OULUN YLIOPISTO
UNIVERSITY of OULU

REHABILITATION DEPT BECAUSE OF COVID-19

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1. **Risk factors and mechanisms for severe COVID-19**
2. Role of good physical fitness related to fight against COVID-19
3. Consequences of physical inactivity
4. Future directions
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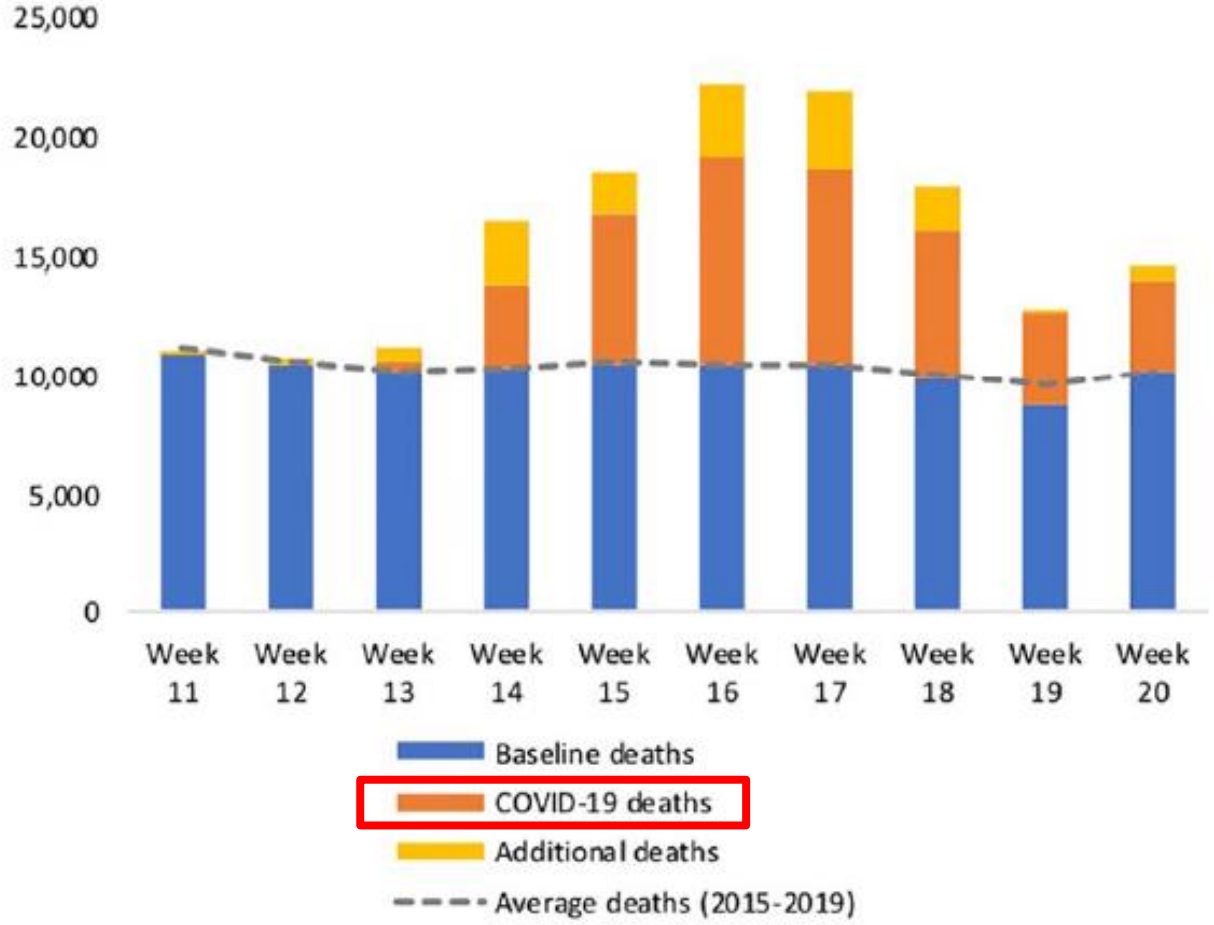
ALL REGISTERED DEATHS DURING THE COVID-19 BETWEEN 7 MARCH AND 15 MAY 2020 IN ENGLAND AND WALES

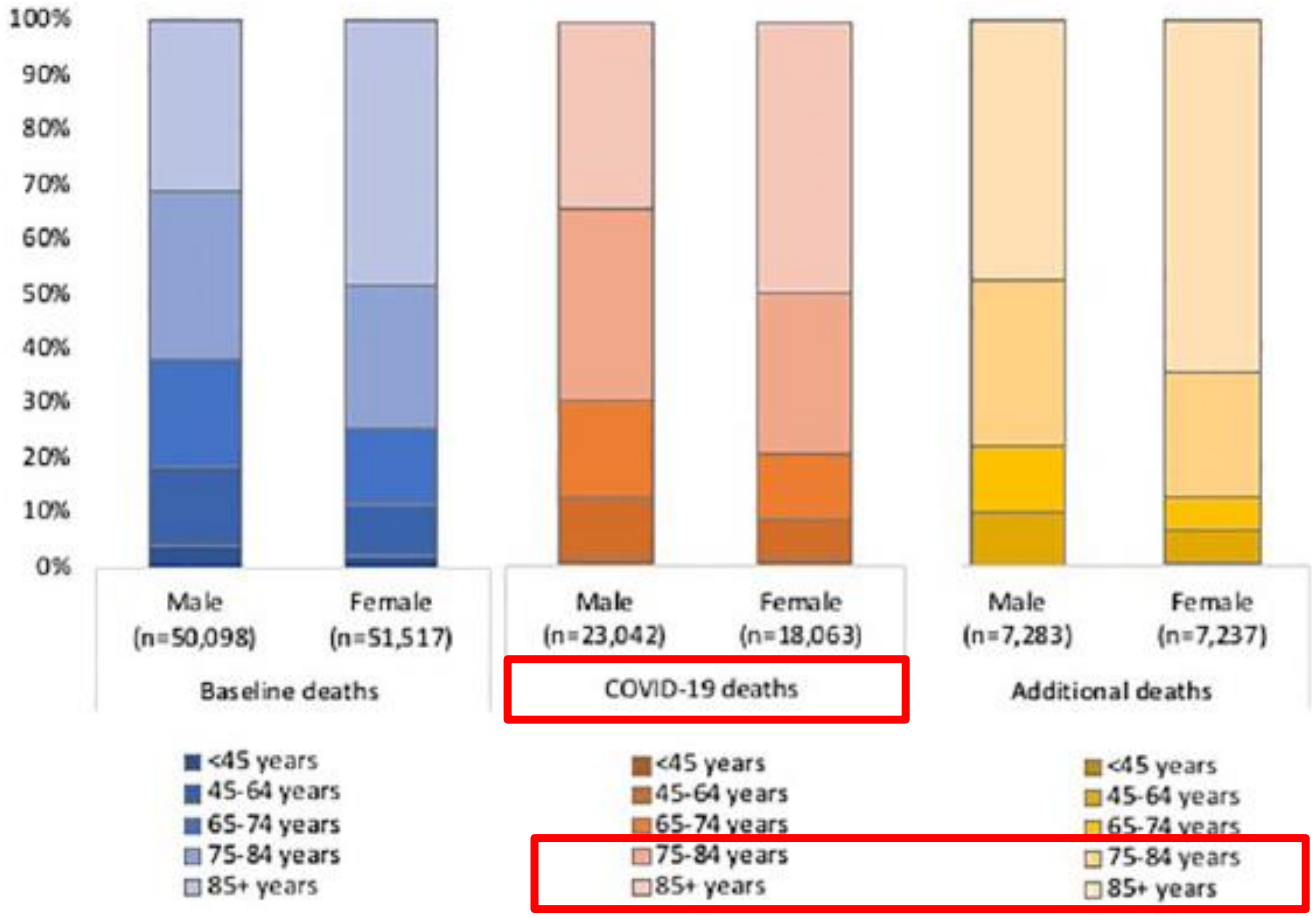


"The number of people dying in care homes increased by 220% during the first 10 weeks of the COVID-19 pandemic in England and Wales.

Many of these deaths were 'additional deaths', which is associated with the COVID-19 pandemic but not directly reported as a result of COVID-19."

Bone et al. Palliative Medicine 2020

AGE AND GENDER DISTRIBUTION OF DEATHS

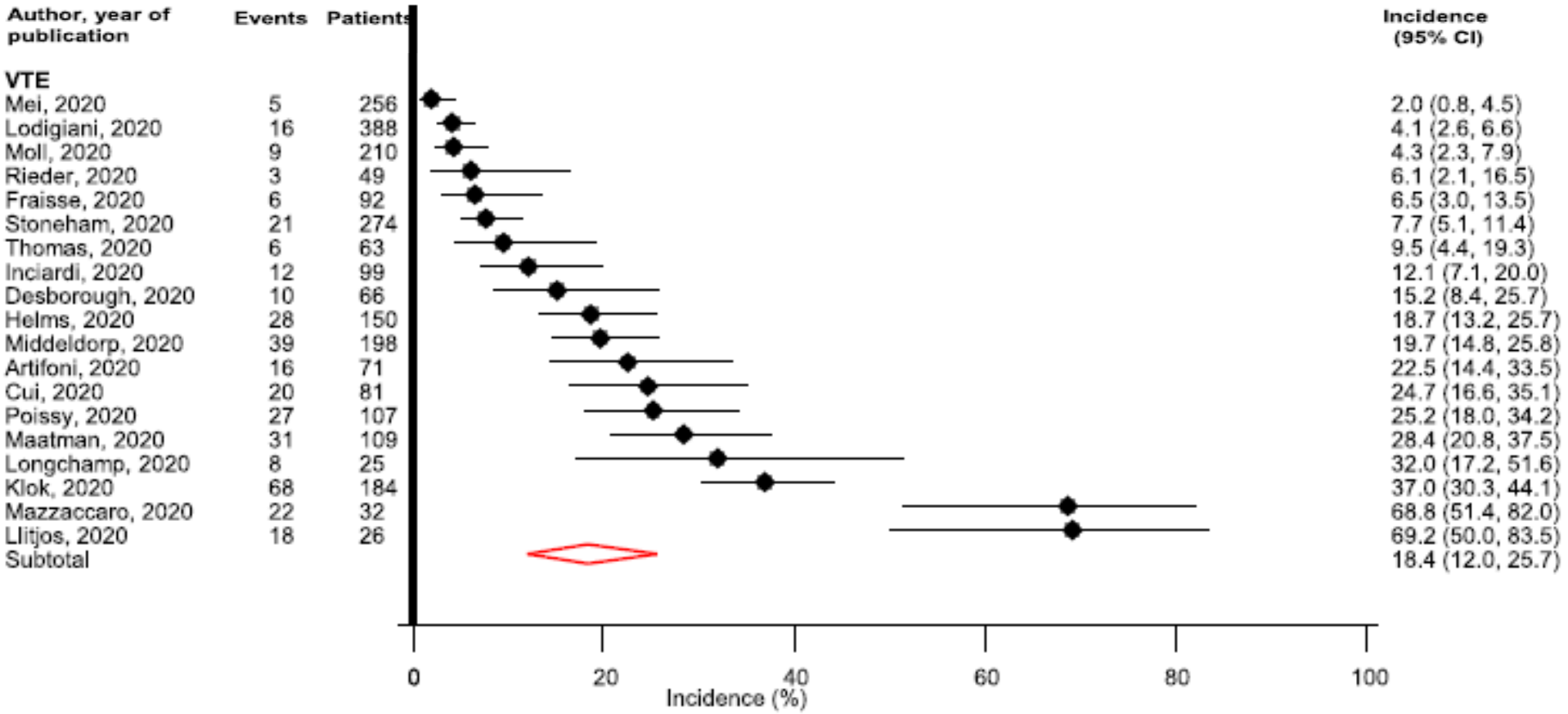


"Health and social care systems must ensure availability of palliative care to support people with severe COVID-19, particularly in care home settings.

The need for integrated models of palliative care in care home settings is key, and research to underpin these models is needed."

Bone et al. Palliative Medicine 2020

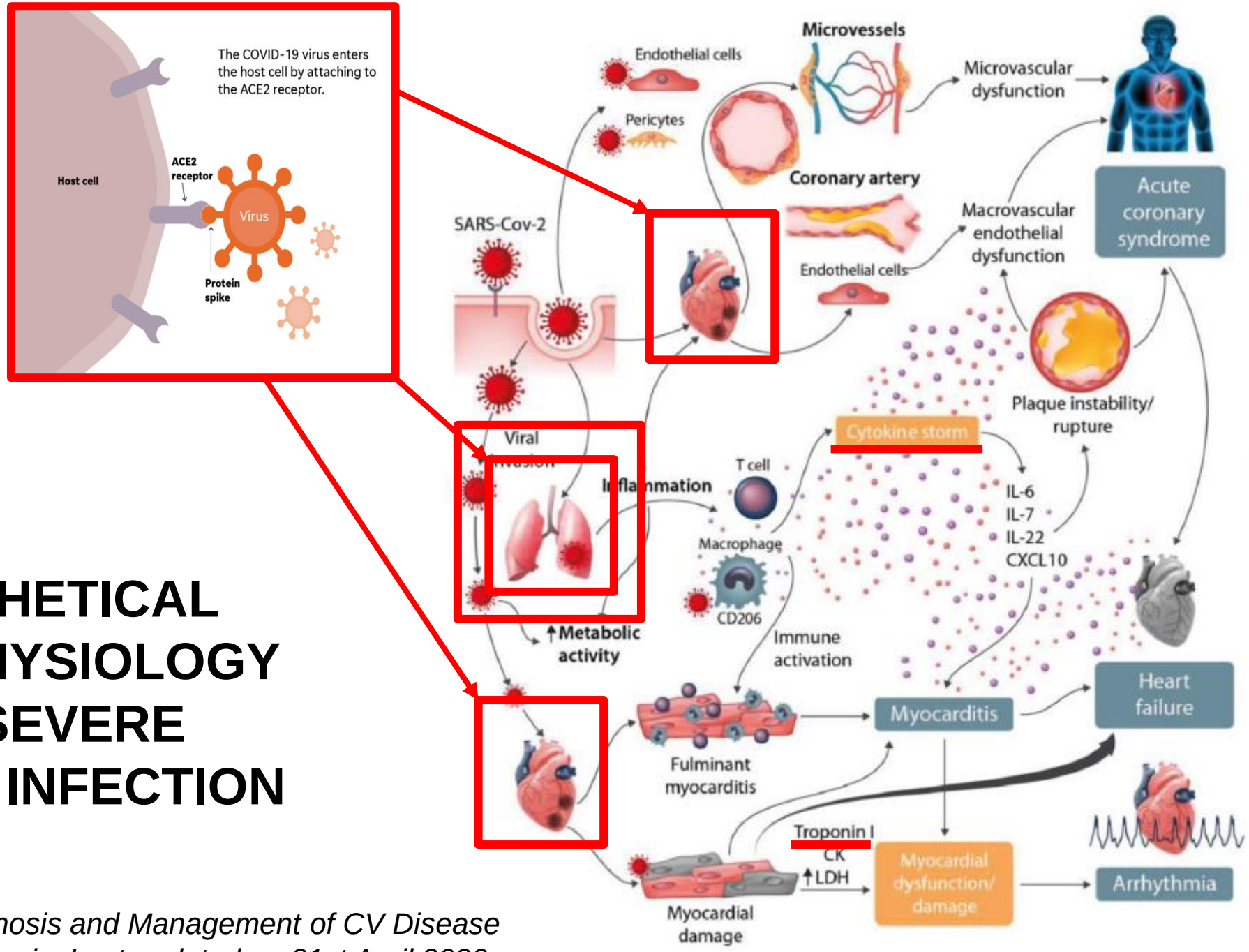
INCIDENCE OF VENOUS THROMBOEMBOLIC (VTE) COMPLICATIONS IN COVID-19 PATIENTS



Estimated VTE incidence is about 1 per 1000

Kunutsor and Laukkanen. Thrombosis Research 2020

HYPOTHETICAL PATHOPHYSIOLOGY FOR SEVERE COVID-19 INFECTION



ESC Guidance for the Diagnosis and Management of CV Disease during the COVID-19 Pandemic. Last updated on 21st April 2020.

AGE AND DISEASES RECOGNIZED AS RISK FACTORS

- Chronic pulmonary disease
- Stabilized heart failure (NYHA 3 or 4)
- Waiting list for cardiac sugery
- Immuno-deficiency or prior organ transplantation
- Hypertension
- Coronary artery disease
- Cerebrovascular disease
- Diabetes
- Severe overweight (>40 kg/m^2)

ESC Guidance for the Diagnosis and Management of CV Disease during the COVID-19 Pandemic. Last updated on 21st April 2020.

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EXERCISE AND RISK OF RESPIRATORY INFECTION

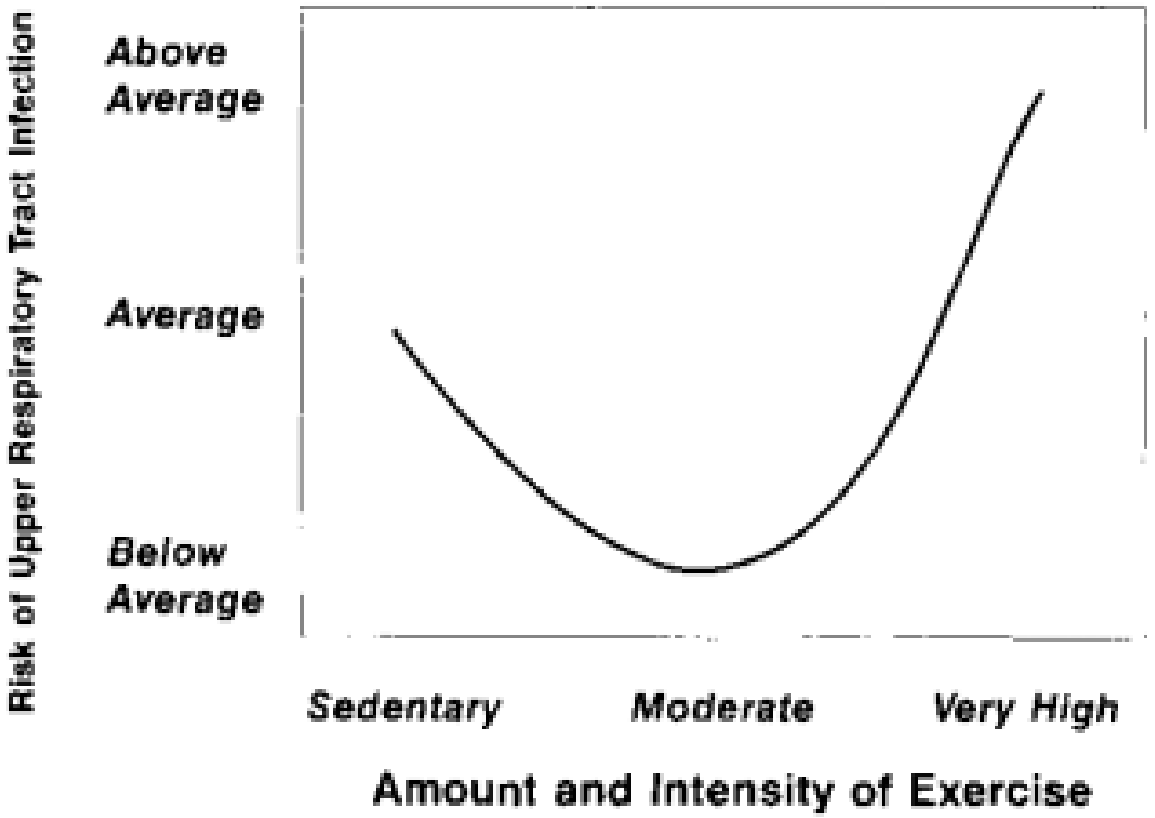


Fig. 1 "J"-shaped model of relationship between varying amounts of exercise and risk of URTI. This model suggests that moderate exercise may lower risk of respiratory infection while excessive amounts may increase the risk.

Nieman DC. Int J Sports Med 1994

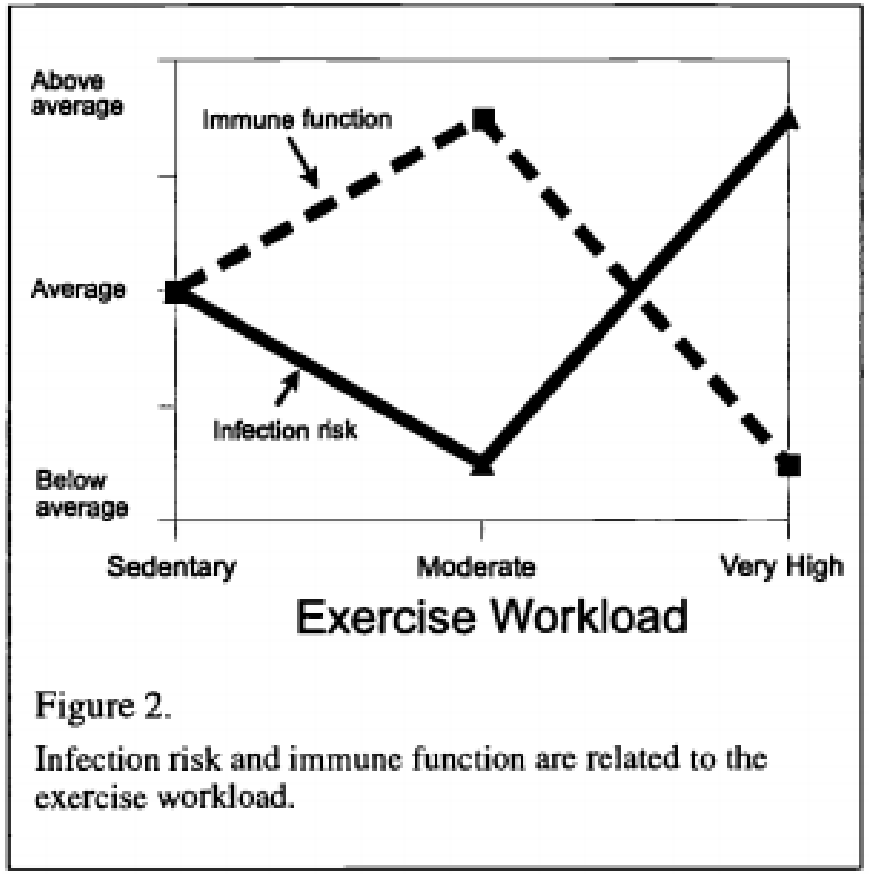


Figure 2.

Infection risk and immune function are related to the exercise workload.

Physical Activity and Fitness Quote

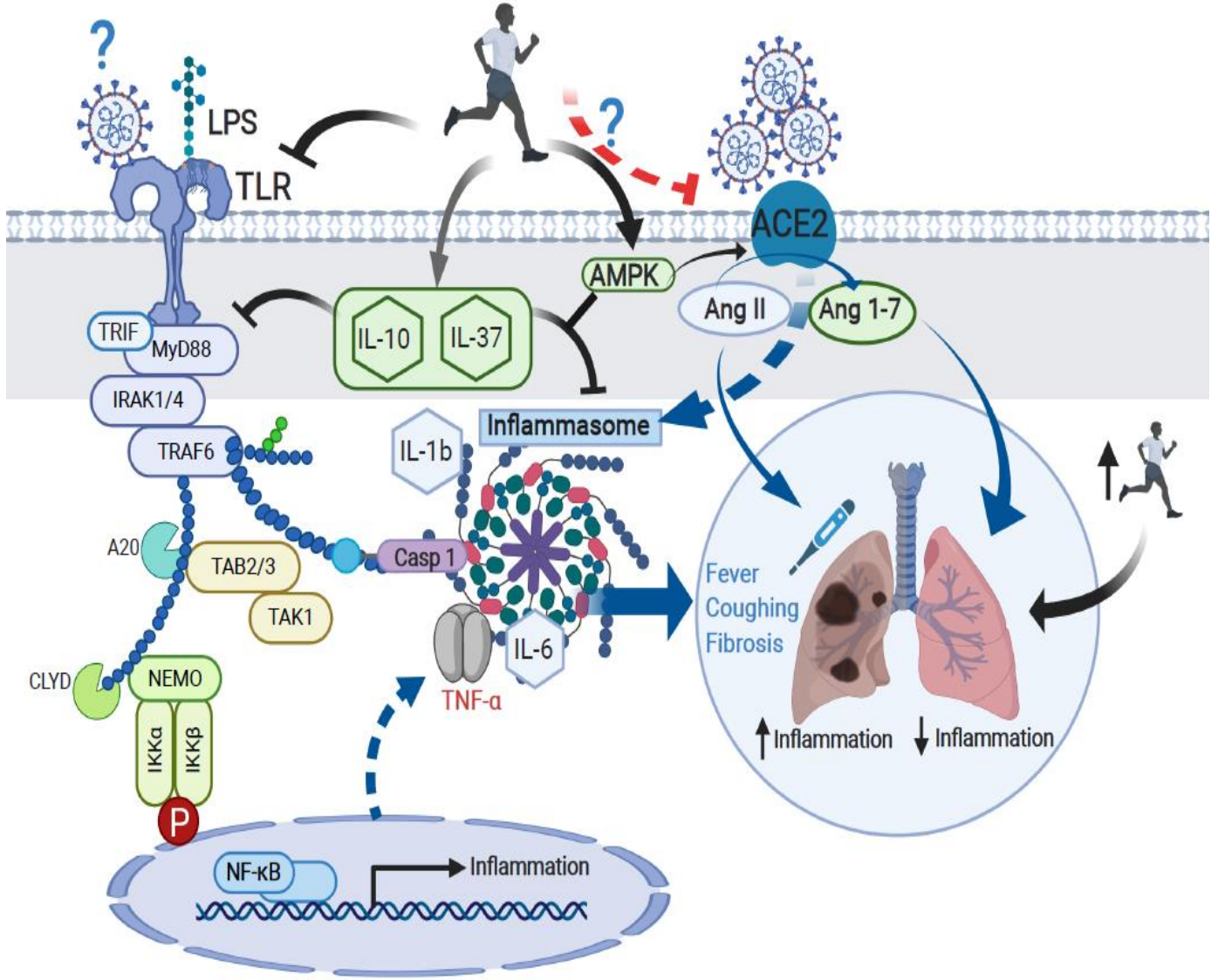
"Research has shown that during moderate exercise, several positive changes occur in the immune system. Although the immune system returns to pre-exercise levels very quickly after the exercise session is over, each session represents a boost that appears to reduce the risk of infection over the long term."

David C. Nieman, DrPH
Department of Health and Exercise Science
Appalachian State University
Boone, NC 28608

Nieman DC. President's Council on Physical Fitness and Sports 2001

Potential mechanisms of good physical fitness for protection against COVID-19:

1. By reducing the expression of the TLRs (opens the inflammatory pathway)
2. By increasing the levels of anti-inflammatory cytokines, which in turn will inhibit the TLR-inflammation pathway
3. By activating the AMP-activated protein kinase (activate glucose and fatty acid uptake and oxidation when cellular energy is low) in lung, reducing the inflammatory processes and improving lung function



Zbinden-Foncea et al. Obesity 2020 Apr 23. Online ahead of print.

18.03.2020

THE FIGHT AGAINST CORONAVIRUS

Older adults and individuals with chronic health conditions are at higher risk for the novel coronavirus. Understanding that the best way to prevent illness is to avoid being exposed to the virus altogether, we still want to promote aging adults to **stay physically active** to **maintain appropriate physical performance.** Especially **strength training at least two days in a week for all big muscle groups will result for better cognition, avoid falls and improve quality of life.**

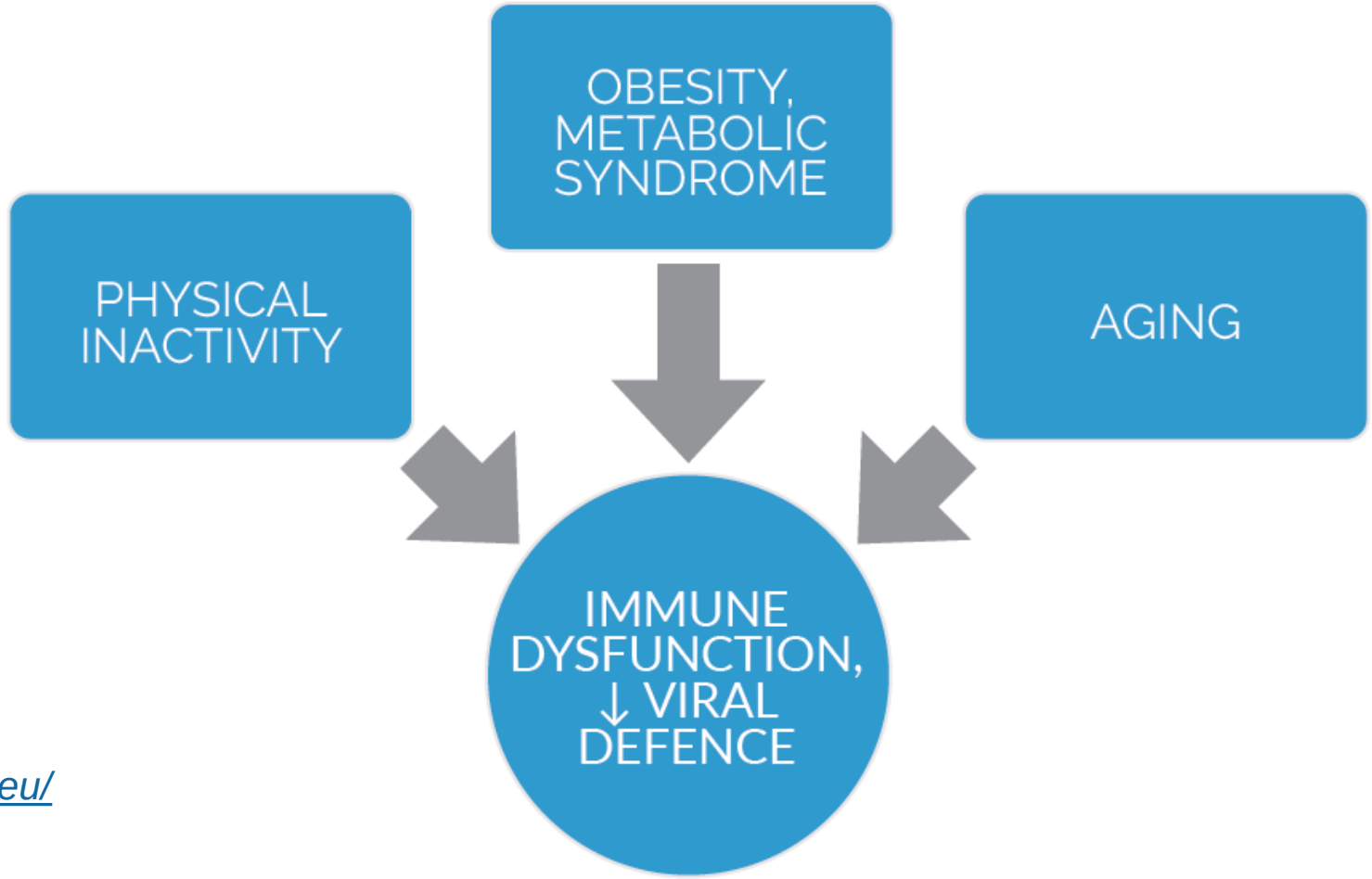
Importantly, our immune systems grow weaker as we age, which makes it more challenging for older adults to fight off infectious diseases. Chronic diseases are more common with age, can damage the immune system, and make people more vulnerable to serious complications. Understanding that **muscles could act as an immune organ** by producing acute phase protective proteins, **regular strength training might be a crucial preventive action to fight against the coronavirus.**

We all understand the severity of this global challenge, but please go ahead with physically active lifestyle and regular strength training for keeping fit and immune system ready for fight.

17.9.2020

https://www.hur.fi/en/news/fight-against-coronavirus

LINKAGE BETWEEN PHYSICAL INACTIVITY, AGING, AND OBESITY WITH IMMUNE DYSFUNCTION

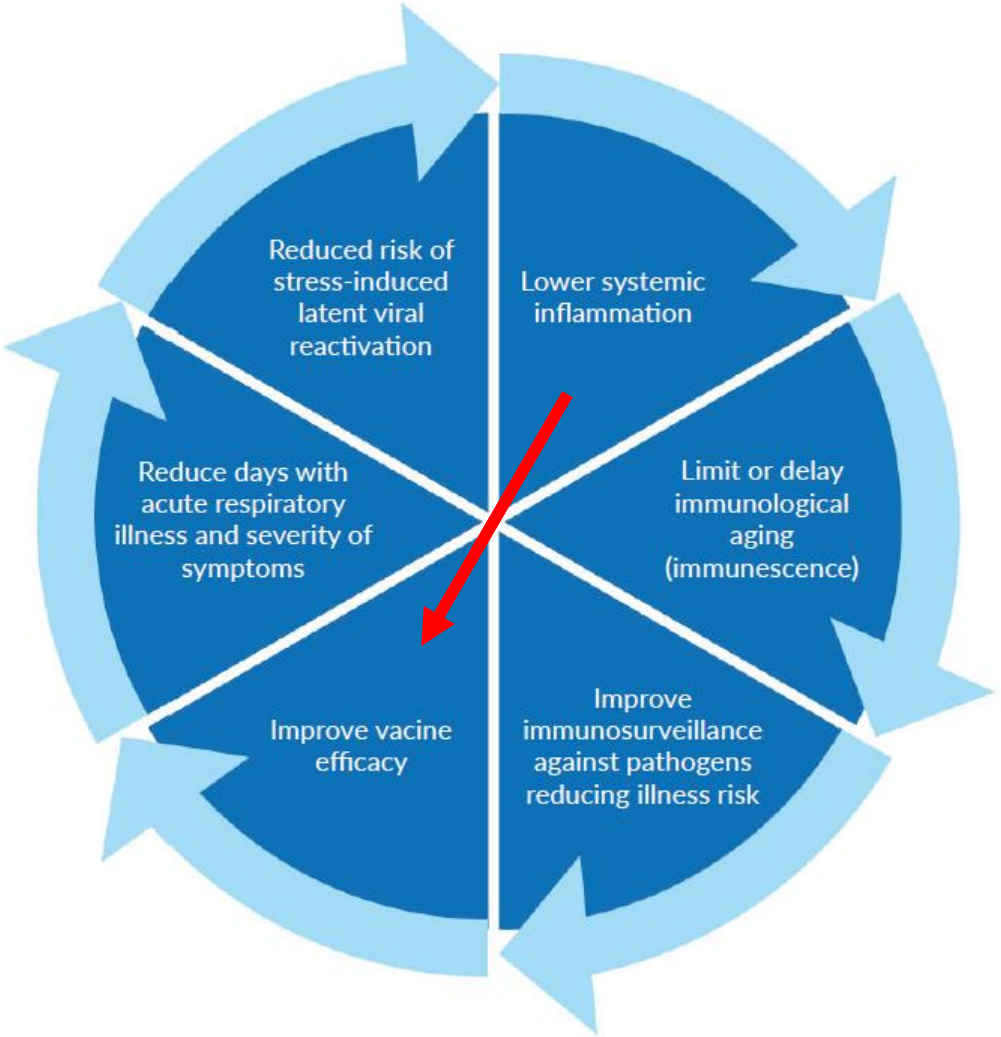


https://www.europeactive.eu/

europeactive
MORE PEOPLE | MORE ACTIVE | MORE OFTEN

Jimenez et al. THINK Active. August 2020

IMPACT OF REGULAR EXERCISE IMPROVING AND REINFORCING IMMUNE FUNCTION



https://www.europeactive.eu/

europe active
MORE PEOPLE | MORE ACTIVE | MORE OFTEN

Jimenez et al. THINK Active. August 2020

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Age and Ageing 2012; **41:** 690–694
doi: 10.1093/ageing/afs076
Published electronically 13 June 2012

Most older pedestrians are unable to cross the road in time: a cross-sectional study

LAURA ASHER[1], MARIA ARESU[1], EMANUELA FALASCHETTI[2], JENNIFER MINDELL[1]

Asher et al. Age and Ageing 2012

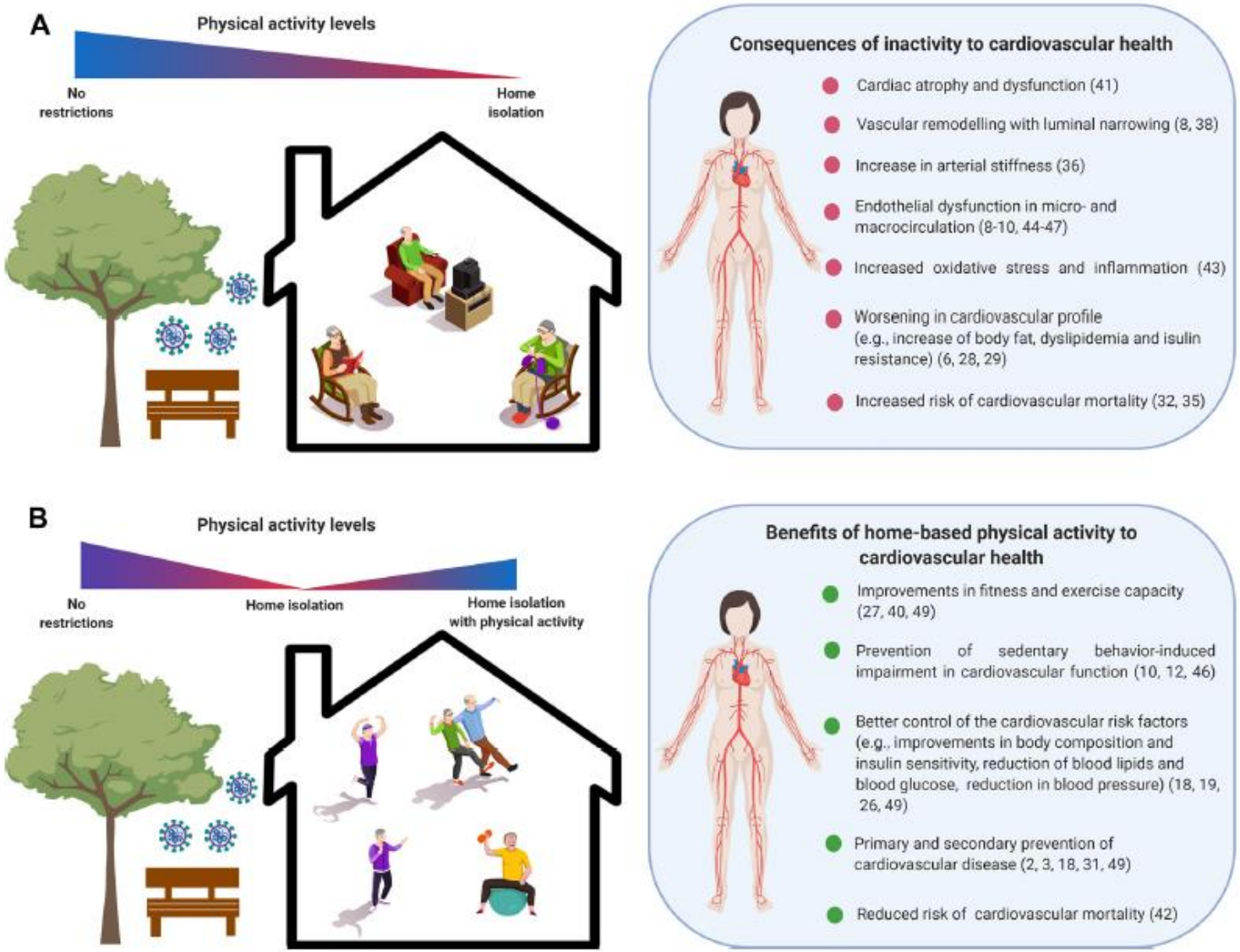
89% OF ≥ 65 YEARS HAD WALKING IMPAIRMENT!

Abstract

Objectives: to compare walking speed in the UK older population with the speed required to utilise pedestrian crossings (≥1.2 m/s), and determine health and socio-demographic associations with walking impairment.
Design: cross-sectional study using Health Survey for England 2005 data.
Setting: private households in England.
Participants: random population sample of 3,145 adults (1,444 men) aged ≥65 years.
Main outcome measures: walking speed was assessed by timing a walk of 8 feet at normal pace. Walking impairment was defined as walking speed <1.2 m/s or non-participation in the test due to being unsafe or unable.
Results: the mean walking speed was 0.9 m/s in men and 0.8 m/s in women; 84% of men and 93% of women ≥65 years had walking impairment. Female gender, increasing age, lower socio-economic status, poorer health and lower grip strength were predictors of walking impairment.
Conclusion: most older adults either cannot walk 8 feet safely or cannot walk fast enough to use a pedestrian crossing in the UK. The health impacts on older adults include limited independence and reduced opportunities for physical activity and social interaction. An assumed normal walking speed for pedestrian crossings of 1.2 m/s is inappropriate for older adults and revision of these timings should be considered.

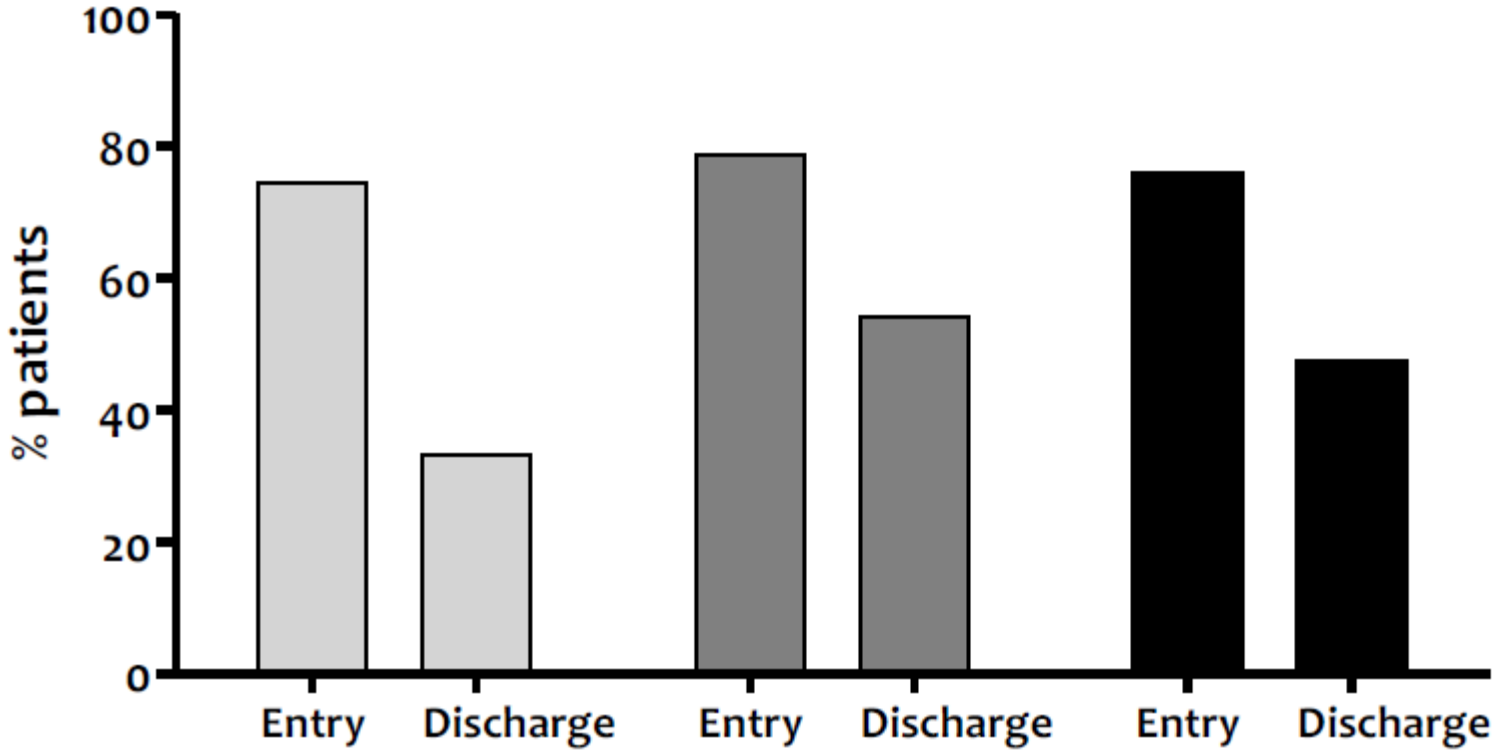
Asher et al. Age Aging 2012

HOME ISOLATION DURING COVID-19



Zbinden-Foncea et al. Obesity 2020. Online ahead of print.

LOW PHYSICAL FUNCTIONING AND IMPAIRED PERFORMANCE OF ACTIVITIES OF DAILY LIFE IN COVID-19 PATIENTS



1-min STS = abnormal low number of 1-min chair stands

SPPB = low performance, score 0-6

Barthel = a poor score, ≤ 60 points

Entry: about 16 days after acute care hospital
Discharge: about 16 days after Rehabilitation Institute of Verona

Belli et al. Eur Respir J 2020. In press

PILOT STUDY BEFORE COVID-19

SENIOR CARE FACILITY 24/7 TOUKOLA IN TAMPERE, FINLAND:

EFFECTIVENESS OF STRENGHT TRAINING ON DAILY ACTIVITIES IN HUR INTELLIGENT GYM

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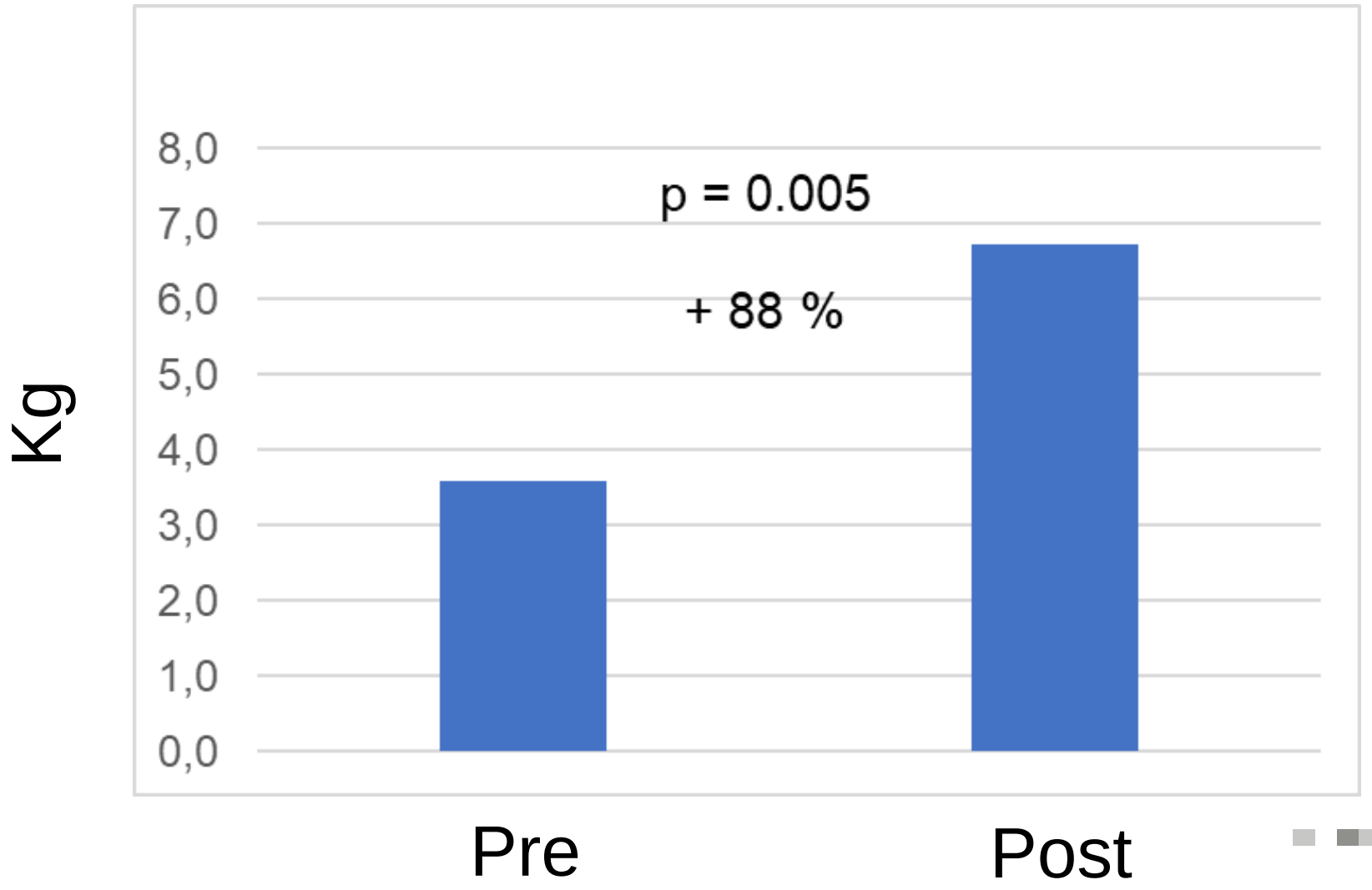
PARTICIPANTS IN TOUKOLA

	Intervention (n=12)
Sex (male/female)	5/7
Age (y), min-max	85±10, 64-96
Weight (kg), min-max	76±11, 55-95
Duration of intervention	noin 12 kk
Visits to gym, min-max	40±11, 11-75
	Control (n=12)
Sex (male/female)	4/8
Age (y), min-max	87±7, 69-94
Weight (kg), min-max	75±12, 50-91

HUR strength training prescription: 2 x week (at least 3 months)
10 min warm-up, 4-8 exercises (lower- and upper body), 10 min cool-down

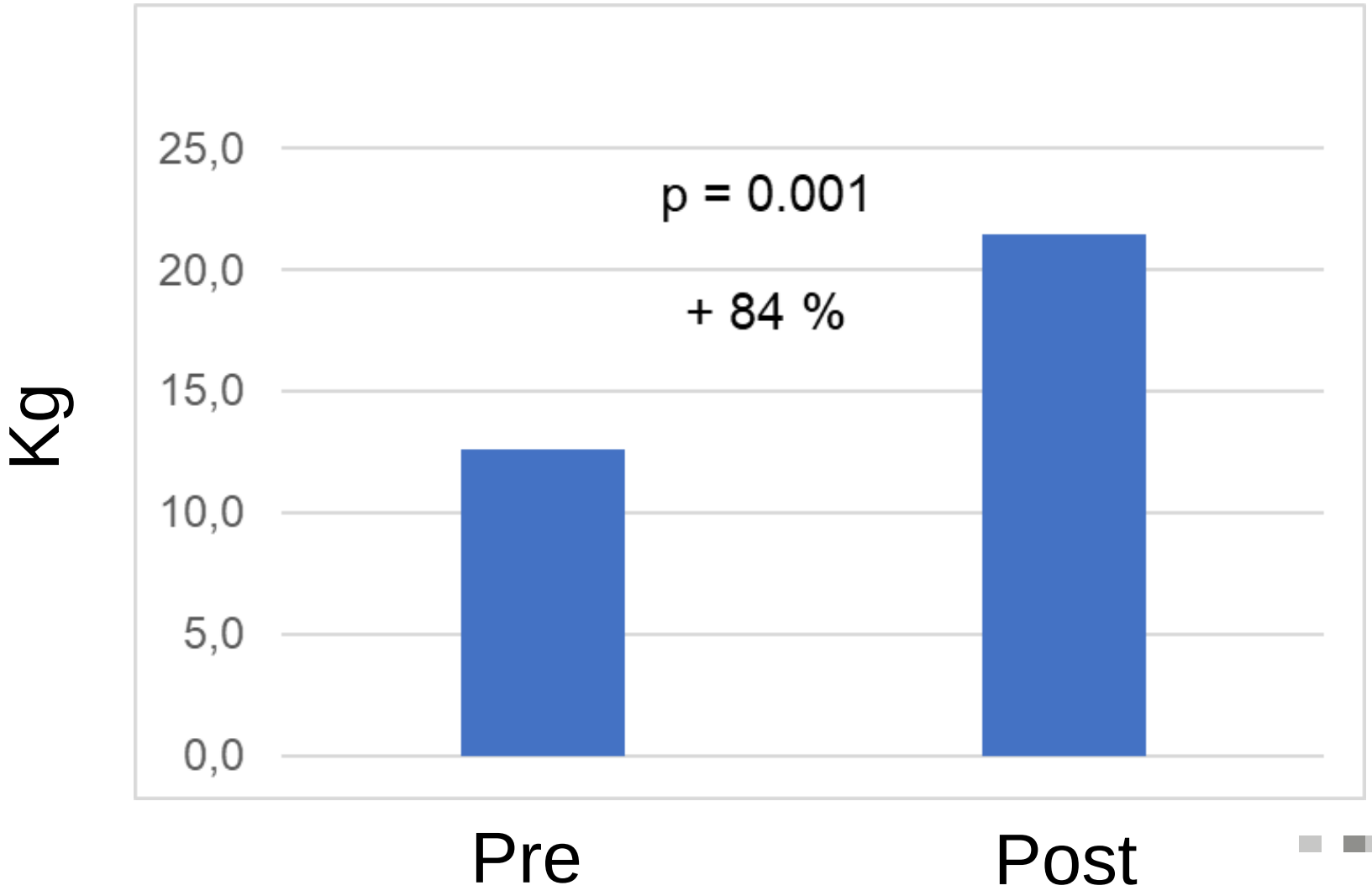
- 2-3 weeks familiarization period: 3 sets of 10-15 reps at 30-40% of 1 RM
- after that: 2-5 sets of 8-12 reps at 60-80% of 1 RM, rest between sets 30-60 s
- progression of strength training: autoupdate (rule: 2 reps more – increase in loading 0.2 – 1 kg)

CHEST PRESS: 1 RM



Hautala et al. Unpublished data 2020

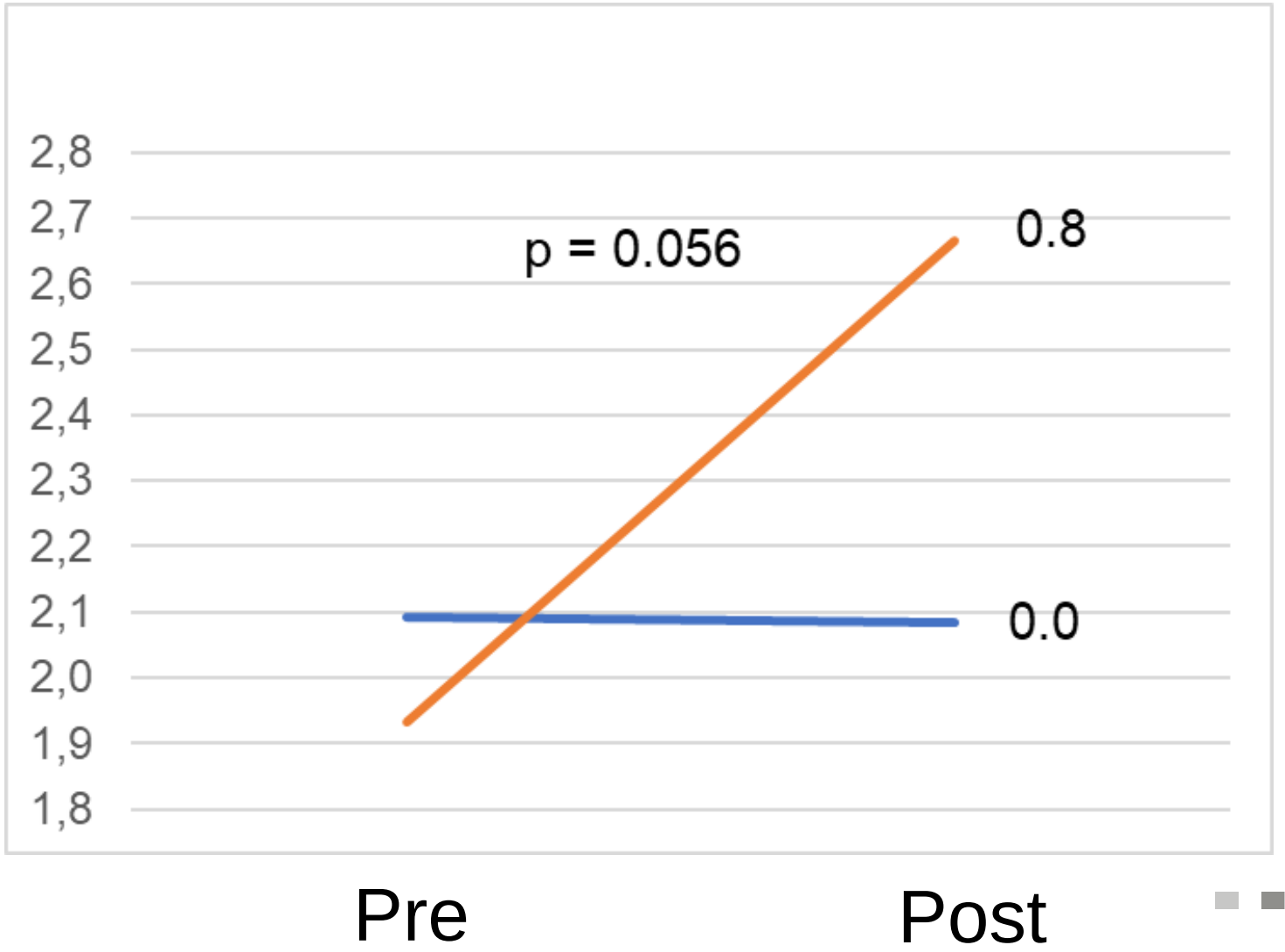
LEG PRESS: 1 RM



Hautala et al. Unpublished data 2020

INTERRAI ASSESSMENT SYSTEM (SCALE 0-6): INDEPENDENT DRESSING

RAI scale 0-6:
0=Independent
6=Fully assistive

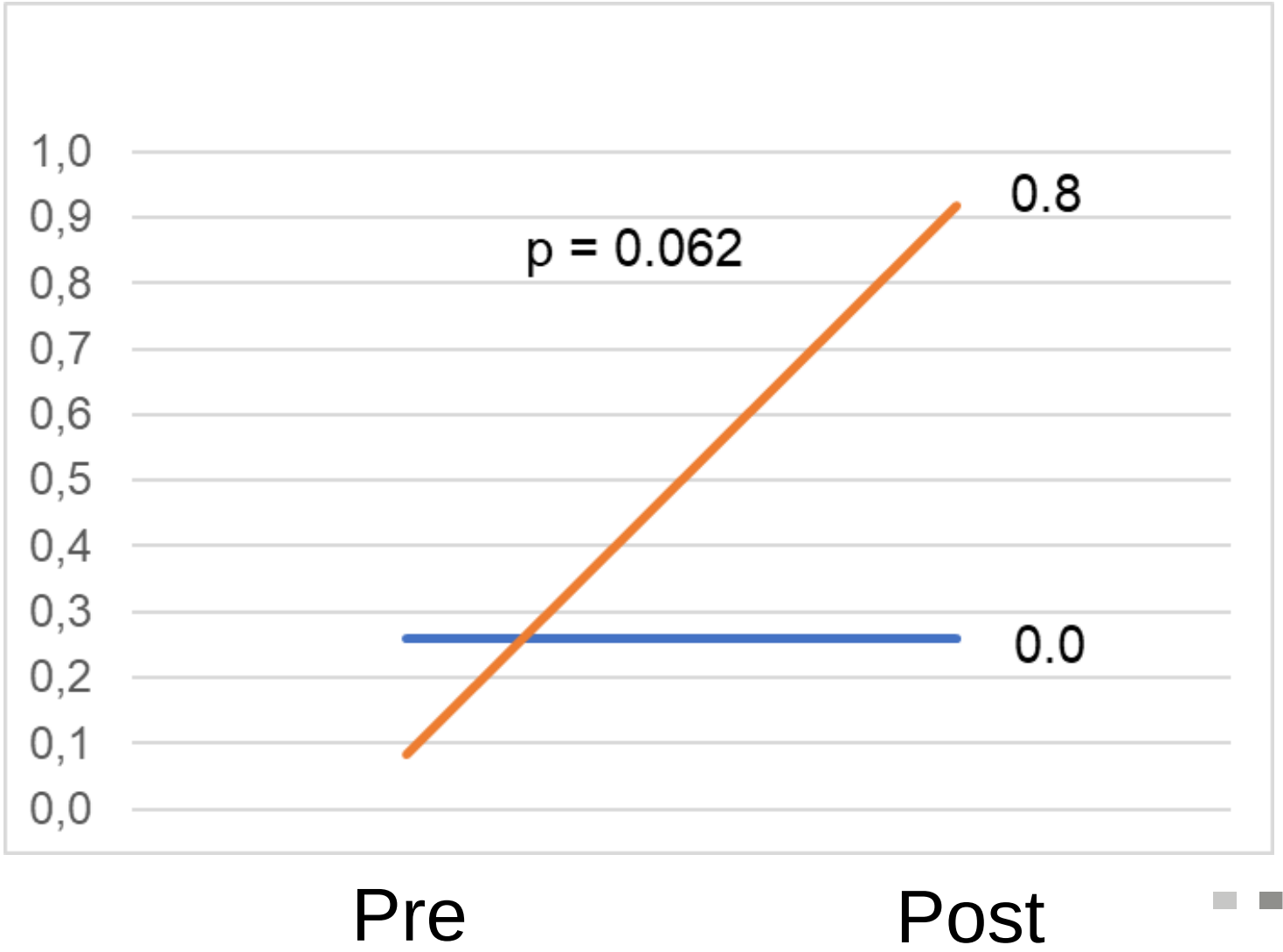


Intervention
Control

Hautala et al. Unpublished data 2020

INTERRAI ASSESSMENT SYSTEM (SCALE 0-6): INDEPENDENT EATING

RAI scale 0-6:
0=Independent
6=Fully assistive



Intervention
Control

Hautala et al. Unpublished data 2020

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FUTURE DIRECTIONS

1. VACCINE AND EXERCISE TRAINING?
2. NEW DEFINIONS FOR STRENGTH?
3. REHABILITATION GUIDELINES DURING COVID-19?

1. VACCICE AND EXERCISE:

EXERCISE TRAINING EXTENDED THE ANTIBODY RESPONSE AFFORDED BY INFLUENZA VACCINATION

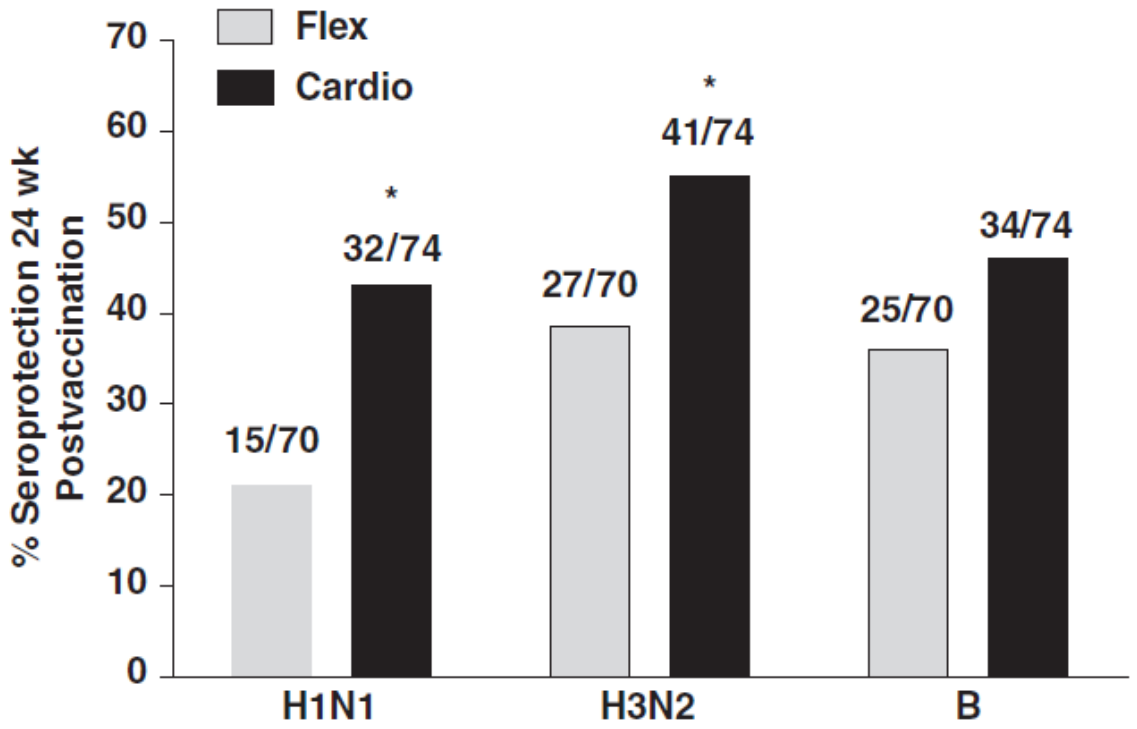


Figure 2. Cardiovascular, but not flexibility, exercise intervention increased the percentage of study participants who achieved seroprotection (hemagglutination inhibition titer ≥40) 24 weeks after influenza vaccination. *Significant treatment difference ($P < .05$).

Randomized controlled trial
Males and females (n=144) aged about 70 y

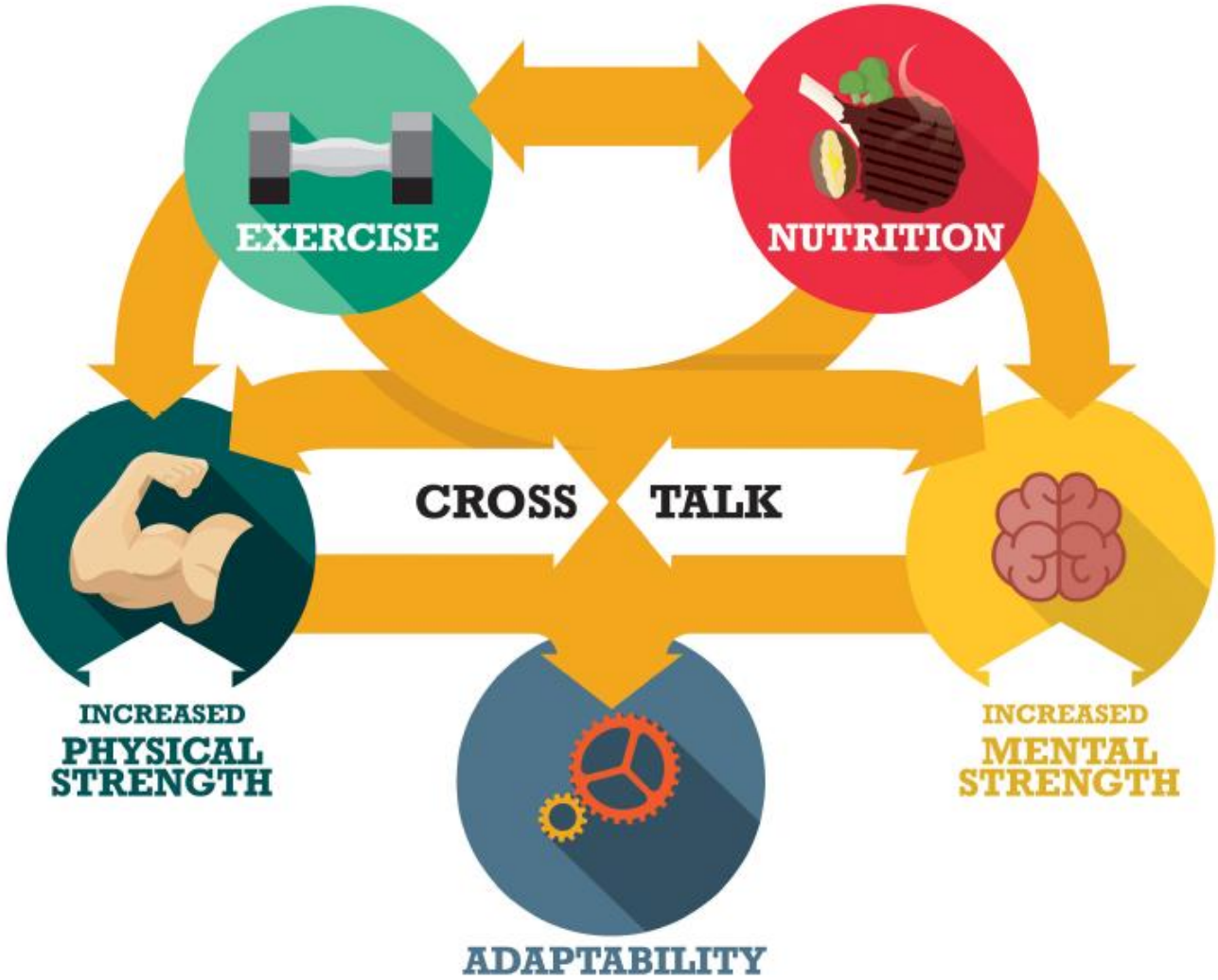
Aerobic Training Group:
3 x week, 45-70 % of $VO2_{peak}$, 45-60 min

Flexibility Training Group:
2 x week, 75 min

Woods et al. J Am Geriatr Soc 2009

2. NEW DEFINITIONS FOR STRENGTH:

PROPOSED INTERPLAY BETWEEN MENTAL AND PHYSICAL STRENGTH



Askow et al. Frontiers in Nutrion 2020

27.10.2017

BRAIN STRENGTH IN AGING ADULTS

https://www.hur.fi/en/news/brain-strength-aging-adults

3. REHABILITATION GUIDELINES DURING COVID-19:

CARDIAC REHABILITATION ACTIVITIES DURING THE COVID-19 PANDEMIC IN ITALY.

POSITION PAPER OF THE AICPR (ITALIAN ASSOCIATION OF CLINICAL CARDIOLOGY, PREVENTION AND REHABILITATION)

Table 1. AICPR proposal for classification of functional frailty through SPPB assessment.

SPPB score	SPPB classification	Functional fragility
0-3	Severe limitations	Very severely frail
4-6	Moderate limitations	Severely frail
7-9	Mild limitations	Moderately frail
10-12	Minimal limitations	No frail

SPPB, short physical performance battery.

Table 2. Physiotherapy program.

Physiotherapy program	Very severely frail	Severely frail	Moderately frail	No frail
Change of posture / therapeutic posture	X			
Passive mobilization and active assisted	X			
Active mobilization	X	X		
Neuromuscular electrostimulation	X			
Standing station recovery	X	X		
Supervised walking		X		
Walk test training			X	
Effort reconditioning (pedal exerciser)		X	X	
Aerobic training (exercise bike, treadmill)			X	X
Muscle strengthening (weights, elastics)		X	X	X
Balance exercises	X	X	X	X
Training on stairs				X
Educational	X	X	X	X

Mureddu et al. Monaldi Archives for Chest Disease 2020

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SUMMARY

Good physical fitness may give some protection against COVID-19 by resulting in several positive changes in immune system.

Home isolation and restrictions during COVID-19 challenges societies to promote daily physical activity and exercise training.

New ideas and approaches are needed to ensure lifelong strength and appropriate quality of life in the middle of “new normal”.

THANK YOU!

www.hur.fi