United Kingdom's Chief Medical Officers' Physical Activity Guidelines

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GM Falls Collaborative: CoLSP

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Physical Activity

Any bodily movement produced by muscles that requires energy expenditure

Exercise

A form of physical activity

Regular, planned, structured, repetitive physical activity for the purpose of **developing** physical fitness

Training

A repeated series of individual exercise sessions **PROGRESSED** over a period of weeks and months to **improve** physical fitness

Strength Training

Muscle action against an external **resistance/load**

Progressed with the goal of **increasing strength** over time

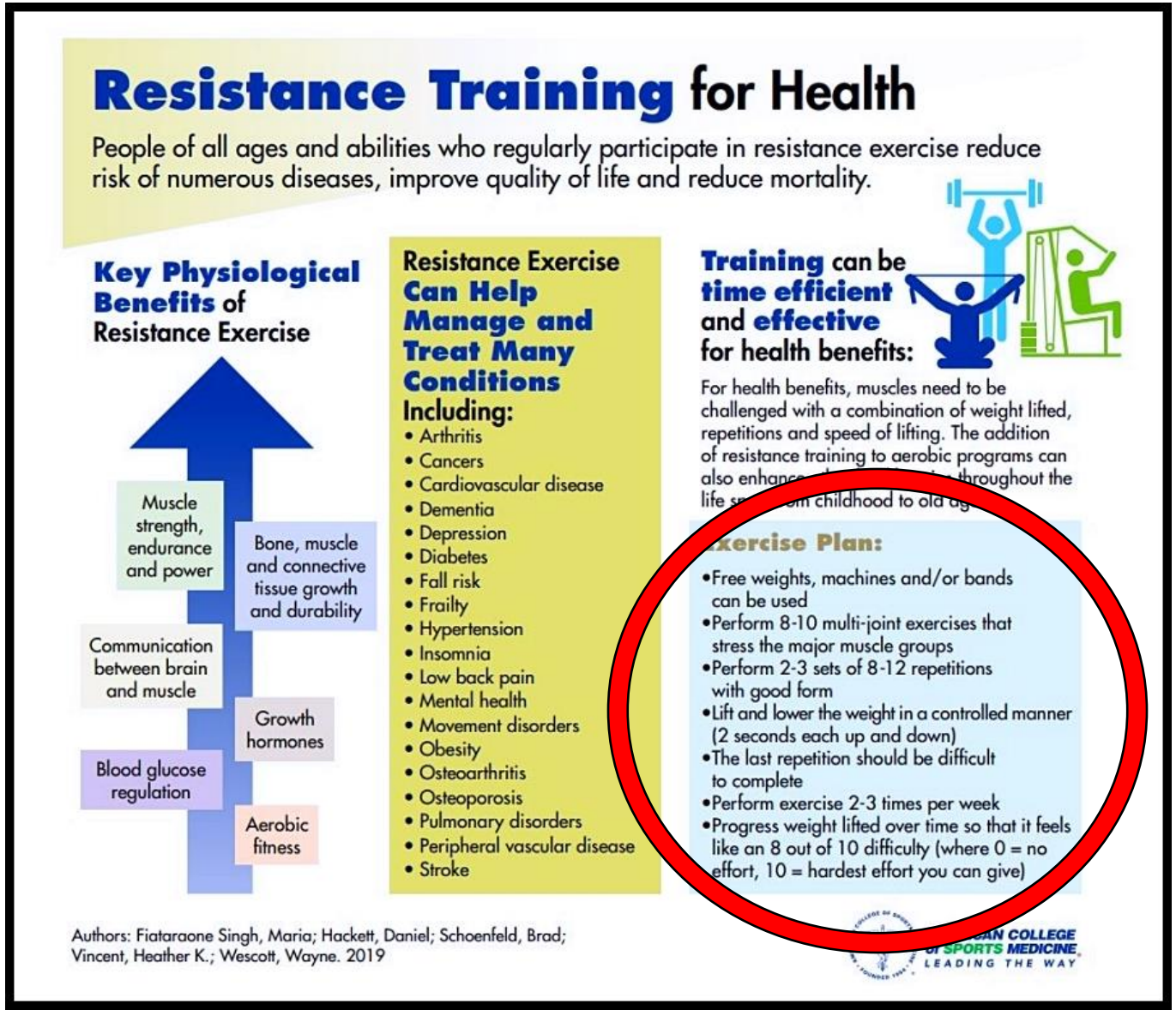
Strength Exercises	Look Just Like...
Squat	Getting out of your chair, toilet, or bathtub
Deadlift	Picking groceries or children off the floor
Lunges	Going up the stairs, getting off the floor, recovering from a slip or trip (preventing falls)
Shoulder press	Putting away dishes or luggage overhead
Push up	Pushing a heavy door open, shopping cart
Row	Keeping an upright posture, pulling heavy doors

UK


Be active
at least
150
minutes
moderate intensity
per week
increased breathing
able to talk
OR
or a combination of both
at least
75
minutes
vigorous intensity
per week
breathing fast
difficulty talking
to keep muscles, bones and joints strong
Build strength
on at least
2
days a week
Swim
Brisk walk
Cycle
Run
Stairs
Sport
Gym
Yoga
Carry heavy bags
Minimise sedentary time
Break up periods of inactivity
Bowls
Tai Chi
Dance
For older adults, to reduce the chance of frailty and falls
Improve balance
2 days a week

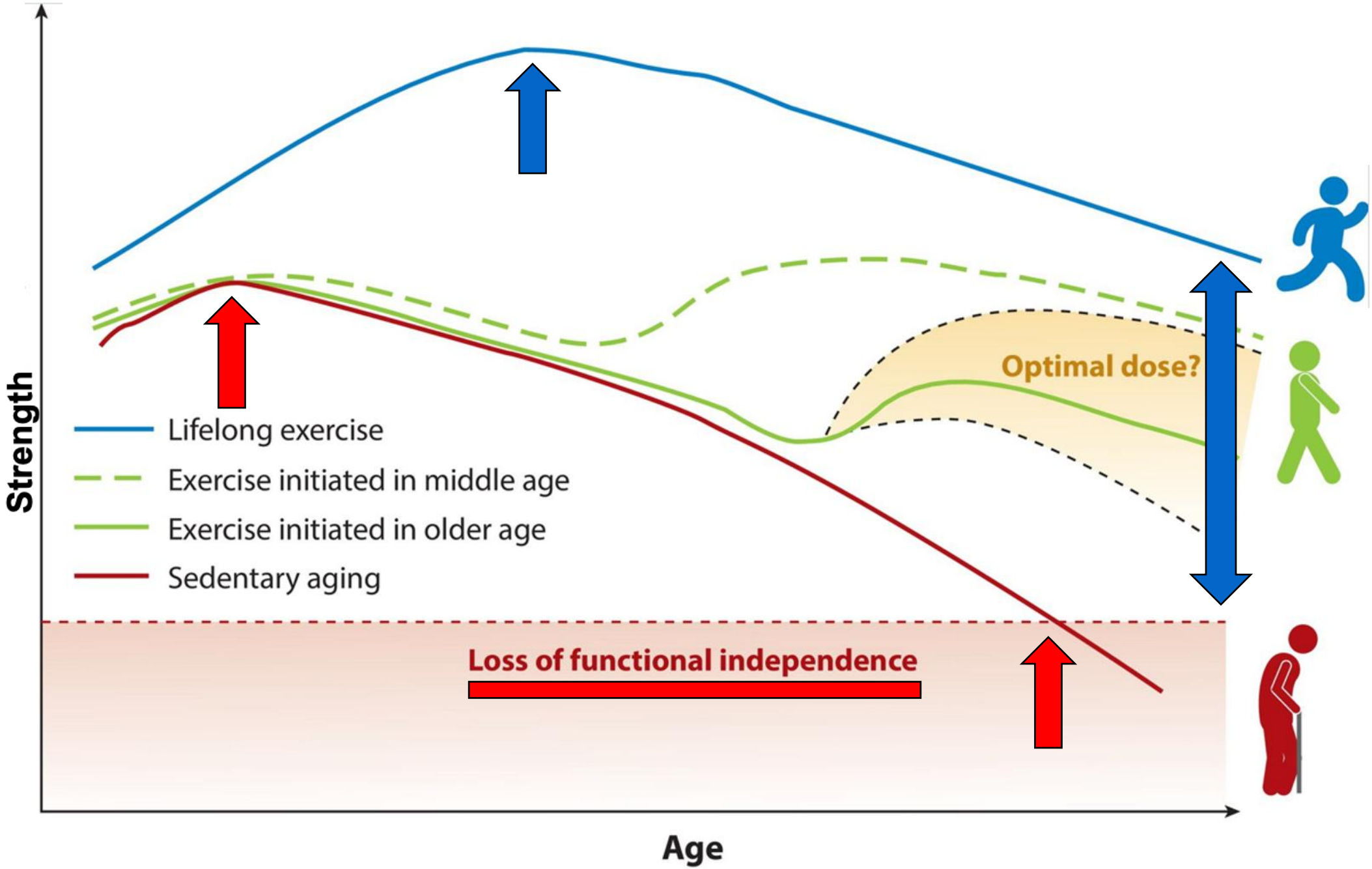
UK v. WHO Guidelines

American College of Sports Medicine



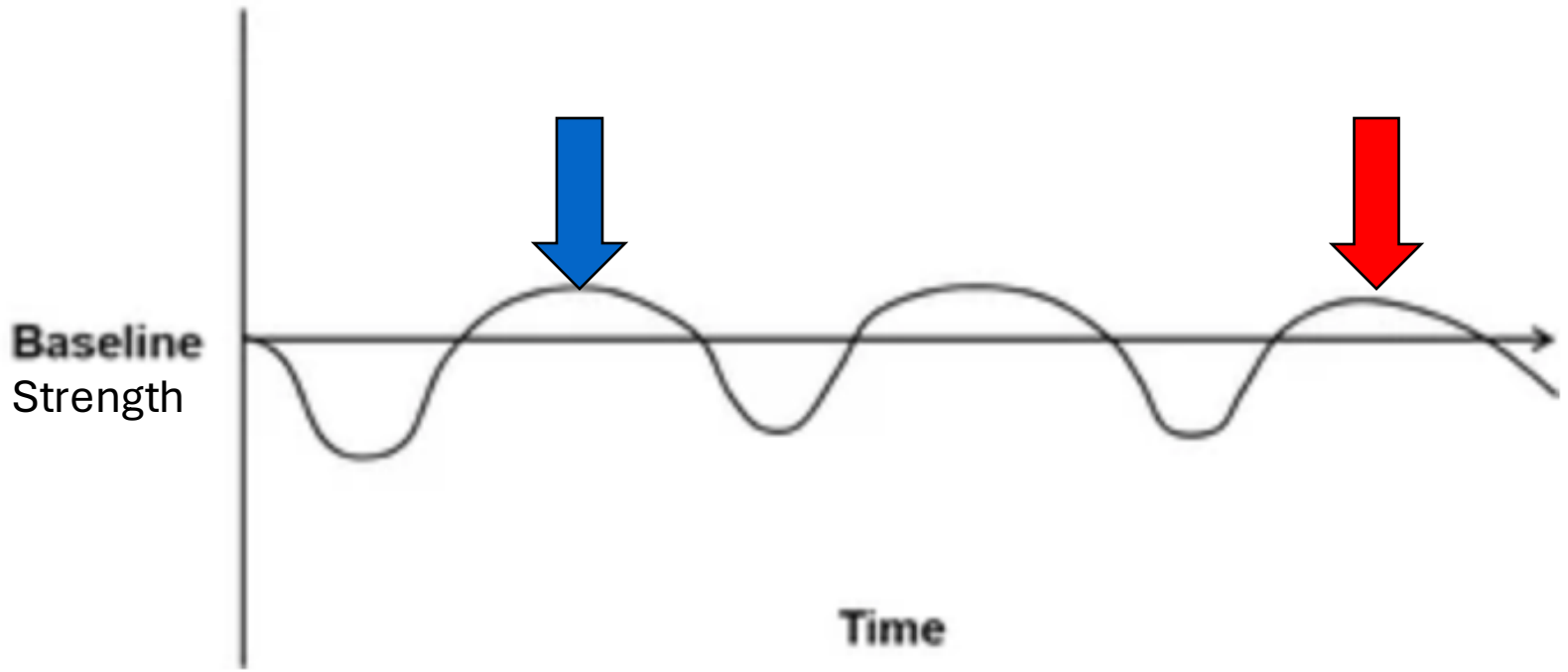
Why?

Muscle strength naturally declines with age after age 30, but **we can significantly slow the decline** by taking part in strength training.



Adapted from Graeme Carrick-Ranson, 2022

Infrequent or Insufficient Resistance/Load



Cunanan, 2018

High Levels of **Strength** is a Vital Sign for **Health**

- A) Non-communicable diseases
  - Type 2 diabetes
  - Metabolic syndrome
  - Cardiovascular diseases
  - Dyslipidaemia
  - Hypertension
  - Cancers
  - Non-alcoholic fatty liver disease
  - Chronic liver disease
  - Chronic kidney disease
  - Chronic respiratory diseases
- Cognitive dysfunction and impaired mental health
- B) Musculoskeletal problems
  - Chronic low back pain
  - Osteosarcopenia
  - Osteoporotic fractures
- Mortality
  - All-cause mortality
  - Cardiovascular diseases-related mortality
  - Cancer-related mortality
  - In-hospital mortality
  - Post-operative mortality
  - Cirrhosis-related mortality
- Other health-related problems
  - Nutritional status
  - Institutional admissions
  - Longer hospital stay
  - Reduced quality of life
  - Functional disability

Vaishya, 2024

Handgrip strength and all-cause dementia incidence and mortality: findings from the UK Biobank prospective cohort study

Irene Esteban-Cornejo[1,2], Frederick K. Ho[3], Fanny Petermann-Rocha[3,4], Donald M. Lyall[3], David Martinez-Gomez[5,6], Verónica Cabanas-Sánchez[6], Francisco B. Ortega[1,7], Charles H. Hillman[8,9], Jason M.R. Gill[2], Terence J. Quinn[2], Naveed Sattar[2], Jill P. Pell[3], Stuart R. Gray[2] & Carlos Celis-Morales[2,10,11]*

range: 8.5; 9.7) for incidence and 9.5 (inter-quartile range: 8.7; 10.6) for mortality. During this time, 4087 participants developed dementia, and 1309 died from it. Lower grip strength was associated with a higher risk of dementia incidence and mortality independent of major confounding factors ($P < 0.001$). Individuals in the lowest quintile of grip strength had 72% [95% confidence interval (CI): 1.55; 1.92] higher incident dementia risk and 87% [95% CI: 1.55; 2.26] higher risk of dementia mortality compared with those in the highest quintile. Our PAF analyses indicate that 30.1% of dementia cases and 32.3% of dementia deaths are attributable to having low grip strength. The association between grip strength and dementia outcomes did not differ by lifestyle or sociodemographic factors.

Conclusions Lower grip strength was associated with a higher risk of all-cause dementia incidence and mortality, independently of important confounding factors.

Keywords Alzheimer; Vascular dementia; Muscular strength; Prevention; Adults; Mortality

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Special Article

International Exercise Recommendations in Older Adults (ICFSR): Expert Consensus Guidelines

M. Izquierdo[1,2], R.A. Merchant[3,4], J.E. Morley[5], S.D. Anker[6], I. Aprahamian[7], H. Arai[8], M. Aubertin-Leheudre[9-10], R. Bernabei[11], E.L. Cadore[12], M. Cesari[13], L.-K. Chen[14], P. de Souto Barreto[15,16], G. Duque[17,18], L. Ferrucci[19], R.A. Fielding[20], A. García-Hermoso[1,2], L.M. Gutiérrez-Robledo[21], S.D.R. Harridge[22], B. Kirk[17,18], S. Kritchevsky[23], F. Landi[11], N. Lazarus[22], F.C. Martin[24], E. Marzetti[11], M. Pahor[25], R. Ramírez-Vélez[1,2], L. Rodriguez-Mañas[2,26], Y. Rolland[15,16], J.G. Ruiz[27], O. Theou[28], D.T. Villareal[29], D.L. Waters[30], C. Won Won[31], J. Woo[32], B. Vellas[15], M. Fiatarone Singh[33,34]

Dementia	• Improved cerebral blood flow • Increased neurotrophic factors in CNS • Hippocampal neurogenesis • Anabolic hormones • Prevention of diabetes/insulin resistance • Prevention of stroke • Prevention of hypertension • Prevention and treatment of depression	• Exercise under supervision if cognition is moderately to severely impaired • Avoidance of head trauma during exercise is critical	• Aerobic exercise • Resistance exercise[a] ⊗Balance exercise
Depression	• Increased self-efficacy, mastery • Internalised locus of control • Decreased anxiety • Improved sleep • Increased self-esteem • Increased social engagement, decreased isolation • Decreased need for drugs associated with depression (beta blockers, alpha blockers, sedative hypnotics) • Decreased body fat, improved body image	• High-intensity resistance training and adequate volumes of aerobic exercise are more efficacious than low-intensity/low-volume exercise in major depression	• Aerobic exercise • Resistance exercise[a] • Yoga/other mind-body exercise[a] ⊗Balance exercise
Osteoporosis / Osteoporotic fracture	• Increased bone density • Increased tensile strength • Increased muscle mass • Improved gait stability and balance • Improved nutritional intake (energy, protein, calcium, vitamin D) • Reduced fear of falling, improved self-efficacy • Increased overall activity levels, mobility • Decreased need for drugs associated with postural hypotension, falls, hip fractures (antidepressants, antihypertensives, sedative-hypnotics)	• High-impact, high-velocity activity (e.g jumping) is potent if tolerable; avoid if osteoarthritis is present. • Resistance training effects are local to muscles contracted. • Balance training should be added to prevent falls and must be challenging	• High-impact exercise[a] • Resistance exercise[a] ⊗Aerobic exercise ⊗Balance exercise

Table 4. Exercise and geriatric syndromes

Geriatric syndromes	Considerations for the prescription	Recommended exercise modality
Frailty and Sarcopenia	• Resistance and power training: 2 to 3 sessions per week, combining slower and faster (power training) muscle actions at intensities of 40 – 80 % of 1RM. • Functional exercises e.g., standing from a chair with progressive increases in loading/speed • Balance and gait exercises progressing in complexity: line walking, tandem foot standing, standing on one leg, heel-toe walking.	• Resistance training • Power training • Balance exercises • Gait retraining • Multicomponent exercise ⊗Aerobic exercise
Falls/Mobility impairments	• Resistance training aimed to improve muscle strength and power. • Balance and gait exercises progressing in complexity: line walking, tandem foot standing, standing on one leg, heel-toe walking. • Dual task exercises including dual task gait and resistance exercises (serial numbers, naming animals, etc). • Adapted Tai Chi exercises progressing in complexity. • Dance interventions may improve adherence.	• Resistance training • Balance exercises • Gait retraining/dual task training • Multicomponent exercise • Dance interventions • Tai Chi exercises ⊗Aerobic exercise
Cognitive impairment	• High-intensity resistance training combined with power training aimed to improve cognitive and functional abilities. • Walking may reduce the risk of dementia. • Dual task exercises may be beneficial to cognitive function. • Use of mirror techniques rather than complex oral instructions. Use of haptic support. • Considerations of emotional aspects such as reassurance, respect, and empathy.	• Walking • Aerobic training • Resistance training • Dual-task training ⊗Balance exercise

SYSTEMATIC REVIEW

Effectiveness of dance interventions for falls prevention in older adults: systematic review and meta-analysis

Kimberly Lazo Green[1,2,3,4], Yang Yang[2,3,4,5], Ukachukwu Abaraogu[1,6,7], Claire H. Eastaugh[8,9], Fiona R. Beyer[8,9], Gill Norman[5,10], Chris Todd[1,2,3,4,5]

Conclusions: There is very low certainty evidence for dance as an alternative to strength and balance training if the aim is to prevent falls. No robust evidence on the cost-effectiveness of dance interventions for the prevention of falls was found.
PROSPERO registration: CRD42022382908.

Balance Training

Balance is **TASK SPECIFIC**

Task training improve tasks

(not necessarily reflective of real-world, dynamic, balance challenges)

Does not prevent injury or fracture when one does fall

Human Movement Science

Volume 44, December 2015, Pages 22-31

Task-specificity of balance training

Louis-Solal Giboin, Markus Gruber, Andreas Kramer

in additional untrained tasks was recorded. ANOVAs showed that each TG outperformed the other groups only in the task they had trained (e.g., task trained by TG1: +225% in TG1, only +41% and +30% in TG2 and control, group * time interaction, $p < 0.001$; Untrained task 1: TG1 +48%, TG2 +48%, and control +30%, no significant interaction, $p = 0.73$). In summary, 2 weeks of balance training resulted in highly task-specific effects, no transfer even to very similar tasks was observed. Therefore, we recommend identifying and training exactly those tasks that need improvement, and test the efficacy of training programs using specific tests instead of general tests with limited functional relevance.

Balance

Balance is also related to things that balance training cannot improve -

- ✓ Vision problems
- ✓ Inner ear issues
- ✓ Polypharmacy

Strength

Strength training not only improves balance but...

Strong muscles and bones, can withstand, cushion, and protect - reducing the likelihood of serious injury when people do fall

Strength Training Will Also…

1. Optimise body composition (decrease fat mass, increase muscle mass and bone density)
2. Reduce (at least 14 different) disease risk
3. Slow the progression of established disease
4. Strength training is the ONLY effective prevention/treatment for some important age-associated diseases (frailty, sarcopenia)

Short-term Superpowers of Strength Training

- ✓Blood glucose regulation
- ✓Improved immune system
- ✓Increased mood
- ✓Increased energy
- ✓Improved sleep

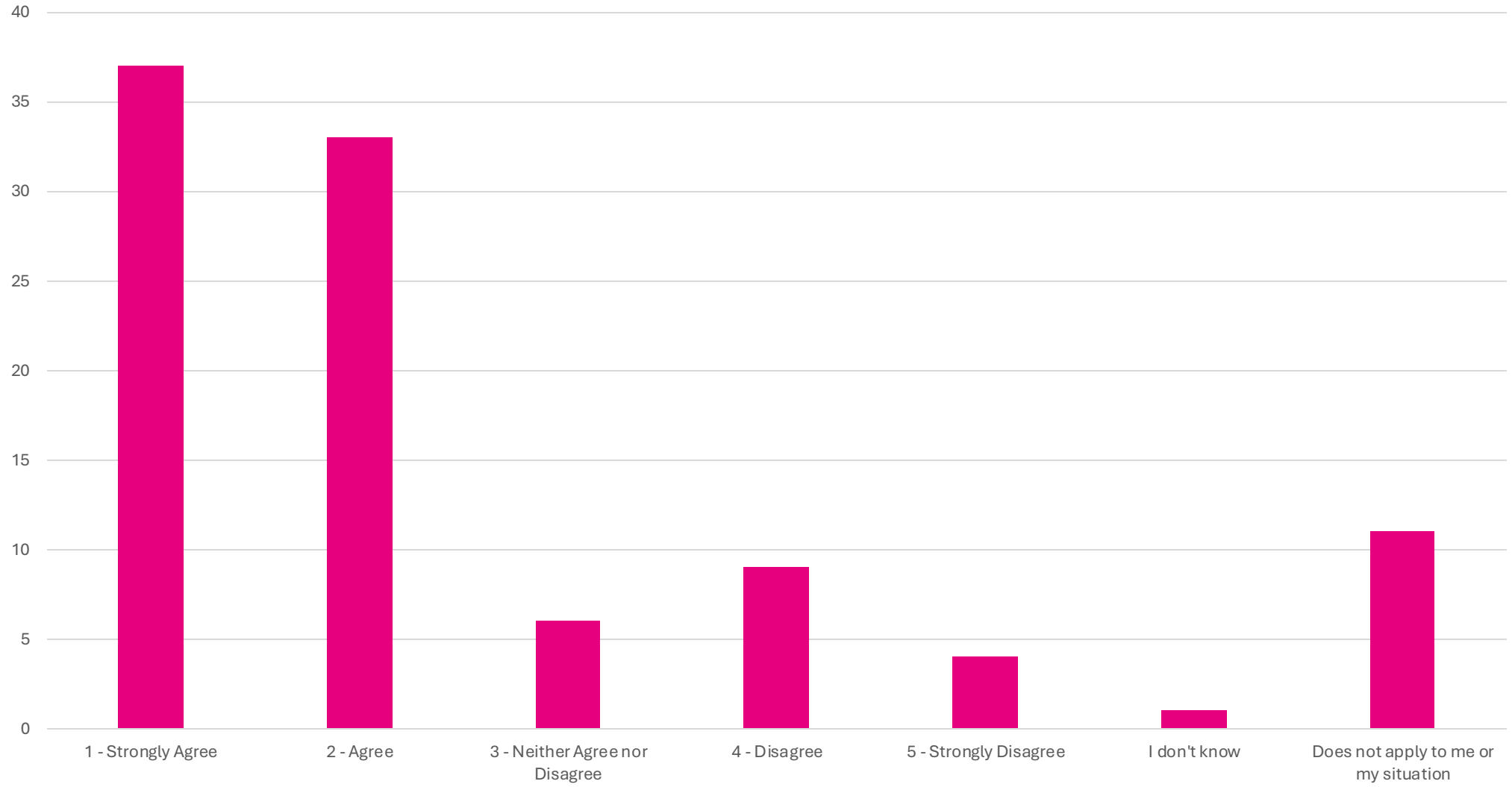
Gateway Drug

Strength training also leads to a more active lifestyle

- ↑ Strength
- ↑ Confidence
- ↓ Obesity and Pain

Miller, 2022

7 in 10 respondents agree/strongly agree they'd be more likely to do strength-training if they knew more about **how to do it.**



Q6. In order for me to participate in strength training at least twice per week, every week, I would have to…
a) Know more about WHY strength training participation is important for me

Gluchowski, unpublished

Strength training works…
…but we have an **evidence-to-practice gap**

Best Evidence

Current Practice

Gluchowski, 2023

Exercise Instructors – Knowledge Barriers

‘I don’t feel you need masses of strength, cause why, what’s the purpose?’

Gluchowski, 2023

Exercise Instructors – Skill Barriers

‘Sitting down marching, we increase their strength in that way.’

Gluchowski, 2023

Exercise Instructors – Beliefs Barrier

‘I’m not going to prescribe [strength training], it’s quite hard on the joints.’

‘I don’t want to be known for causing an injury.’

Public Beliefs Barrier

‘I do the weights but obviously not heavy weights, **I’m not trying to get muscles**’

Relevance of Current Classes for ‘Older Adults’ Barrier

‘I don’t need to do chair-based exercises. **I’m not old.**’

Female, **70** years

‘Classes are always for **the older old.**’

Female, **68** years

Seated exercises,

‘Gentle’ exercises, and

Low dose exercises (<50 hours)

Are **not effective** at preventing falls,

fractures, frailty, or sarcopenia and

may not be attractive to some older adults

Enabler?
Strength Training Messaging Guidelines

Greater Manchester Moving

University of Salford MANCHESTER

‘We need people who look strong in a variety of ways:’ Using the Physical Activity Messaging Framework to Co-Design Strength Training Messaging

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This is a preprint version of the paper.

Example citation: Gluchowski, A. 2024. ‘We need people who look active and strong in a variety of ways:’ Using the Physical Activity Messaging Framework to Co-Design Strength Training Messaging. Sportrxiv.

Abstract

Physical activity guidelines and their supplementary messaging play an essential role in raising awareness and changing behaviour at a population level. However, recent research suggests a low awareness of, and adherence to, strength training guidelines, especially when compared to the aerobic guidelines. This study applied the Physical Activity Messaging Framework (PAMF) with an aim of co-designing strength training messaging guidance. Twenty adults (n=18 females, n=2 males) aged 40-60 years residing in the Greater Manchester area of the United Kingdom participated in one, four-hour, in-person workshop at the University of Salford. Participants were in the contemplation, preparation, action, maintenance, or relapse stage of health behaviour change. The focus group activities and resulting discussions aligned with the PAMF to identify message content, format, and

Use images
of real people being active and strong in a variety of ways

1

2

Success stories
and quotes are an excellent use of text

Peers
are the preferred source of information and inspiration

3

4

'How to do it'
should take precedence over 'why' and 'what to do'

Benefits
other than appearance or performance should be included

5

6

Short and long-term
benefits should be used simultaneously

Progressive overload
is important for continued benefits and lasting results

7

8

Clear and consistent
messages across messengers, channels, and settings

Link
to more information and opportunities

9

10

Inclusive
messages include information and opportunities for all, beginner to advanced

Credible
information comes from recognisable, relevant, trustworthy sources

11

#StrongEnough to be the role model my children deserve

Scan for support on your strength training journey

'I love feeling strong, and strength training means I can keep up with my children as I age. I strength train in front of them to normalise lifting weights and to inspire them to be strong too.'

EVERYTHING YOU NEED TO GET STRONGER at HOME

Greater Manchester Moving

University of Salford MANCHESTER

#StrongEnough to cope with the ups and downs of life

Scan for support on your strength training journey

'As a mental health nurse my job can be stressful. Strength training helps me manage my stress and keeps me strong enough to continue playing the sport I love.'

EVERYTHING YOU NEED TO GET STRONGER at HOME

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Scan to get **started**

Strength starts at home

Access research-led strength training tutorials and turn your living room into your own personal gym

EVERYTHING YOU NEED TO GET STRONGERatHOME

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Scan to get **started**

BREATHE
MOVE
IMPROVE

Get stronger from anywhere with Stronger at Home.
No membership required

EVERYTHING YOU NEED TO GET STRONGERatHOME

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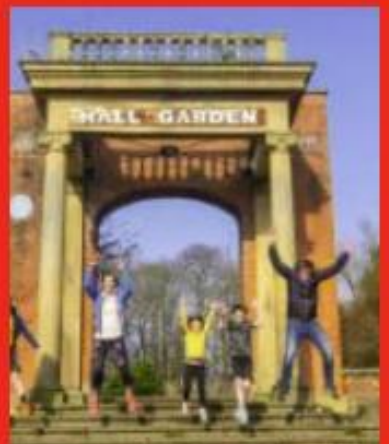
Photo Library

Photography by Adam Barker, University of Salford.



EVERYTHING YOU NEED TO GET

STRONGER at HOME

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