

Limits of Stability and Static Balance Training

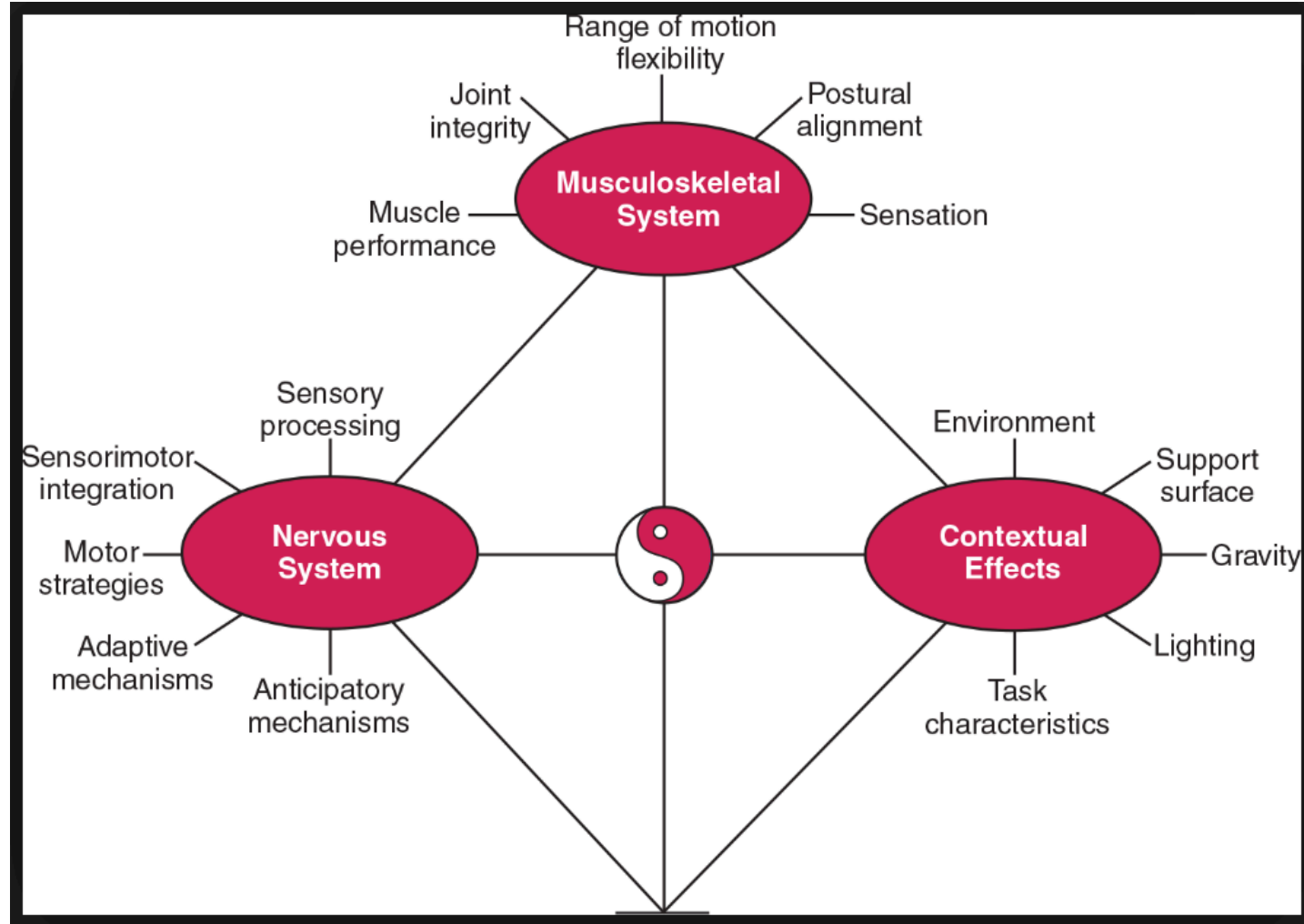
AgeWell Collective Episode #26
Christian Thompson, Ph.D.



Objectives

- Describe the importance of static balance capabilities for older adults to live successful lives.
- Learn biomechanical concepts such as limits of stability and center of pressure excursion which determine static balance.
- Understand how the Functional Reach Test provides a valid means to measure static balance.
- Learn several static balance training exercises that can be progressed and regressed for their older clients.

Balance: A Complex Phenomenon



Essential Exercise Elements

- Accumulation of 50 hours of exercise to reduce OCCURRENCE but only 2 weeks to reduce RISK

Sherrington, 2011 *NSWPHB*

REQUIRED COMPONENTS

- Joint Mobility
- Sensory Stimulation
- Muscle Strength/Power
- Static/Dynamic Balance
- Gait Enhancement

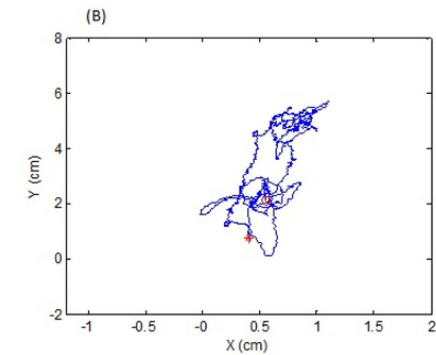
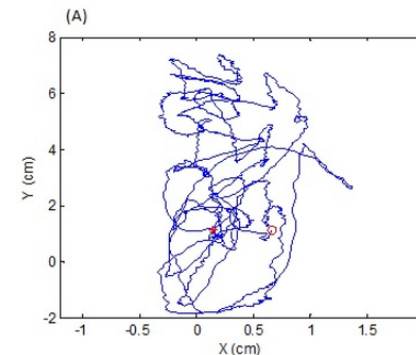
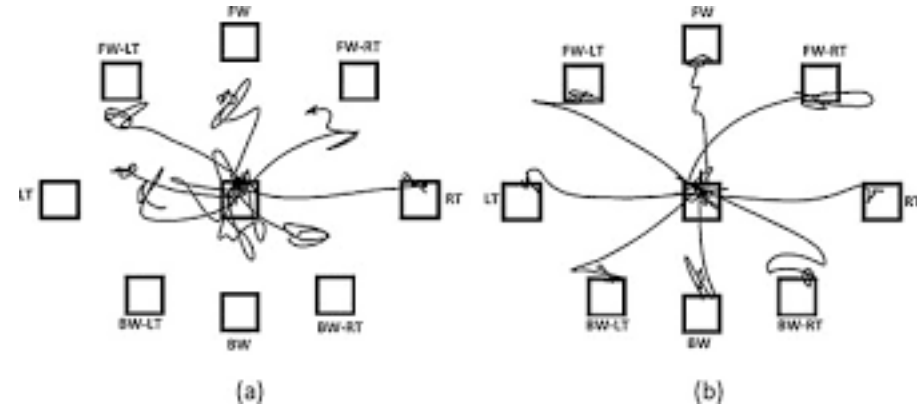


Static Balance Basics

- Limits of Stability
- Center of Pressure Excursion

Affected By

- Joint Mobility (Ankle & Hip in Particular)
- Sensory Integration (Visual & Vestibular)
- Muscle Strength/Power (Lower Body)



Reach Test

- Developed by Duncan (*JOG* 1990)
- Measures sagittal plane Limits of Stability (LOS)
- Requires both mobility and stability of the kinetic chain during reach/hold/return
- Outcome measurement is anterior reach distance ($\pm 0.25''$)



Reach Test

Task Demand Analysis

- Quiet Standing: Postural Control, Core Strength
- Reach Phase: Joint Mobility (hip hinge, TPC integrity, rotational capacity), Vestibular and Visual (body orientation), Muscle Strength (eccentric control)
- Reach Hold: Static Balance (at limits of stability), Core Strength
- Reach Return: Core Strength, Vestibular and Visual (body orientation), Muscle Strength (concentric force production)

AWC Static Balance Assessment – Reach Test

AWC Assessment Battery

Client's Name: _____ Age: _____ Current Date: _____

Limitations: _____



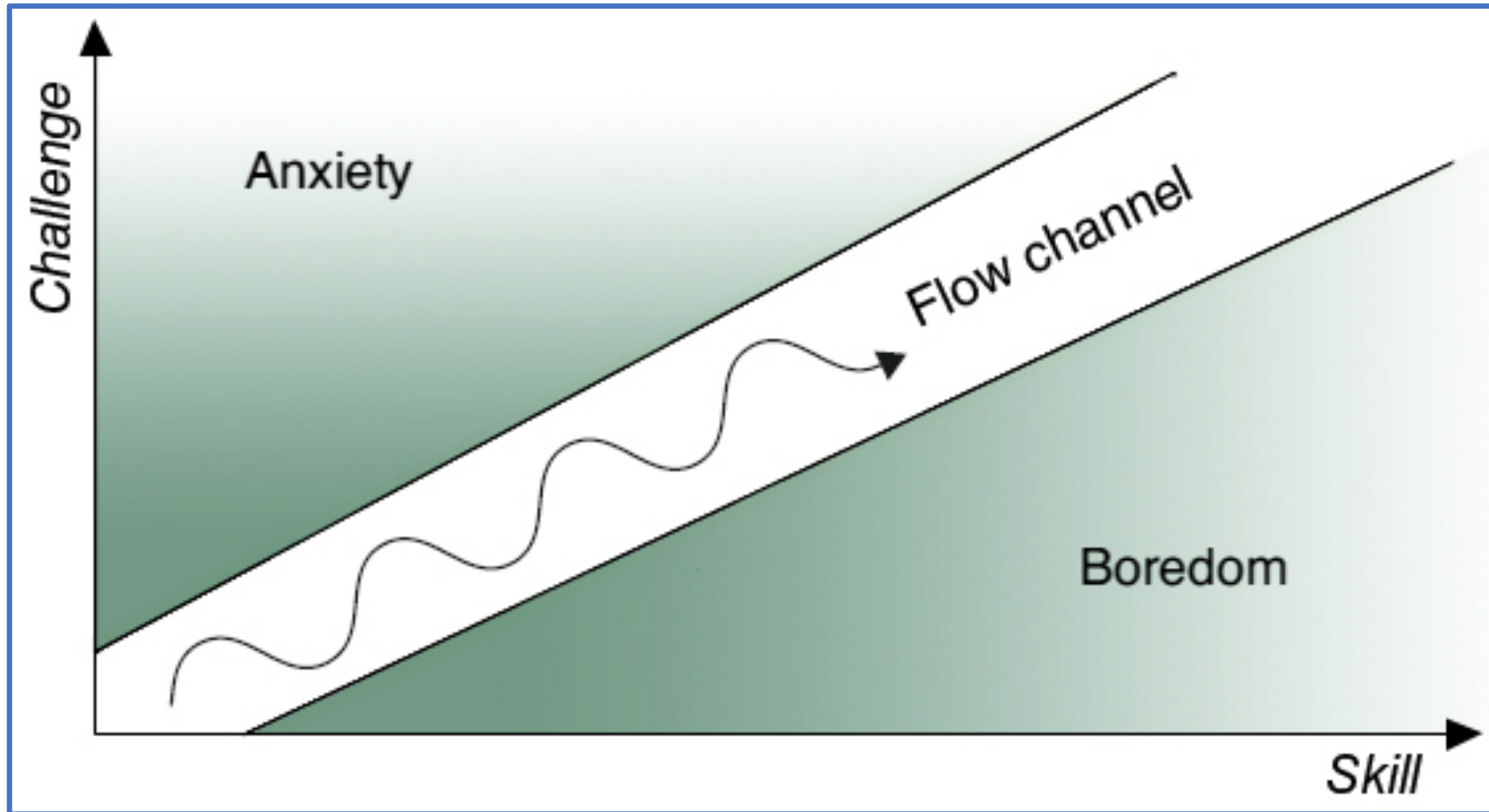
Assessment	Observation Check List				Rating/Score/Comments/Notes
REACH TEST (Measured to the closest 0.25")	Right Trial 1	Start: _____	End: _____	Total: _____	Lost balance before performing reach? ☐ Yes ☐ No
	Right Trial 2	Start: _____	End: _____	Total: _____	Compensatory step during reach/return? ☐ Yes ☐ No
	Left Trial 1	Start: _____	End: _____	Total: _____	Hand fell below height of ruler? ☐ Yes ☐ No
	Left Trial 2	Start: _____	End: _____	Total: _____	Lost balance when holding reach position? ☐ Yes ☐ No
					Felt/appeared wobbly during reach/hold/return? ☐ Yes ☐ No
					More than 2" difference between right/left reach? ☐ Yes ☐ No



Reach Test

Developing Exercise Program from Assessment Results

Optimal Adaption: The Flow Channel



Choose the Level of Challenge for Static Balance Exercises

Assessment	Poor 20% & Below	Below Average 21-40%	Average 41-60%	Above Average 61-80%	Excellent Above 80%
FRT	6.75" or less	7.00" - 8.75"	9.00" - 10.25"	10.50" - 12.00"	> 12.00"

Level of Challenge Mapping

- Poor Score = Level 1 Exercise
- Average Score = Level 3 Exercise
- Above Average Score = Level 5 Exercise

Any Good Exercise Exists On A Continuum!!!



Types of Static Balance Exercises

- Lower Body Driver
 - Single leg stance with other leg creating instability & balance challenge
 - Modify difficulty via external assistance, distance, direction, speed, surface, dual tasking...etc.
- Upper Body Driver
 - Balance challenged stance with upper body creating instability & balance challenge
 - Modify difficulty via external assistance, foot position, distance, direction, speed, surface, dual tasking...etc.



Static Balance



Static Balance

Thanks & Stay Tuned!!



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Next: Episode #22 – Dual–Tasking in Gait & Balance
w/ Ryan Glatt – Thursday February 11th

