

# Effects of a multi-component exercise program on physical function and falls among older women: a two-year community-based, randomized controlled trial

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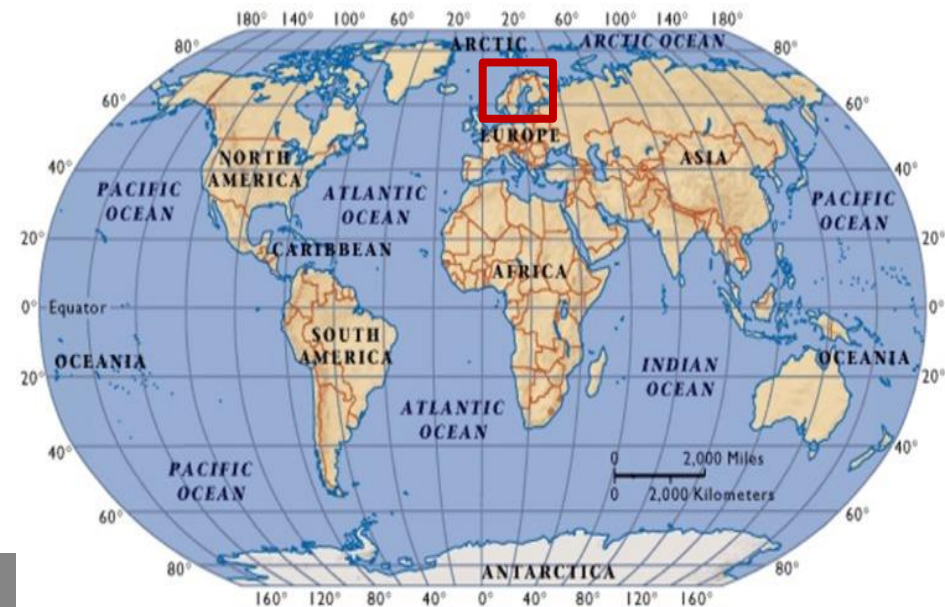
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## BACKGROUND AND PURPOSE

- In older adults, exercise may effectively reduce risk factors of falling, prevent functional decline, increase confidence and improve quality of life (QoL)
- Multi-component exercise programs can prevent falls in community-dwelling elderly populations, and seem to prevent fall-induced injuries
- The purpose of this randomized study was to assess the effects of multi-component supervised exercise on falls and physical functioning among older home-dwelling Finnish women
- The Vitamin D and Exercise in Falls Prevention (DEX) study  
A 2-year randomized controlled vitamin D and open exercise trial of 409 home-dwelling women 70 to 80 years of age (NCT00986466).

## METHODS

- 409 women aged 70-80 years were randomly assigned to the exercise group (EX) or control group (CON)

### Inclusion criteria:

- At least one fall during the previous year
- Moderate to vigorous exercise  $\leq 2$  h/week
- No contraindication to supervised exercise

EX group participated in supervised moderate-intensity group exercise classes 2/week for the first 12 months, 1/week for the last 12 months

Training was progressive and consisted of strength, balance, agility and mobility training, home exercise plan practised on the rest days  
CON group asked to maintain previous levels of physical activity.



## METHODS

- Falls

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

Daily fall diaries returned monthly

Fall-related injuries (bruises, abrasions, muscle or joint pain, head injuries, fractures)

Injuries for which participants sought medical care (nurse, physician or hospital)

- Physical functioning

**Muscle strength:** Maximal isometric leg extensor strength

**Mobility:** Gait speed, TUG test, chair stand time

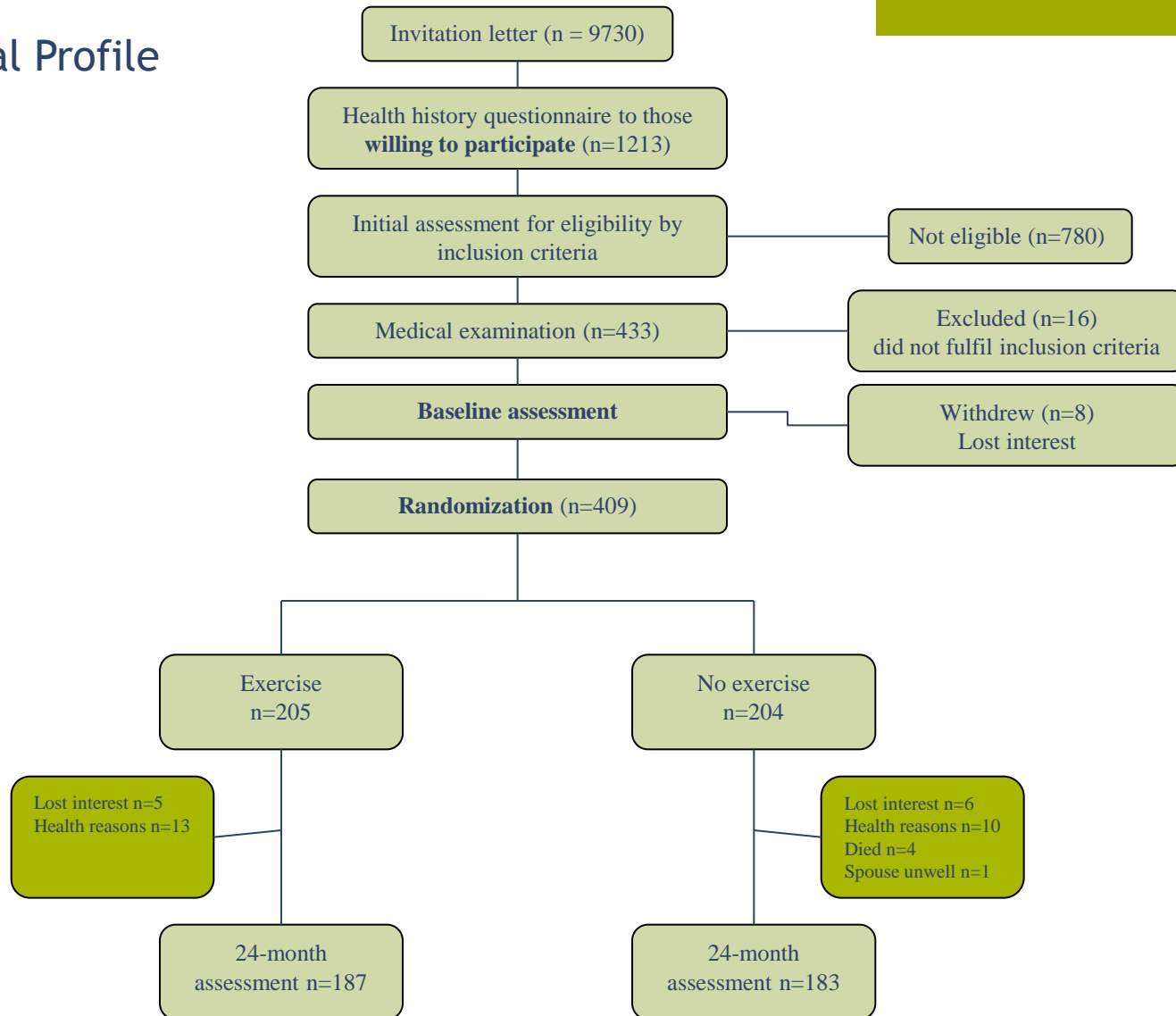
**Dynamic balance:** 6.1 m backwards walking time

**Concern about falling:** FES-I score (16-64)

## **METHODS: Statistical analyses**

- *Falls incidence rates=Total number of falls/time (100 person years)*
- Negative binomial regression: incidence rate ratios (IRR) for all falls, falls resulting in injuries and falls for which medical care was sought
- Cox-regression models: hazard ratios (HR) of fallers, injured fallers and fallers who sought medical care in each group
- **Physical functioning outcomes:**  
LMM for normally distributed outcomes  
GLMM with gamma distribution and log link function for non-normally distributed outcomes  
age, height, and weight as covariates.

**Fig 1. Trial Profile**





**RESULTS**
**Table I. Descriptive characteristics**

Variable	EX	CON
Age, years	74.4 (2.9)	74.0 (3.1)
Weight, kg	72.2 (10.6)	72.3 (12.7)
Height, cm	159.6 (6.0)	160.0 (5.7)
General health and functional status		
Number of diagnosed illnesses	2.2 (1.3)	2.2 (1.3)
MMSE score, points	28.3 (1.4)	28.4 (1.6)
ADL score (6-36)	6.9 (1.9)	6.8 (1.9)
IADL score (8-48)	10.1 (4.0)	10.3 (3.9)
Mobility score (4-24)	4.8 (1.7)	4.9 (2.0)
Exercise-related activities, hours/week	14.2 (7.4)	14.3 (6.9)
Average daily steps, n	5909 (2437)	5953 (2594)
Physical functioning		
Maximal leg extensor strength/body weight	2.3 (0.6)	2.4 (0.7)
Timed Up-and-Go test, s	8.9 (1.7)	9.2 (2.1)
Normal gait speed, m/s	1.0 (0.2)	1.0 (0.2)
Backwards walking test, s	29.8 (18.9)	28.8 (18.7)
Concern about falling (FES-I) score (16-64)	23.0 (6.2)	23.7 (6.3)

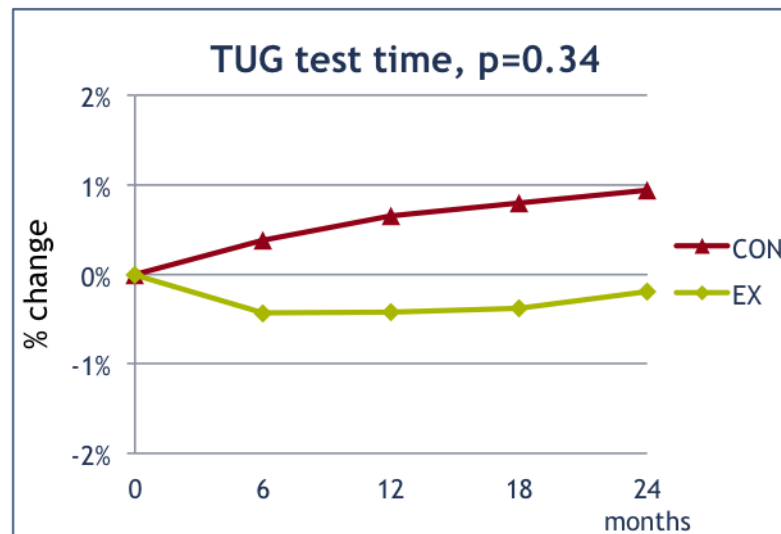
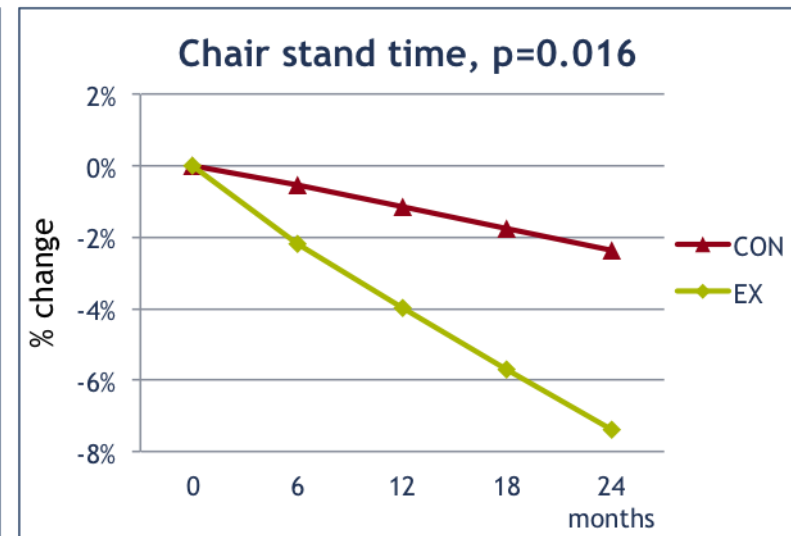
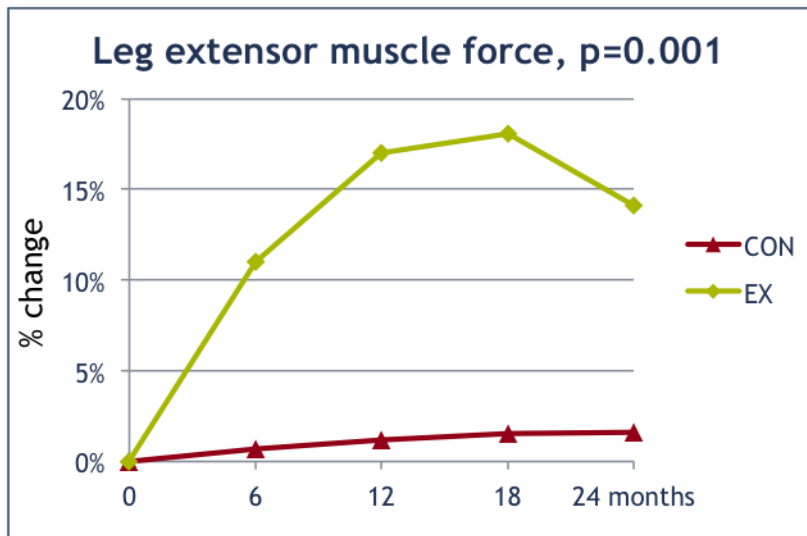
## RESULTS

**Table 2.** Rates of falls and related injuries per year, incidence rate ratios (IRR) (95% CI) for falls and hazard ratios (HR) (95% CI) for fallers in the EX and CON groups during the 24-month intervention.

Outcomes	EX (n=205)	CON (n=204)	IRR or HR (95% CI)	p-value
<b>Falls (per 100 person-years)</b>				
All, n	233.8	250.3	1.00 (0.79-1.26)*	0.98
No consequences, n	113.9	123.1	0.98 (0.75-1.29)*	0.90
Resulting in injury, n	119.9	127.2	1.03 (0.79-1.35)*	0.83
Medical treatment sought, n	11.5	26.2	0.45 (0.27-0.78)*	0.004
<b>Fallers</b>				
all, n	140	141	0.99 (0.78-1.25)†	0.94
sustained any injury	115	111	1.03 (0.79-1.34)†	0.81
sustained fracture	8	12	0.66 (0.27-1.61)†	0.36
sought medical treatment	20	39	0.45 (0.26-0.77)†	0.004
fell ≥ 2 times	98	92	1.07 (0.80-1.42)†	0.64

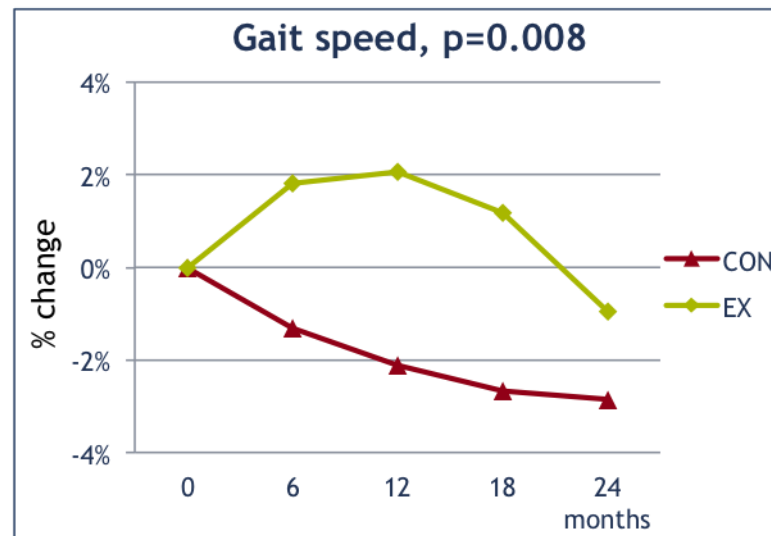
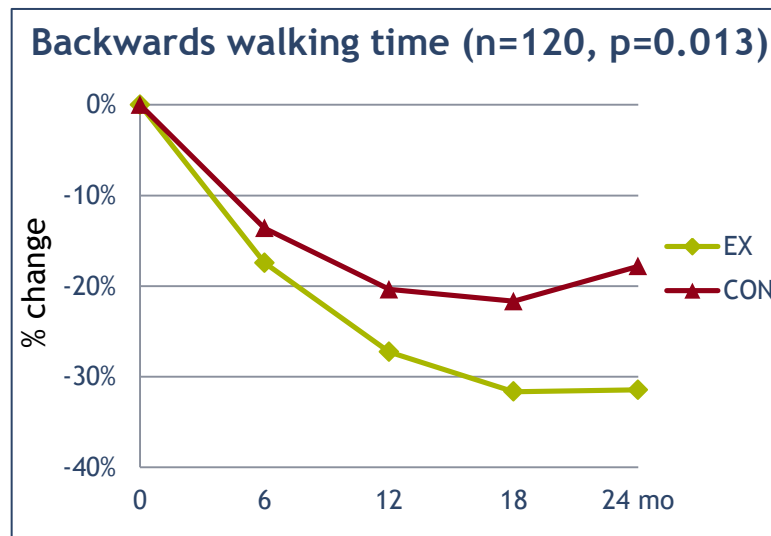
\*IRR = incidence rate ratio; †HR = hazard ratio

**RESULTS**



**Figure I.** Predicted percentage mean differences between groups in time for change in physical functioning outcomes.

# RESULTS



**Figure I.** Predicted percentage mean differences between groups in time for change in physical functioning outcomes.

## RESULTS

- Training compliance: 73% for supervised exercise, 63% for home exercise  
Overall drop-out rate: 9.5% (18 EX and 21 CON)
- Falls for which participants sought medical treatment halved in EX  
No between-group differences in the rates of falls, injurious falls or fallers
- Falls resulting in fractures lower in EX group (n=8) compared with CON (n=13), but this did not reach statistical significance
- EX group's mean physical performance scores improved during the intervention, with the greatest improvements achieved between 12-18 months.
- Quadratic trend for reduced concern about falling ( $p=0.055$ ), the difference being greatest at 12 months.

## CONCLUSIONS

- Exercise improved physical functioning and prevented age-related functional decline in older home-dwelling Finnish women
- Exercise reduced fall-related healthcare visits, although it did not reduce overall falls
- The trend for fewer fallers with fractures also suggested some benefit in preventing the most severe consequences of falls
- Training was feasible and safe for this age group.

- Thank you for your attention!

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