Risk Factors for Falls in Cognitive Impairment

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Background

Epidemiology of falls in CI/ Dementia

- Annual incidence of falls in cognitively impaired populations is 70-80% ie. double the normal population
- Fractures are up to 3x more common
- Gait abnormalities are more common
- Psychotropic drug use more common
- Orthostatic hypotension more common
- 26% of hospital admissions in people with dementia are fall related

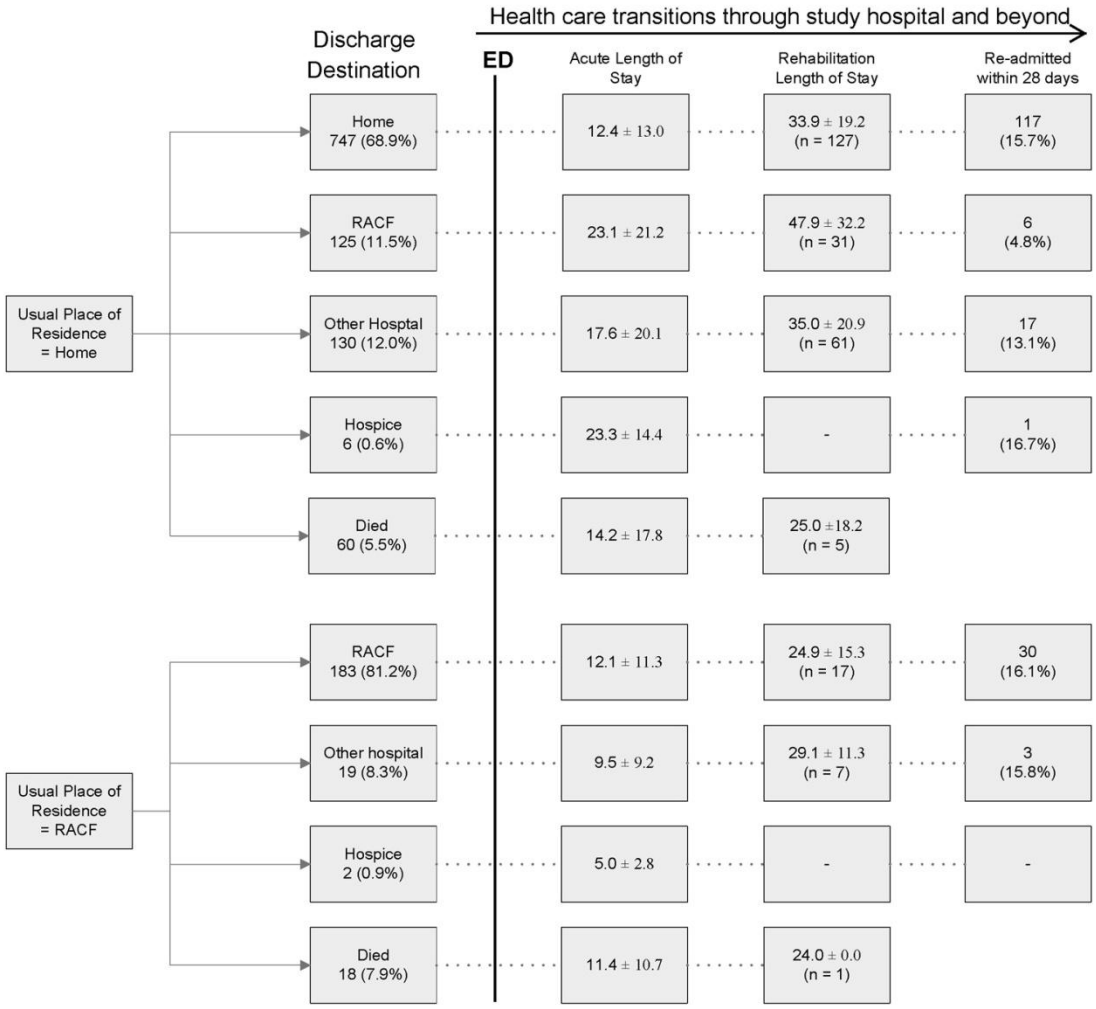
Older people presenting to ED

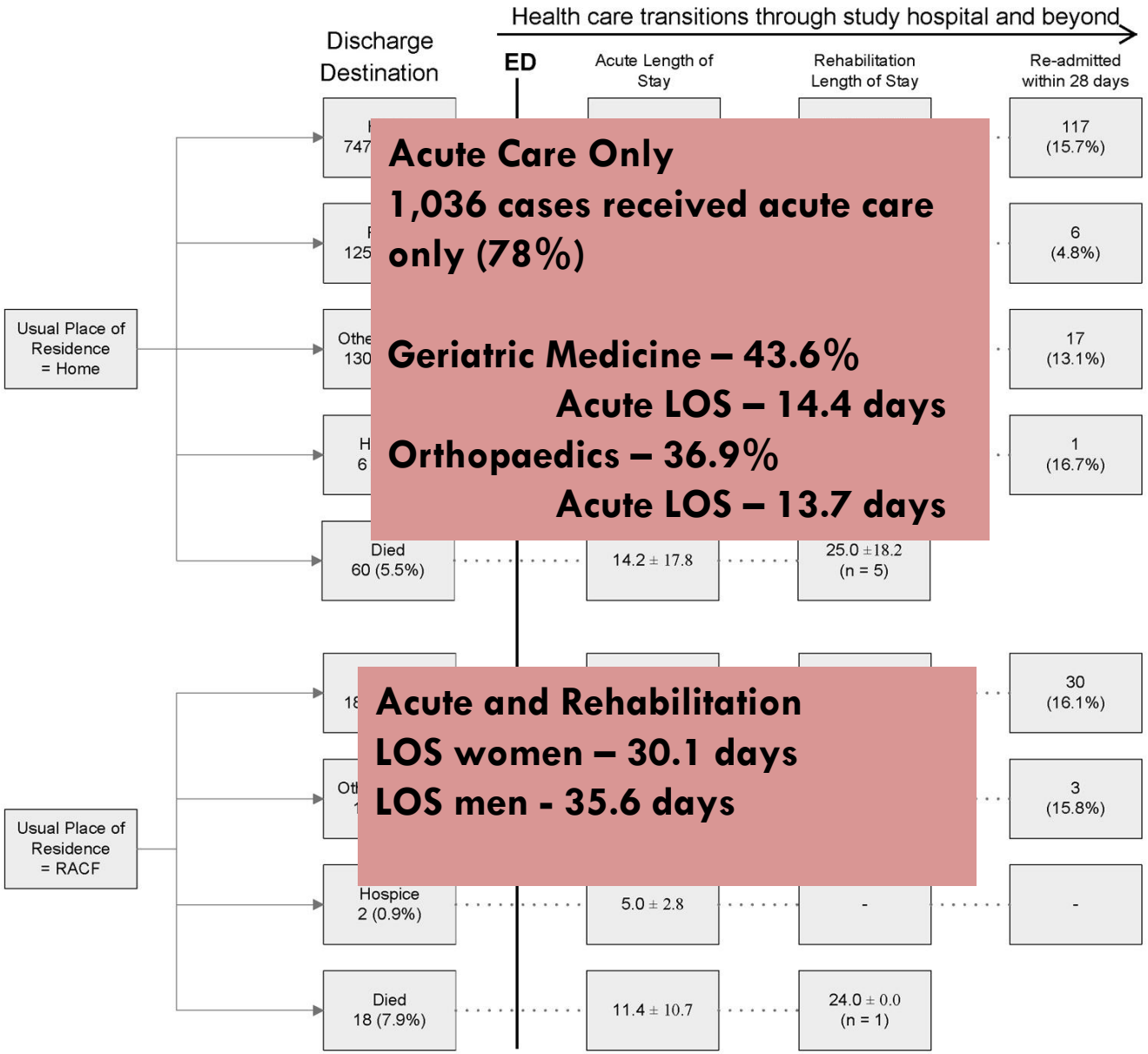
- 24 month prospective identification of all people aged 70+ presenting to POWH ED
- Data collected on reason for presentation, previous presentations and admissions, discharge destination, LOS, and DRG information
- 18,902 ED presentations
- Mean age 80.8 (6.73)yrs
- 54% female

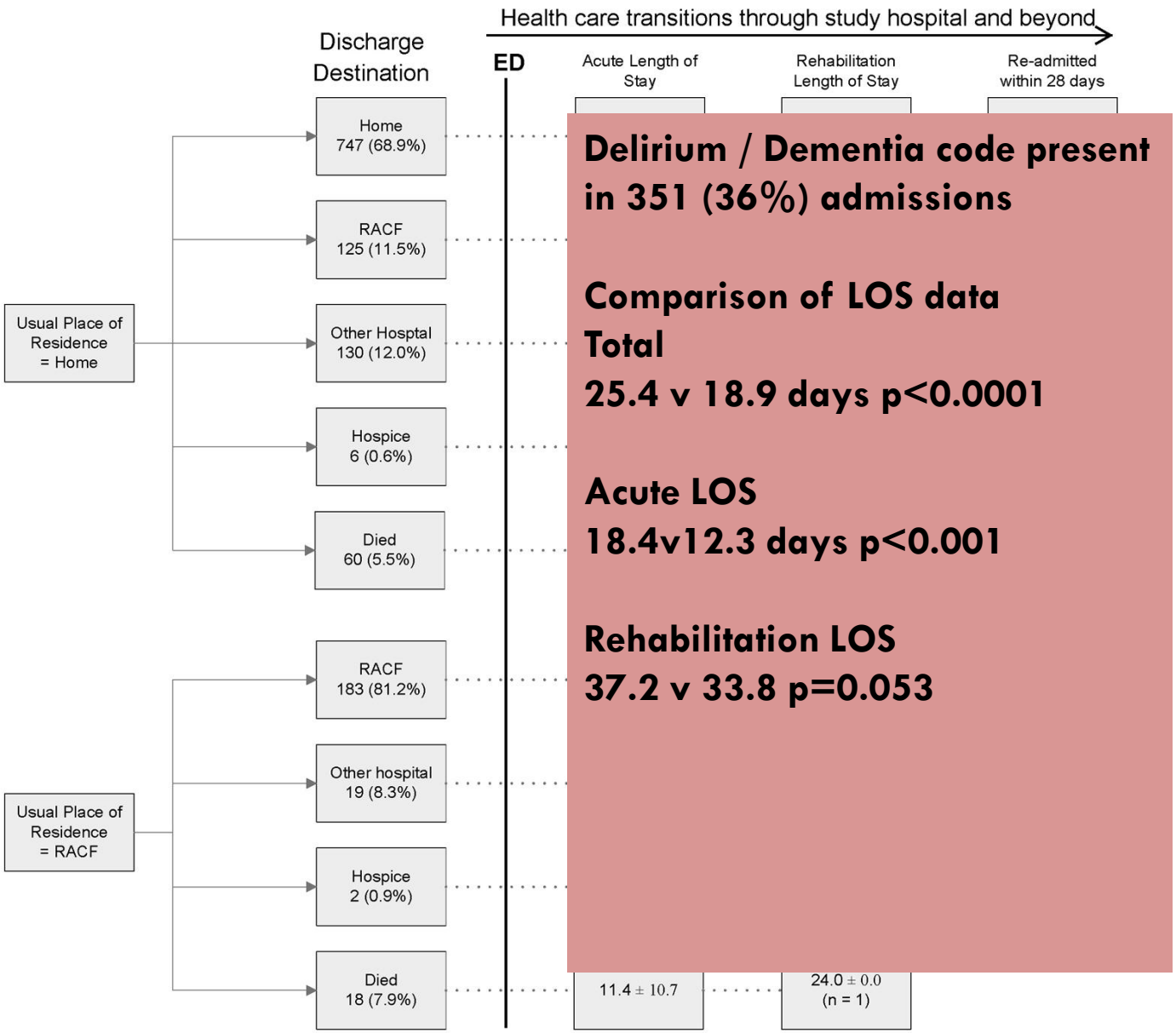
Fallers

- A fall contributed to 3,220 (17%) presentations in 2,703 individuals.
- 1:6 presentations to ED = fall (4.4 cases/day)
- Fallers were older (82.5yrs v 80.5yrs)
- More likely to be female (63.2% v 52.3%)
- More likely to live in RACF (18.4% 12.4%)
- More likely to have had a hospital admission in the previous year
- More likely to be admitted (49.8%)

Tracking of Admissions




Health care transitions through study hospital and beyond
Discharge Destination
ED
Acute Length of Stay
Rehabilitation Length of Stay
Re-admitted within 28 days
Usual Place of Residence = Home
747
117 (15.7%)
125
6 (4.8%)
Othe 130
17 (13.1%)
H 6
1 (16.7%)
Died 60 (5.5%)
14.2 ± 17.8
25.0 ±18.2 (n = 5)
Acute Care Only
1,036 cases received acute care only (78%)
Geriatric Medicine – 43.6%
Acute LOS – 14.4 days
Orthopaedics – 36.9%
Acute LOS – 13.7 days
18
30 (16.1%)
Oth
3 (15.8%)
Usual Place of Residence = RACF
Hospice 2 (0.9%)
5.0 ± 2.8
-
-
Died 18 (7.9%)
11.4 ± 10.7
24.0 ± 0.0 (n = 1)
Acute and Rehabilitation
LOS women – 30.1 days
LOS men - 35.6 days



Delirium / Dementia code present in 351 (36%) admissions

Comparison of LOS data
Total
25.4 v 18.9 days p<0.0001

Acute LOS
18.4v12.3 days p<0.001

Rehabilitation LOS
37.2 v 33.8 p=0.053

Cochrane 2009

"As the majority of trials specifically excluded older people who were cognitively impaired, the results of this review may not be generalisable to this important group of people at risk. Research on the impact of management programmes for other risk factors such as cognitive impairment and urinary incontinence on risk and rate of falling appears justified"

AGS/BGS Guidelines – Jan 2010

"There is insufficient evidence to recommend for or against multifactorial or single interventions to prevent falls in older persons with known dementia living in the community or in long-term care facilities".

Extrapolation from existing trials

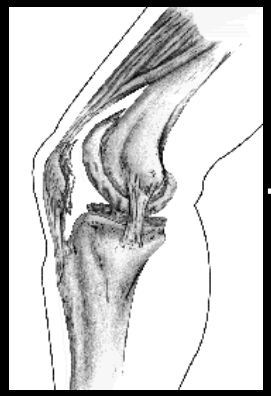
If the mechanism by which the intervention has it's effect is understood and not felt to affected by the presence of cognitive impairment / dementia then it is reasonable to extrapolate data from trials undertaken in cognitively intact populations

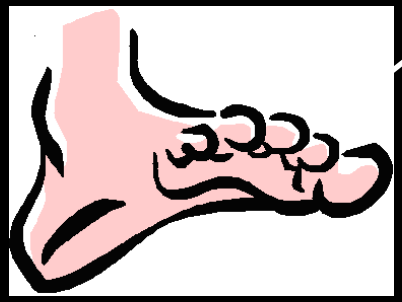
Example 1. Treatment of osteoporosis with bisphosphonates

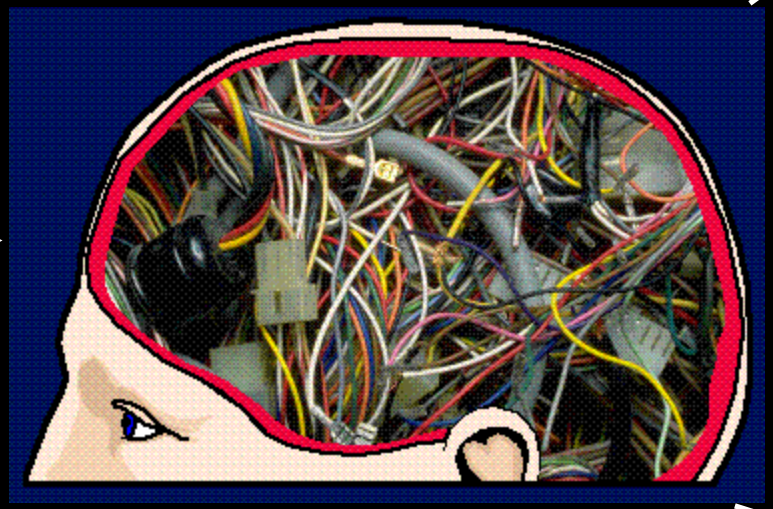
Note: It assumes that relative contribution of risk factors to overall risk in cognitively impaired people is comparable to that of cognitively intact subjects

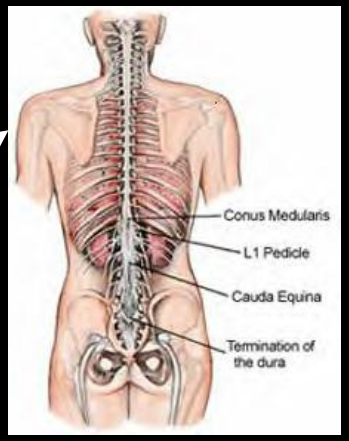
Extrapolation

Sensory input → **Central Processing** → **Effector Response**







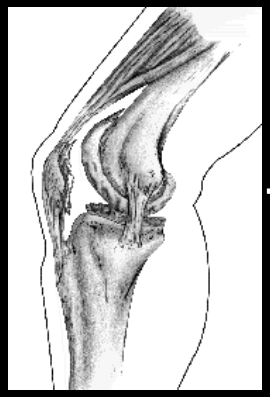


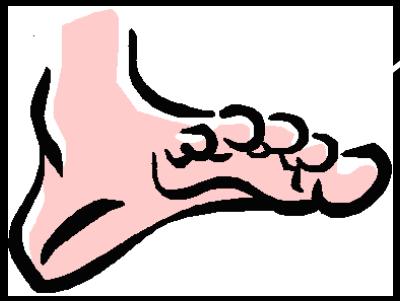
Extrapolation

Sensory input → Central Processing → Effector Response

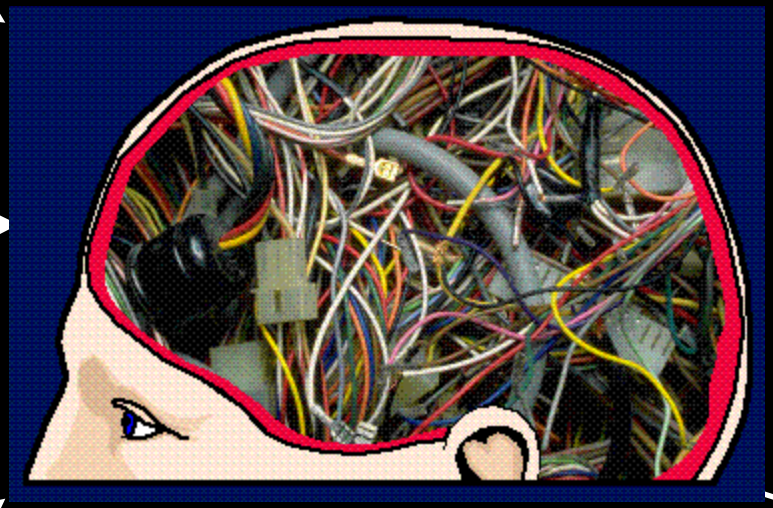
Cataract extraction

?Bifocals





?Environment



?Exercise

CVS intervention

Vitamin D

Osteoporosis

Medication review

Understanding the risk

Falls in Cognitively Impaired Subjects

FOCIS

- Prospective risk factor study
- Aged 60+
- Diagnosis of CI ± dementia
- Recruited from hospital, clinics, adverts etc
- Had to have consenting "carer"

Methods

FOCIS

- Demographic information
- Medical history & medication use
- Previous falls
- Physiological measures
- Neuropsychological measures

Follow Up

FOCIS

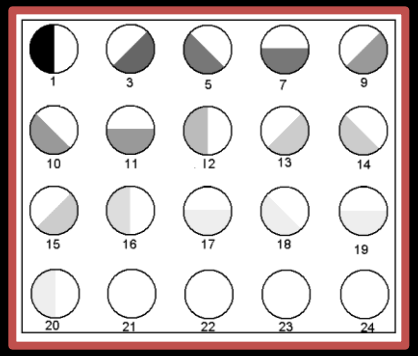
- 1 year follow up
- Monthly falls calendars
- Fall defined using ProFaNE concensus definition
- Multiple faller defined as someone with 2 or more falls in the one year follow-up

Methods (Case Control Study)

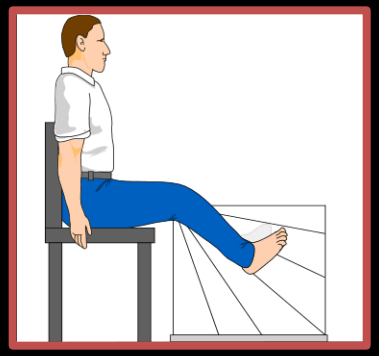
FOCIS

- Case Control Study
- 414 community dwelling older people
  - 138 with cognitive impairment / dementia
  - 276 age and sex matched cognitively intact
- Compared physiological function and prospective falls

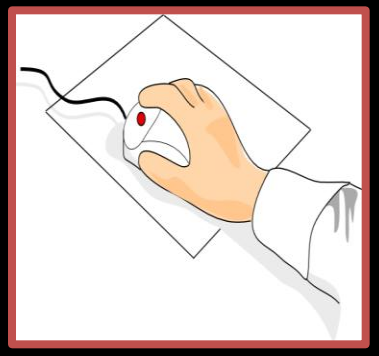
Physiological Profile Assessment (PPA)



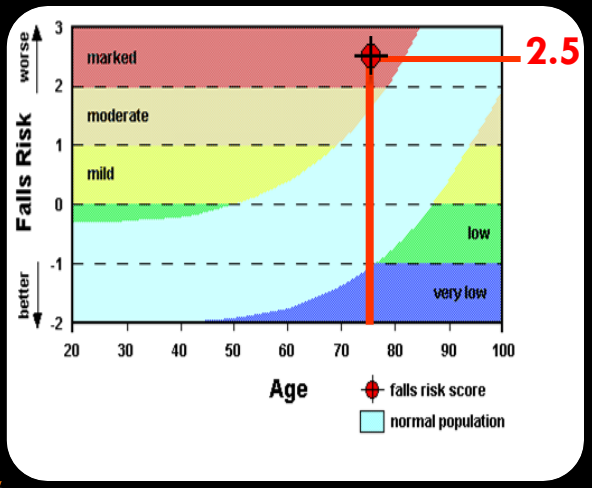
Melbourne Edge Test

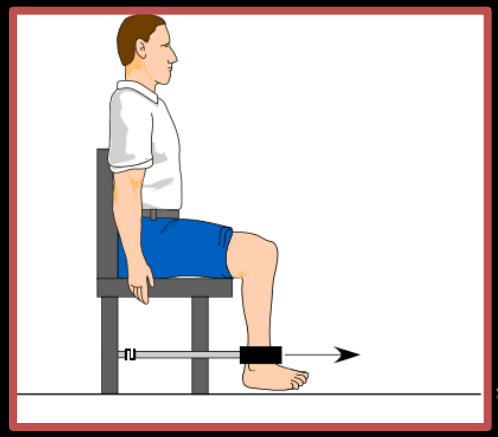


Proprioception



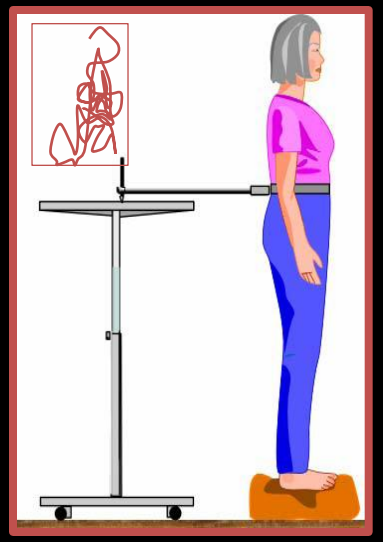
Simple Reaction Time



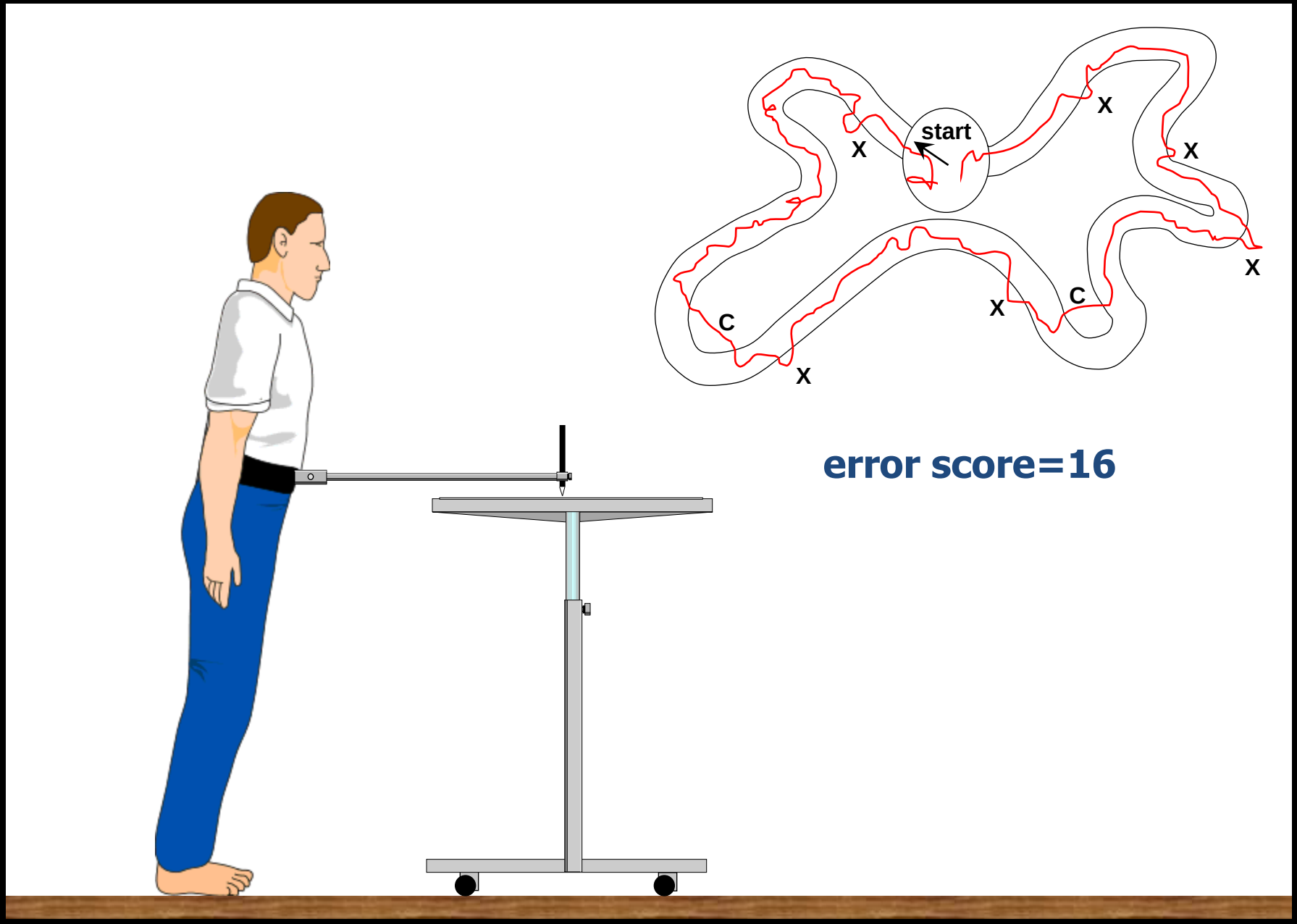


Quadriceps Strength

Fall Risk Score: predicts recurrent falls with 75% accuracy (Lord et al., 2003)

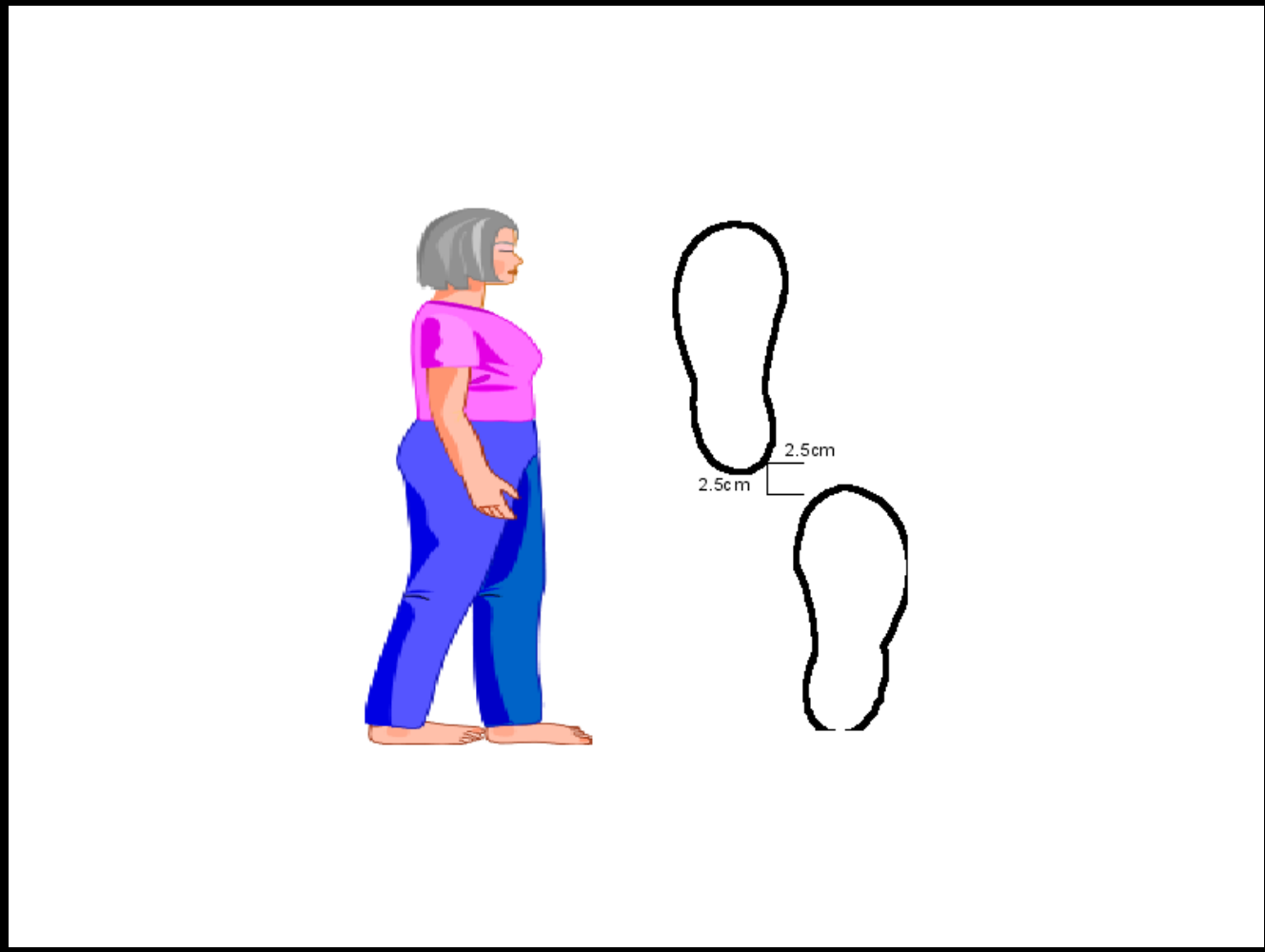


Postural Sway



Co-Ordinated Stability

Near Tandem Stand



Results

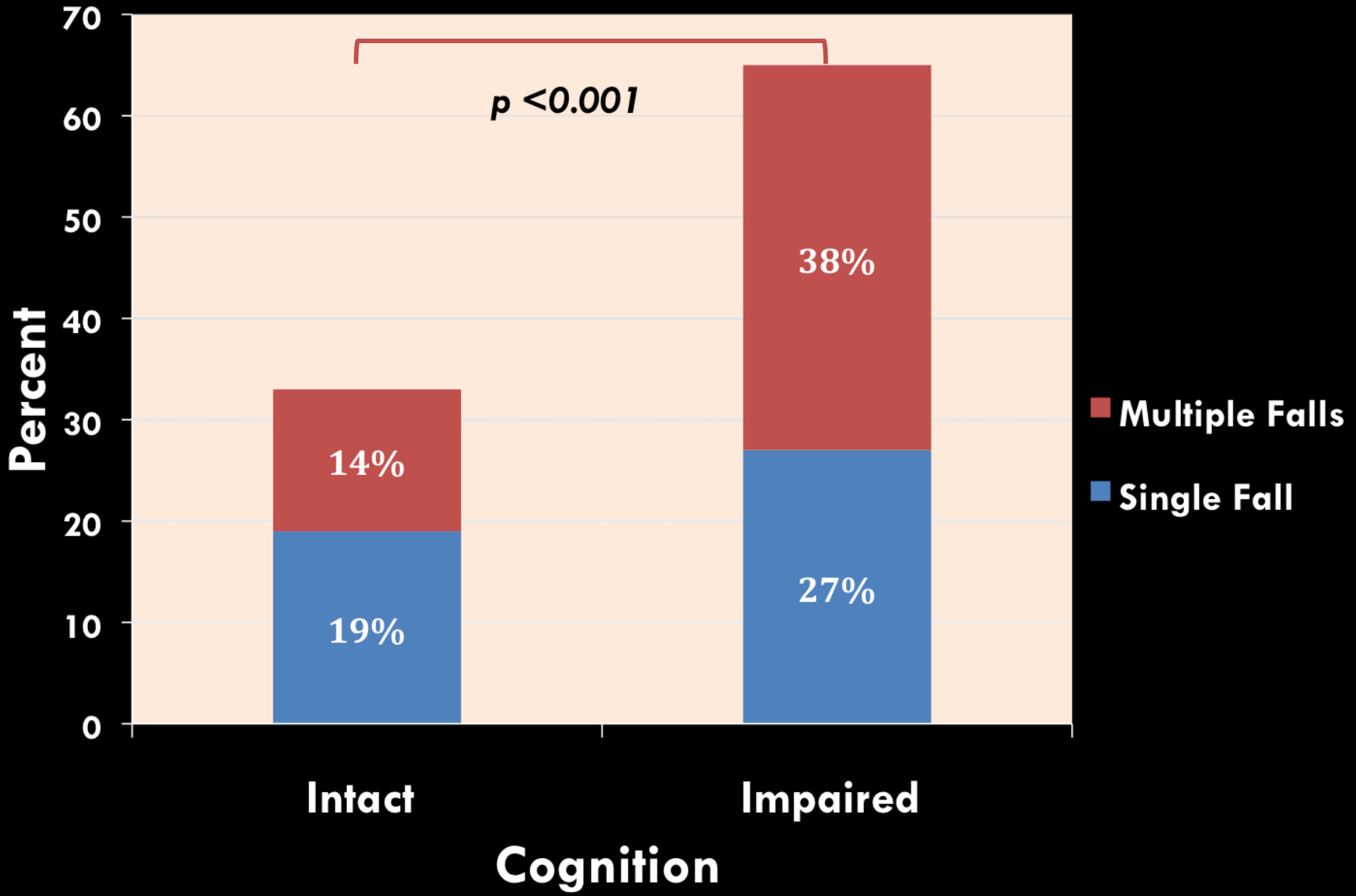
Demographics

Characteristic	Cognitively Intact N=276	Cognitively Impaired N=138
Age, mean ± SD	81.61 ± 5.84	81.95 ± 6.71
Female, n (%)	136 (49)	68 (49)
MMSE, mean ± SD	28 ± 1.6	23 ± 4.1**
Education, yrs, mean ± SD	11.4 ± 3.4	9.9 ± 3.0**

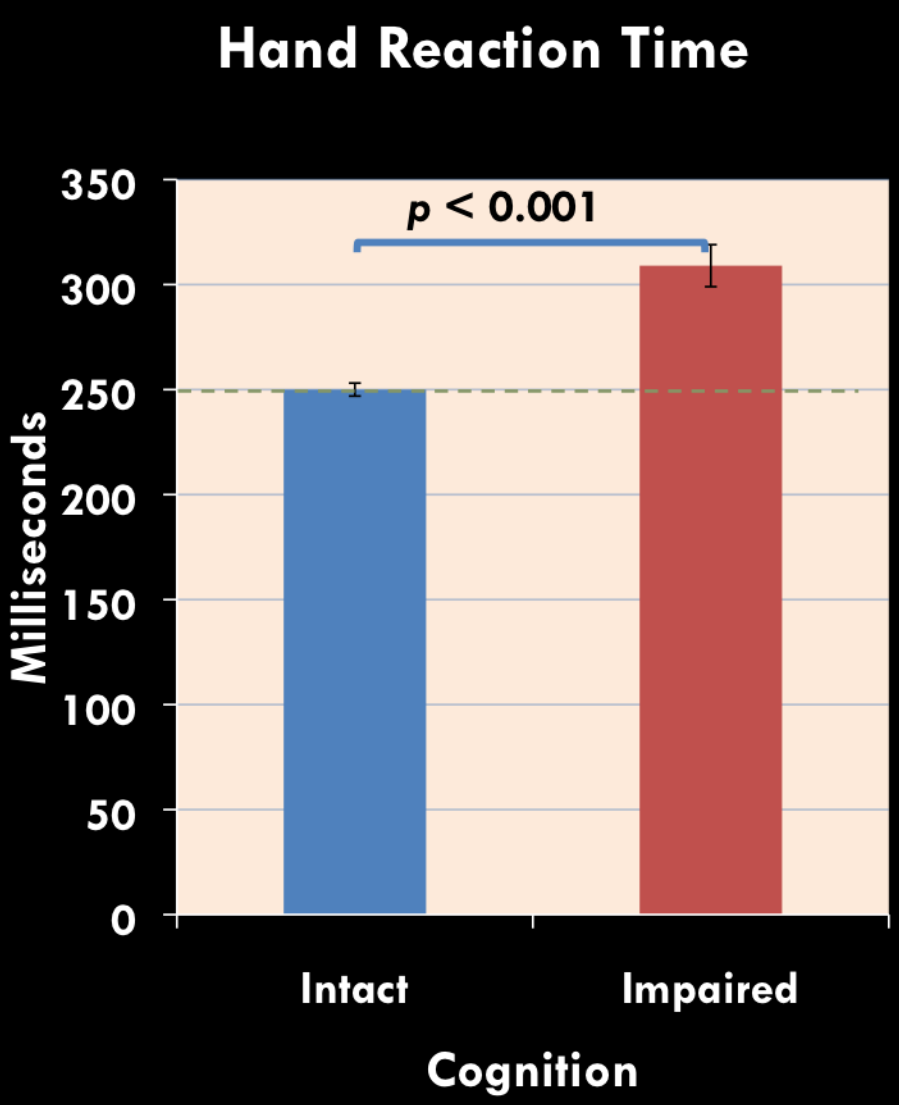
Medical History and Medications

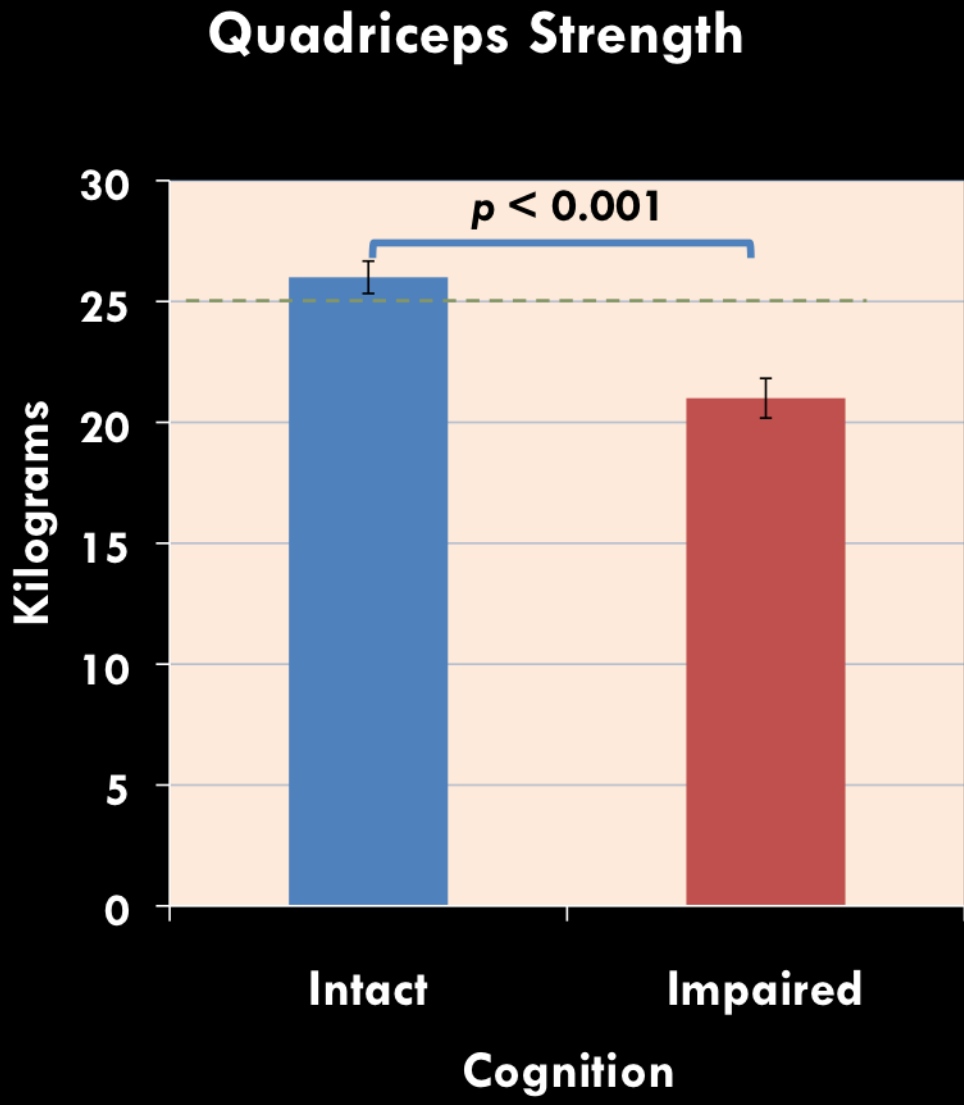
Characteristic	Cognitively Intact	Cognitively Impaired	P value
Stroke, n (%)	11 (4)	19 (14)	<.001
Depression, n (%)	40 (18)	40 (29)	0.008
Total Number Medications, mean + SD	5.6 ± 3.2	7.5 ± 4.2	<.001
Psychoactive med use, n (%)	46 (17)	50 (36)	<.001

History of Falls in previous year



Physiological Comparisons at Baseline





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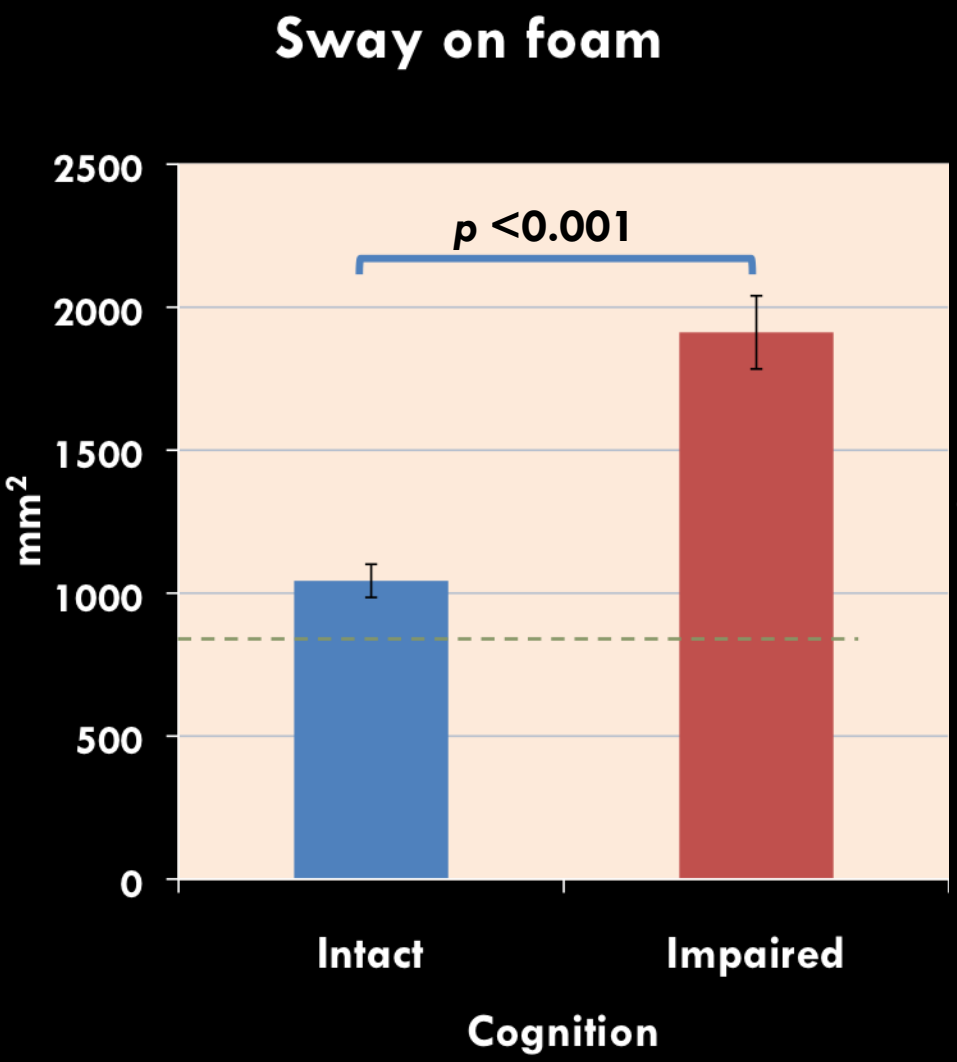
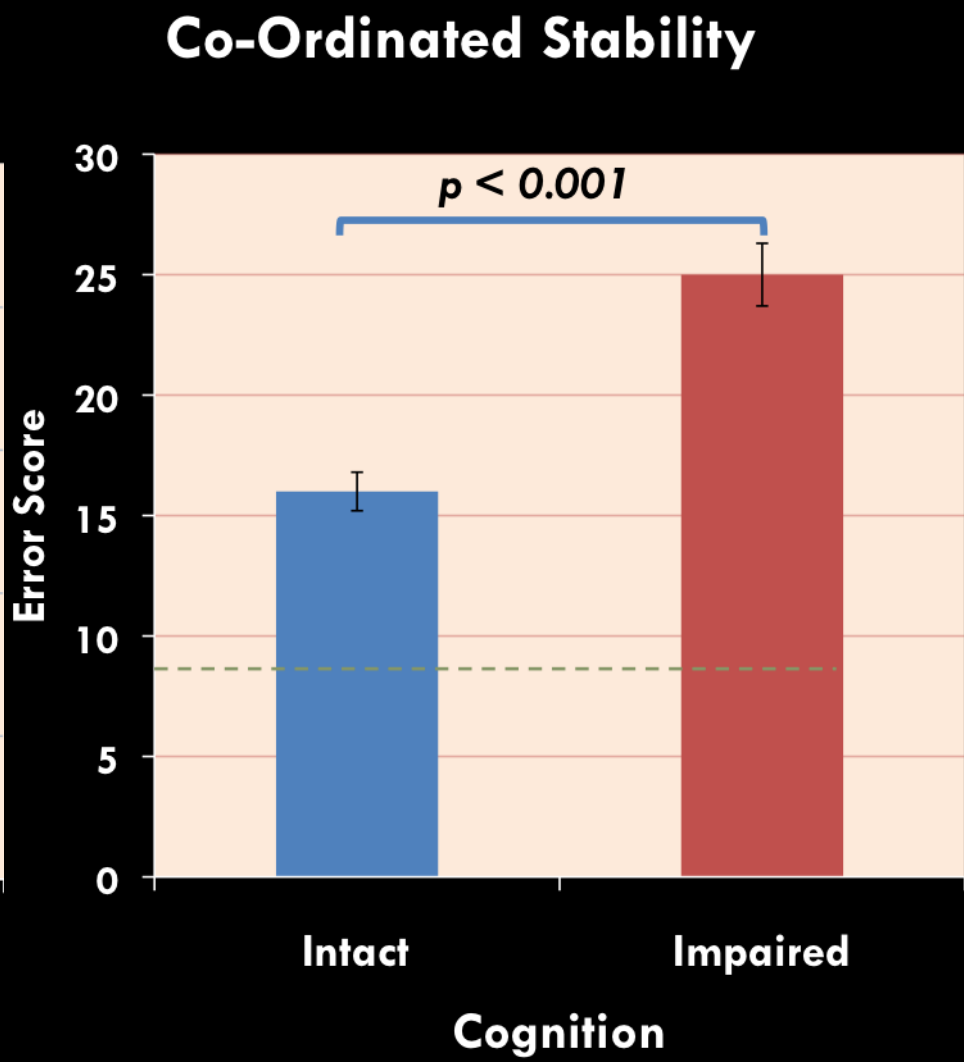
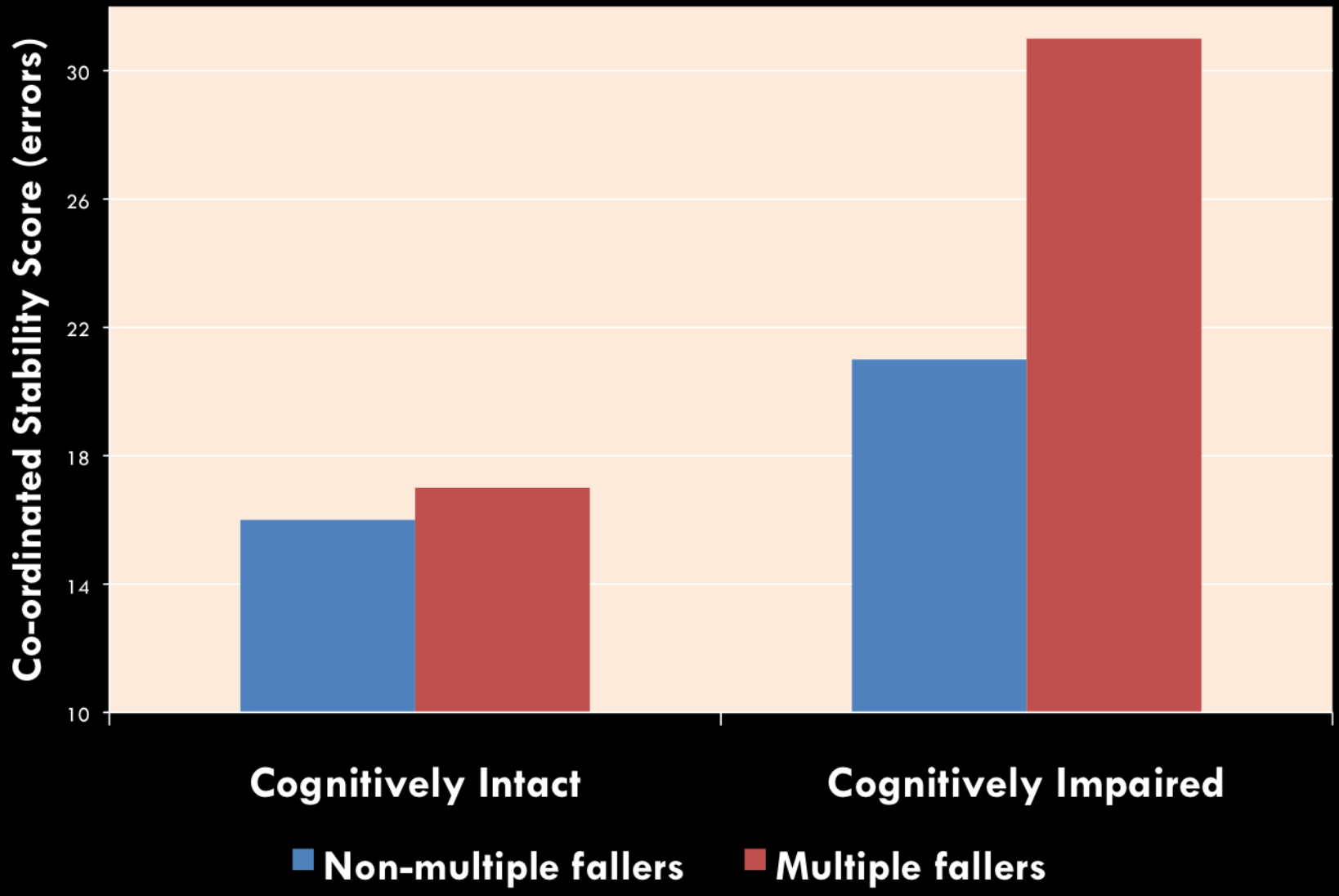




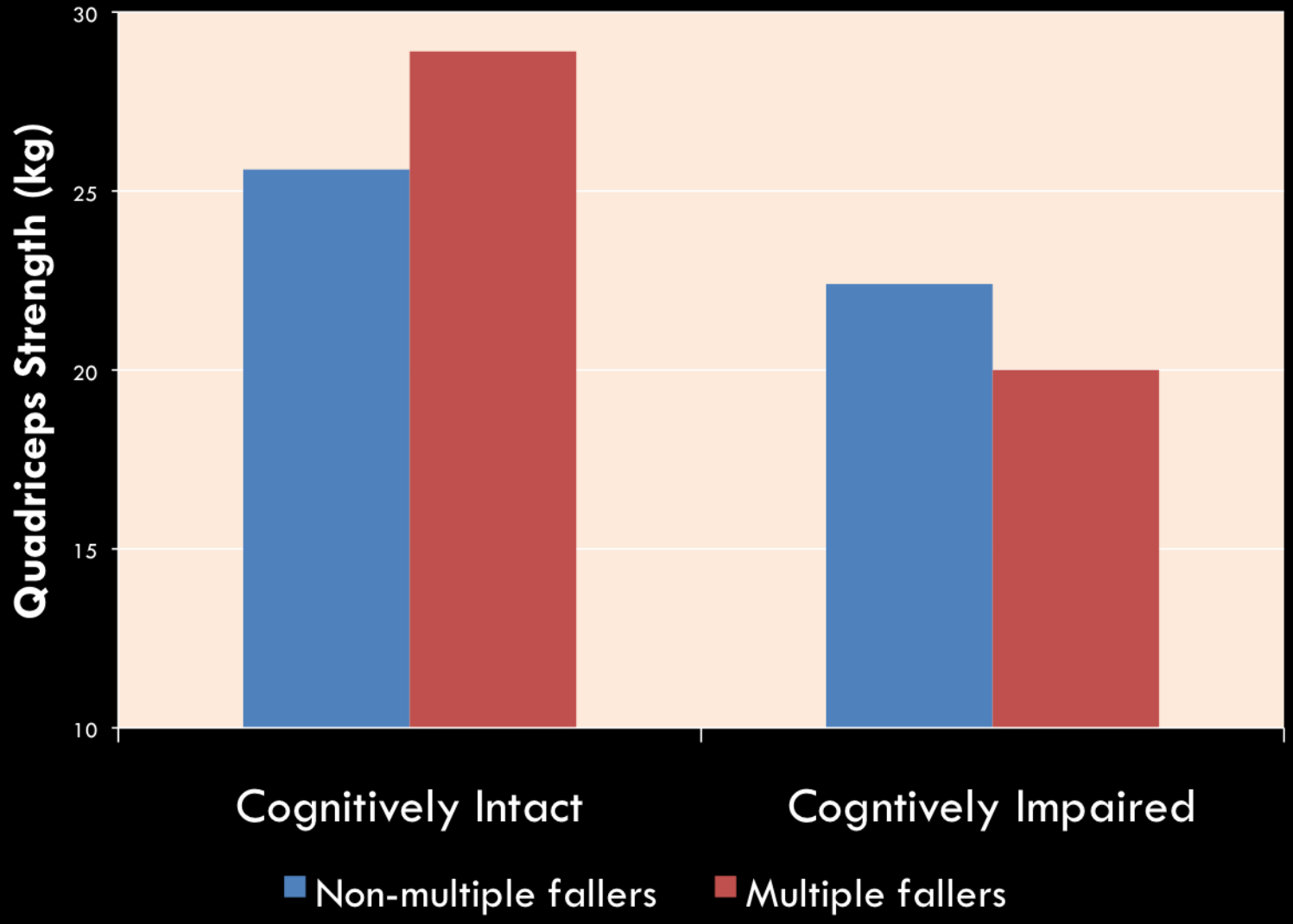
Follow-up falls data

	Intact	Impaired
0	53%	32%
1	23%	23%
2+	24%	45%

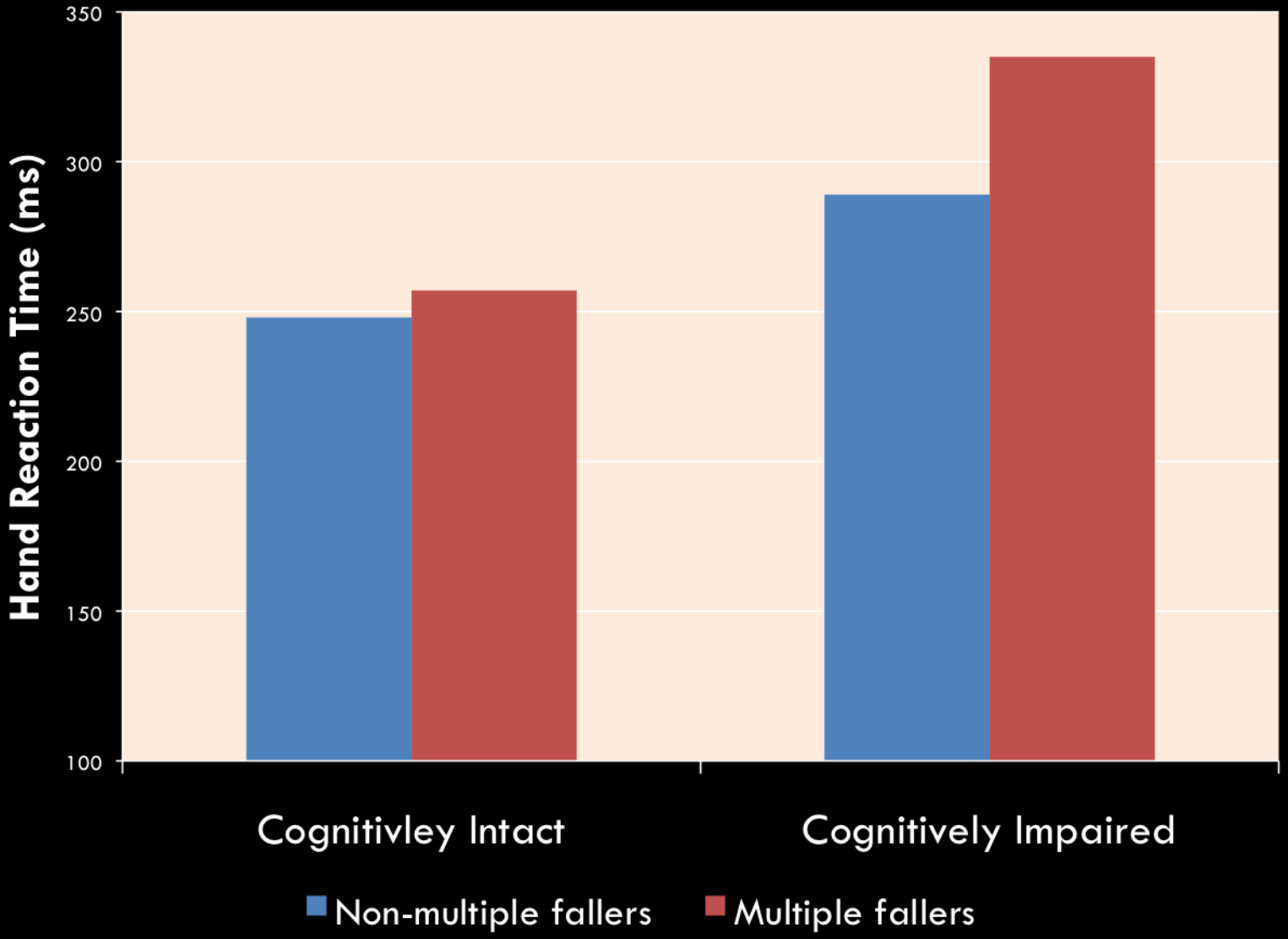
Balance: Co-ordinated Stability



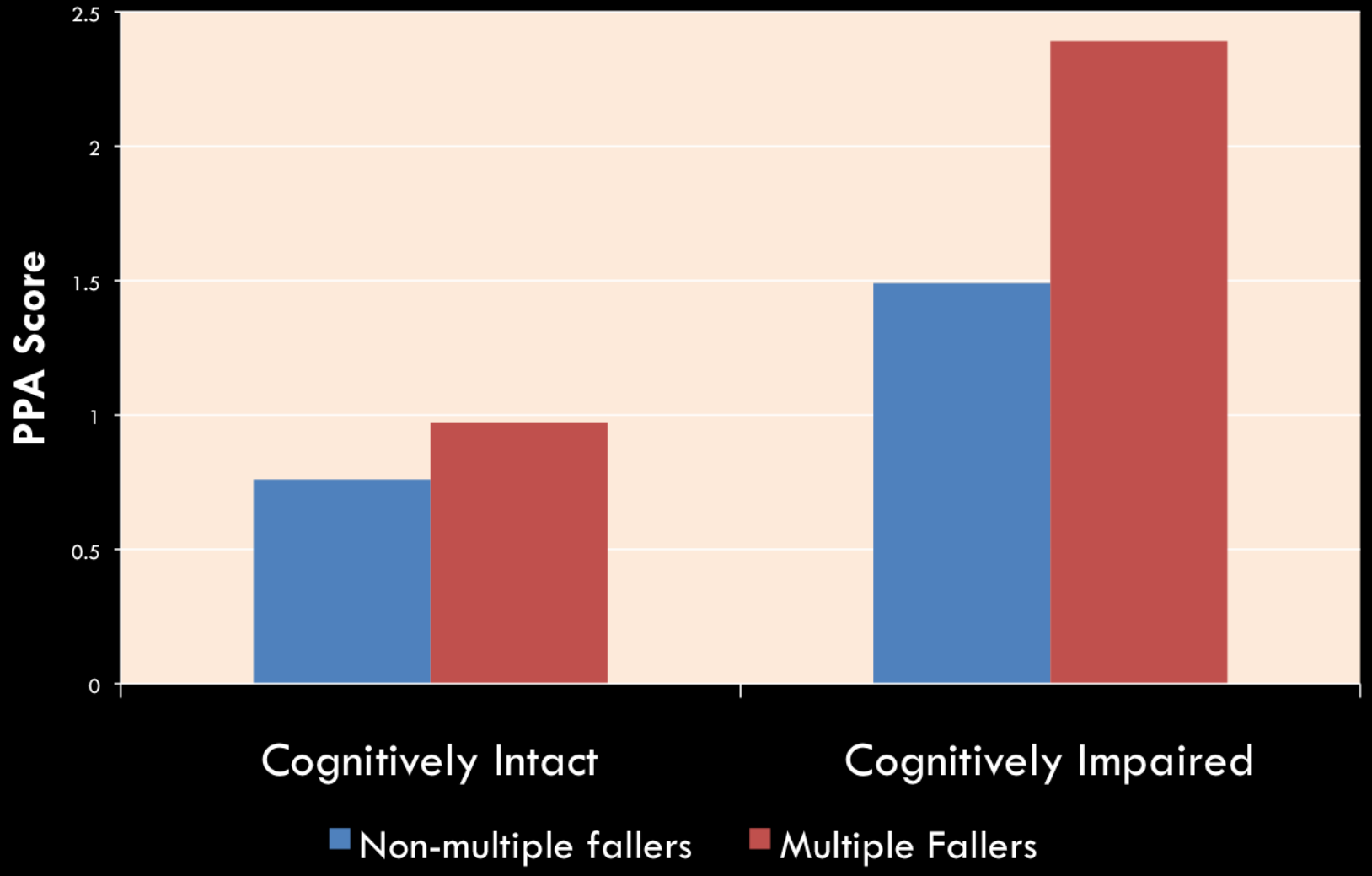
Lower Limb Strength



Hand Reaction Time



Overall Falls Risk Score



Physiological Predictors in CI population

Best model – correctly classifies 71% of people

Timed near tandem stand

OR 0.80 (95%CI 0.71-0.90)

Z HRT

OR 1.51 (95%CI 1.04-2.19)

Best clinical model- correctly classifies 68% of people

Timed near tandem stand

OR 0.831 (95%CI 0.75-0.92)

Discussion

Discussion

- Cognitively impaired people perform worse on physiological tests when compared to cognitively intact
- Sensorimotor deficits are associated with prospective falls in people with cognitive impairment
- Within the cognitively impaired group, a simple measure of balance and reaction time can classify 71% of the population

Discussion

- Likely that people with cognitive impairment will benefit from an exercise intervention
- Pilot data suggests that it is possible to deliver a tailored exercise and environmental intervention
- Remains to be seen if this can reduce falls
- Important not to exclude people with cognitive impairment from some interventions

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