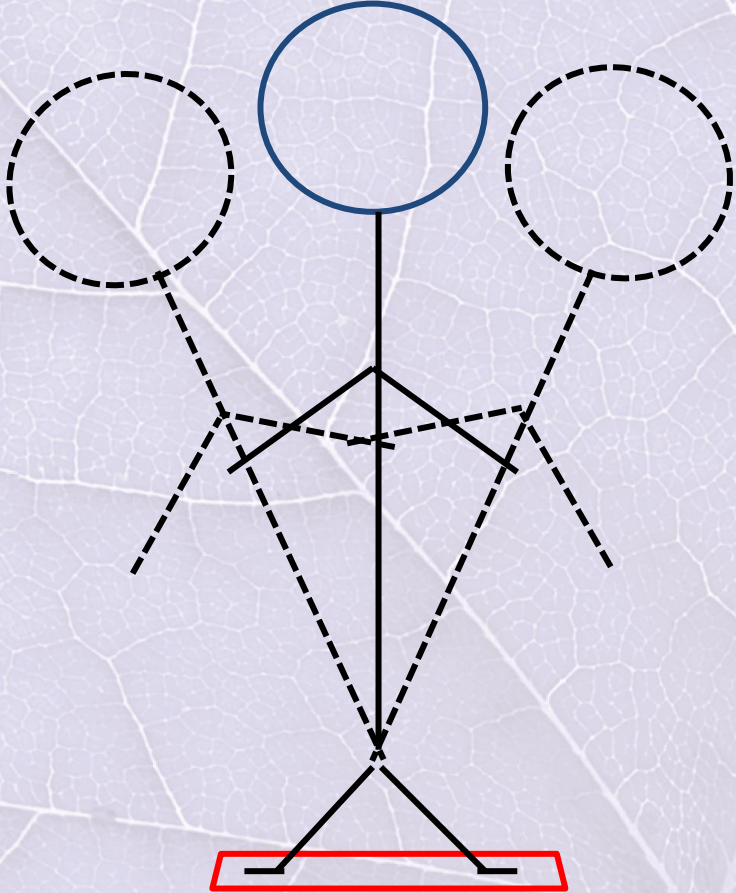
Improve static (i.e. standing) and dynamic stability (i.e. locomotion) in populations whom experience balance difficulties

*To determine if static balance training using
Nintendo® Wii Fit Balance Board
can lead to improved static and dynamic balance in
various populations with balance difficulties.*

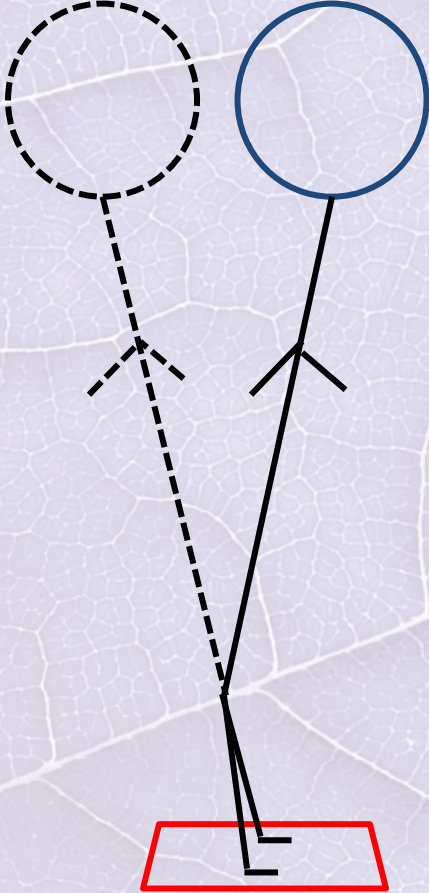
Nintendo Wii Fit: *Table Tilt*



Nintendo Wii Fit: *Table Tilt*



M/L Displacement



A/P Displacement

Experiment One

Denomme, Roy & Cinelli (under review)

Participants:

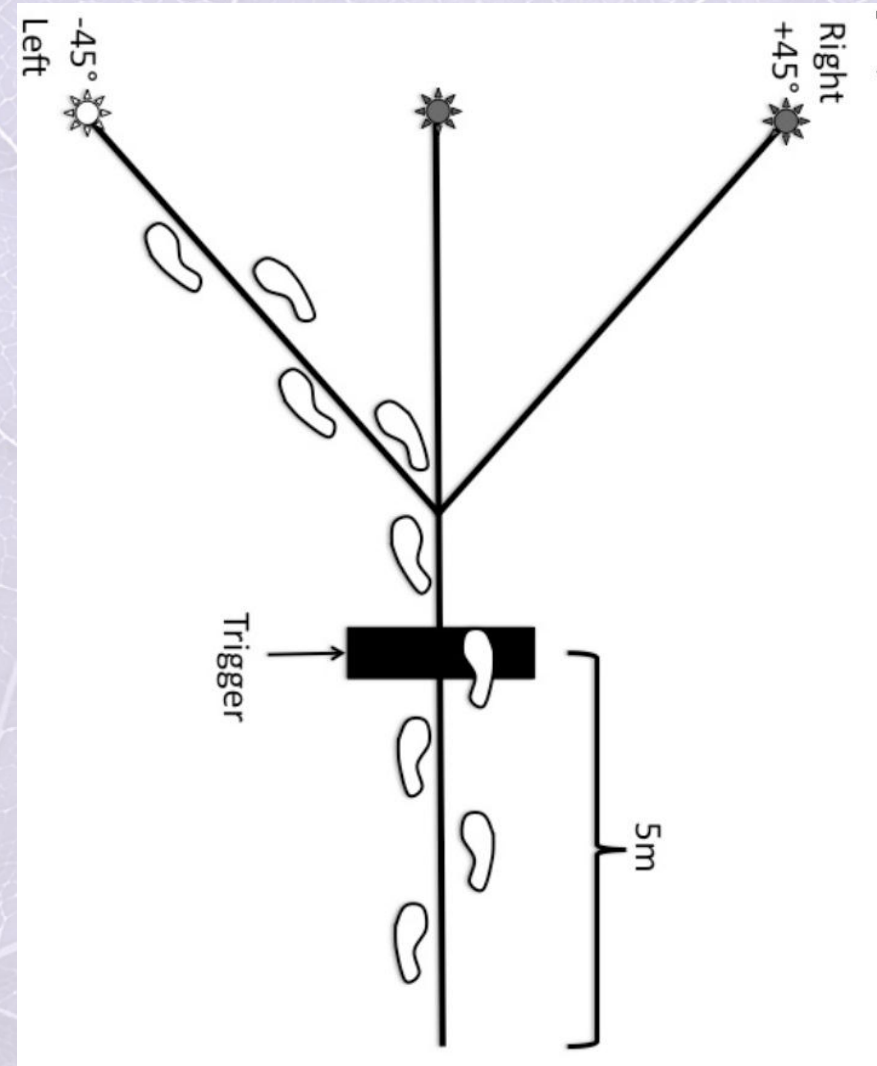
- 9 community-dwelling OA >65 yrs (M=68yrs)

Equipment:

- Walking task with turns (45°)
- Optotrak (14 frontal IREDs)

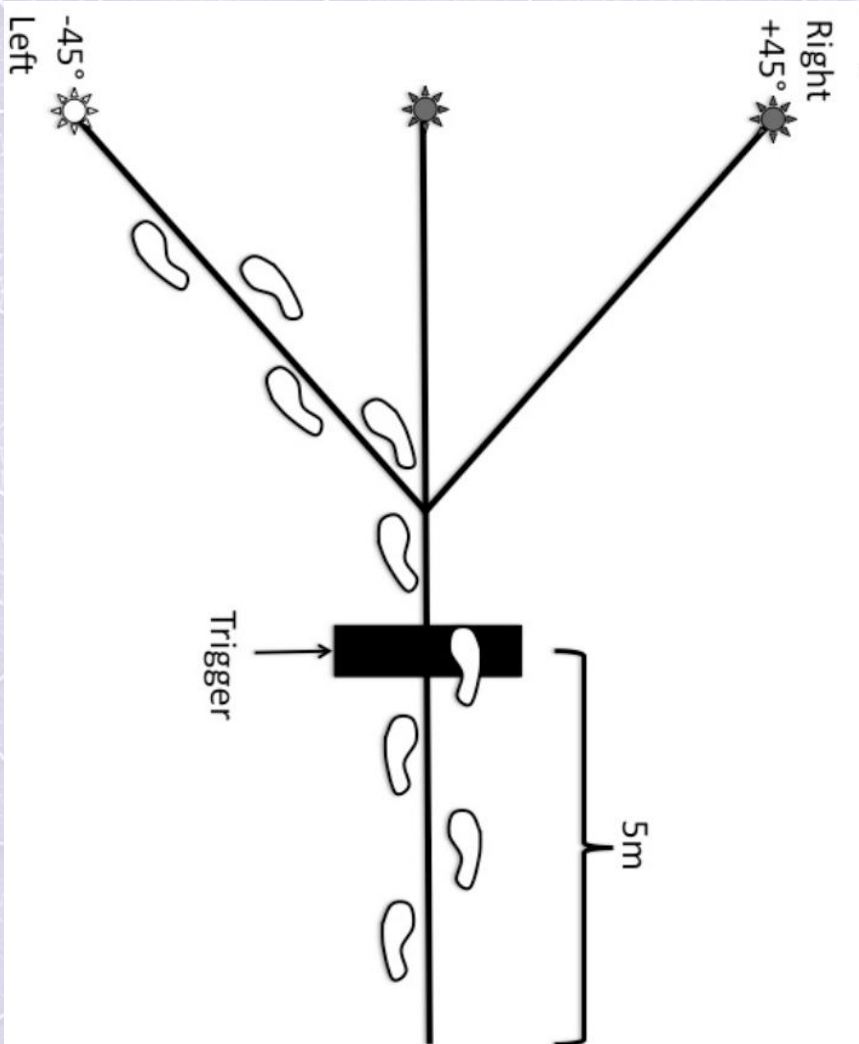
Conditions:

- Left 45° , Centre 0° , Right 45°



Experiment One

Denomme, Roy & Cinelli (under review)



Findings

Significant improvements
($P < 0.001$):

- Improved balance during locomotion
- Increased walking speed

Experiment Two

Denomme & Cinelli (under review)

Participants:

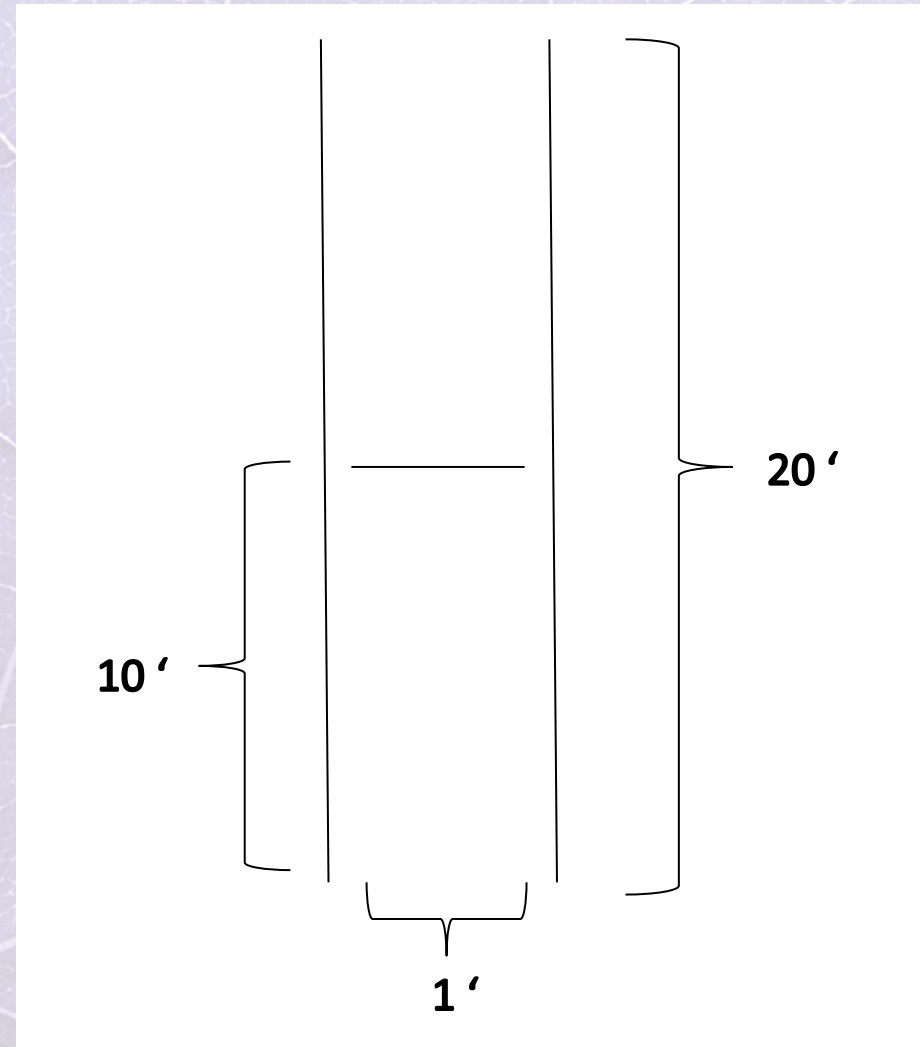
- 14 Unilateral Vestibular Loss
- Balance vs Visual Training

Equipment:

- Dynamic Gait Index (20 ')
- Timed Up and Go (10 ')

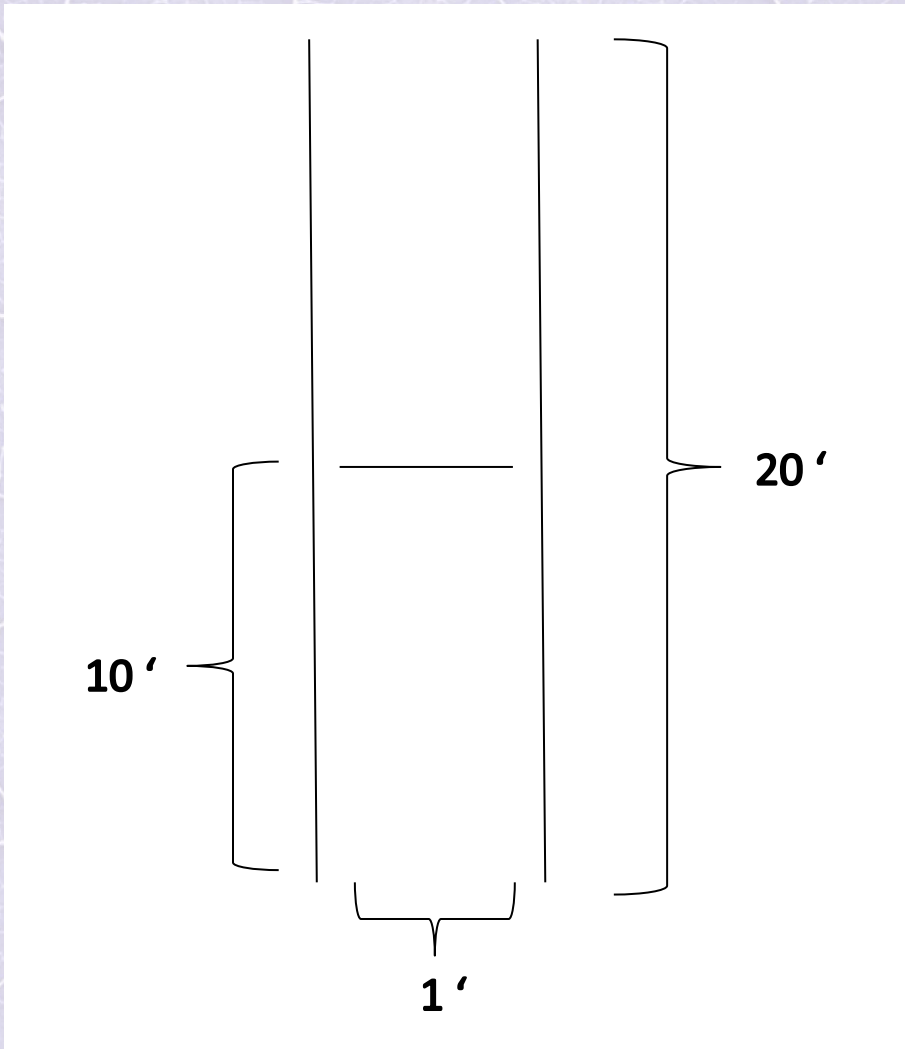
Two physiotherapists

- Expert scorers
- Blinded to participation group



Experiment Two

Denomme & Cinelli (under review)



Findings

Significant improvements
($P < 0.05$):

- Improved balance during locomotion
- Balance Training Group

>

Visual Training Group

Experiment Three

Denomme, Cinelli, Sharratt, Brown, Keszthelyi (in progress)

Participants

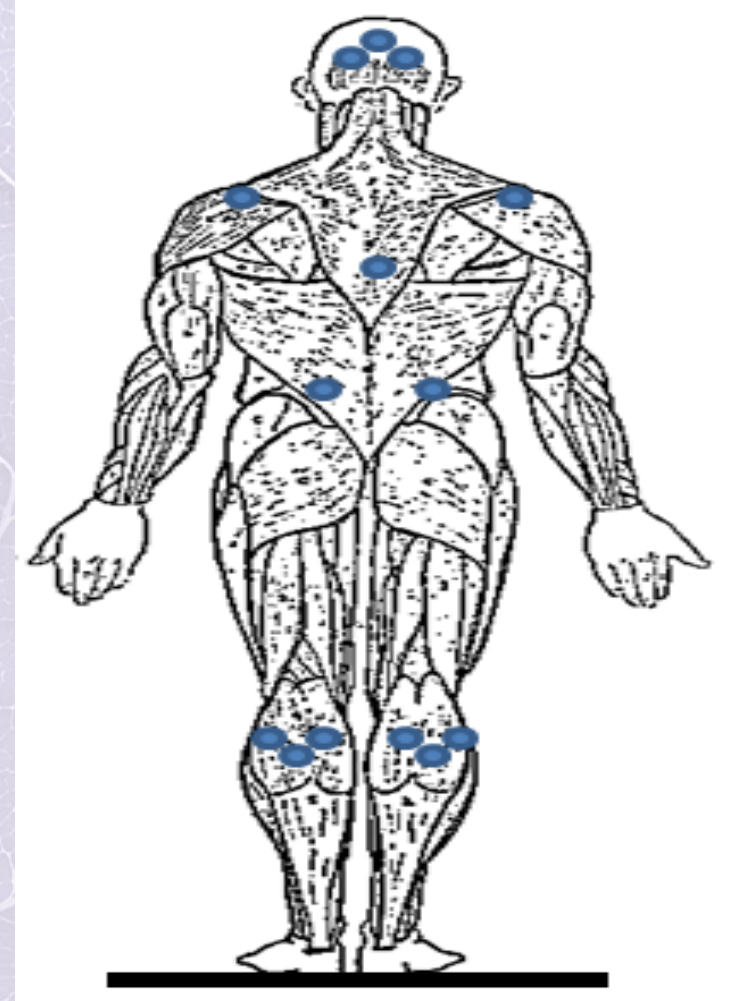
- 10 assisted living
OA > 65 yrs (M=81 yrs)

Equipment

- 25' walk
- Force platform

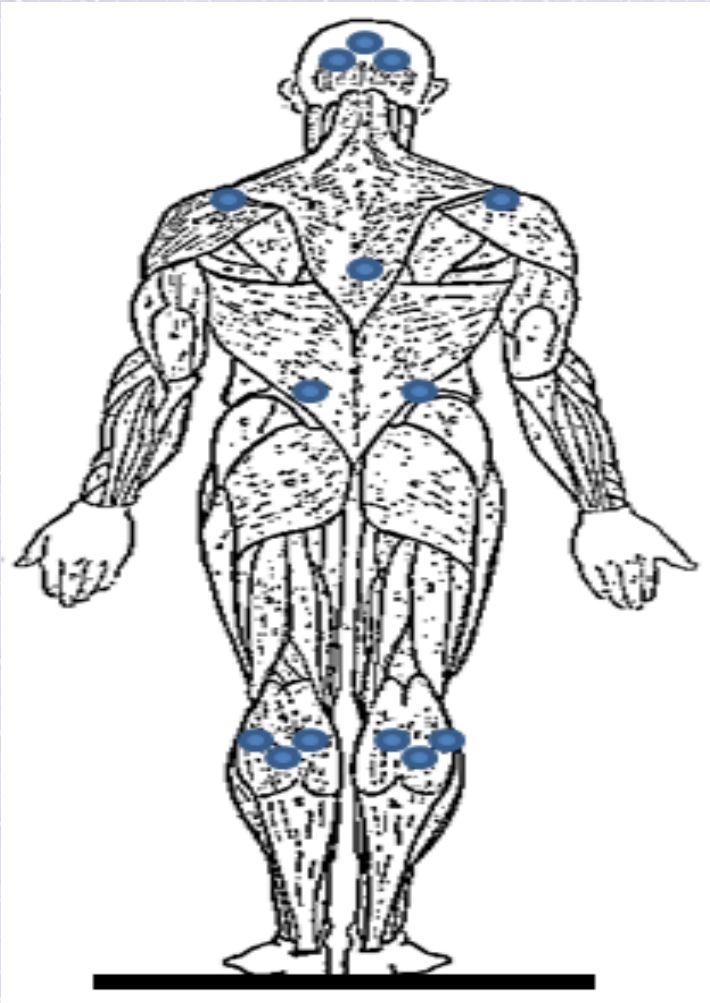
Conditions

- Eyes Open, Eyes Closed



Experiment Three

Denomme, Cinelli, Sharratt, Brown, Keszthelyi (in progress)



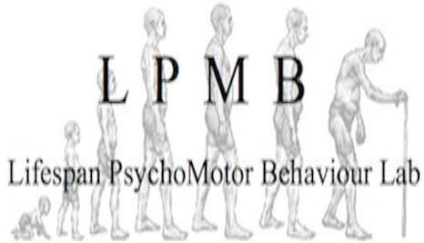
Findings

- Increased medio-lateral (M-L) sway
- Increased walking speed
- Increased balance confidence
- Less conservative and stiff

Summary

- Balance training using the Nintendo Wii Fit balance board (WBB) was able to improve dynamic stability
- WBB able to improve community-dwelling OA's dynamic stability, making it less conservative and stiff
 - Training successfully forced the COM to the edges of the lateral border of the BOS
- WBB able to help improve clinical balance impairment (acute peripheral unilateral vestibular loss)

Thank You



Ontario Research
Coalition



CDRAKE

CANADIAN DEMENTIA
RESOURCE AND
KNOWLEDGE EXCHANGE

Creating new ways to know and do.



- Seniors Health Knowledge Network (SHKN) has a falls prevention Community of Practice (CoP)
- Attendees can join on their website
 - www.shrtn.on.ca
 - Click on ‘communities’ and then ‘falls prevention’

