Exercise: Putting the brakes on aging

"Your doctor can only do so much.
The rest is up to you. Stop getting older."

Embrace Aging Month

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Institute for Healthy Living and Chronic Disease Prevention
PARTNERS IN RESEARCH FOR BETTER HEALTH

Interior Savings

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Objectives

1. Exercise is good for you but, age, health, physical condition may make it difficult to participate.
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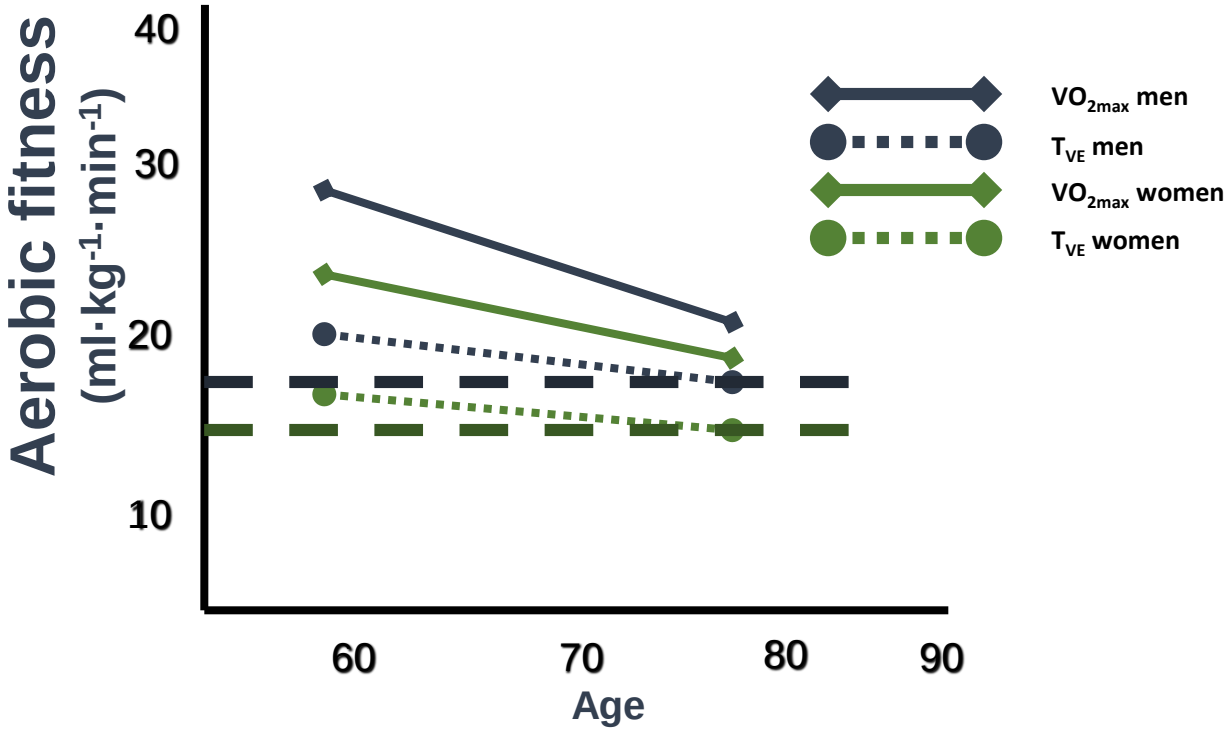
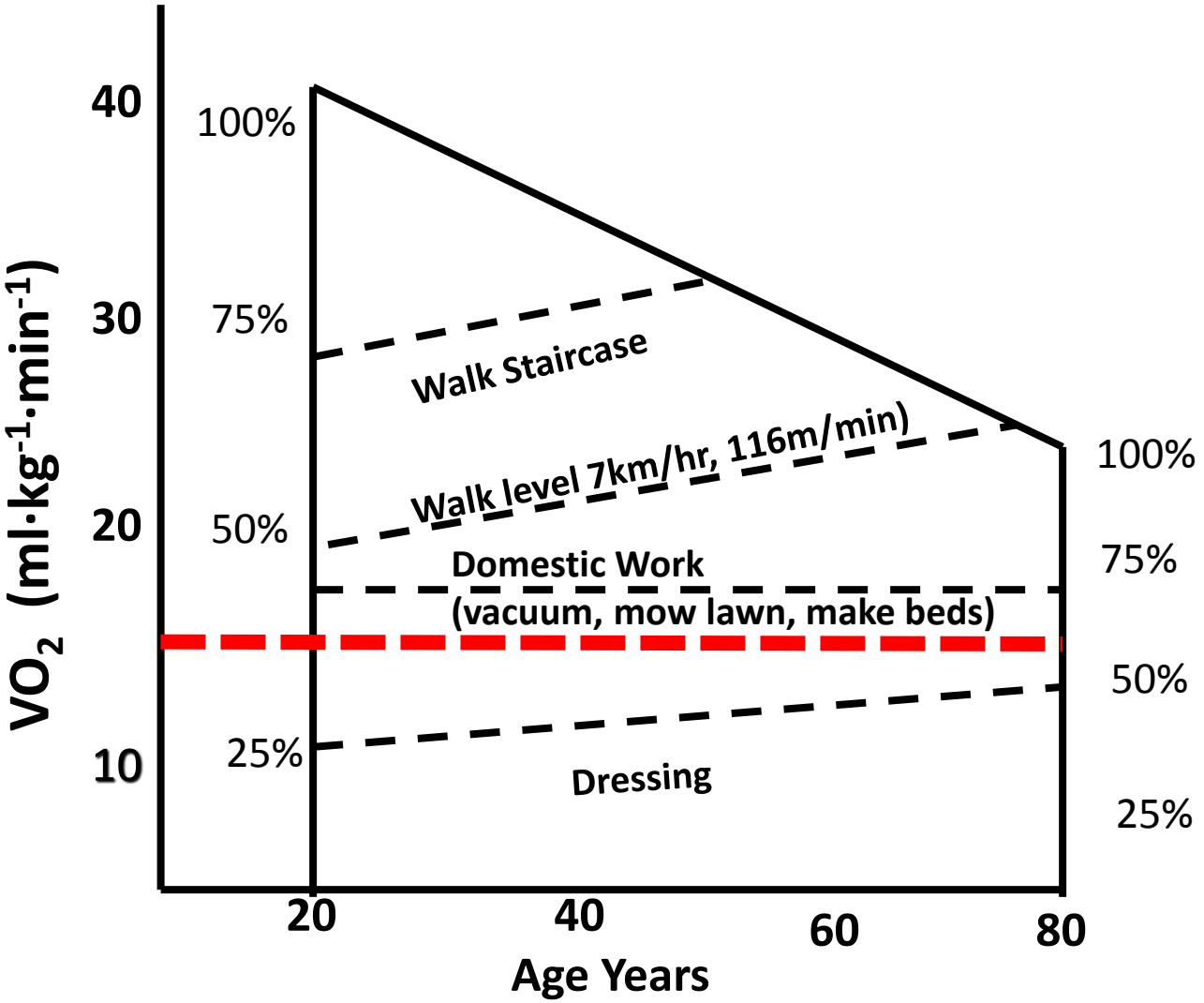
Age-associated decline of aerobic capacity

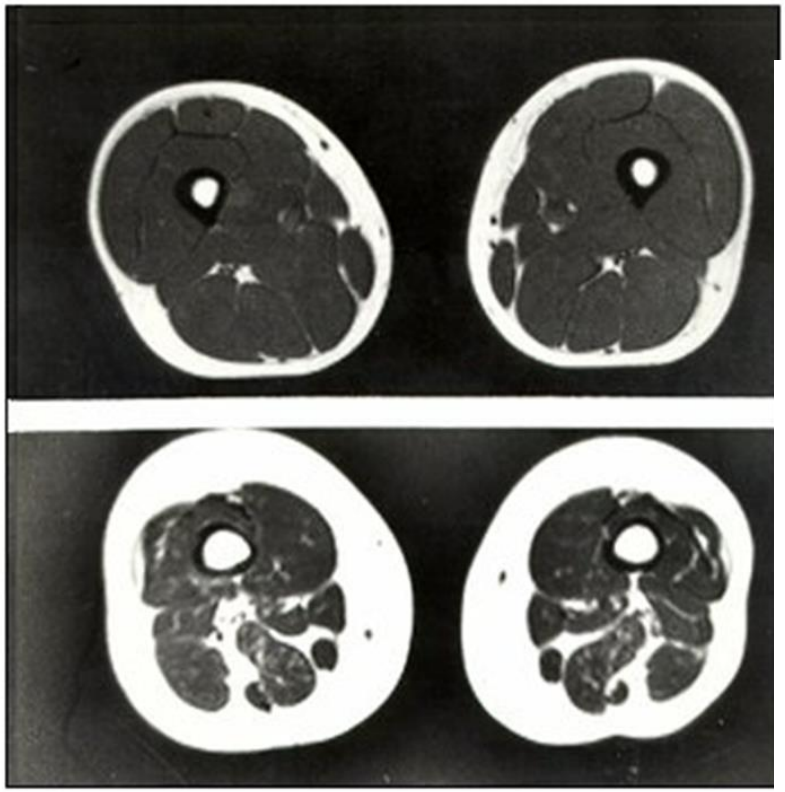


(Stahokotas et al. 2010)

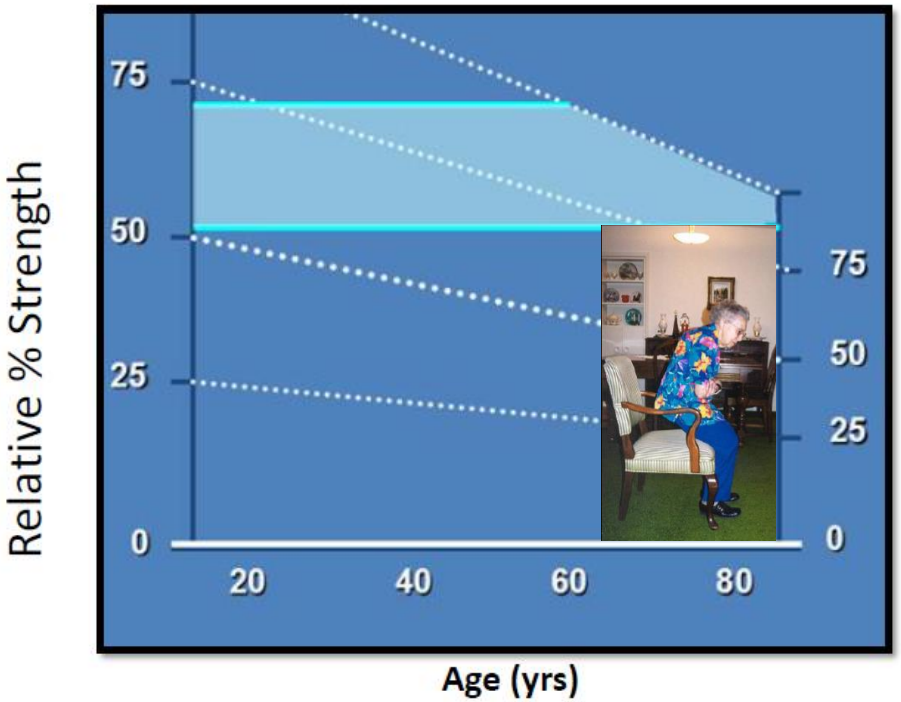
Aging – life gets tougher



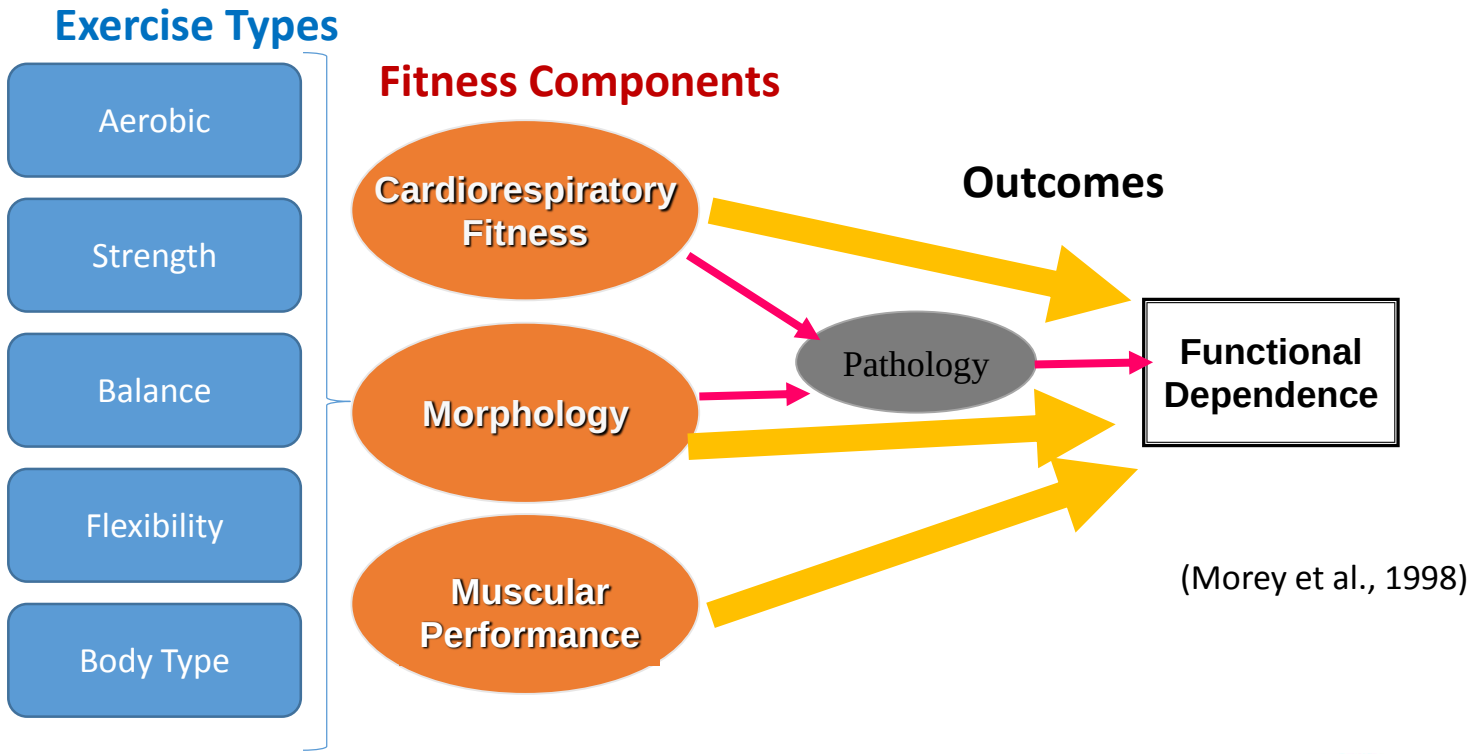
Age-associated decline of muscle



Age-related changes in muscle mass in thigh cross-sectional area of two people with similar BMI



Poor Fitness Directly Related to Functional Dependence



(Morey et al., 1998)

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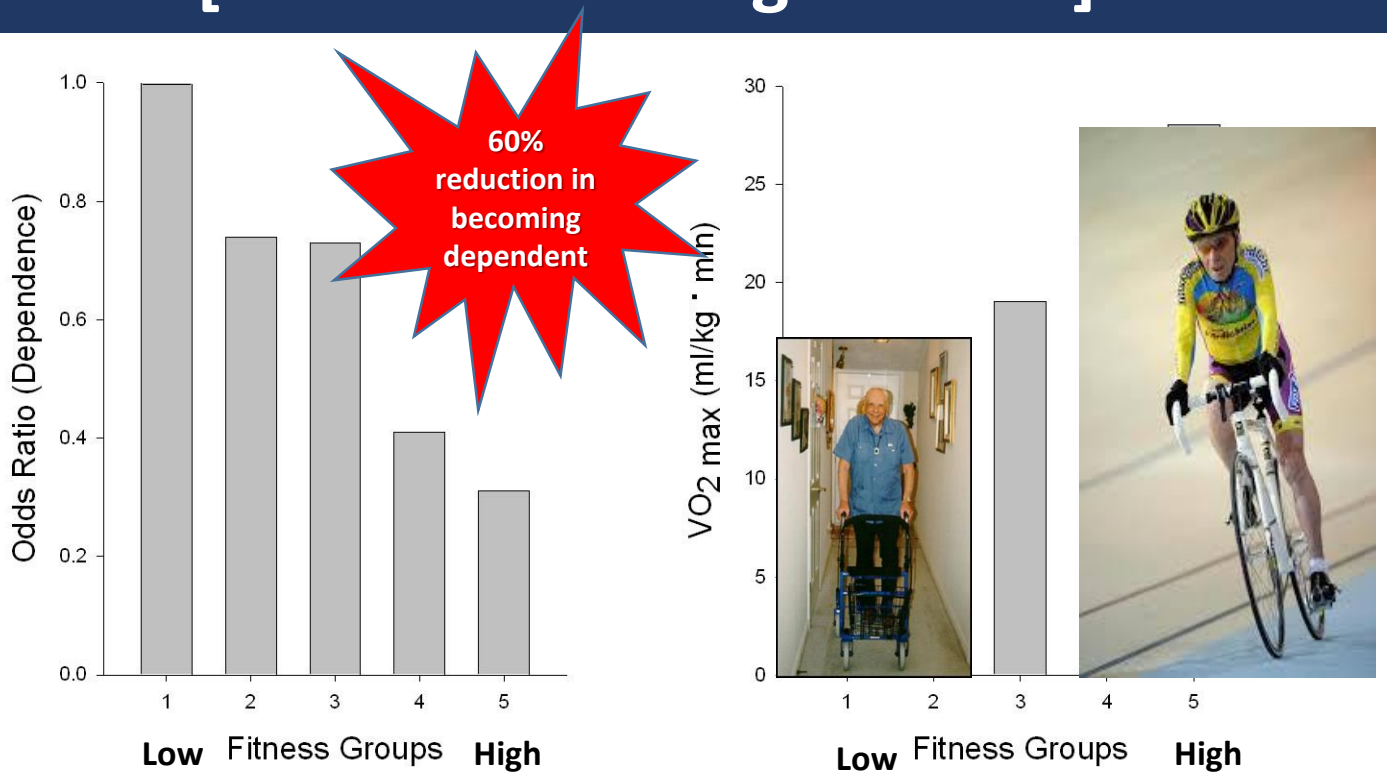
Odds of becoming functionally dependent over 8-yrs for each fitness group [low fitness to high fitness]



Paterson et al. (2004)

What Makes a 97-Year-Old Man Cycle 5,000 km a Year?

Gerontology, 2016

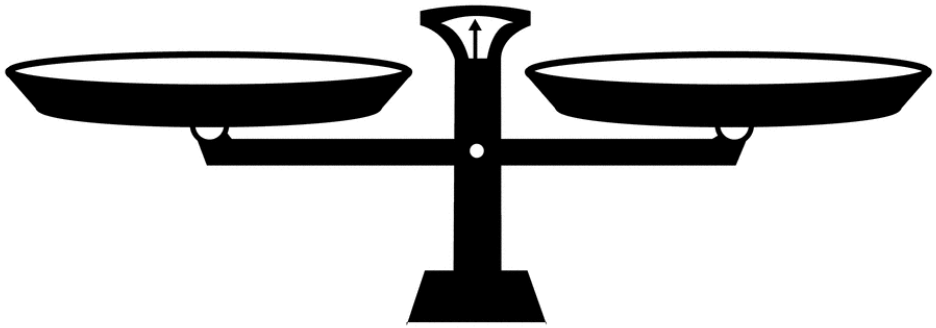
Fig. 1. I.K. at the age of 91 at the World Masters Athletic Championships (2009, Lahti, Finland). Photo: Ken Stone/Masterstrack.com.

Deficits

Prostate Cancer
Hypothyroïdisme
Hypogonadism
Popliteal Thombosis

Assets

Muscle
Cognitive function
High levels of physical activity
Social Interaction



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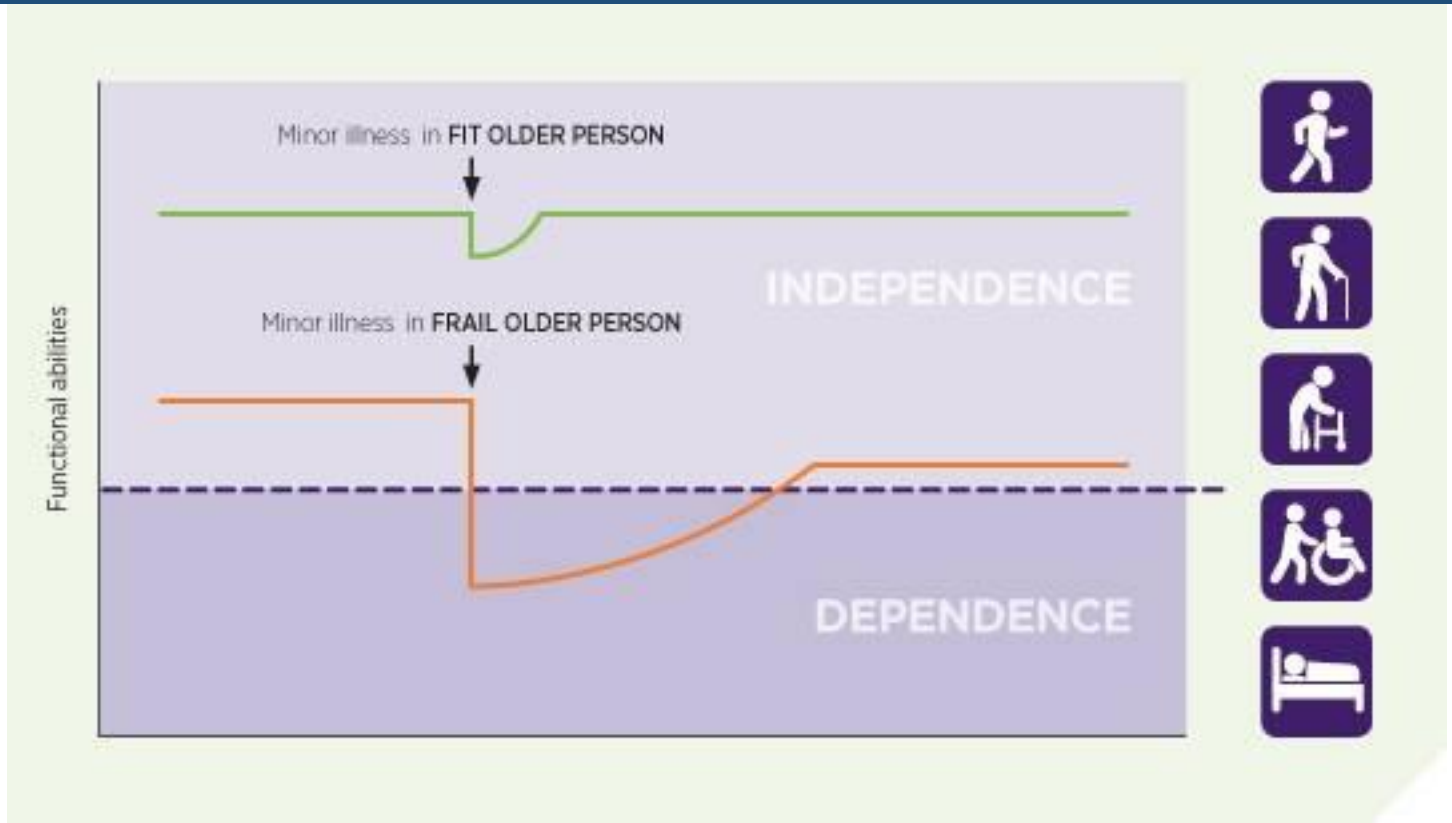
Frailty = Poor Fitness

[age-associated physiological decline]



Extensive evidence for the exercise pill

- Prevention and therapy for most chronic diseases
- Exercise as effective as medication
  - Select cases more effective or additive effect
- Long-term exercise participation reduces dependency risk by 60%
- All age cohorts improve functional capacity with exercise (65-100^{+})

(Paterson, Jones, Rice, 2007)

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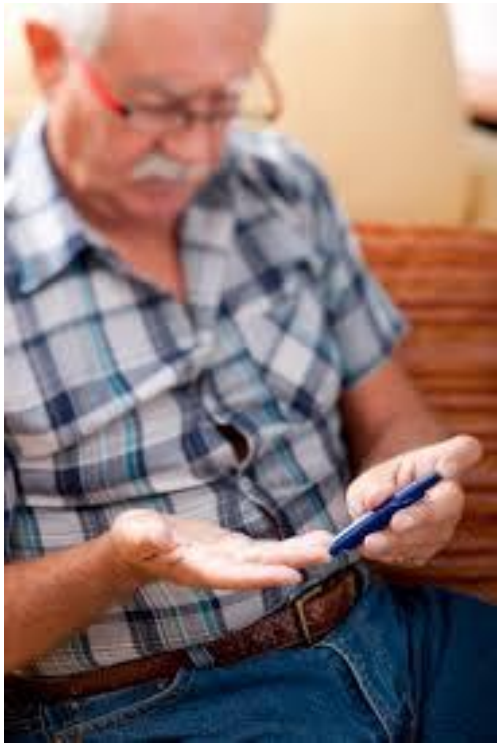
Type 2 Diabetes Has Been "Reversed" in 40% of Patients for 3 Months

March 16, 2017

- 8 weeks or **16 weeks** respectively – where they were given **personal exercise** plans, meal plans that **lowered their calorie intake** by 500 to 750 calories a day, and regular meetings with a nurse and dietitian.
- 11 out of 27 patients **(40%)** in the 16-week intervention group showed complete or partial diabetes remission, as did six out of 28 individuals (**21%)** in the eight-week group.



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Exercise

Physical Activity

(Courtesy of Naoto Miyako, Japan, 2016)

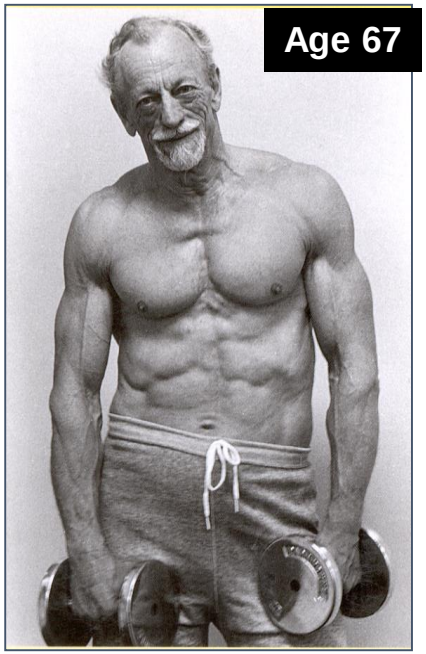
WALKING IN TREADMILL DRAWS WATER

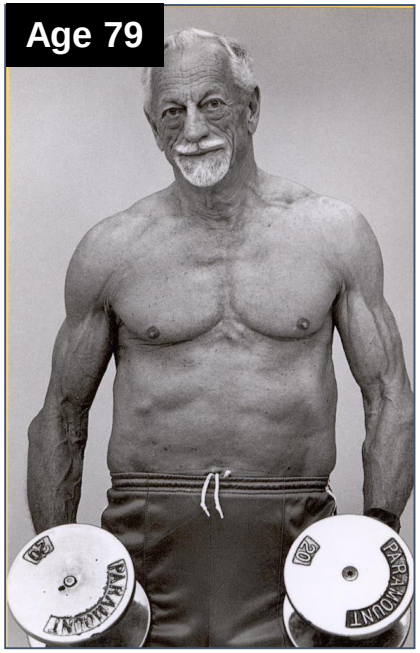
A BRITISH country dweller walks a quarter of a mile to get a drink of water, without leaving his own cellar! To raise the large bucket in his 300-foot well, Fred Hoare, of Beauworth, Hants, installed a twelve-foot treadmill beside the shaft. When he steps inside it to take his daily constitutional, a windlass puts his exercise to practical use and winds in the cable to which the bucket, shown in the photograph below, is attached. Thus he secures his daily supply of water.

Fred Hoare, of Beauworth, England, is drawing his daily supply of drinking water. He does this by taking his exercise inside the twelve-foot treadmill which winds up a cable from the well

(Popular Science, 1933)

Brakes yes, but not a full stop!





(Etta Clark: Growing Old is Not for Sissies I & II)

Aging is a complex Interaction between Primary and Secondary Factors

Primary Aging

Secondary Aging

Normal Aging

Similar across the species

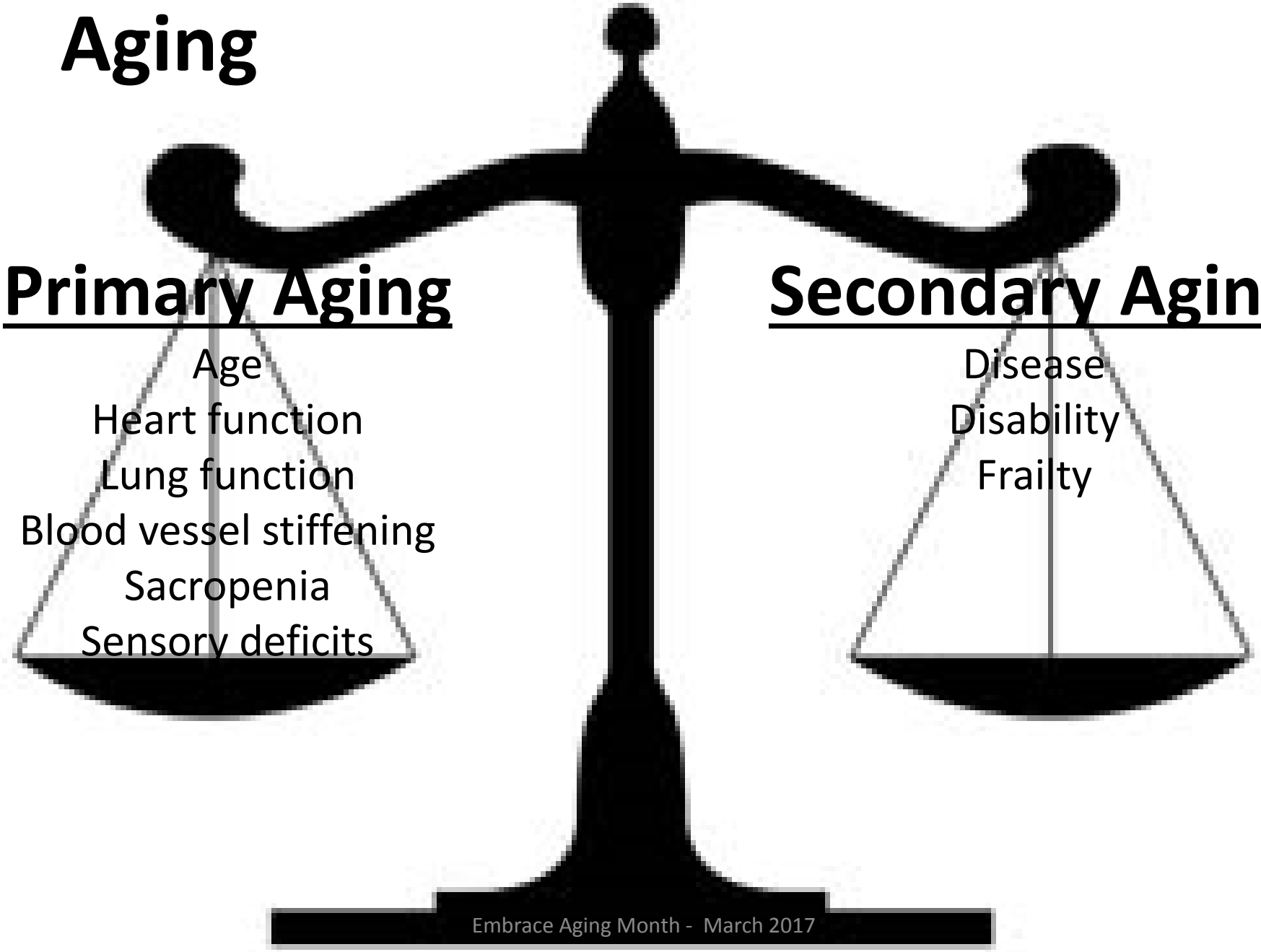
- Puberty, menopause, andropause

Chronic Disease

Clinical syndrome

- Multi-morbidity

Aging



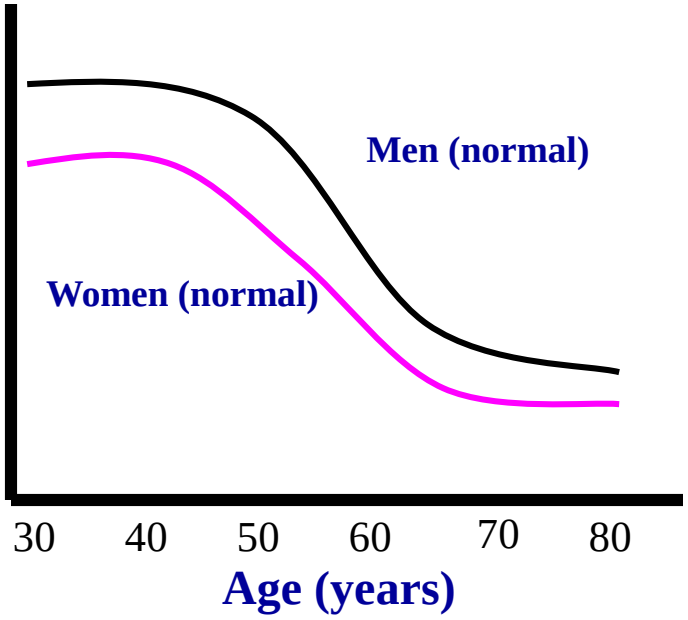
Primary Aging

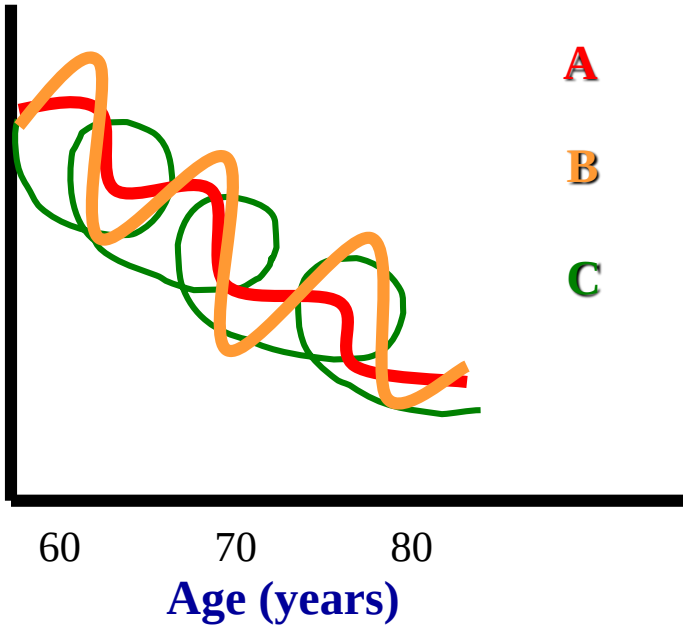
Age
Heart function
Lung function
Blood vessel stiffening
Sacropenia
Sensory deficits

Secondary Aging

Disease
Disability
Frailty

Aging at different rates of physiological decline





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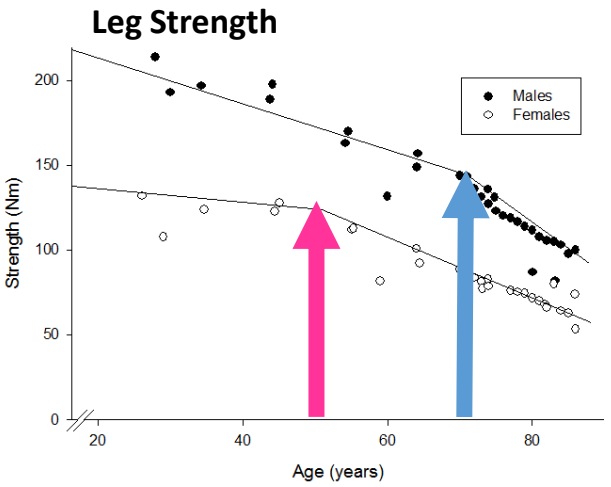
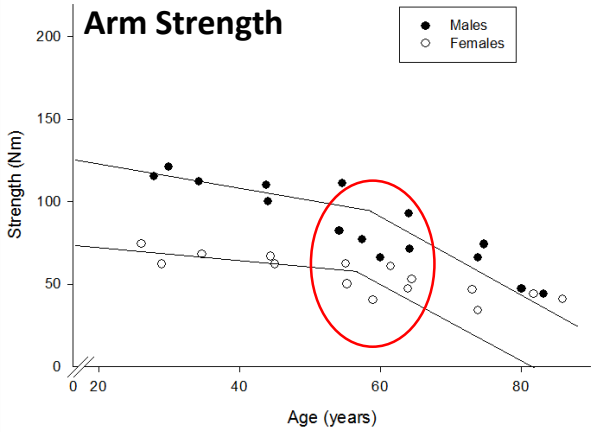
Sex (biological) differences in age-associated strength loss across the adult lifespan

- Females experienced accelerated muscle strength declines at a younger age than males
- Faster rate of decline in males than females in lower limb strength
- No difference in upper-limb strength





(Jones et al., in review)

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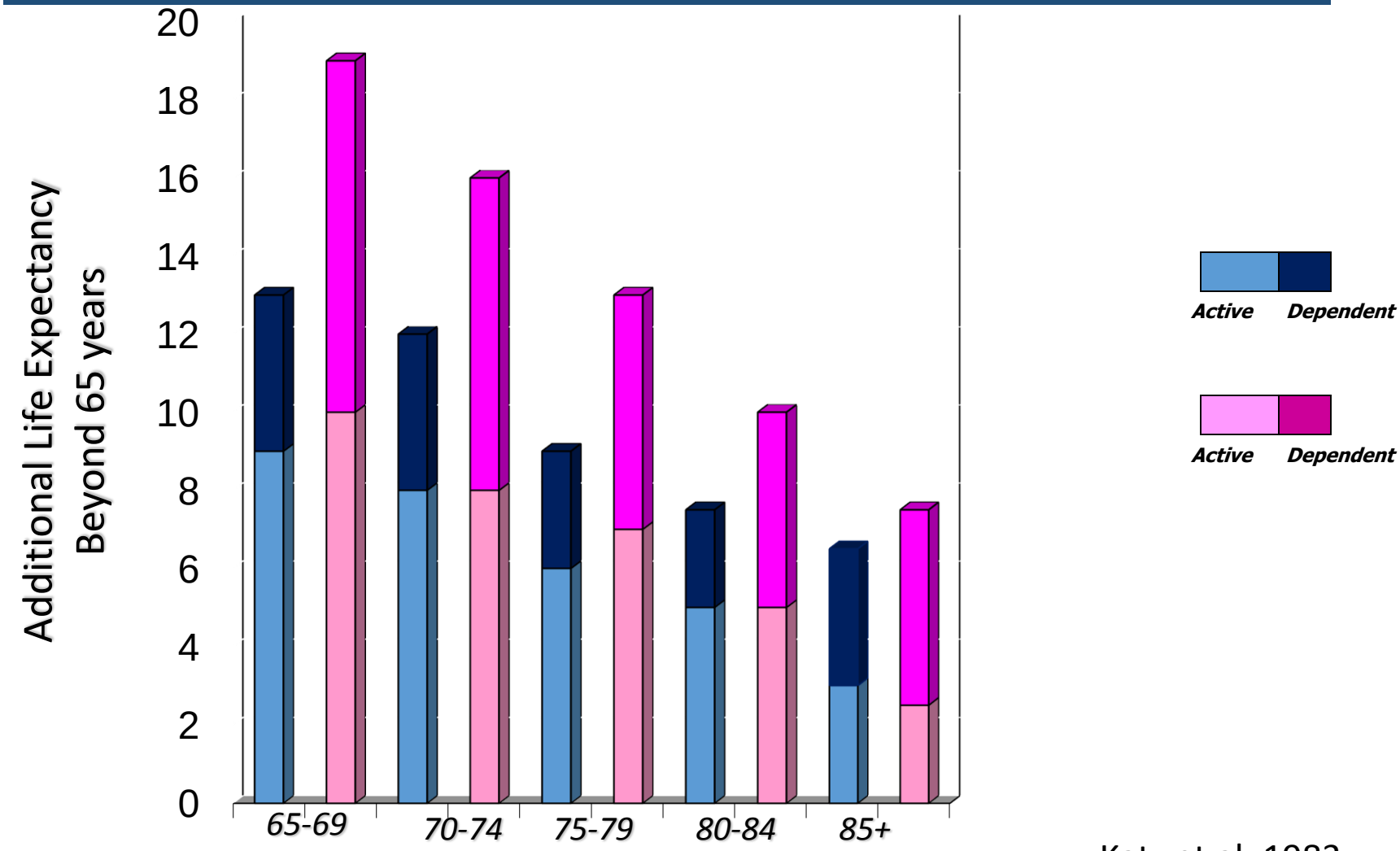
Years of active life expectancy & projected years of dependent living



Katz et al. 1983

Gender differences in age-related loss of strength

Evolutionary perspective

- Men compete for women
- Women chose men

Social construct

- Home vs. work
- ADL preferences

Most likely that sex-differences influence gender choices when it comes to aerobic fitness and muscle strength

Exercise Paradox

Too much

- Increased risk of falls
- Slight risk of medical events
- Non-fall related injuries
- Better chance of survival

Too little

- Much greater increase risk of falls
- Greater risk of medical events
- Much greater risk of injury
- Least chance of survival

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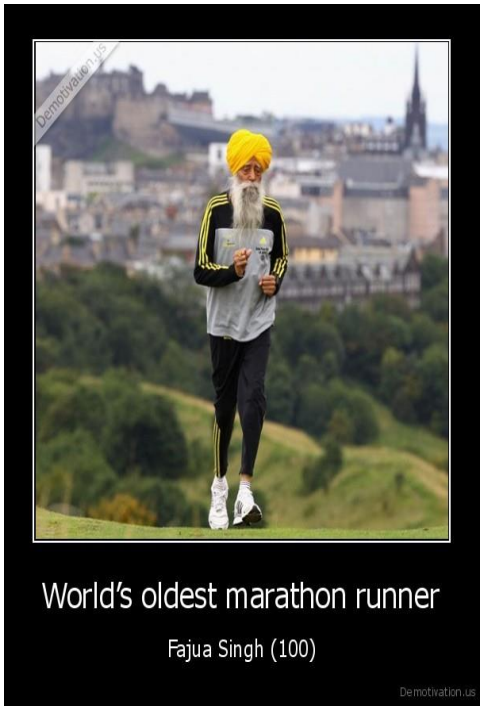
Cardiorespiratory (Aerobic) Fitness

- 3 x 10 min bout of sustained physical activity for the least fit
- 30 min per day, **MINIMUM** for maintaining health
- 60-90 min per day **MAXIMIZE** health and fitness benefits
- Intensity – moderate to vigorous
  - SWEAT!
  - BREATHING HARD!
  - MOVE AT A BRISK PACE!



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Muscle Strength/Power Fitness

- 2x per week **MINIMUM** – included as part of the 150 min accumulated physical activity
- Need to train muscle POWER – "rapid contraction of muscle"
- Progression to **POWER training**
  1. Muscular **endurance** (12-15 reps)
     - 4-6 weeks
  2. Muscular **strength** (6-8 reps)
     - 7-12 weeks
  3. **Power** (2-3 @ 40-80% max RAPID)
     - 13-16 weeks

82 years lifting 153lbs

Learning	Endurance	Strength	Power

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Balance/Coordination of movement

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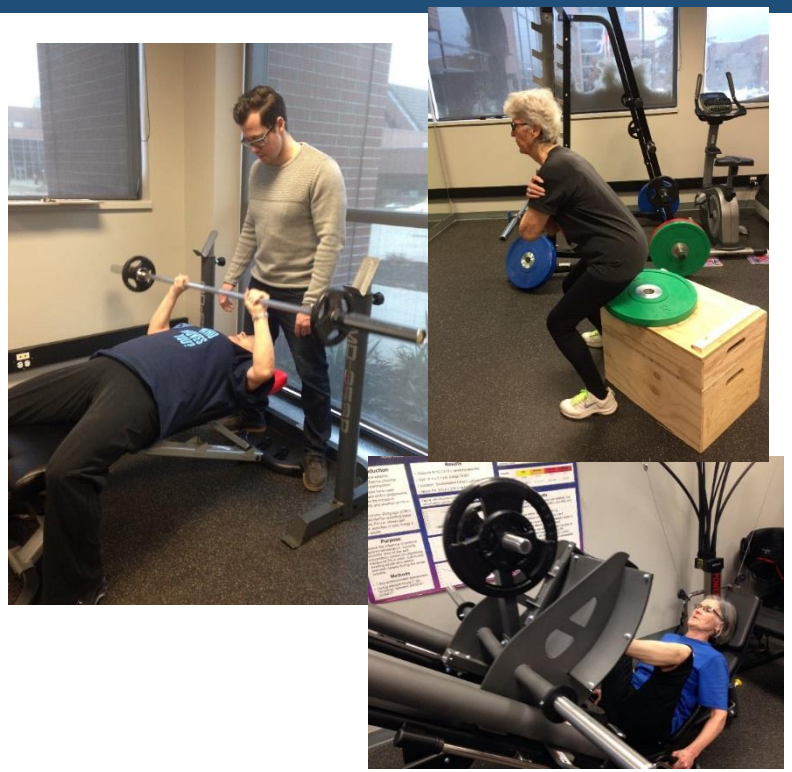
Flexibility

- Specific exercise required if experiencing a reduced ROM.
- Lack of evidence to support flexibility training
- Movement though ROM during other exercise will promote flexibility

Exercise to reverse frailty in pre-frail women

Currently running CT Reg# H16-00712

- 10 EX and 10 CON matched for age (72-84), all pre-frail
- Experimental measures completed at baseline, week 5, week 9, week 13
- Assessment of strength to apply progressive overload occurs every 3-weeks and at the end of the study to assess absolute change in strength.



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Exercise to reverse frailty in pre-frail women

Aerobic

- 10 min aerobic exercise

Strength

- 3 sets, 6-8 reps, deadlift
- 3 sets, 6-8 reps squat
- 3 sets, 6-8 reps bench press
- 3 sets, 6-8 reps inclined leg press

8 weeks –in results forthcoming

Balance

- Progression – semi-tandem, tandem, single leg → →

Flexibility

- Hip flexor stretch

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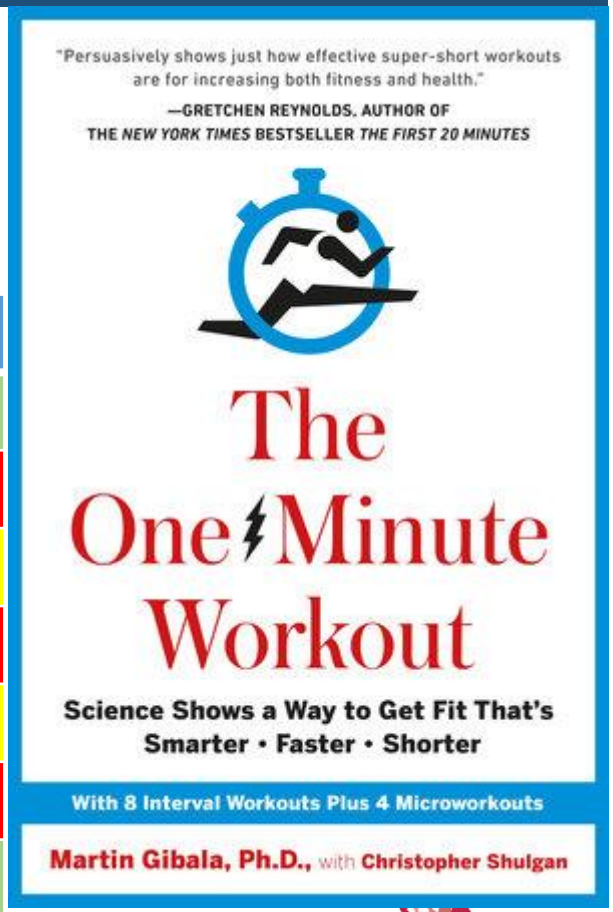
The 1-minute workout: How to get fit in 60 seconds

CBC news 2016

- **Yes, effective for both sexes**! Even the most unfit and those with failing hearts and metabolic disorders benefit.

Time/Duration	Intensity
5 min	Progressive warm-up to moderate
20 sec	Very hard (90+% of max.)
60 sec	Easy 'active' rest
20 sec	Very hard (90+% of max.)
60 sec	Easy 'active' rest
20 sec	Very hard (90+% of max.)
120 sec	Active recovery, return to rested state



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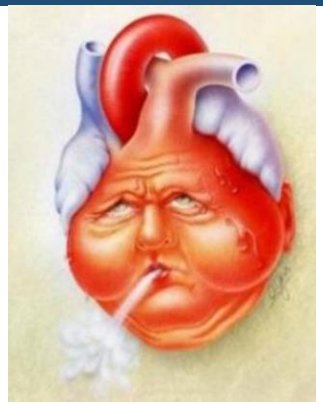
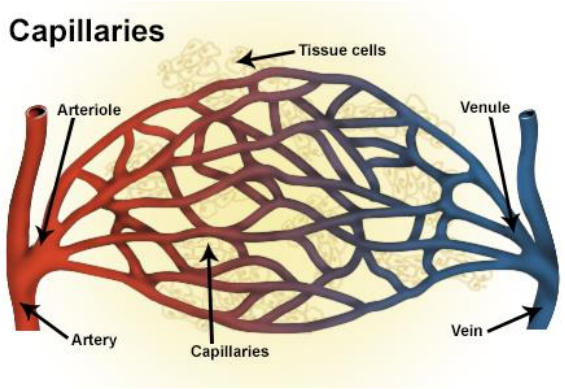
High Intensity Interval Training

- Stress '***eustress***' required for physiological adaptation – **push yourself** beyond comfort zone (i.e. walk uphill); choose a **variety of activities**
- **To much** stress = injury, medical event, overtraining
- **To little** stress = no health or fitness benefit
- Less duration required if you push yourself harder.
- If unaccustomed to High Intensity exercise **consult with your physician first** and work with an exercise professional

Response to aerobic exercise training in the vigorous zone.

- **Older men** improved aerobic capacity due to improved heart function and increased capillary networks for working tissue.
- **Older women** may only improve through increased capillary networks, but not necessarily heart function.





Why?

This to is likely both a sex and gender effect.

If they exercise hard enough both sexes and genders will experience improvements in heart and vascular performance

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What's wrong with the picture?

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Are we getting our message across?

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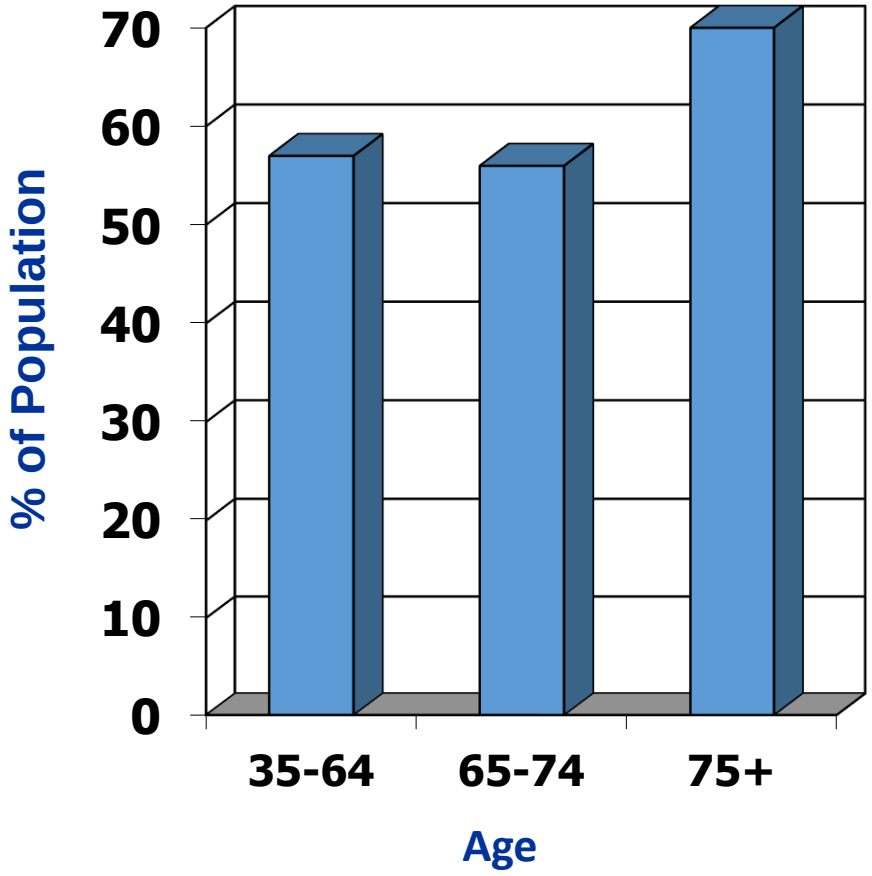
Older adults need exercise prehabilitation

- 91% live with one or more chronic diseases
  - **Disease prevention – too late?**
- 40% live with one or more physical disabilities
  - **Active life expectancy – shorter?**
- 88% of older men and women **do not meet minimal** physical activity (PA) and exercise recommendations
  - **Why are they not listening?**

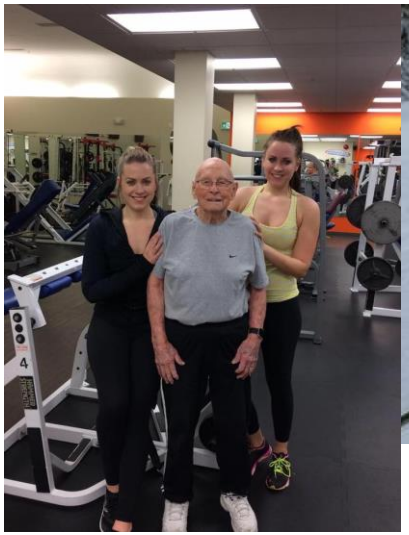
(NACA, 2006)

A Population of Physically Inactive

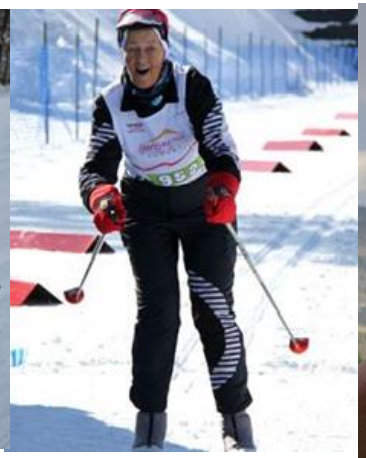


(Statistics Canada, 2007)

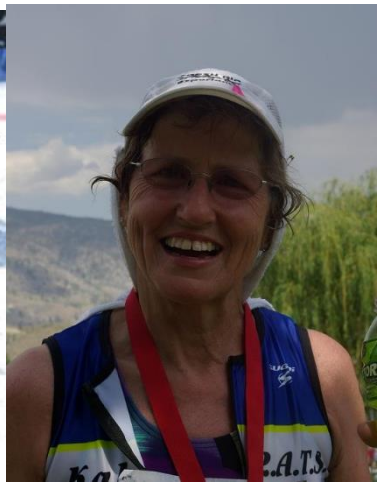
Yet many older Vernonites are successful at aging



(Paul turns 96, courtesy of **Breakaway Fitness**)



(Sovereign Lake Nordic Club Master Skiers)



(Kal **R**unning **A**nd **T**riathlon **S**ports)

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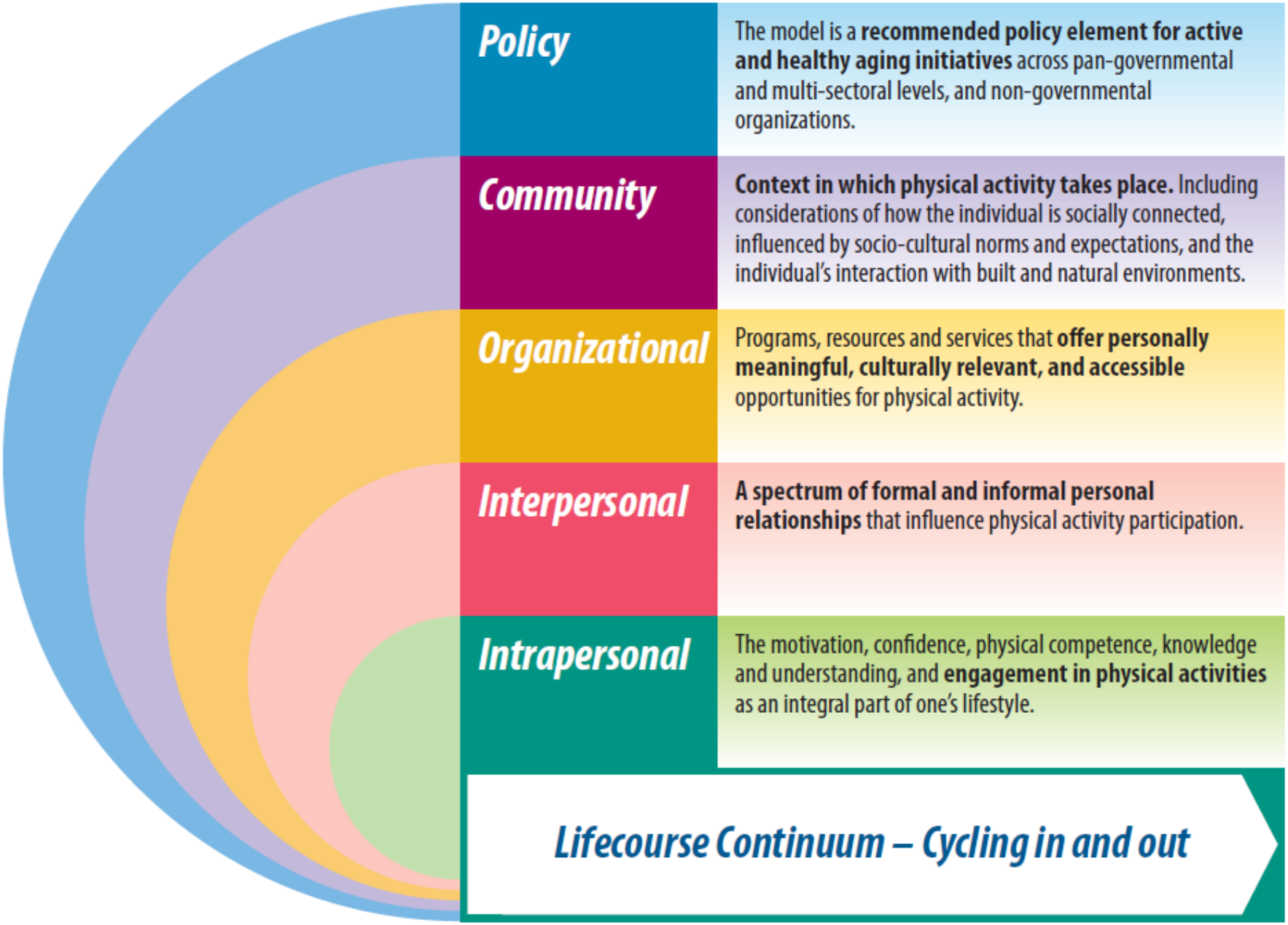
Physical Literacy in Older Adults – An Ecological Model



Exercise Training for Life

Skill Tuning (development)

Skill Retuning

Exercise
the New Activity of Daily Living

Think about it…

- Exercise engenders fitness reducing the risk of physical dependence
- Exercise is the best medicine to reduce the impact of chronic disease
- Exercise becomes an essential self-care activity (Activity of Daily Living)
- Arguably, this concept applies across all age-groups

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Take home messages

- **Sorry no easy fix !**
- An effective exercise dose is just the medicine you need to **LIVE BETTER LONGER**
- Your **Olympics is life** and **your event is preserving your physical reserve** capacity through exercise
- Gold medal performance is **retaining your physical independence until the end**.

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Thank you for listening
Questions

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