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Balance in Adults with Visual Impairments

Pamela S. Haibach

The College at Brockport, phaibach@brockport.edu

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Balance in Adults with Visual Impairments

Pamela Haibach, PhD

Associate Professor

Dept. of Kinesiology, Sports Studies, and P.E.

The College at Brockport



Institute of Movement Studies for
Individuals with Visual Impairments



Overview

- Why is balance important?
- Background
- Current research on balance
- Role of Sensory systems
- Balance and Motor Skills
- Balance Assessments
- How to improve balance
- Balance Activities



Why is Balance so Important?



Balance

- Inherent factor of movement
- Crucial for activities of daily living



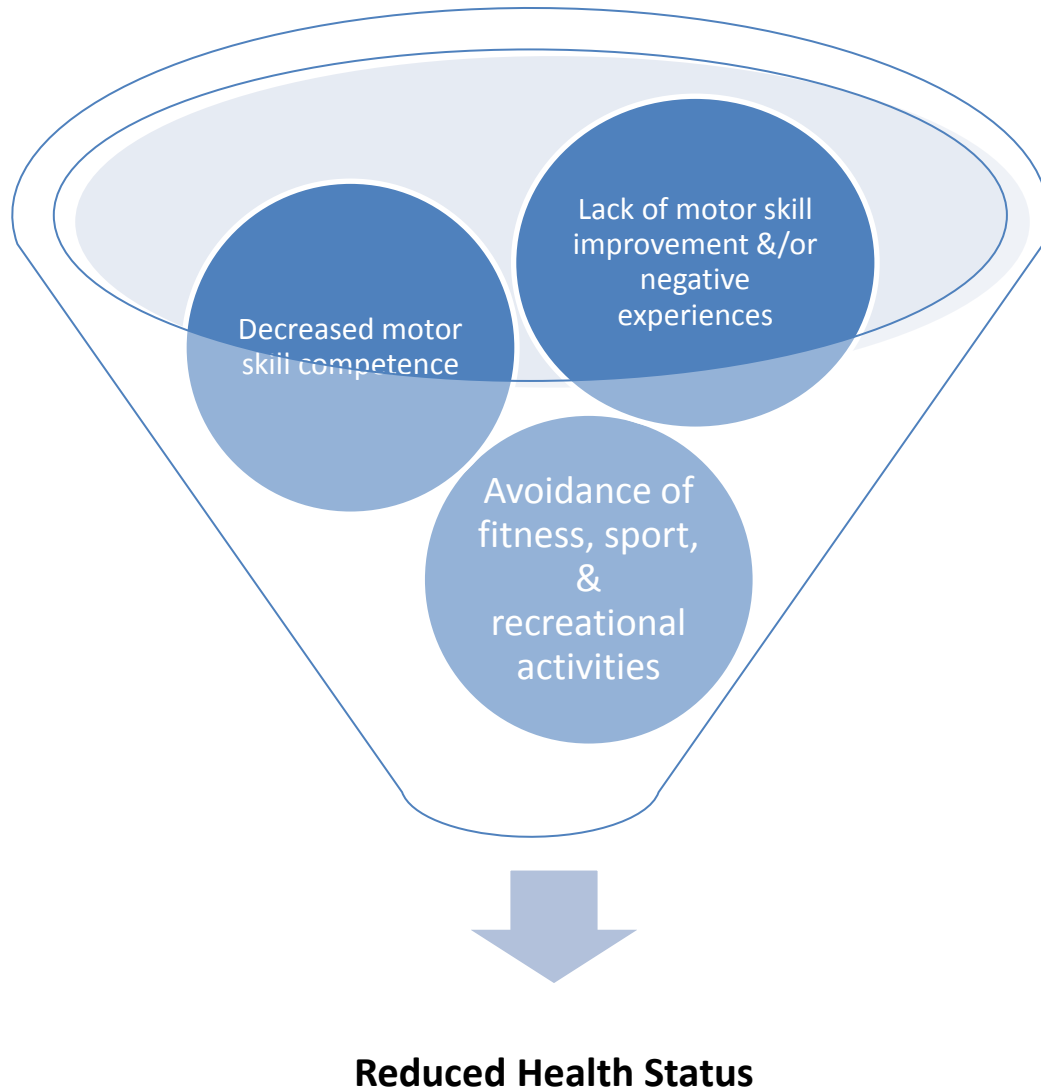
Foundation for motor skills so important



Motor Skills are Foundation for Fitness

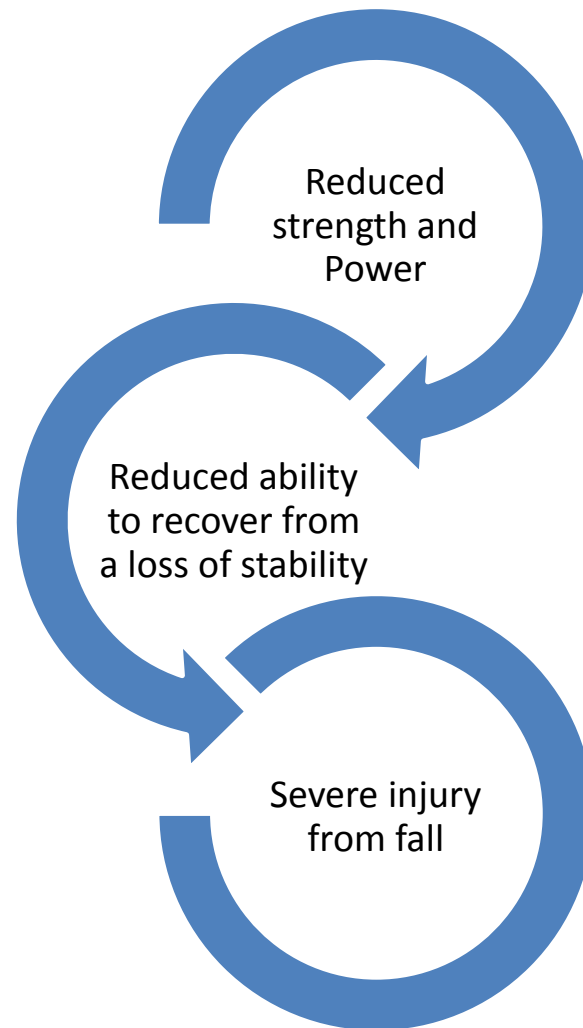
- The development of fundamental motor skills, and therefore motor skill competency, significantly influences an individual's physical activity levels, fitness and health status (Cairney, Hay, Faight, & Hawes, 2005; Cantell, Crawford, Doyle-Baker, 2008; Cawley & Spiess, 2008; Hands & Larken, 2006; Hands, 2008) •
- Physical activity levels at each life stage influences the physical activity levels of subsequent life stages, such that active children are more likely to become active adolescents (Barnett, Morgan, Beurden, & Beard, 2008) and active adults (Boreham & Riddoch, 2001; Cantell, Crawford, Doyle-Baker, 2008).

On the flip side...



Avoidance of Physical Activities Leads

to:



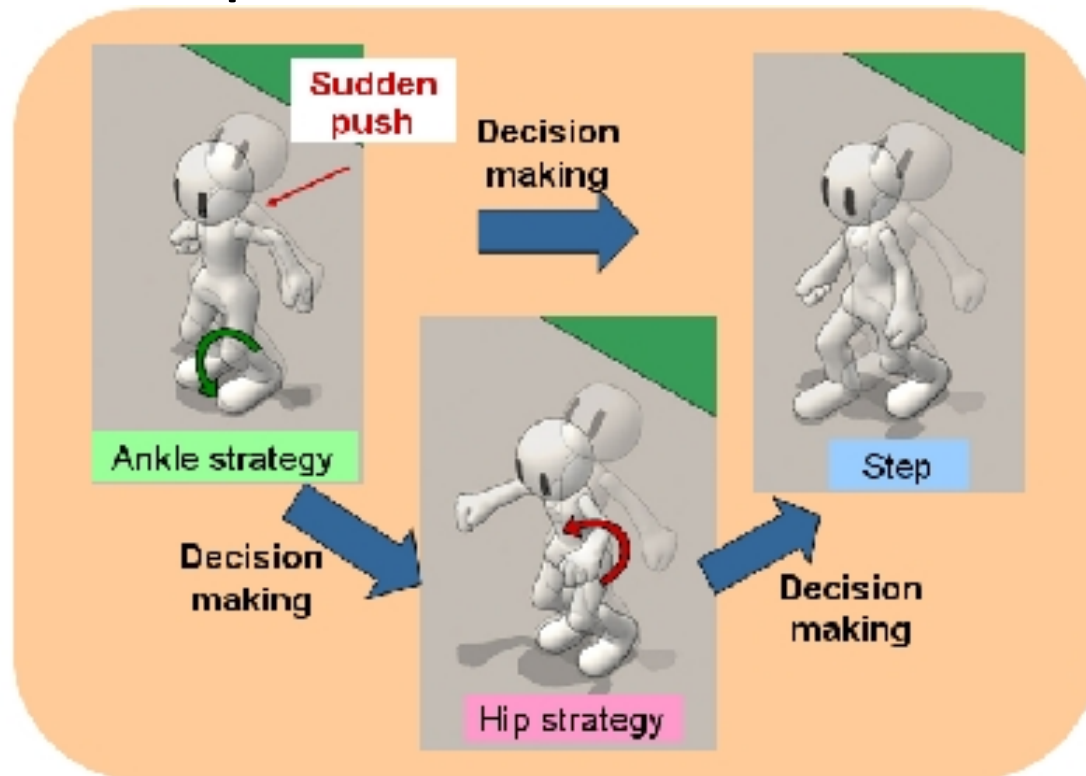
How do we maintain balance?

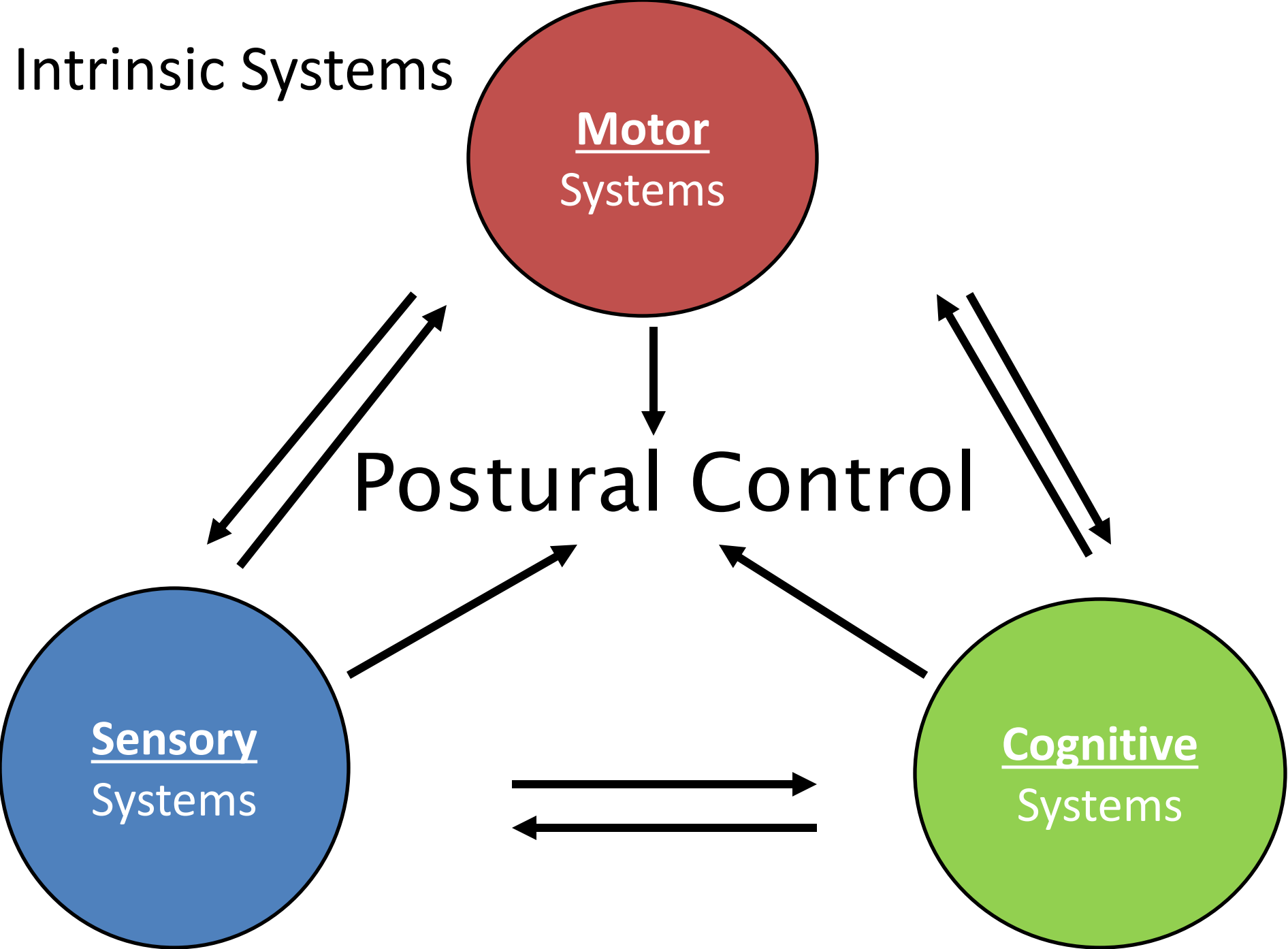
Continuous adjustments of muscle activity and joint position occur in anticipation and response to integration of sensory information



Postural Control

- Anticipatory Postural Control- actions that can be planned in advance
- Reactive Postural Control- describes situations that can not be planned in advance of the action required





Sensory System

“Where am I”

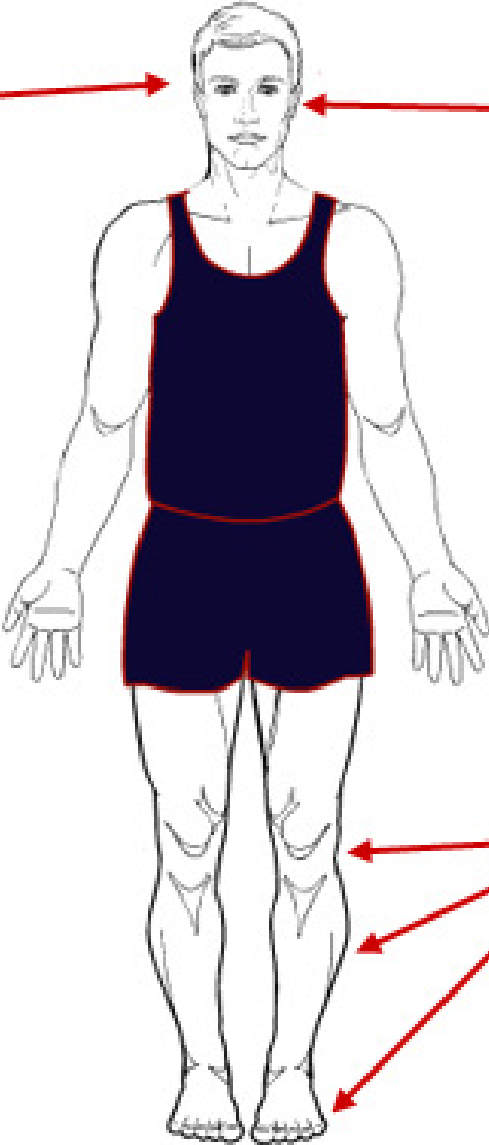
Critical for successful goal-directed
action planning as well as
subconscious or automatic
adjustments



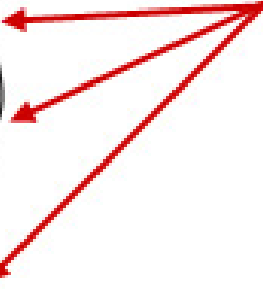
Vision



**Vestibular
(Inner Ear)**



Proprioception



=

BALANCE

Vestibular system

- Internally measures gravitational, linear & angular accelerations of the head
- Resolves the conflict that arise b/n the sensory systems in complex visual environments

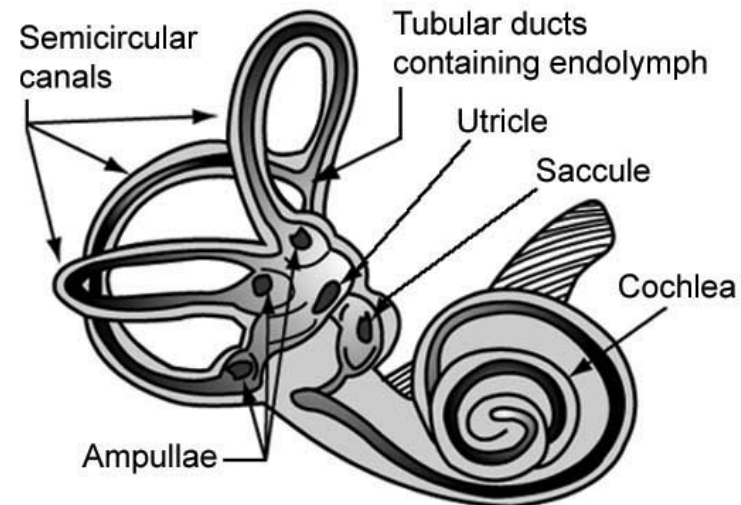
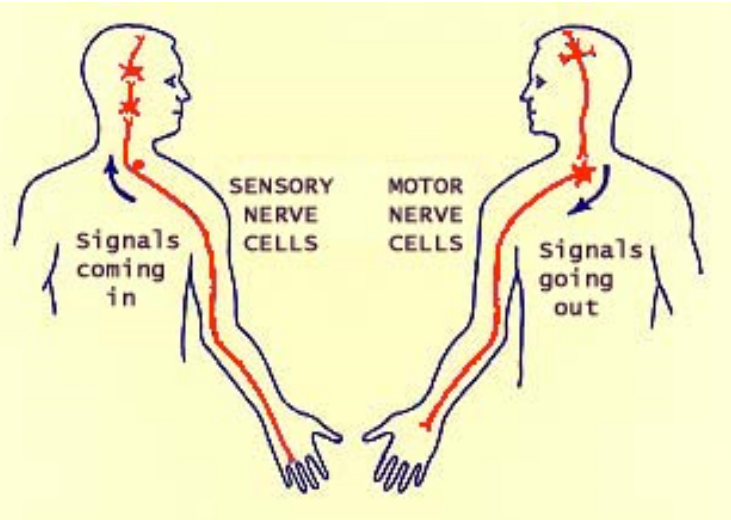


Figure 2: The Vestibular System - semicircular canals and otolith organs

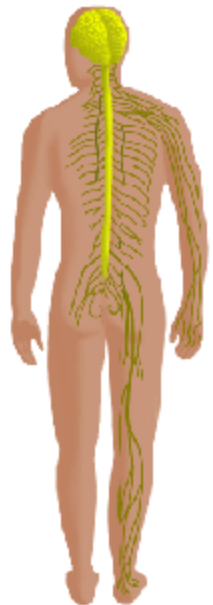
Motor “What am I going to do?”

- Acts on the sensory info. Arising from the external environment as well as other sensory areas within CNS
- Begins with the central component of the motor system with the selection of the various muscle group



Cognitive Systems

- Assistive role in posture and balance
- Interpret the incoming sensation and plan the ensuing motor response
- Speed and accuracy of the movement is influenced by how well we:
 - initially evaluate the environment
 - remember what we are supposed to do in a given situation
 - efficiently allocate our attentional resources



Sensory Conflict

- Children resolve sensory conflict situations from an early age
- More adaptive and fully mature postural balance responses occur later in childhood due to sensory reweighting



Sensory reweighting

- Without vision
 - primary source - proprioceptors
- Standing on compliant surface – somatosensory inputs can no longer provide accurate information
 - Focus is on vision
- Vision
 - Primary during locomotion
- Vestibular
 - Primary when other two are compromised



Adaptive Balance

What happens if there is inadequate sensory reweighting?



Have you ever felt like you were moving when you were not?

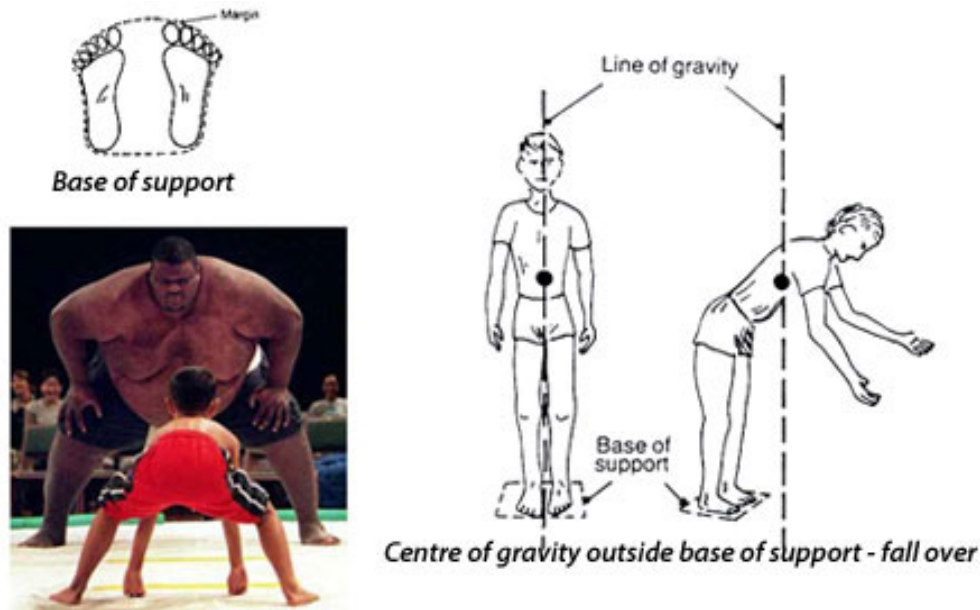


Perceptual Rooms



Sensory System Balance Training

- Exercises are designed to train each of the sensory systems that affect balance (somatosensory system, vestibular, and visual systems) to function more efficiently.



Focus upon Somatosensory System

The focus can be placed on the sensory systems by doing the following:

- The somatosensory system provides information on touch, pressure, and body position relative to the ground.
- Alter or remove vision while sitting, standing, or walking on a hard surface to improve the function of the somatosensory system

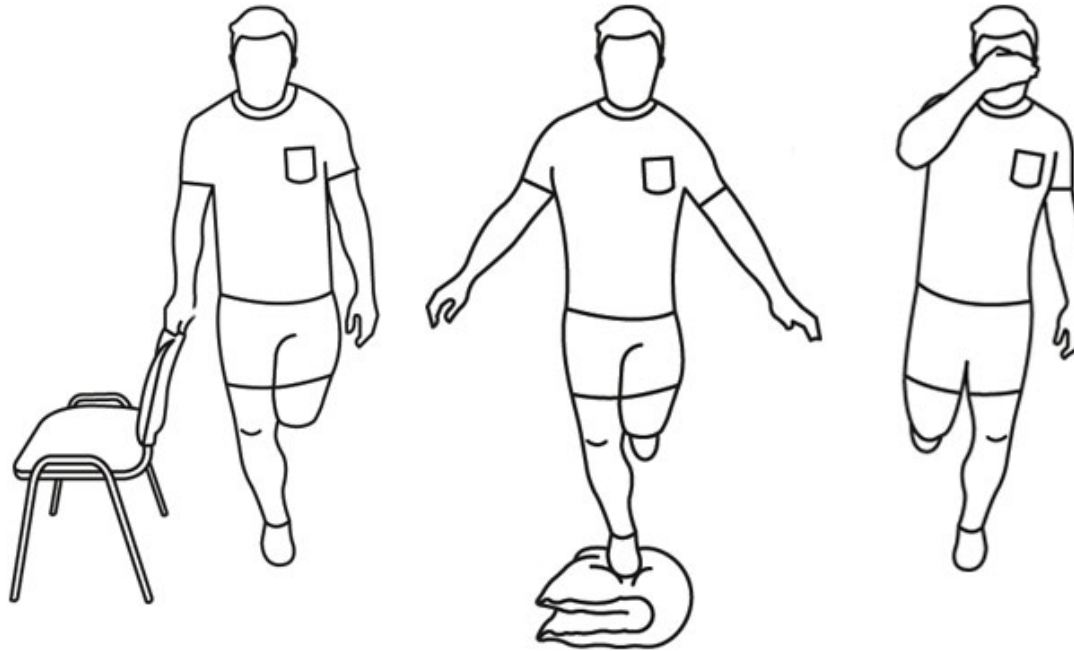


Focus upon Vestibular System

- The vestibular system provides information in regard to head position and movement.
- Alter both the somatosensory and the visual systems while sitting, standing or walking to improve the vestibular system function by standing on a compliant surface and altering or removing vision.



Balance Assessments



Berg Balance Scale

- ITEM DESCRIPTION SCORE (0-4)
 1. Sitting to standing _____
 2. Standing unsupported _____
 3. Sitting unsupported _____
 4. Standing to sitting _____
 5. Transfers _____
 6. Standing with eyes closed _____
 7. Standing with feet together _____
 8. Reaching forward with outstretched arm _____
 9. Retrieving object from floor _____
 10. Turning to look behind _____
 11. Turning 360 degrees _____
 12. Placing alternate foot on stool _____
 13. Standing with one foot in front _____
 14. Standing on one foot _____

BERG Assessment Example 1

SITTING TO STANDING

INSTRUCTIONS: *Please stand up. Try not to use your hand for support.*

4 - able to stand without using hands and stabilize independently

3 - able to stand independently using hands

2 - able to stand using hands after several tries

1 - needs minimal aid to stand or stabilize

0 - needs moderate or maximal assist to stand

BERG Assessment Example 2

PLACE ALTERNATE FOOT ON STEP OR STOOL WHILE STANDING UNSUPPORTED

INSTRUCTIONS: *Place each foot alternately on the step/stool. Continue until each foot has touched the step/stool four times.*

4 - able to stand independently and safely and complete 8 steps in 20 seconds

3 - able to stand independently and complete 8 steps in > 20 seconds

2 - able to complete 4 steps without aid with supervision

1 - able to complete > 2 steps needs minimal assist

0 - needs assistance to keep from falling/unable to try

Falls Self-Efficacy Scale

1 = not at all concerned

2 = somewhat concerned

3 = fairly concerned

4 = very concerned

1. Cleaning the house
2. Getting dressed or undressed
3. Preparing simple meals
4. Taking a bath or shower
5. Going to the shop
6. Getting in or out of a chair
7. Going up or down stairs
8. Walking around in the neighborhood
9. Reaching for something above your head or on the ground
- ...

Activities-Specific Balance Confidence (ABC) Scale

How confident are you that you will not lose your balance or become unsteady when you...

1. walk around the house? _____%
- 2....walk up or down stairs? _____%
- 3....bend over and pick up a slipper from the front of a closet floor? _____%
- 4....reach for a small can off a shelf at eye level? _____%
- 5....stand on your tip toes and reach for something above your head? _____%
- 6....stand on a chair and reach for something? _____%
- 7....sweep the floor? _____%
- 8....walk outside the house to a car parked in the driveway? _____%
- 9....get into or out of a car? _____%
- 10....walk across a parking lot to the mall? _____%
- 11....walk up or down a ramp? _____%
- 12....walk in a crowded mall where people rapidly walk past you? _____%
- 13....are bumped into by people as you walk through the mall? _____%
- 14....step onto or off of an escalator while you are holding onto a railing? _____%
- 15....step onto or off an escalator while holding onto parcels such that you cannot hold onto the railing? _____%
- 16....walk outside on icy sidewalks? _____%

Balance Activities

- Activities that can be used at home as strategies to help improve their balance.



Sample exercises



Shoulder Flex



Lunge



Baseball



Strengthening and Flexibility



Group Activities to Improve Balance



Tai Chi



Ballroom Dancing

www.blindyoga.net



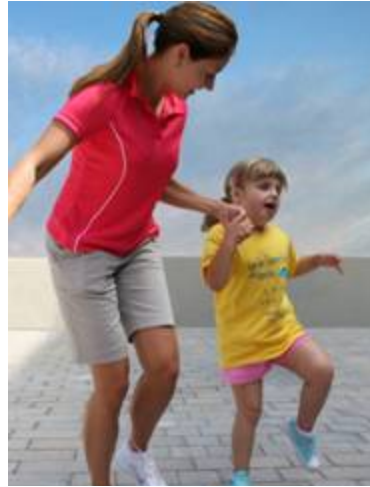
Balance modifications

- *Remember, **you can modify any of these activities** to fit the specific needs, capabilities, and personality of the individual.*



Thank you for attending

Any Questions or Comments?



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