



THE GEORGE INSTITUTE
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Prevention of falls in older age: The role of physical activity

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Fall definition

Prevention of Falls Network Europe (ProFaNE) definition¹:

‘an unexpected event in which the participant comes to rest on the ground, floor, or lower level’

NOT as the result of an external force (e.g. being pushed)

NOT as a result of loss of consciousness (e.g. stroke)

1. Lamb SE, et al. *J Am Geriatr Soc.* 2005; 53: 1618-22.



Epidemiology

Falls in older age are **common**:

- 1 in 3 community-dwellers over 65 fall at least once each year
- 1 million older Australians & 12 million older Americans fall/ year
- Every 29 mins in the US an older person dies as a result of a fall
- 1 in 2 people living in residential aged care fall each year

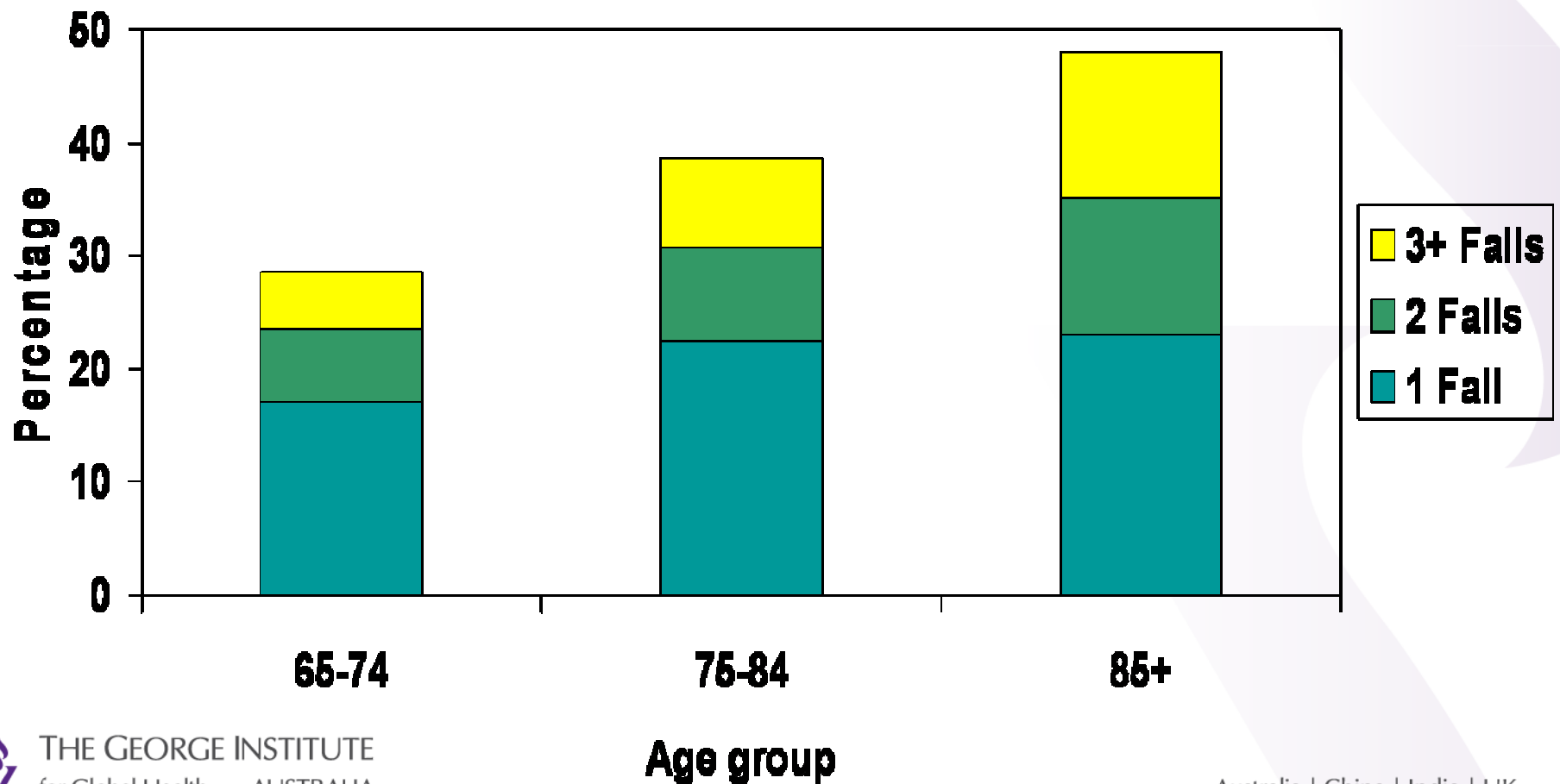
Ageing population:

- Approx. 1 in 4 Australians and 1 in 5 Americans will be aged 65+ by 2050

Falls have **serious consequences**:

- Social, economic, ongoing disability

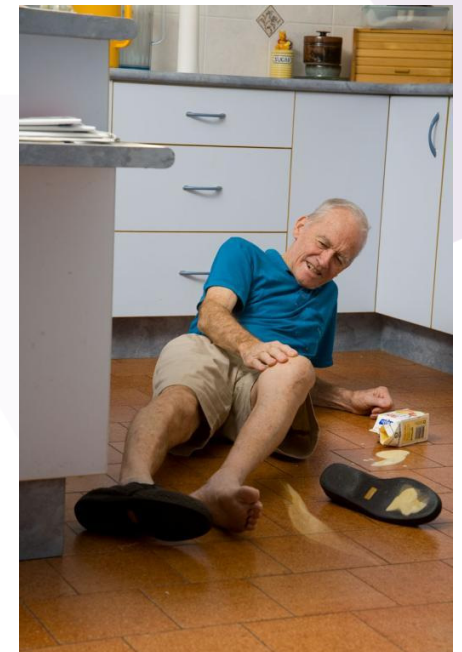
Falls frequency increases with age



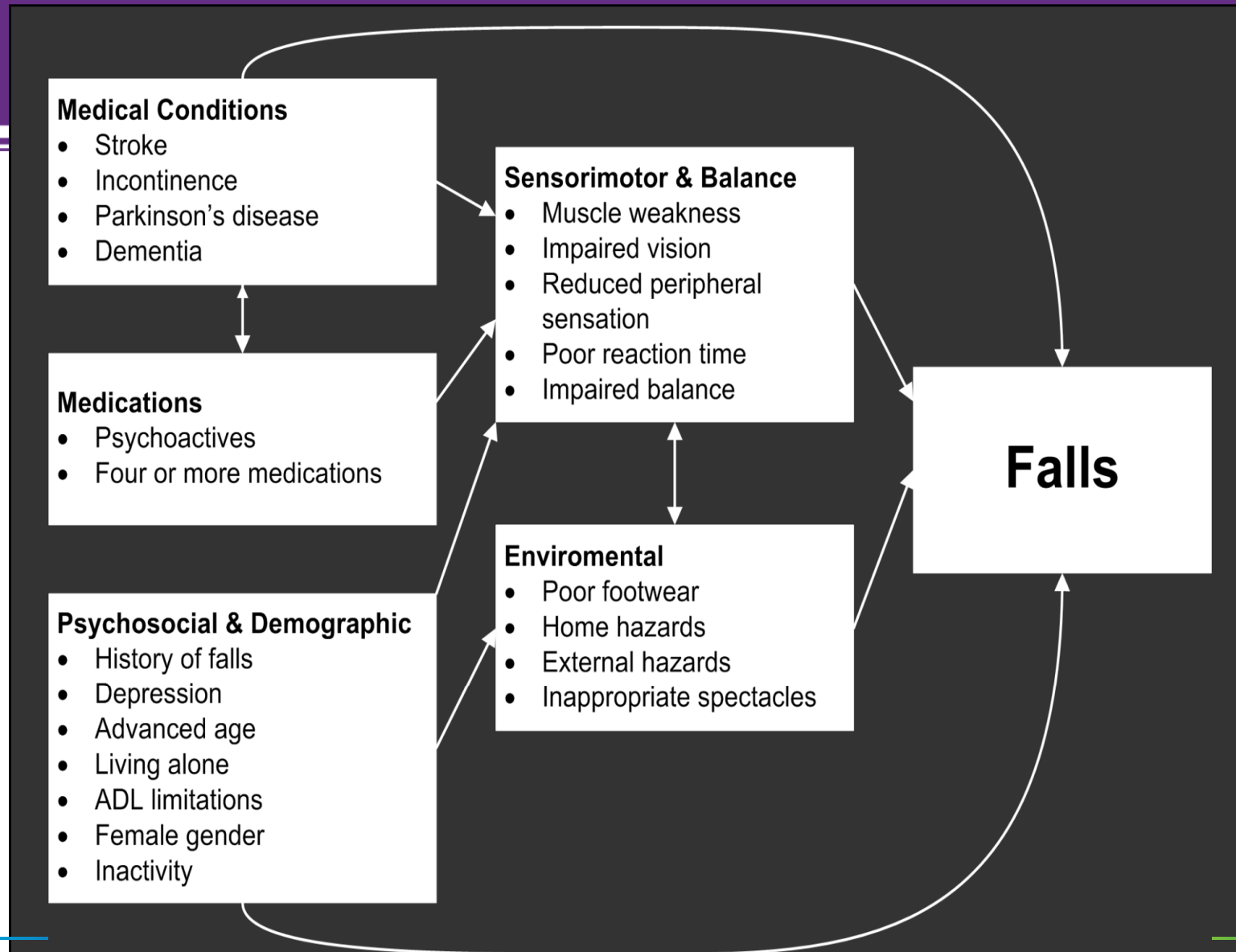
Impact of falls: personal costs

Morbidity and mortality

- Leading cause of injury-related death in older adults
- Leading cause of hospitalisation in older adults
- 20-60% of older people suffer injuries from falls
- 10% result in death
- 10-15% are serious injuries (eg. fractures)
 - 1 hip fracture costs \$10,000
 - 25% patients die within 12 months
 - 25% never regain their pre-fracture mobility



Risk factors for falls



Fall risk factors: A fall occurs when an individual's physiology can't cope with a task being undertaken and/or the environment in which the task is being undertaken

Disease/medication
Ageing
Inactivity

Physical factors:
balance strength,
vision sensation
reaction time,
cardiovascular

Cognition
Insight
Attitudes
Distraction

Behaviour: choice
of activity and care
taken when doing
it

**Environmental
hazards: home
and elsewhere**

**Environment
triggers**



Interventions to prevent falls



THE COCHRANE LIBRARY

Independent high-quality evidence for health care decision making

Interventions for preventing falls in older people living in the community (Review)

Gillespie LD, Robertson MC, Gillespie WJ, Sherrington C, Gates S, Clemson LM, Lamb SE

Single interventions for preventing falls

- Interventions to maximise vision
- Interventions to reduce medication use
- Home modification programs
- Cardiovascular interventions
- Podiatry
- **Exercise**



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Exercise to prevent falls in older adults: an updated meta-analysis and best practice recommendations

NSW Public Health Bulletin, 2011

***Catherine Sherrington^{A,B,E}, Anne Tiedemann^{A,B},
Nicola Fairhall^{A,C}, Jacqueline C.T. Close^{B,D}
and Stephen R. Lord^B***

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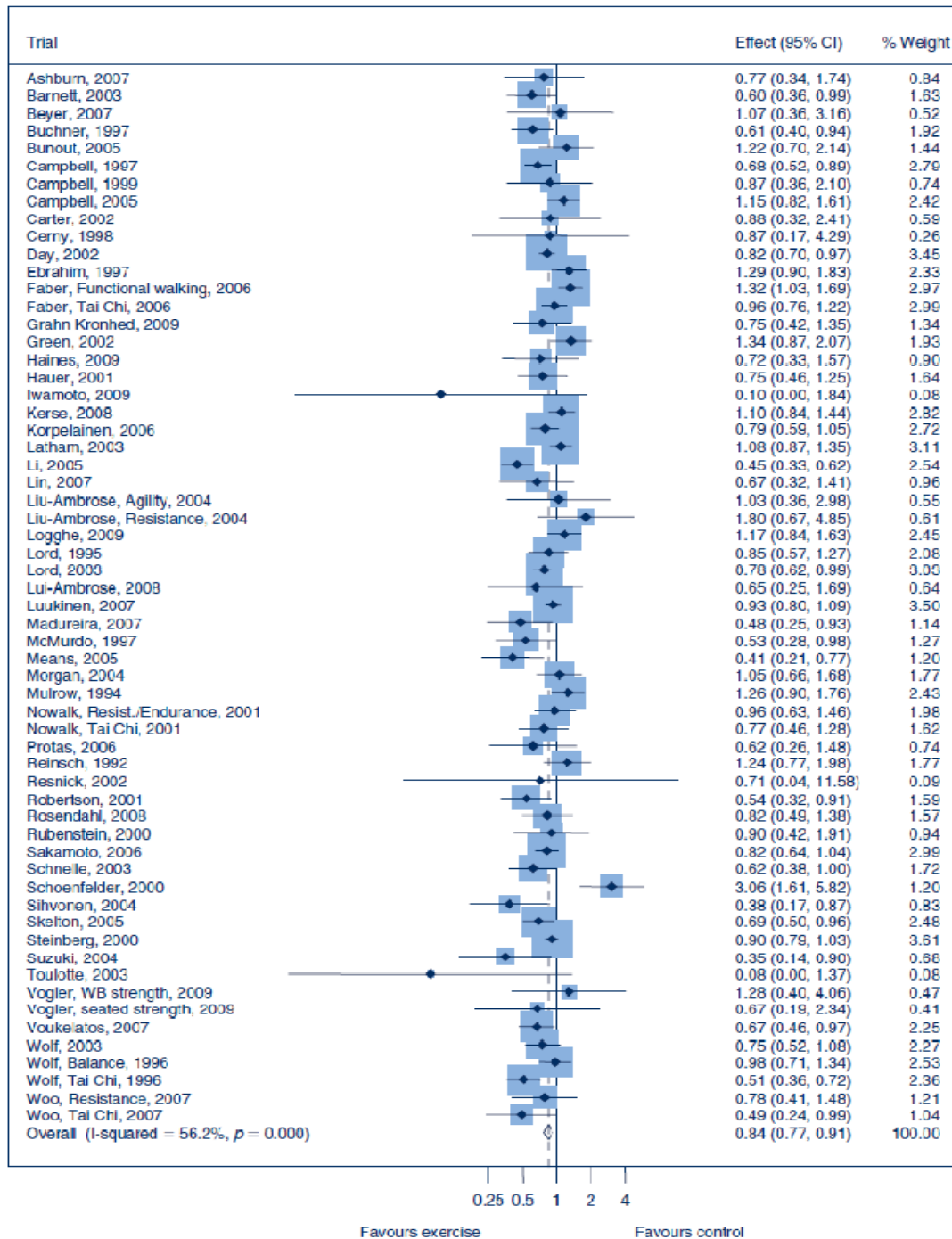
^B*Falls and Balance Research Group. Neuroscience Research*

health services and the community. This impact will grow substantially in the near future due to the increased proportion of older people in the population. The proportion of Australians aged 65 years and over is predicted to increase from 14% (3 million people) in 2010 to 23% (8.1 million people) by 2050.¹ By 2051, the Australian

Are there bigger effects on falls in studies with different:

- exercise program components?
- populations?
- design features?





60 group comparisons

Overall effect of exercise on falls:

RaR= 0.84

95%CI 0.77 to 0.91

(16% reduction in rate of falls)

Differences between study findings

Greater effects on fall rates from exercise programs which:

- challenge balance
- include 50+ hours of prescribed exercise
- don't include a walking program

= 64% of variance explained

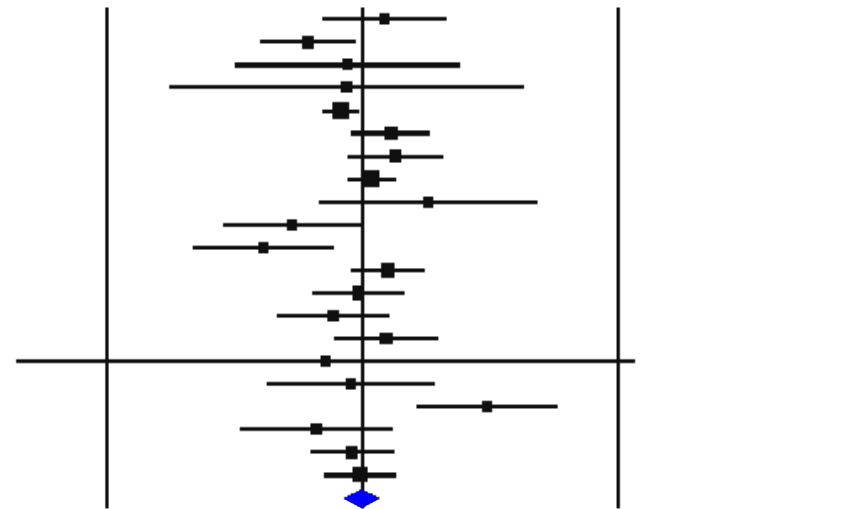
Balance training intensity

Low intensity

Study name

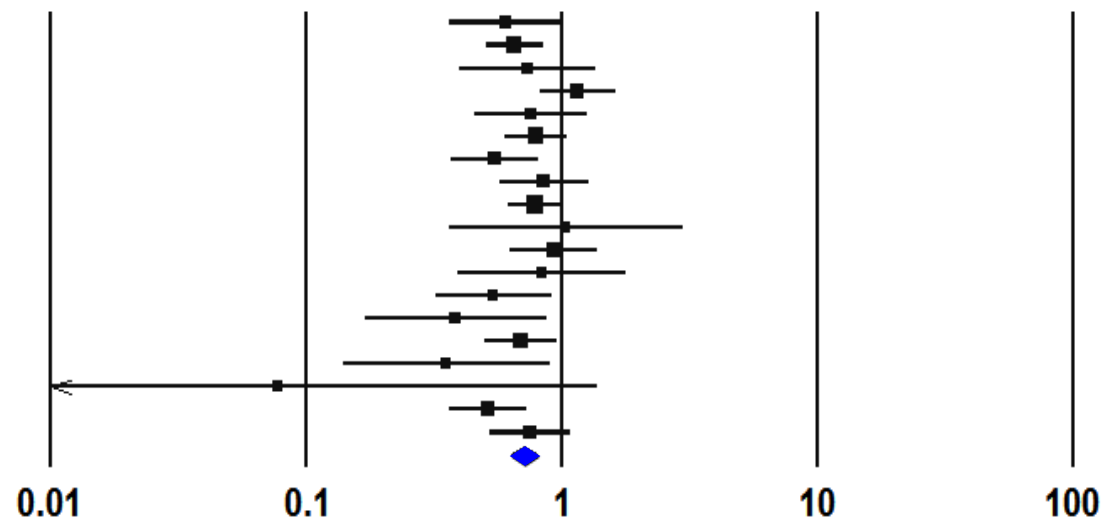
Rate ratio and 95% CI

Bunout
Buchner
Carter
Cerny
Day
Ebrahim
Green
Latham
Liu-Ambrose, Resistance
McMurdo
Means
Mulrow
Nowalk, Resist./Endurance
Nowalk, Tai Chi
Reinsch
Resnick
Rubenstein
Schoenfelder
Schnelle
Steinberg
Wolf, Balance

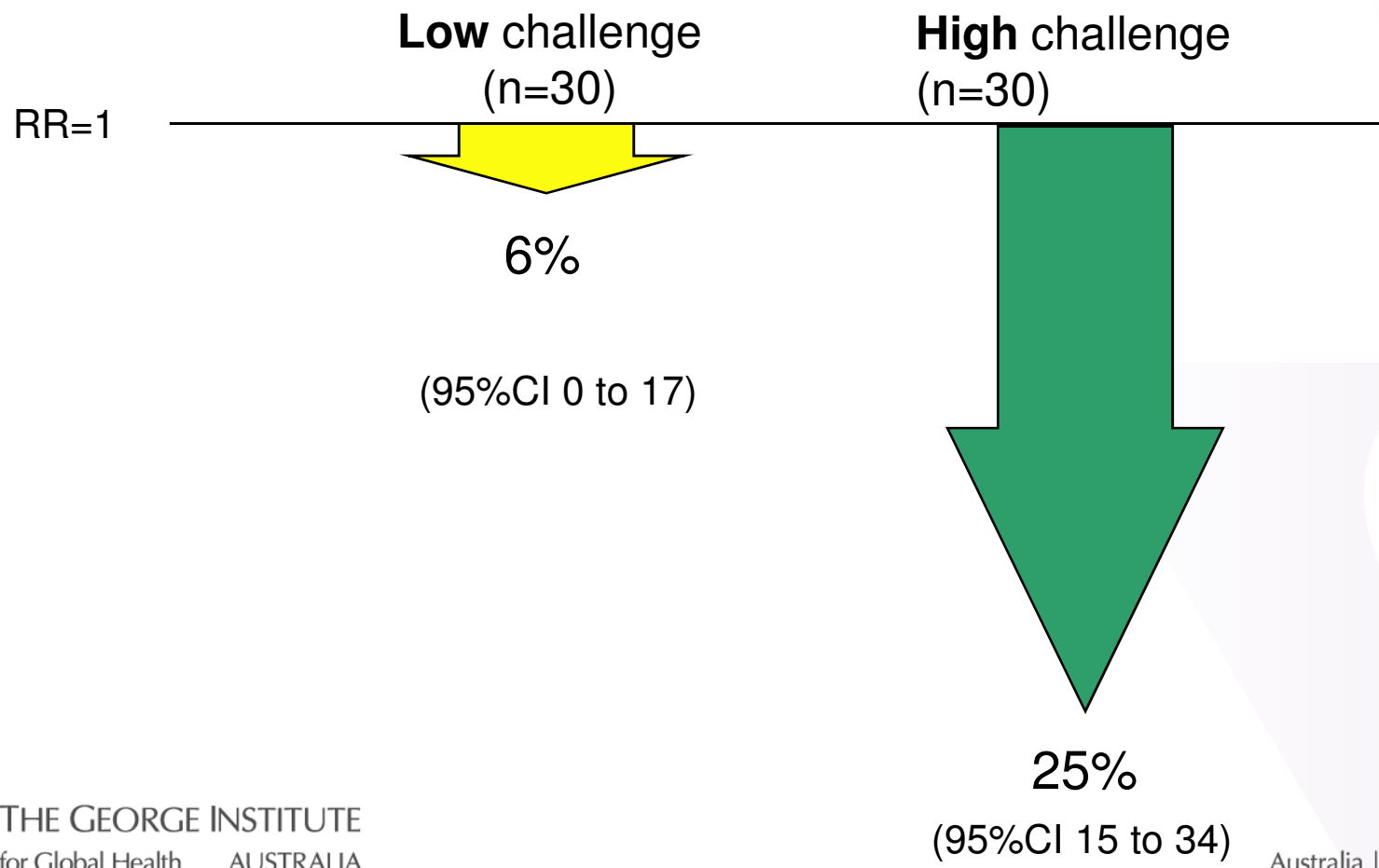


High intensity

Barnett
Campbell, 1997
Campbell, 1999
Campbell, 2005
Hauer
Korpelainen
Li
Lord, 1995
Lord, 2003
Liu-Ambrose, Agility
Morgan
Protas
Robertson
Silvonen
Skelton
Suzuki
Toulotte
Wolf, Tai Chi
Wolf



Balance training intensity

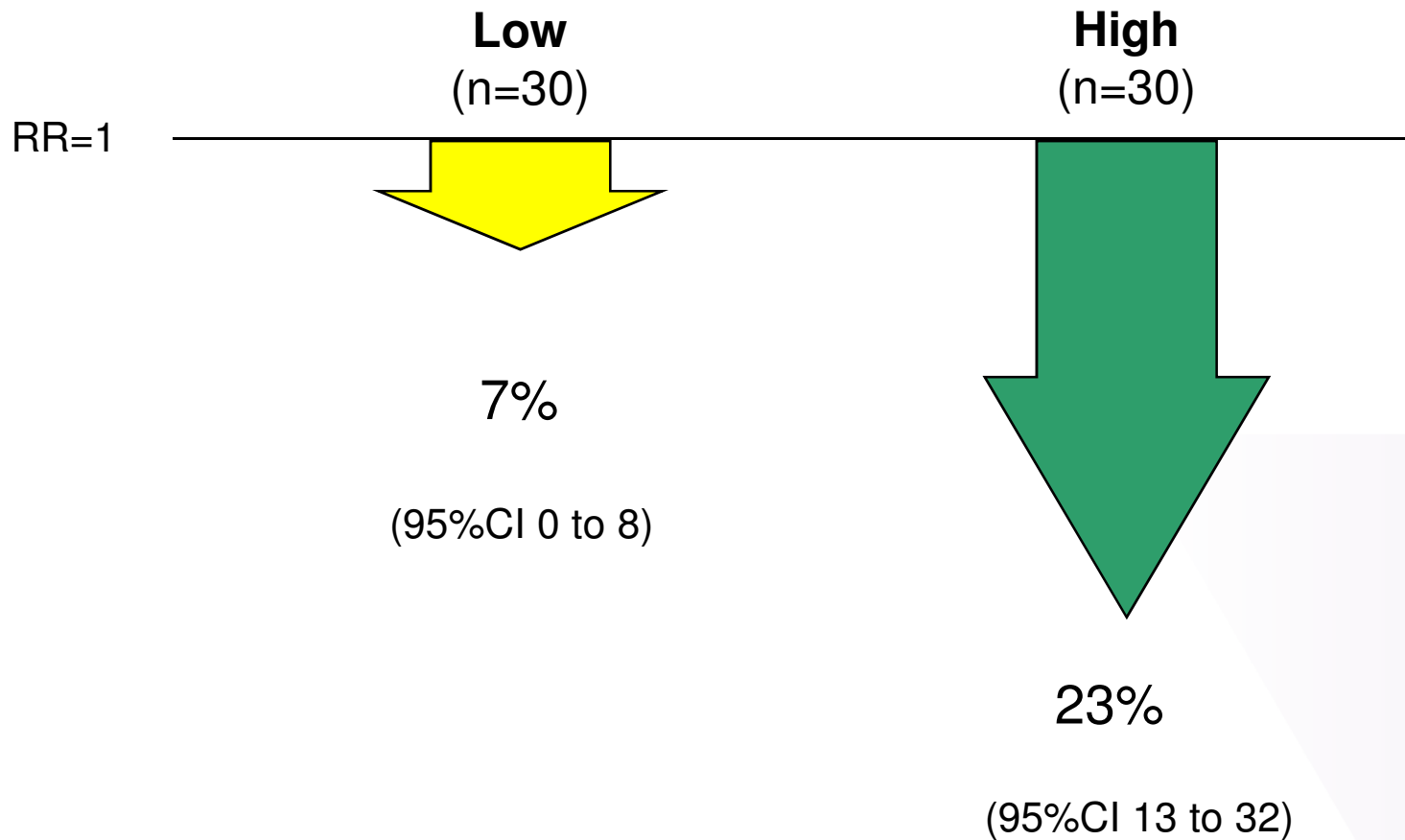


Exercise Dose

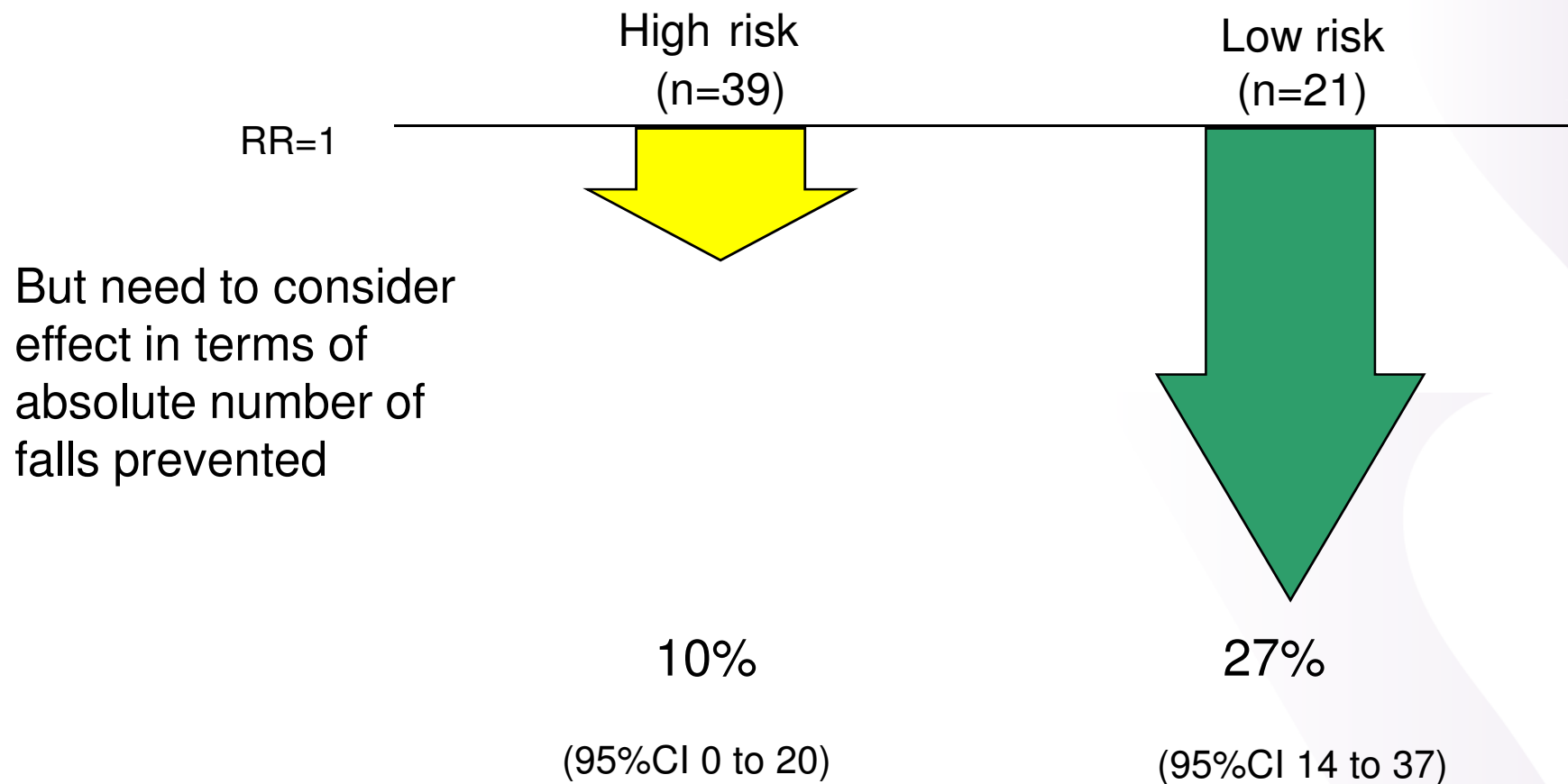
DEFINITION

- High = 50 hours of exercise with instructor plus prescribed home exercise over study period.

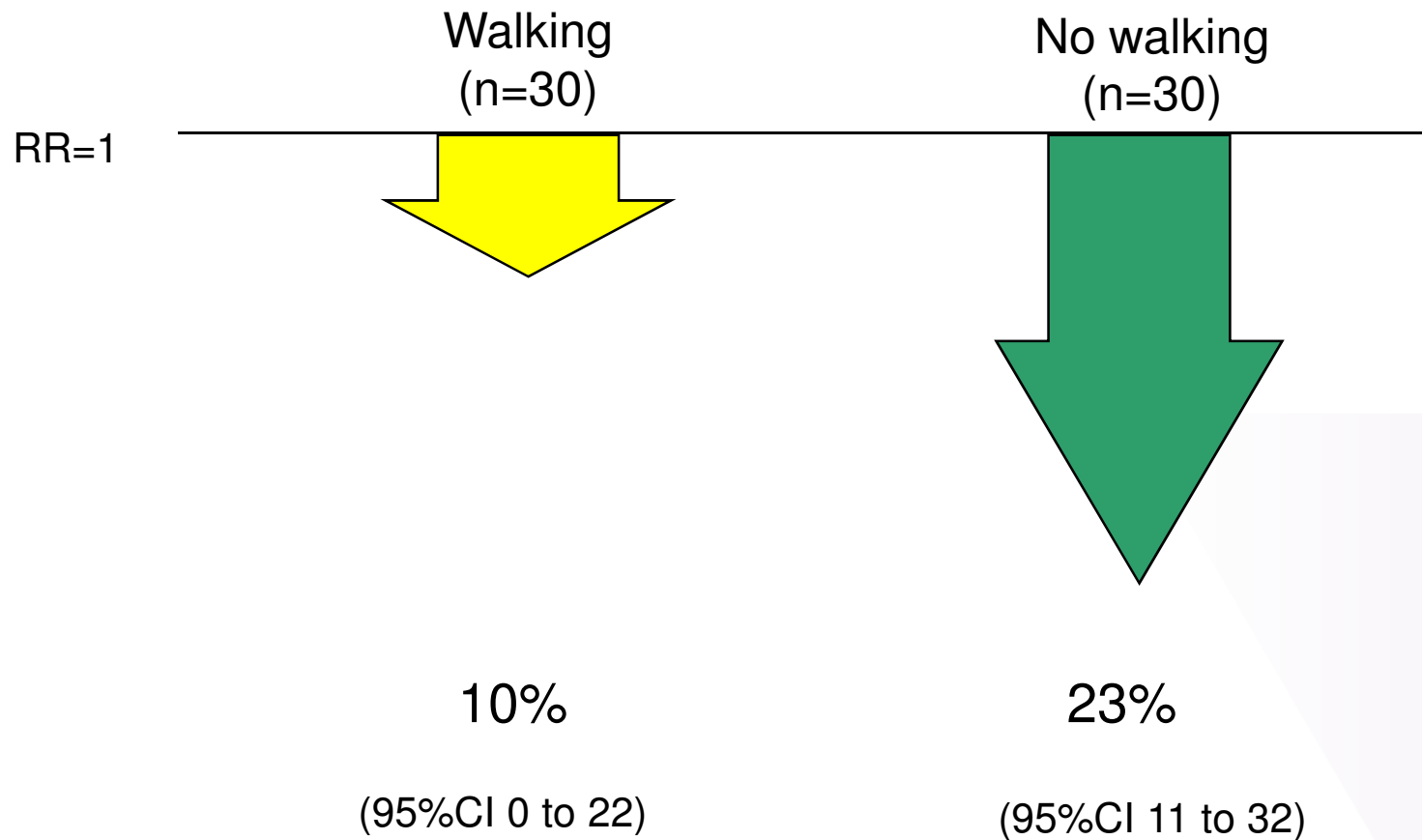
Dose (50+hours)



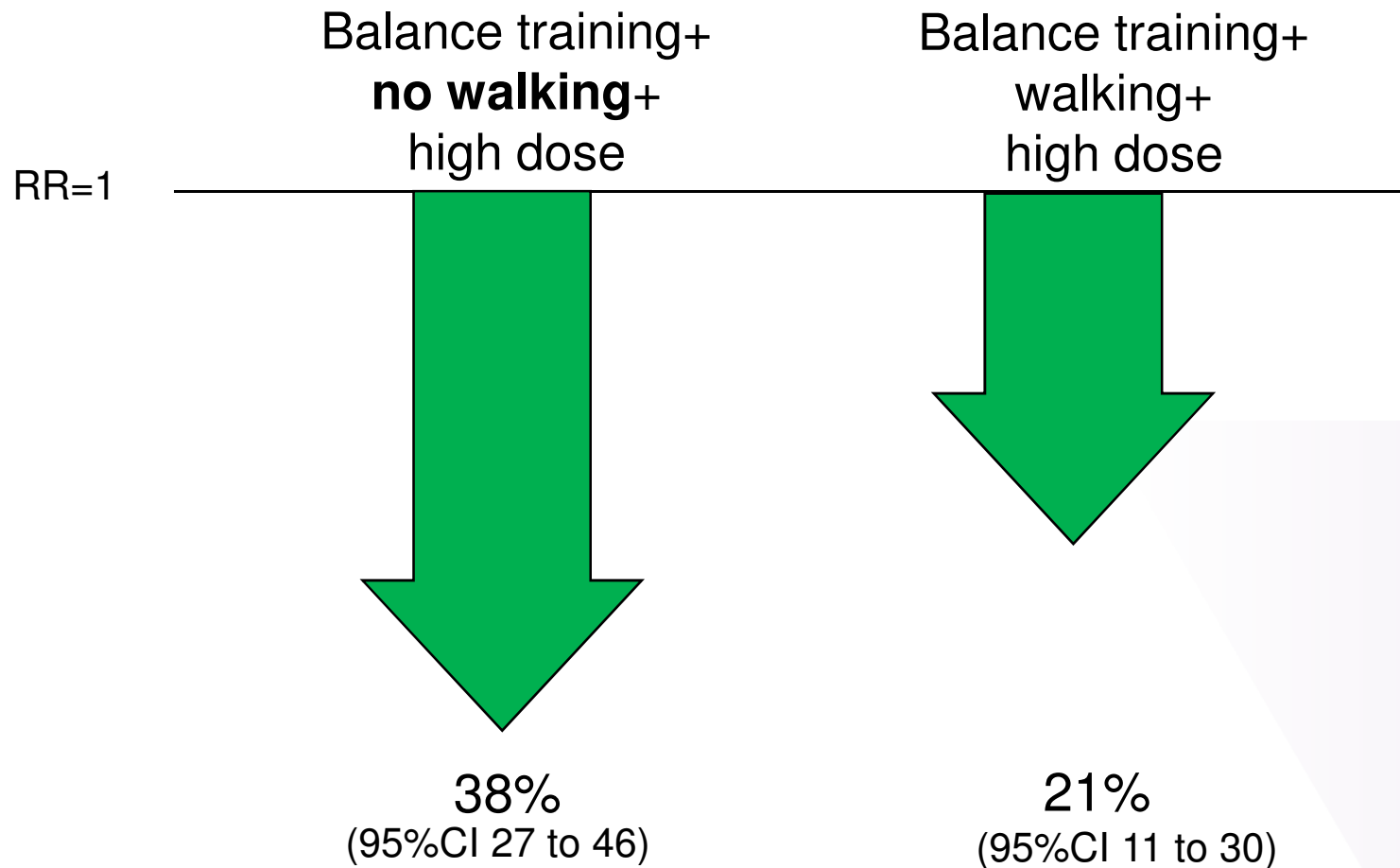
Population (High risk versus general population)



Inclusion of walking program



Best combination to maximise effect



Exercise to prevent falls

- Dose- at least 2 hours per week and should be ongoing
- Progression- ongoing to gain benefit and maintain interest
- Intensity- balance challenge needs to be high
- What do we mean by “balance challenge”?
- Exercise in standing involving:
 - movement of the centre of mass
 - narrowing of the base of support
 - minimising upper limb support



Balance exercises

Aims of balance and mobility exercises

- Improve gait and mobility
- Improve ability with transfers
- Improve leaning, reaching ability
- Improve voluntary stepping



Strength exercise

Aim to increase lower limb muscle strength

- Ankle dorsiflexors and plantarflexors
- Knee extensors and flexors
- Hip muscles (extensors/flexors and abductors/adductors)

- Improve sit to stand and stair climbing ability
- Improve transfers
- Develop power – reaction time tasks



Effective exercise programs

- Otago home-based strength and balance training
- Lifestyle and Functional Exercise (LiFE) program
- Tai Chi
- Yoga?

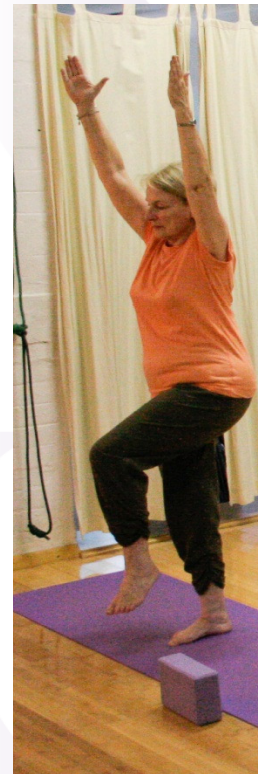


Can yoga prevent falls?

Tiedemann et al, J Gerontol A Biol Sci Med Sci 2013



- RCT, 54 people, aged 60+, community-dwelling
- Intervention: 12 weeks group-based Iyengar-style yoga,
 - 2x /week + home practice, standing balance postures
- Control group: general info about falls risk/ prevention
 - Primary outcome: standing balance
 - Secondary outcomes: sit to stand, gait speed, one-legged stand, falls self efficacy



Yoga results



- After 12 weeks, yoga group significantly better than control at:
 - Standing balance
 - Walking quickly
 - Standing on one leg with eyes closed
 - Sit to stand performance
- Excellent adherence: mean class attendance 20/24 classes (83%)
- No serious adverse events
- *Conclusion: Yoga shows promise as a falls prevention intervention- large RCT with falls outcome is planned*

Exercise summary

- Strong evidence
 - Strength and balance training
- Moderate evidence
 - Weight bearing group exercise with balance exercises
 - Tai Chi
 - Iyengar yoga
- Little evidence
 - General fitness training
 - Seated resistance training
 - Walking
 - Seated exercise
 - Water exercise

Barriers to exercise participation



Global inactivity



- Only 57% of Australian adults participate in minimum recommended level of physical activity *Bauman et al 2001, Australian Sports Commission: Canberra.*
- Of those who start exercise, half dropout within six to 12 months *Dishman, Health Psychology, 1982*
- Need to consider strategies for maximising uptake and adherence to falls prevention exercise

Engaging with older people

- **Yardley and Todd**, UK researchers. Extensive work around attitudes of older people to falls prevention advice and how to successfully engage with them.
- Findings:
 - older people believe that falls prevention information/strategies are **not relevant** to themselves but to **other** older people, who they consider are older and at greater risk of falls.
 - to suggest that falls are personally relevant to older people can be a **threat to their identity**. Older people then more likely to reject information and advice.
- **Poor uptake** (as low as 10%) and adherence to falls prevention interventions is a barrier to their public health impact

Implications

- Risk reduction messages, such as ‘reducing your risk of falling’ are likely to be ignored
- Messages should promote positive identities that are relevant;
 - maintaining an independent lifestyle;
 - staying healthy and physically active; and
 - promotion of activities that enhance fitness, balance and mobility
- The word “falls” has strongly overriding negative connotations
- Focus on “healthy ageing message” rather than “falls prevention”
- Don’t mention the “f” word!

Future challenges.....

- How can we **attract** older people to participate in exercise programs and ensure that they maintain participation?
- How can we **tailor** programs to suit the needs and **preferences** of older people?
- How can we “**market**” programs to suit the older person? e.g. focus on “maintaining independence” rather than “preventing falls”

Take home message

- Falls are common and costly but many are **preventable**
- Targeted exercise that provides a **high challenge to balance** is effective in preventing falls
- Balance-challenging exercise can be **incorporated into everyday** activities for older people
- Older people may need extra **education and support** to maintain participation

Come to Sydney, Australia!

Australian and New Zealand Falls Prevention
Society conference

16-18 November 2014, Sydney

www.anzfallsprevention.org

Thanks for listening!
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