A FALL PREVENTION PROGRAM FOR OLDER ADULTS: IMPACT ON BALANCE, ITS SENSORY SYSTEMS, AND CONFIDENCE

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SIGNIFICANCE OF STUDY

- An older adult falls every second in the U.S. (Bergen, Stevens, & Burns, 2016)

- Falls are the most frequent cause of unintentional injuries
  - Average hospital costs of over $30,000
  - Cost increases with age (CDC, 2016)

- Fear of falling (FOF), or decreased balance confidence, is a major issue.

- FOF creates further risk for falling
  - Limits activity level
  - Further loss of physical function (Haynes, League, & Neault, 2015).

- Strongest fall prevention programs use a multi-factorial approach.
  - Balance and mobility
  - Medication management
  - Home safety evaluation (Bergen, Stevens, & Burns, 2016)

FALL RISK ASSESSMENT AND INTERVENTION PROJECT

- This multi-factorial approach was conducted from April – September ‘16

- Interdisciplinary:
  - Gerontology
  - Exercise Science
  - Nursing

- My Role: graduate/research assistant

- Funding was provided by the AARP

- Goal: Establish protocol for annual clinic that is open to the

RESEARCH QUESTION

What impact does this Fall Prevention program have on balance, the balance sensory systems, and balance confidence?

Balance

- Significant improvement in overall balance from participating in the Fall Risk Assessment and Intervention Project?
- Does each group – Tai Chi, balance yoga, or MOB only – show significant improvement in overall balance?

Sensory System

- Significant improvement in any of the three balance sensory systems – somatosensory, visual, or vestibular?
- Does each group show significant improvement in any of the three balance sensory systems?

Balance Confidence

- Significant improvement in balance confidence?
- Does each group show significant improvement in balance confidence?

INTERVENTIONS

One Group

Tai Chi

Movements in Tai Chi incorporate a series of constant weight shifting, body rotations, and semi-squat positions that require accurate joint positioning. (Hakim et al, 2010; Hu et al, 2016; Wu, MacDonald, & Pescatello, 2016).

- Attended a 1-hour session, twice a week for 15 weeks.

One Group

Balance yoga

The physical benefits of yoga include improvements in strength, endurance, flexibility, and balance as the body is challenged to maintain stability through stretching and holding various postures from a standing or seating position (Hakim et al, 2010; Nick et al, 2016; Patel et al, 2011; Youkhana et al, 2016).

- Attended a 1-hour session, twice a week for 15 weeks.

All Participants

A Matter of Balance

MOB is an evidence-based program designed to decrease fear of falling by enhancing self-efficacy and perceived control of falling. (Alexander et al, 2015, pg. 184; Matter of Balance, n.d.)

- Attended a 2-hour session, once a week for 8 weeks.

BALANCE SENSORY SYSTEMS

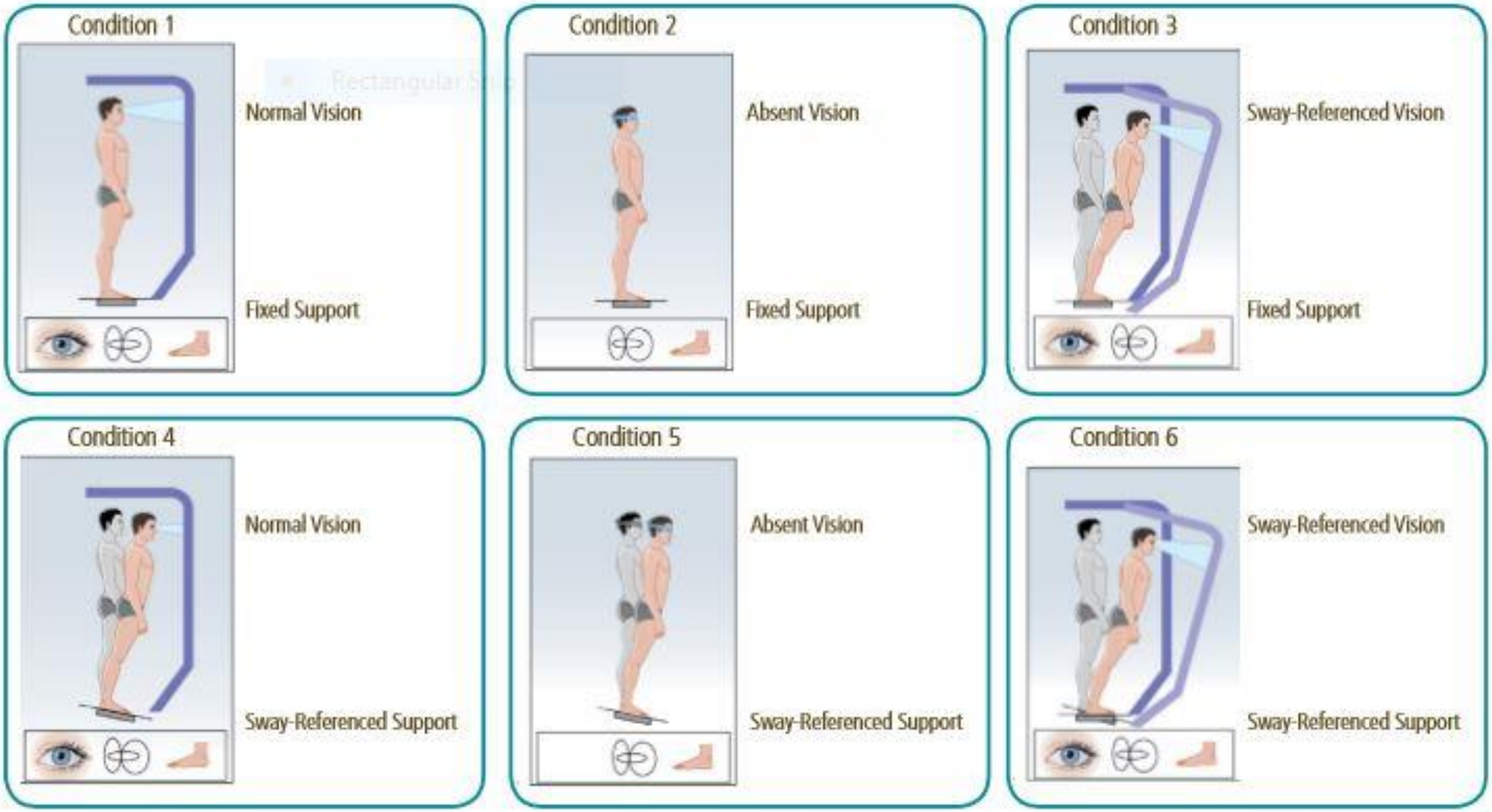
- Somatosensory
  - Proprioceptors → Brain → Muscles = Regain/maintain balance
- Visual
  - Eyes → Brain → Muscles = Regain/maintain balance
  - Let the body know where it is in relation to other things around it (Brown & Ferringo, nd).
- Vestibular
  - Involves the balance organs of the inner ear

METHODS

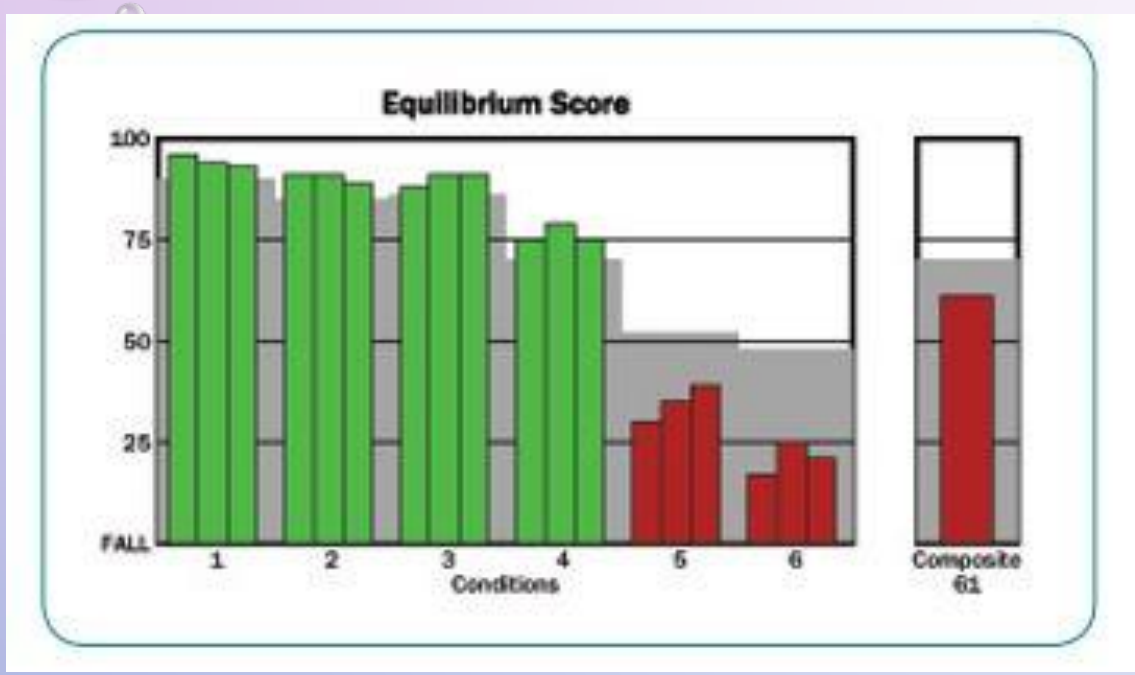
46 in 1st clinic, 28 completed MOB, but only 21 were able to attend 2nd clinic

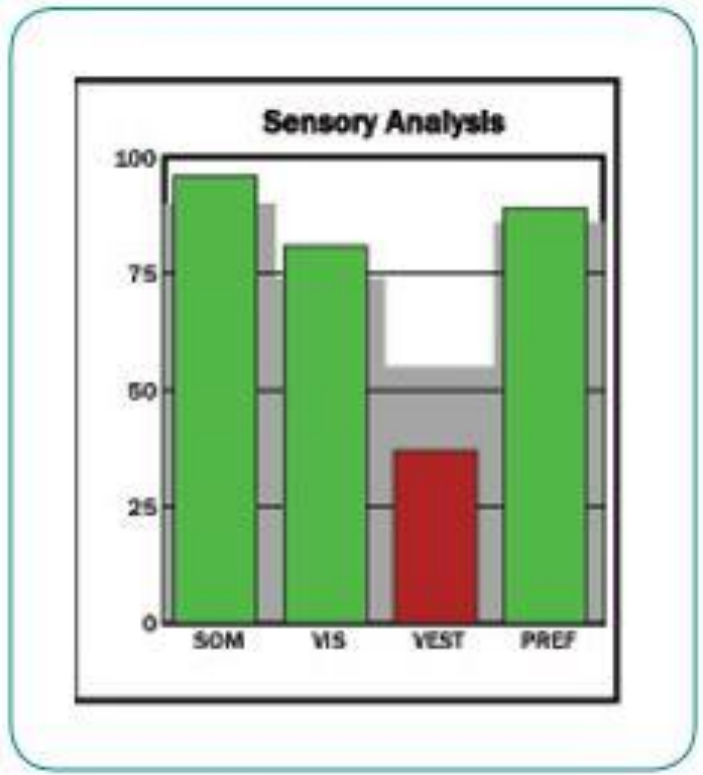
- First clinic (April)
  - First assessment survey. This included: demographics, exercise history, fall history, and balance confidence.
  - First assessment NeuroCom data
  - Three blood pressure readings
  - Review of medications
- MOB first session
  - Pre-test provided by MOB
- MOB last session
  - Post-test provided by MOB
- Second clinic (September)
  - Second assessment survey. This included: follow-up questions on falls and balance confidence.
  - Second assessment NeuroCom data
  - One blood pressure reading
  - Followed up on medication suggestions
  - Followed up to see if home modifications were made


Sensory Organization Test


Condition 1
Normal Vision
Fixed Support
Condition 2
Absent Vision
Fixed Support
Condition 3
Sway-Referenced Vision
Fixed Support
Condition 4
Normal Vision
Sway-Referenced Support
Condition 5
Absent Vision
Sway-Referenced Support
Condition 6
Sway-Referenced Vision
Sway-Referenced Support

DATA ANALYSIS





- The 3 scores for each trial were averaged.
- The NeuroCom program performed calculations to provide the composite balance score.

SOM	Condition 2 / Condition 1	Patient's ability to use input from **somatosensory** system to maintain balance
VIS	Condition 4 / Condition 1	Patient's ability to use input from **visual** system to maintain balance
VEST	Condition 5 / Condition 1	Patient's ability to use input from **vestibular** system to maintain balance

SAMPLE (N=28)

Mean age	75
Range	66-91
Gender	
Female	23 (82)
Male	5 (18)
Marital Status	**n (%)**
Never Married	3 (11)
Married/partner	16 (57)
Divorced/separated	3 (11)
Widowed	6 (21)
Education	**n (%)**
High School/ GED	3 (11)
Some college	7 (25)
College Graduate	8 (29)
Some graduate work	4 (14)
Graduate degree or higher	6 (21)
Income	**n (%)**
<$20k	1 (4)
$20k - <$35k	3 (11)
$35k - <$55k	2 (7)
$55k - < $75k	5 (18)
$75k +	11 (39)

Self-reported Health	**n (%)**
Physical Health	
Excellent	7 (25)
Very Good	12 (43)
Good	8 (29)
Fair	1 (4)
Mental Health	
Excellent	13 (46)
Very Good	10 (36)
Good	5 (18)
Exercise	
None	2 (7)
Mild	7 (25)
Moderate/Strenuous	19 (68)

FALL RESULTS (N=28)

First Assessment	n (%)
Fall in past year	
No falls	11 (39)
One fall	11 (39)
>1 fall	6 (21)
Fall in past 5 years	
No falls	7 (25)
One fall	6 (21)
>1 fall	15 (54)
Where fall occurred	
Indoors	2 (7)
Outdoors	12 (43)
Both	6 (21)
Cause of fall	
Dizziness	1 (4)
Tripping	13 (46)
Slipping	11 (39)
Injury Occurred	
Yes	11 (39)
Serious Injury	
Yes	5 (18)

Second Assessment	n (%)
Fall since program	
No falls	17 (61)
One fall	4 (14)
>1 fall	1 (4)
Where fall occurred	
Indoors	2 (7)
Outdoors	2 (7)
Both	1 (4)
Cause of fall	
Dizziness	0 (0)
Tripping	2 (7)
Slipping	3 (11)
Injury Occurred	
Yes	1 (4)
Serious Injury	
Yes	1 (4)

T-TESTS RESULTS

	Composite Score	Somatosensory	Visual	Vestibular	Balance Confidence
Overall Sample (N=28)					
1st assessment	64.38	97.26	79.35	45.17	3.35
2nd assessment	66.62	96.65	82.80	46.70	**4.0***
Yoga (n=8)					
1st assessment	65.38	97.42	78.42	46.96	3.67
2nd assessment	70	98.88	**85.33***	54.25	4.17
Tai Chi (n=7)					
1st assessment	61.14	95.78	77.14	36.90	3.33
2nd assessment	61.86	94.40	85.16	31.70	**4.0***
MOB (n=6)					
1st assessment	66.83	98.78	83.15	52.43	3.0
2nd assessment	67.67	96.31	76.66	54.14	3.8

Note: *$p < .05$

DISCUSSION

Limitations

- Small sample size, with no diversity
- Large drop-out due to time commitment and scheduling issues
- Not random assignment
- NeuroCom had no comparative norms for 80+
- No way to tell specific cause of improvements made
    - Too many variables (in the study and outside of study)

Strengths

- Community engagement and feedback was positive
- MOB discussions helped participants learn about themselves and reduce FOF
- Connections and friendship were formed
    - Combats social isolation
- Established protocol to complete on an annual basis, open to the community.

Future recommendations

- Limited research on balance yoga. More studies should be conducted targeting the older population
- This pilot study shows promise, so should be replicated on a larger scale and with a more diverse population
- NeuroCom needs to extend database for comparative norms for 80+

TAKE HOME MESSAGE

- We established a protocol for the Fall risk assessment clinic.
- The next annual clinic will be the weekend of September 29th, 2018.
- Based on our limited sample, it appears that MOB does help improve Balance Confidence, which reduces the risk of falling. However, the impact could be strengthened when combined with a balance-specific exercise program, such as balance yoga.

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