Exercise Prescription Recommendations for the Aging Adult from the CEEAA

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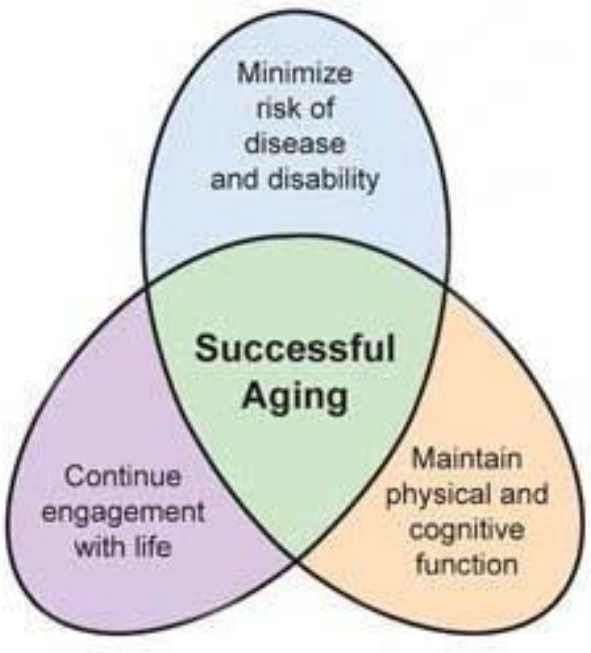
Session Objectives

- Identify the essential competencies and guiding principles for best practice in geriatric physical therapy with respect to the development of an evidence-based exercise prescription for the older adult population
- Review the benefits of and the steps to take to acquire the APTA Certified Exercise Expert for Aging Adults credential ,
- Recognize recommended evidence-based assessments needed for development of a patient-centered, effective exercise prescription for the older adult
- Apply exercise principles including the FITT Principle, Physical Stress Theory, Overload Principle and the Catabolic Crisis Model when designing exercise plans of care for an aging adult to support successful aging

Essential Competencies in Geriatric Physical Therapy (2011)[1]



Essential competencies identify the knowledge, skills and behaviors essential for providing value-based, effective geriatric physical therapy

- From Domain 2:
  - Select, administer and interpret standardized and psychometrically sound tests and measures that can identify fall risks and mobility deficits, communicate and incorporate findings into a comprehensive plan of care and make recommendations to the healthcare team
- From Domain 3:
  - Develop and implement an evidence-based and person-centered plan of care including appropriate interventions for conditions commonly encountered in older adults, utilizing the ICF model, emphasizing the movement system and considering principles of optimal aging across physiologic systems

Guiding Principles for Best Practices in Geriatric Physical Therapy[1]

6 Principles developed by the Academy of Geriatric PT Task Force on Best Practice (2022)

Principle 4 – Provide positive outcomes of physical therapy care by completing interventions based on the best available evidence

1. Use high intensity exercise whenever possible for strength, balance, endurance and functional training. Prescription of high intensity exercise is intentional and requires monitoring

2. Provide and advocate for appropriate dosage and challenge

3. Design unique programs that fit the individual's needs based on goals and abilities, time commitment, travel concerns, financial limitations, and available resources

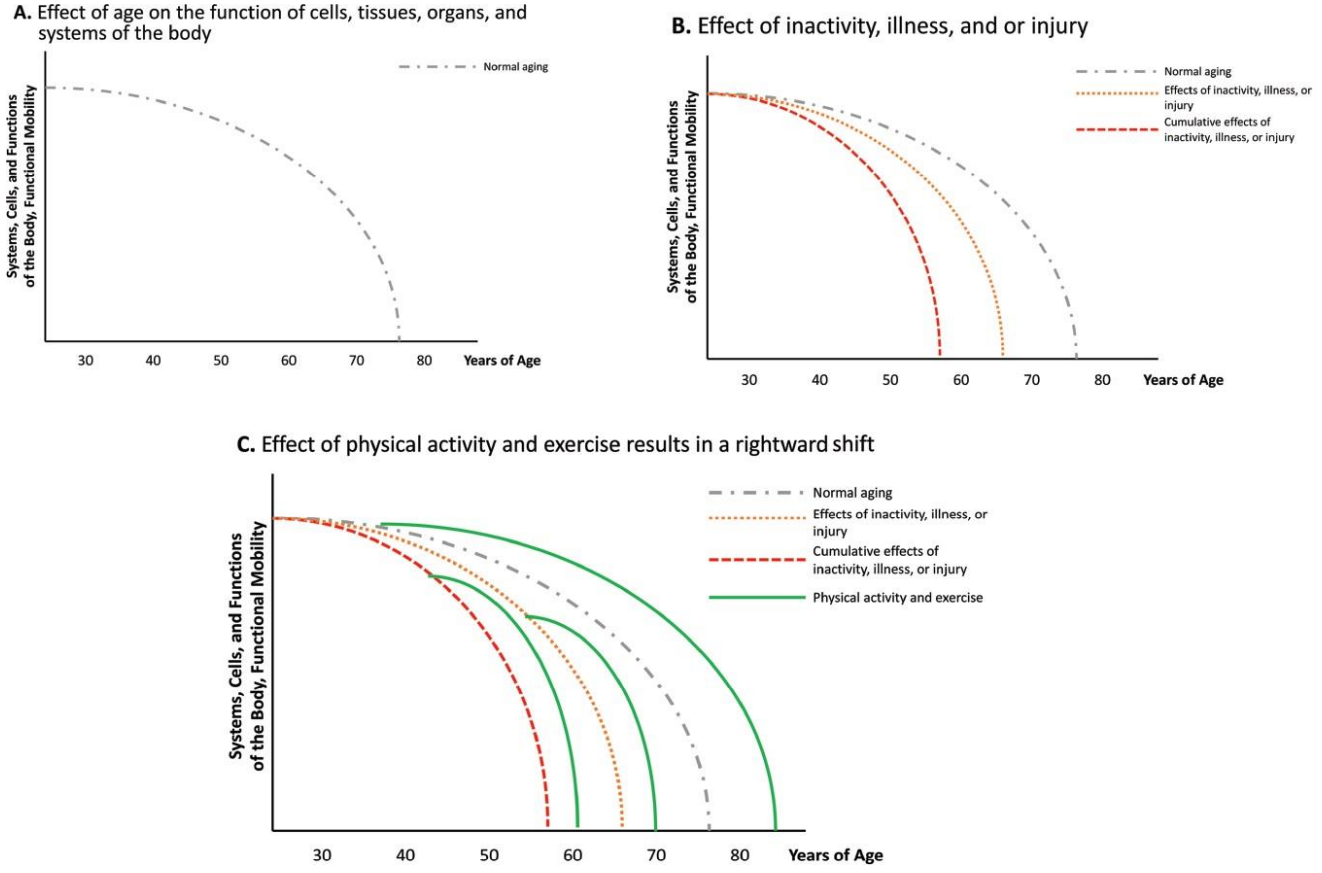
4. Exercises should be progressive, creative, variable and challenging to enhance outcomes and patient engagement

What is the CEEAA[1]

APTA Geriatrics
An Academy of the American Physical Therapy Association

- 32.9 Continuing education course that culminates in the Certified Exercise Expert for Aging Adults (CEEAA) credential
- Hybrid format
- 5 interactive self-paced modules
- 2 live webinars
- 1 capstone weekend with lab and practical exam
- Cumulative online exam
- Complete all components within 2 years
- $1,650 for APTA members / $1,955 for non-members

Wellness Aging Model (WAMI-3) Related to Inactivity, Illness, and Injury[4]



- Health aging directly related to physical activity levels and prevention education to avoid the "slippery slope of ageing"
- Non-communicable disease is leading cause of death in the aging population (89% all US deaths)
- 1 in 4 older adults >65 fall each year with falls the leading cause of fatal and non-fatal injuries
- Promotion of independent ADLs
- Prevent functional decline (senescence) and reduced physiologic reserve
- Avoid the "triple whammy" (age +inactivity, illness, and injury)

Exercise is Medicine[3]

American College of Sports Medicine established EIM concept as a global health initiative emphasizing assessment and promotion of increasing physical activity as a standard of PREVENTATIVE practice

“Although no amount of physical activity can stop the biological aging process, there is evidence that regular exercise can minimize the physiological effects of an otherwise sedentary lifestyle and increase active life expectancy by limiting the development and progression of chronic disease and disabling conditions” – ACSM Position Statement on Physical Activity and Exercise for the Older Adult

- Only 3.4% to 15% of US adults meet the minimum daily physical activity guidelines for moderate level activity.
- Replacing 30 minutes of sedentary time with light physical activity can reduce mortality by 20%

Goal of all health care practitioners is to guide patients and clients in lifestyle behaviors that lead to successful ageing

From Failure to Frail, To Function, To Fun! [1]

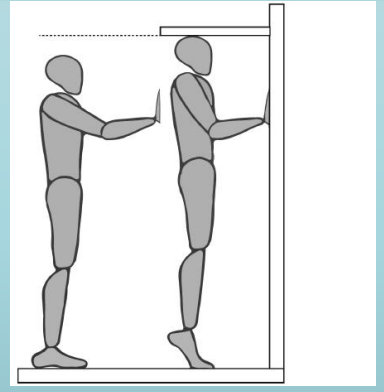
- "The ageing process is of course a biological reality which has its own dynamic largely beyond human control. However, it is also subject to the constructions by which each society makes sense of old age" – WHO Definition of Aging
- Ageing categories
  - Young older adults = 55/60-69 years of age
  - Middle older adults = 70-79 years of age
  - Old older adults = 80 years and older
  - Frail older adults = dependent in 1 ADL, loss of physiologic reserve, prone to illness, falls, I
- An appropriate Exercise Prescription is an important component that contributes to successful aging

Physical Activity Vital Sign Assessment – History Questions from a Preventative Practice Perspective [1]

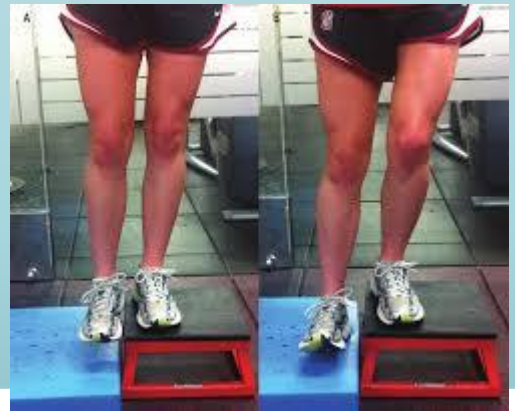
- How many days per week do you engage in moderate to vigorous exercise like a brisk walk?
- On average how many minutes per day do you exercise at this level? (Using the Borg RPE 0-10 scale looking for rating of 5-6 for moderate activity or 7-8 for vigorous activity)
- What prevents you from being physically active or exercising now?
- What will it take for you to increase the amount of physical activity or exercise?
- On a scale of 0-10, how confident are you that you can complete the prescribed exercises or activities?
- When the client/patient returns next visit – On a scale of 0-10 how well did you perform your prescribed exercises since last visit?
    - What prevented you from doing so? What encouraged you to follow-through?

Exercise Prescription Begins with Screening and Assessment – Aerobic Capacity [1]

- Blood Pressure – before, during, after exercise
- Respiratory Rate
- Pulse Oximetry
- RPE Scale
- Timed walking or stepping tests
  - 6MWT, 2MWT, 400-meter walk test, 2-minute step test, 3-minute step test, Seated step test
- Dyspnea Scale
- Angina Scale
- Claudication Scale
- Ankle Brachial Index
  - Normal ratio = 1.0 - 1.40



Muscle Performance Screenings and Assessments[1]



- Sit to Stand
  - Correlates with lower extremity strength primarily of quadriceps and glutes
  - Convergent validity with gait speed and 6MWT findings
  - Anticipate declines in repetitions, longer times in persons with dementia, orthopedic diagnoses, vestibular disorders, Parkinson's disease, stroke, cardiovascular disorders
- Single Step Test
  - Assesses functional strength of concentric/eccentric quadriceps
  - Correlates with TUG, 6MWT, stair climbing
- Hip Extension Test with Dynamometer in prone or supine
  - Correlates with sit to stand independence and ability to walk 30 meters in inpatient rehabilitation patients (Cardin and Bohannon 2017)
- Calf Raise Senior Test (Andre et al 2016)
  - Measure of functional strength of gastroc-soleus
  - Use metronome set to 60 bpm and count # of rises up to 25
  - > 20 repetitions identified ambulatory ability at speed of 1.05 m/sec (Davenport et al, 2014)

A few more Muscle Performance Assessments [1]

- Timed up from the floor (Bergland, 2002)
  - Marker of failing health in older adults
    - 87% of 75-79-year-olds could manage to get up from the floor
    - 75.9% of 80-84-year-olds could manage to get up from the floor
    - 65.2% of 85+ year-olds could manage to get up from the floor
  - Correlates with decreased TUG times, decreased ability to climb stairs, decreased walking outdoors
- Prone Bridge(Plank) (Bohannon et al 2018)
  - Test for core muscle strength
  - Correlates with self-reported fitness, adiposity/BMI
  - Mean time for Women aged 60-79 =124.7 seconds as compared to Women aged 20-35 = 152.3 seconds
  - Mean time for Men aged 60-79 = 127.4 seconds as compared to Men aged 20-35= 176.7 seconds

Don’t Forget Grip Strength [1]

- Predictive of mortality in persons without disability, hospitalized with pneumonia, undergoing cancer surgery
- Predictive of postoperative complications and future disability in all populations
- Correlated with strength of other functional muscle groups

Age	Hand	Men (lb)	Women (lb)
65-69	Left	84.3	50.4
	Right	91.9	56.5
70-74	Left	79.9	49.5
	Right	84.3	53.4
75-79	Left	68.5	42.5
	Right	72.7	47.6
80-84	Left	59.6	37.6
	Right	66.4	38.2
85-89	Left	55.3	34.6
	Right	56.9	37.7

Multi-Purpose Batteries & Fall Risk Assessments [1]

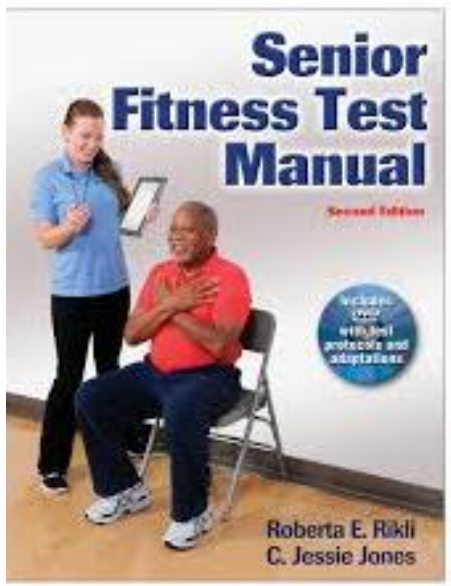
Senior Fitness Test (general fitness)

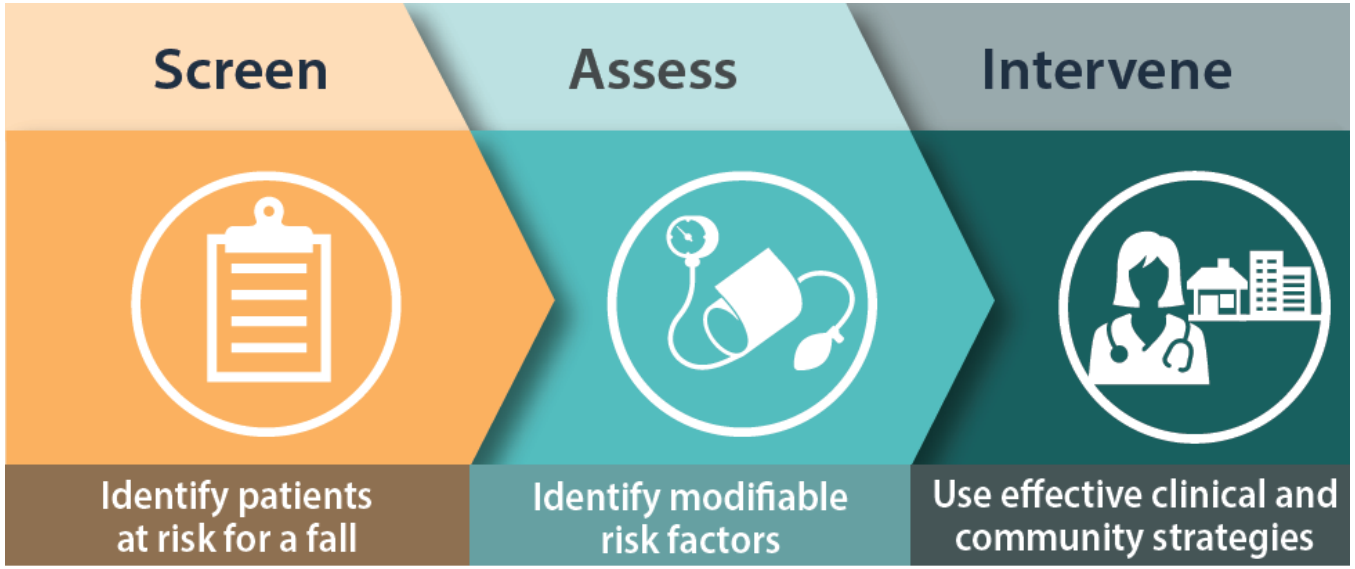
STEADI (Stopping Elderly Accidents, Deaths and Injuries)

FGA/DGI (gait, functional mobility)

TUG (fall risk)

10 meter walk test (gait speed)



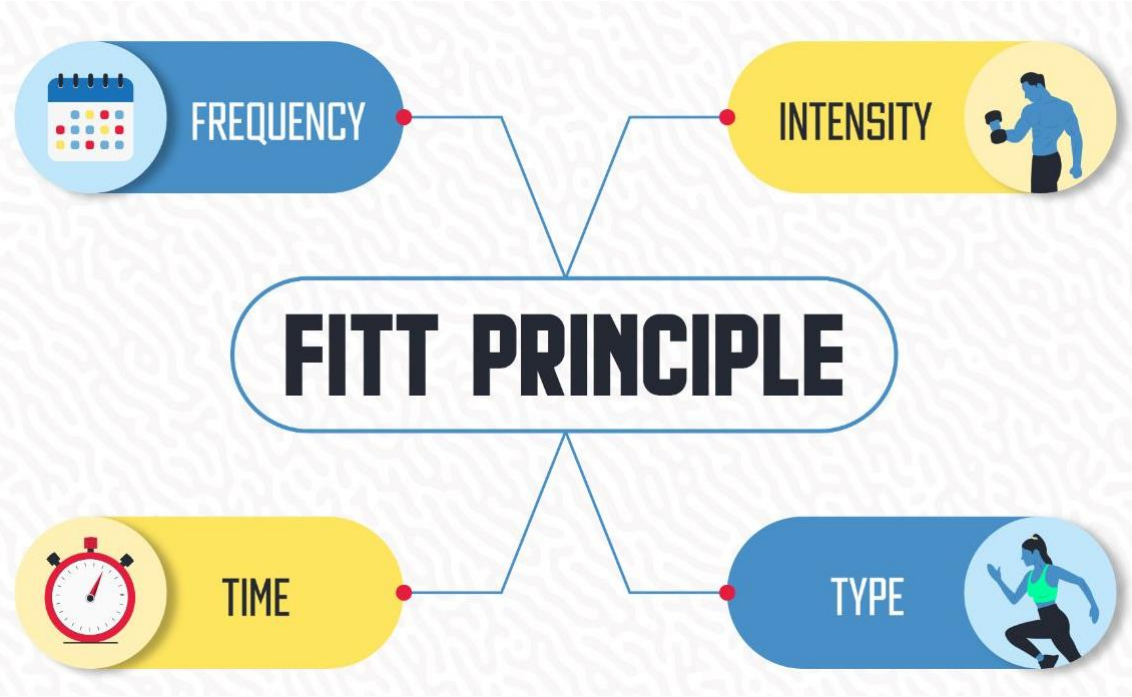


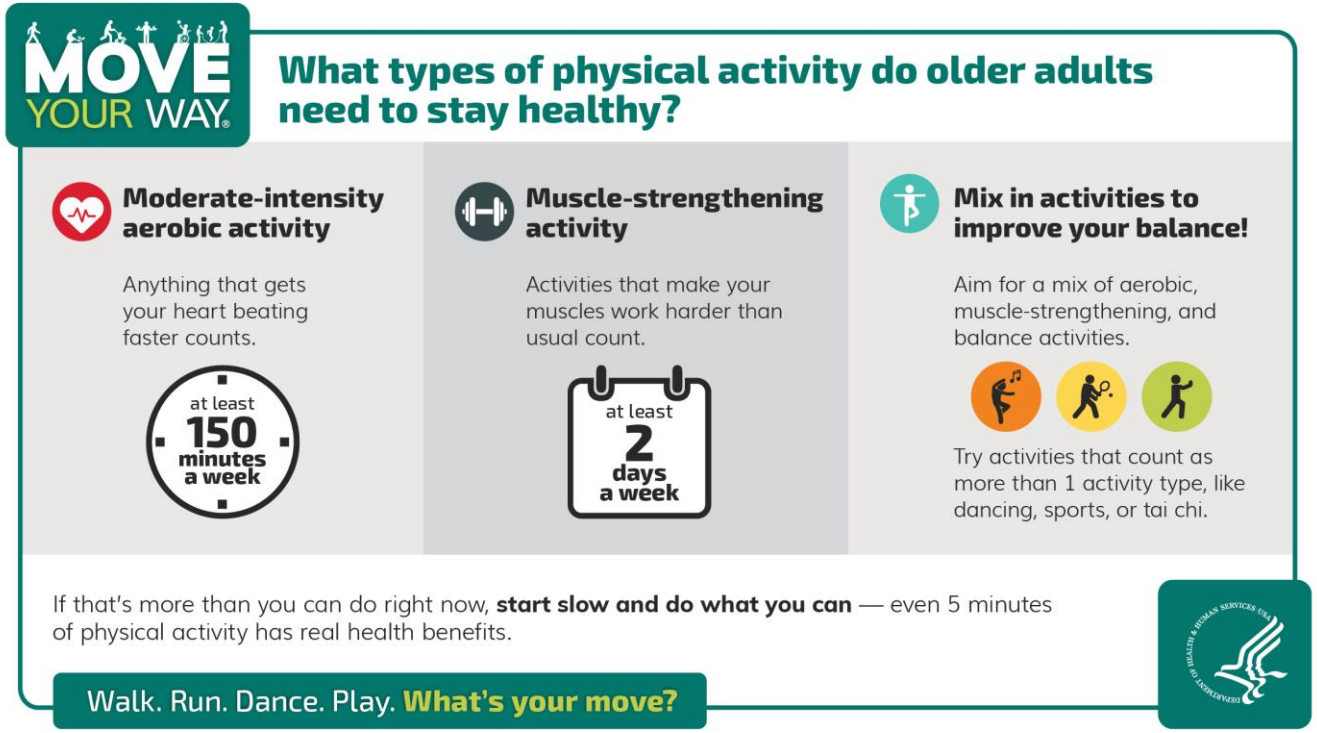
STEADI Stopping Elderly Accidents, Deaths & Injuries

Exercise Prescription Based on Evidence-Based Exercise Science Theory/Principles [1]

- FITT Principle
- Physical Stress Theory
- Overload Principle (DOSING!)
- Specificity Principle
- Reversibility

FITT Principle [3]

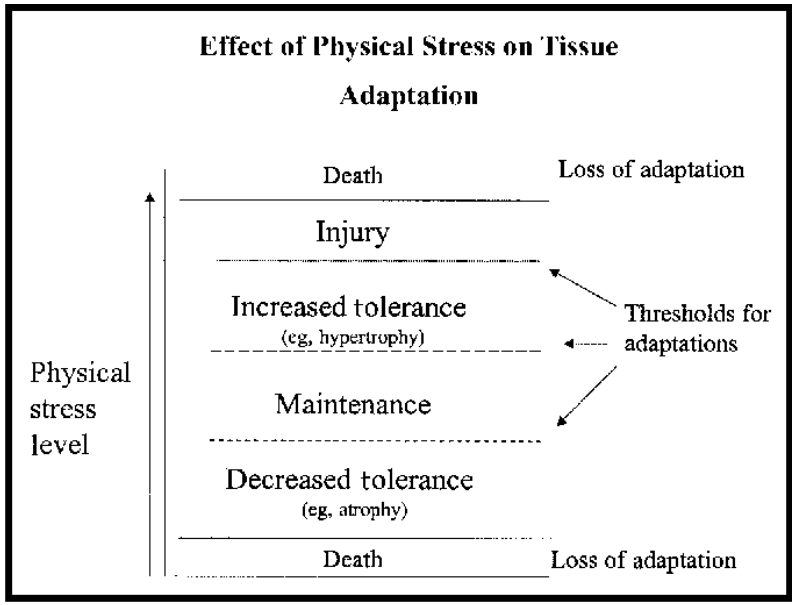




Dosing Principles [1]

Physical Stress Theory (Mueller MJ 2002)

- Changes in relative level of physical stress causes a **predictable** response in all biologic tissues



Overload Principle

- Tissue has to be exposed to a load **not normally exposed to** in order to improve function in the older adult (ACSM Exercise Guidelines for Older Adults 2014)
- Applies to all modes of exercise
- Has to be individualized
- Applies to Intensity, Duration, Frequency and Speed
- Adaptation = Adjust the load and continue to monitor

Are PTs Setting Functional Goals Too LOW? [1]

- ~ 1203 feet (367 meters) required to complete a community errand (Shumway-Cook et al 2011)
- Need to carry an average 6.7 lb. package
- Consider the challenge of stairs, curbs, slopes, gravel, uneven pavement
- Recommendation for 200 meters (656 feet) as a starting point for goal setting (Brown et al, 2010)

How far does a community-dwelling older adult need to be able to walk? (distance in meters) [1]

Category	N	Mean (SD)	Minimum	Maximum
Post office	12	52.0 (23.3)	25.1	98.4
Bank	17	57.1 (20.9)	25.0	102.0
Medical	16	65.8 (32.2)	30.5	149.4
Pharmacy	18	206.3 (26.8)	153.9	255.1
Department store	20	345.9 (69.2)	241.3	512.0
Grocery	23	380.6 (86.3)	162.1	526.0
Hardware	14	565.5 (38.6)	499.2	626.7
Superstore	16	606.6 (101.2)	472.0	792.0
Club warehouse	5	676.8 (159.4)	506.3	922.0

Acquired from Andrews et al. Journal of Geriatric Physical Therapy 2010; 33: 128-134

Specificity of Training [1]

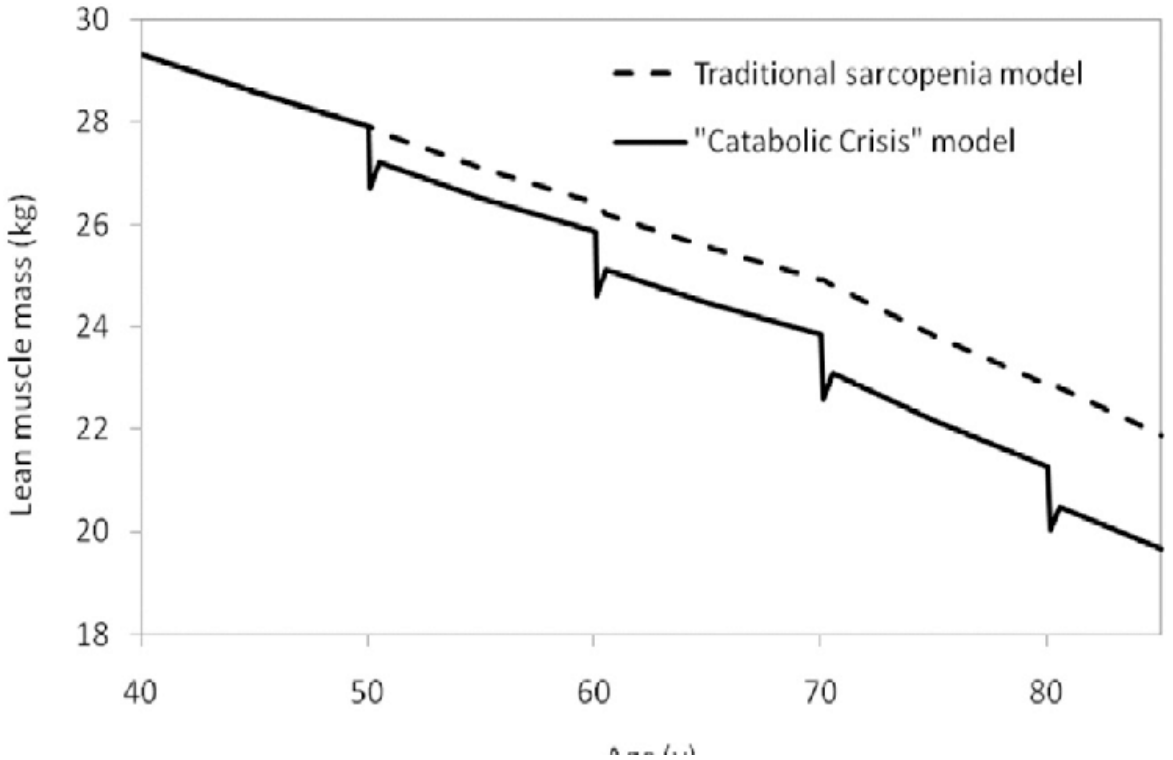
Specificity Principle

- Tissue change will only improve those body parts being trained
- Training must match the desired physical performance requirements
  - ADLS vs. Senior Olympics
- Techniques that simulate velocity and acceleration are essential for older adults (Cronin JB 2002)
  - https://www.youtube.com/watch?v=8z9F0hYPZ7M

Training Progression

- Prescribe the OPTIMAL dose as soon as possible
- Must steadily increase intensity to continue to provide overload
- Can't rush training
- Balance between training and rest
  - Cross train
  - Alternate between high and low intensity sessions

Reversibility Through Strength Training in the Older Adult – Catabolic Crisis Model [1]



- Catabolic Crisis Model (English and Paddon-Jones, 2010)
- "Muscle strength is the single best measure of age-related muscle change and is associated with physical disability in IADL and functional limitations" (Hairi NN et al 2010)
- Exercises that overload muscles minimize "typical" age-related changes

Where and How to Start with Strength Training [1]

Safety First

- Most healthy aging adults and aging adults in need of PT can safely exercise at 70-80% of a 1 RM
- Extensive research supports effectiveness and safety at this level even for the very old and frail population
- Must include warm-up and cool-down
- Full pain-free ROM
- With good form and technique

Determine 1-Repetition Max (1RM)

- Decide the appropriate intensity
  - 30-60% 1 RM for non-exerciser or those with chronic conditions
  - 70-80% for all others
- Perform 1-2 reps – ask the patient to "stop on a dime" – no shaking or pain
- Was the level "fairly light", "somewhat hard", "hard"
  - If less than "somewhat hard" increase the resistance
  - If more than "somewhat hard" reduce resistance
- Exercise to momentary fatigue
  - Should occur in most adults between 8th and 12th repetition – NO 3 SETS OF 10!

A Word or Two about POWER in the Older Adult [1]

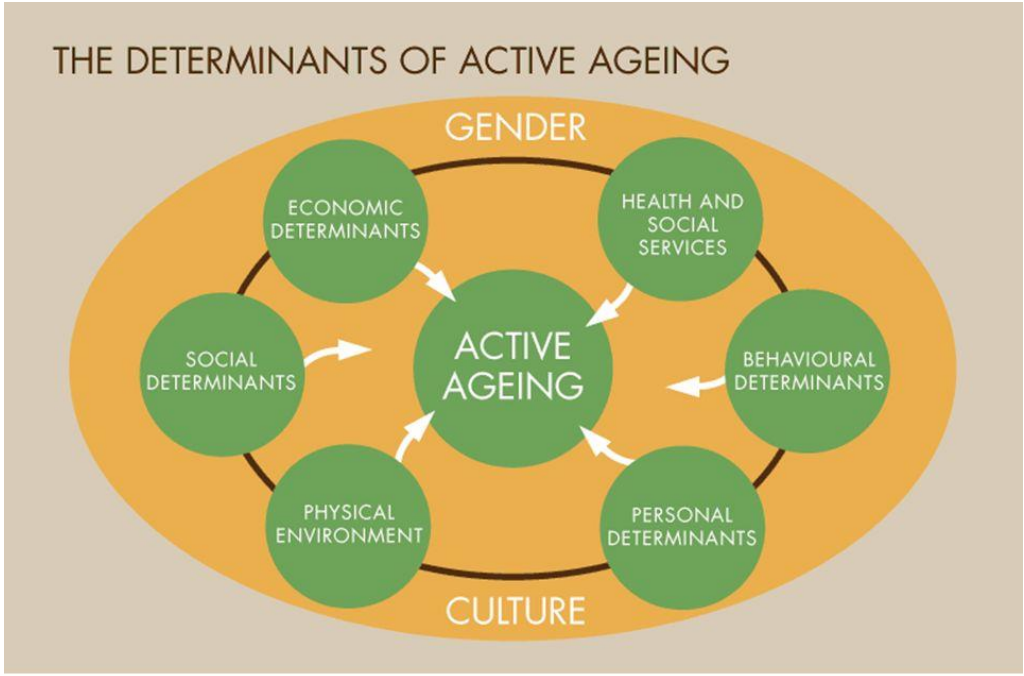
- ACSM Guideline for Power training in the older adult
  - UE 30-60% of 1 RM, LE 40-60% of 1 RM, 3-6 repetitions at faster speed, 1-3 sets per exercise
- Power may be a better predictor of physical function than either isometric or isokinetic strength (Beanetai, 2003)
- Explosive-type strength training enhances stair climbing performance at maximal self chosen speed, reflecting improved functional ability (Holsgaard-Larsen, 2011)
- Significant improvements in dynamic muscle strength, knee extension power, floor rise to standing time, 6-meter walk, and repeated chair rise with 2 days per week using high velocity resistance training (Henwood TR, 2005)
  - Bench press, seated row, shoulder press, leg press, leg extension, leg curl, seated calf press

Exercise Prescription Recommendations[1,3]

	Frequency	Intensity	Time/Volume	Type
Aerobic	5 x per week	**Moderate Intensity** 30-50% HRR if deconditioned progress to 40-60% HRR 5-6 / 10 RPE **Vigorous Intensity** 60-70%HRR 7-8/10 RPE	30-60 minutes/day Bouts of 10 minutes 150-300 minutes /week	Walking, dancing, swimming, water aerobics, jogging, aerobic classes, bicycling, elliptical, gardening
Resistance	1-3 x per week No 2 consecutive days same muscle groups	60-70% 1-repetition maximum	8-10 exercises Major muscle groups 1 set 10-15 reps If to failure = 60-70% 1RM	Progressive resistance exercises, weights, machines, cables, resistance bands, body weight
Flexibility	2 x per week	Stretch to point of gentle resistance Shoulders, hip flexors/glutes, back, hamstrings, wrists, gastroc/soleus	Hold each position for 30-60 seconds	Slow movements into sustained position
Balance	2-3 days per week	Moderate intensity progressively challenging postures that decrease base of support, challenge sensory input; start with static postures and move to dynamic postures quickly	90 minutes per week	Agility activities, multi-planar walking, stepping over/around obstacles, walking with head motions

It's Never TOO Late!

- https://www.youtube.com/watch?v=cX4VNXnD0Dc



Active Ageing: A Policy Framework (WHO, 2002)

Thank you!

Questions?????

References

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