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# Physical Activity and Cognition: Benefits, Options and a Hint of Fun

Activity Benefits, Recommendations, Options and Tips

Cognition

Smartstep and Standing Tall

**Acknowledgement:** Neuroscience Research Australia (NeuRA) in particular, Dr Daina Sturnieks and Professor Kim Delbaere, for slides and interventions

TM

Rock  
Steady  
for Life

We don't stop playing because we grow old;  
We grow old because we stop playing.

George Bernard Shaw



Slide provided by NSW Fall Prevention and Healthy Ageing Network





# What happened when we danced?

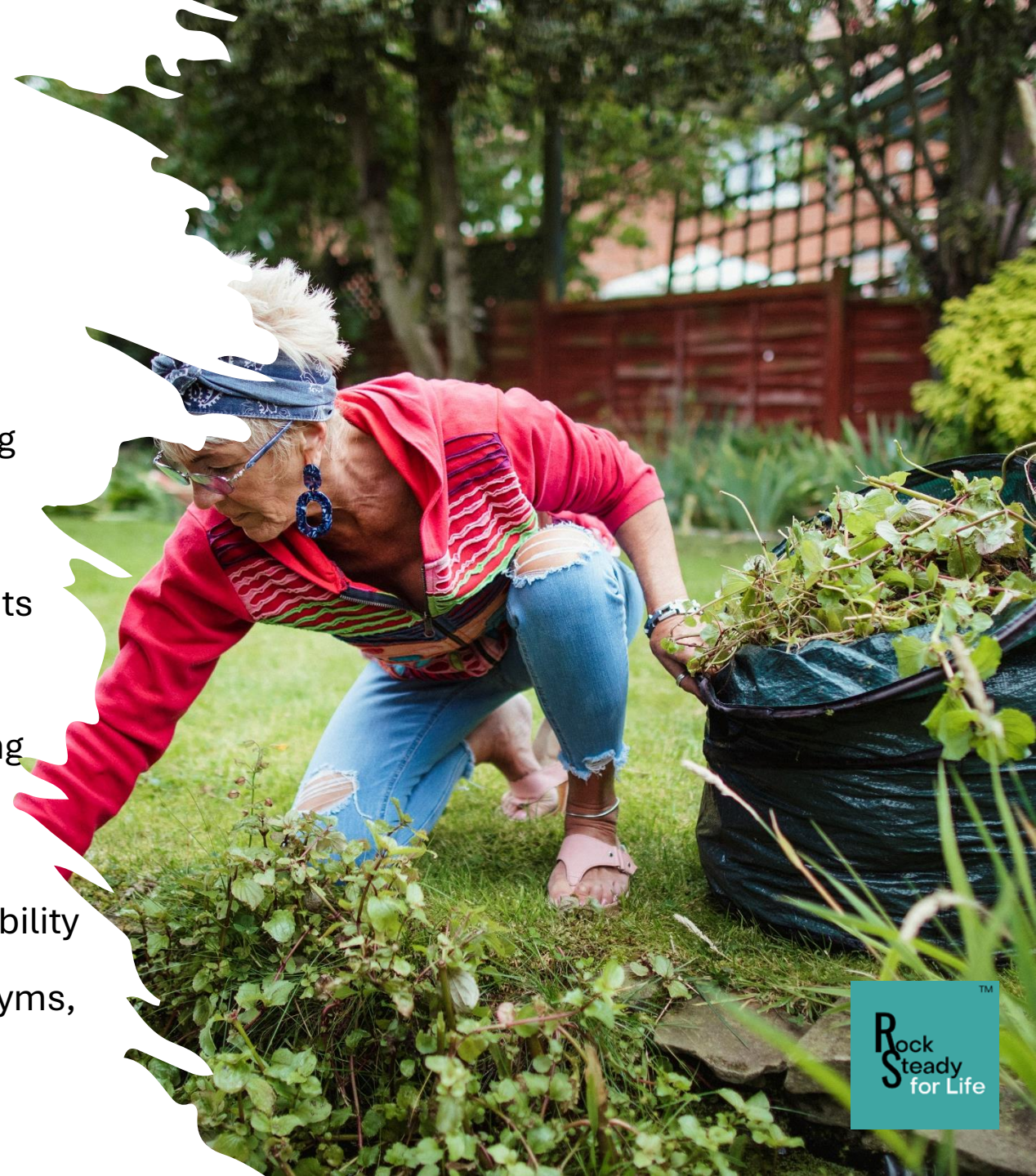
- Rating
- What did we do? We moved, balanced, challenged our muscles, concentrated, listened, visualised, planned, put things in order, managed the intensity (e.g how high we jumped), reacted (to prevent falling), used impulse control to prevent whacking the next person, had fun, got blood flowing through our body and into our brain
- Would you do more?
- Dual tasking
  - allocating attention to simultaneous tasks
  - training vs everyday (e.g when walking and have fall risk factors)
  - E.g balance, ball, count back by 7, imagine grandkids smiling and remember their ages



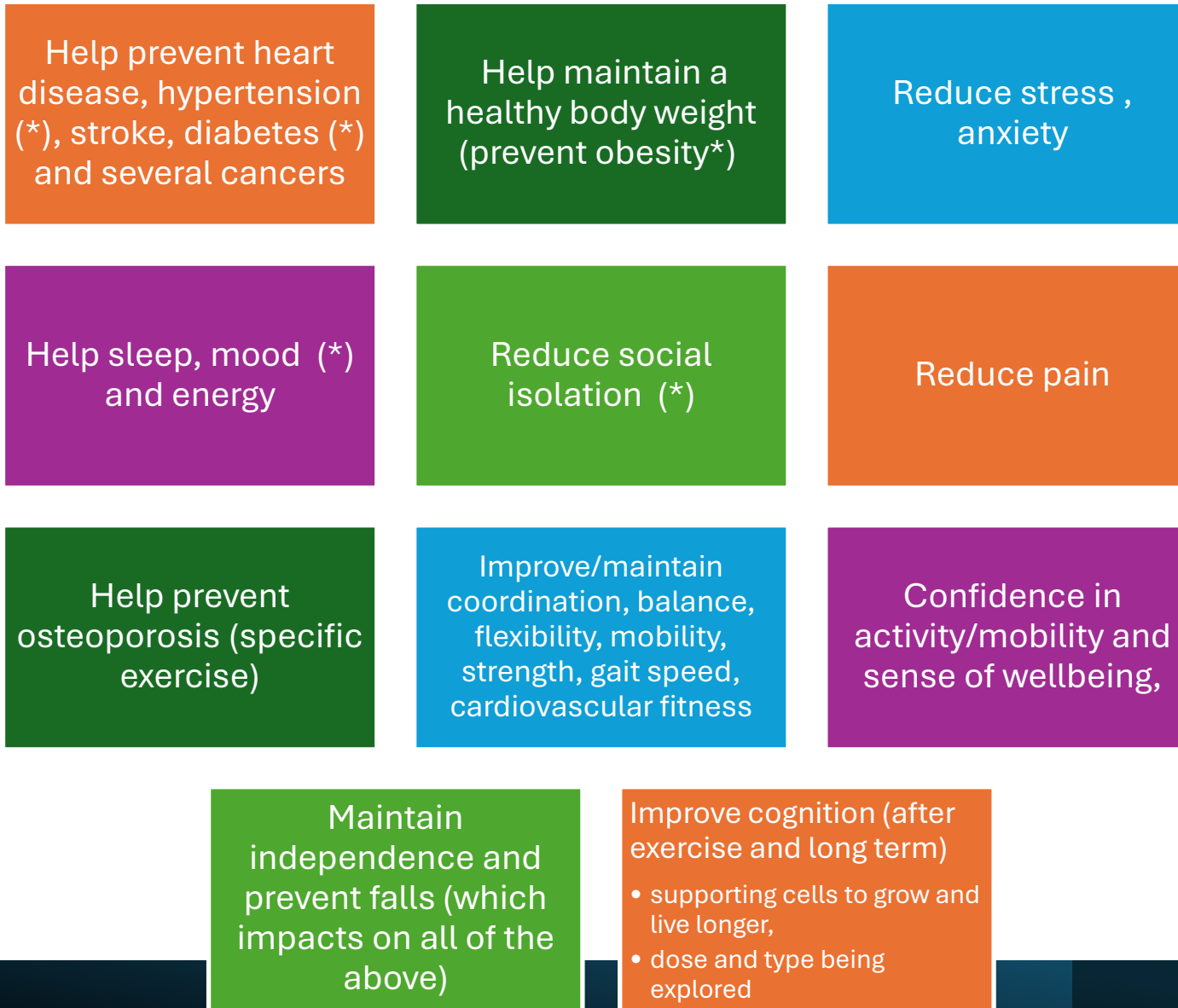


# Physical Activity – Preventing Dementia

- Not only “exercise”
- Includes housework – dusting, vacuuming, mopping (Floor washing example- preference, ability)
- Garden work, mowing
- Playing with kids, grandkids- fun, interactive, benefits both
- Dancing
- Exergaming- e.g Smartstep cognitive – motor training
- Exercise
  - groups, individual, buddy, gym, home, outside, online, F2F, combination
  - cardio, strength training, balance training, flexibility training, combination
  - supported exercise (e.g exercise phys, rehab/gyms, exergaming, classes for seniors)



# Regular Exercise - Benefits



\* relates to other potentially important risk factors for dementia

# Cognition, physical activity, chronic conditions and falls

- Keep physically active to prevent chronic conditions, dementia and falls so .....
- We can: keep physically active, to prevent chronic conditions, dementia and falls and so on...





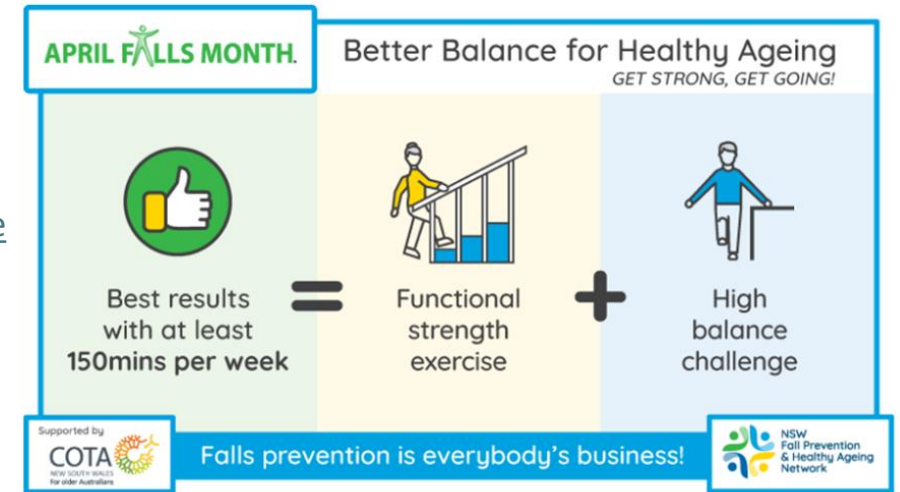
# Tips

- What's the most important thing that helps people keep moving (especially to keep exercising)?
- Get something out of it:
  - a good gossip,
  - fun,
  - feeling better,
  - less lonely,
  - better mood,
  - food,
  - feel stronger,
  - feel stimulated,
  - “wasn’t as bad as I thought it would be”

# Tips

- Need to be retired to do everything they say!
- Some is better than none
- Can be in smaller chunks
- 30 mins most days- moderate intensity- a bit breathless but still be able to talk
- Different types, do with others to keep interested and motivated
- Achievable, bite size goals
- Check in with a GP if over 40, obese, other chronic condition, sedentary for a while
- Options for health conditions/reduced mobility (chair-based exercises, senior's classes, Smartstep can be used with frame, chair, bars)
- Balance, balance, balance!
- Drink water!
- Importance of protein (1-1.5g/body weight/day- be aware of impact on medication, health conditions)
- Important: accessibility, cost, small chunks, individually tailored, transport

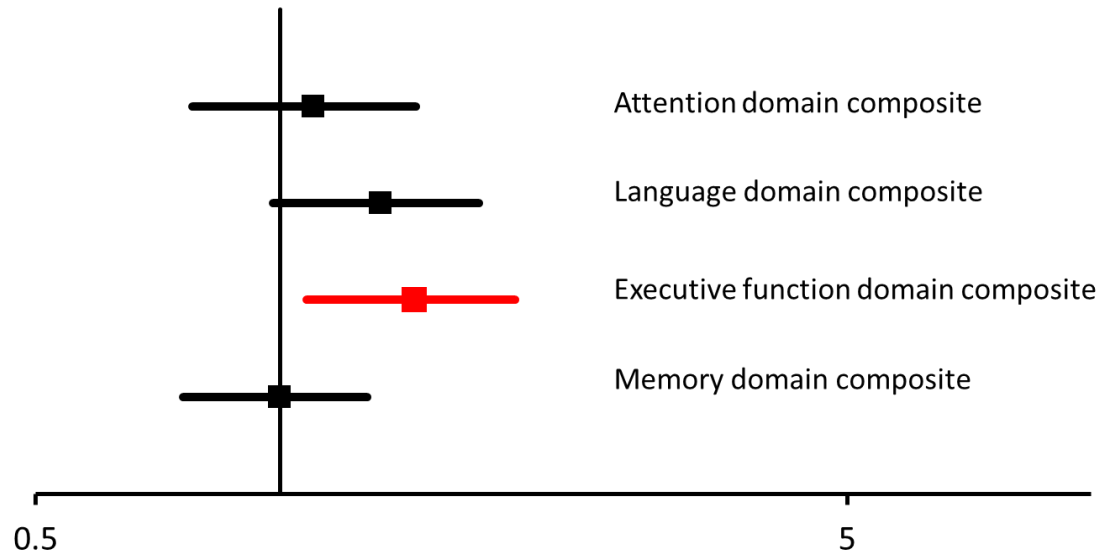
Image taken from [NSW Fall Prevention and Healthy Ageing website](#)





# Cognition and Falls

*"The findings indicate that **objectively defined MCI is an independent risk factor** for injurious or multiple falls in a representative sample of community-dwelling older people. The presence of **nonamnestic MCI, based primarily on executive function**, was found to be an important factor in increasing fall risk"*



**Nonamnestic MCI:** affects non memory related thinking skills e.g making sound decisions, judgements, sequencing steps to complete complex tasks

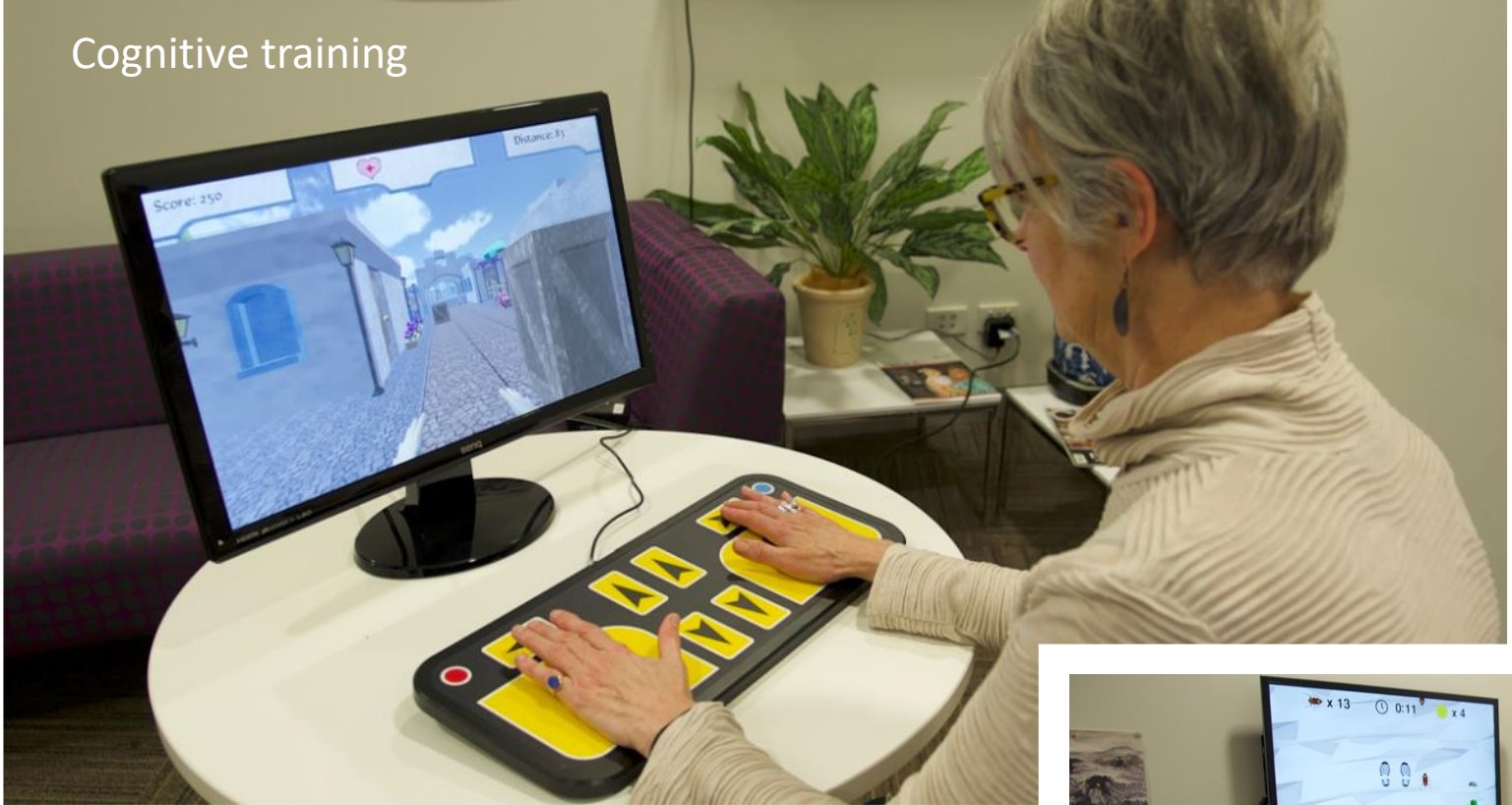
Delbaere K, et al. Mild cognitive impairment as a predictor of falls in community-dwelling older people. American Journal of Geriatric Psychiatry 2012; 20 (10), 845-853

# Cognition and Staying On Our Feet

High level processes enable anticipatory and adaptive mechanisms for planning movement and reacting to changing environments

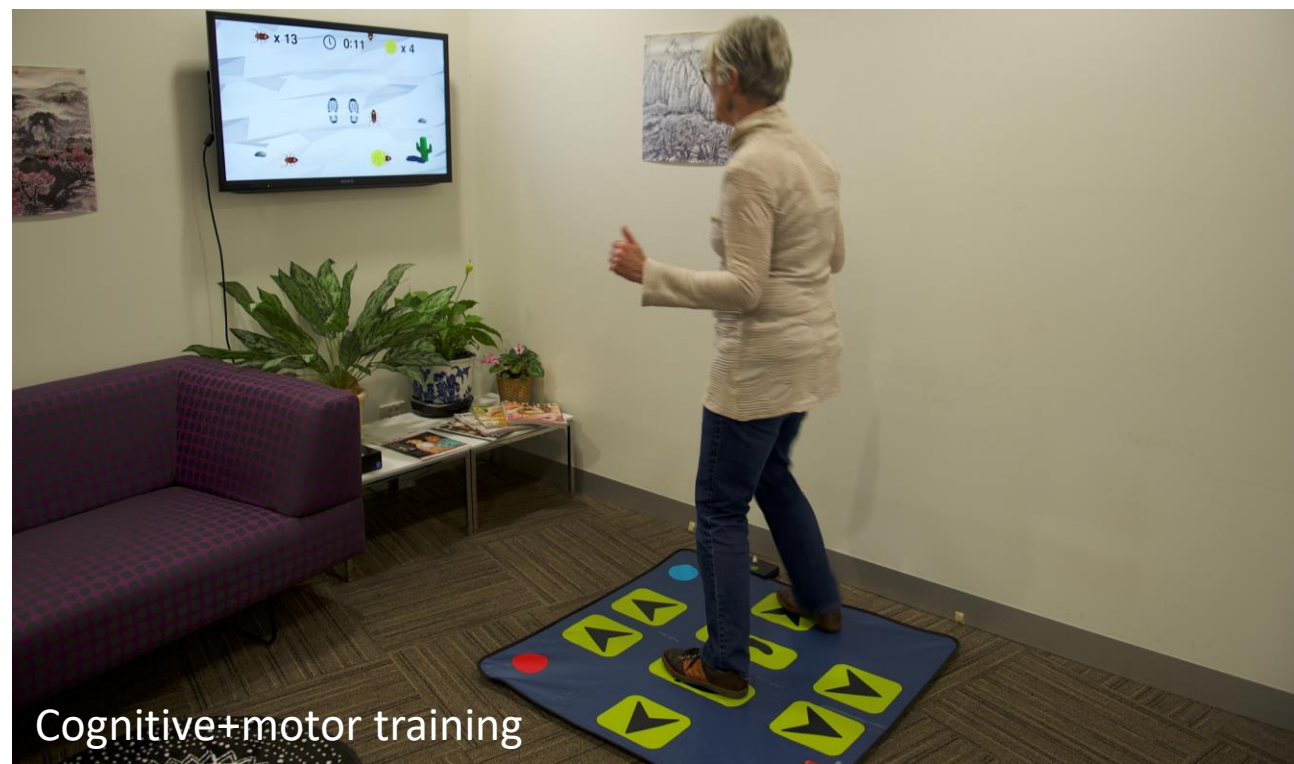
Cognitive function	Description of component
Planning	The identification and organisation of steps needed to walk or prevent a fall.
Response inhibition	Allows one to ignore irrelevant sensory input and filter out distractions.
Response monitoring	Enables one to compare ongoing actions with an internal plan and to detect errors.
Dual tasking	The ability to appropriately allocate attention among tasks that are performed simultaneously.

Cognitive training



response inhibition  
selective attention  
visuospatial processing  
set shifting

balance challenging  
accurate stepping  
fast responses



Cognitive+motor training



# smart + step

0 / 150 MINS    0    0    0

- TUTORIAL
- STEPMANIA**
- TETRIS
- LA CUCARACHA
- GREEK VILLAGE
- SPACE INVADERS

PREVIOUS GAME    NEXT GAME v2.5.0

**STEPMANIA**

554 SCORE    1:40 LEVEL: MODERATE

QUIT ●

Select User:  
Guest

START GAME ●

BLUE TOOTH    WIFI STATUS

EXIT ●

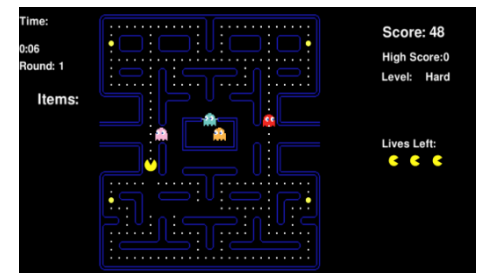
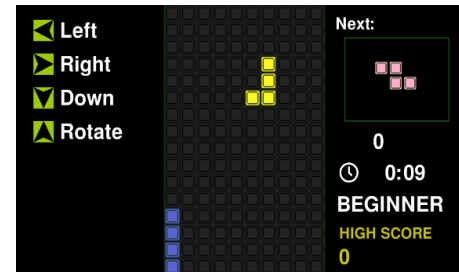
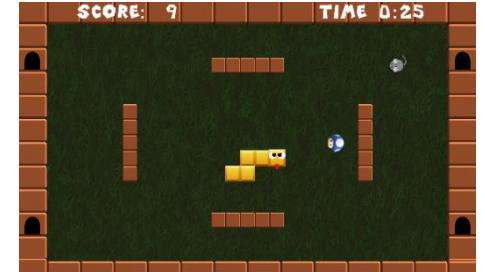
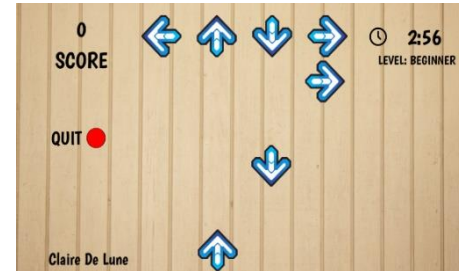




Photo of Bob Barnes (Lismore West Rotary) and Dr. Daina Sturnieks (Neuroscience Research Australia) by Julia Dayhew

# smart step



Up to 26% reduction in falls for community living people

## EVIDENCE -BASED

### Published article- Nature Medicine

<https://www.nature.com/articles/s41591-023-02739-0>

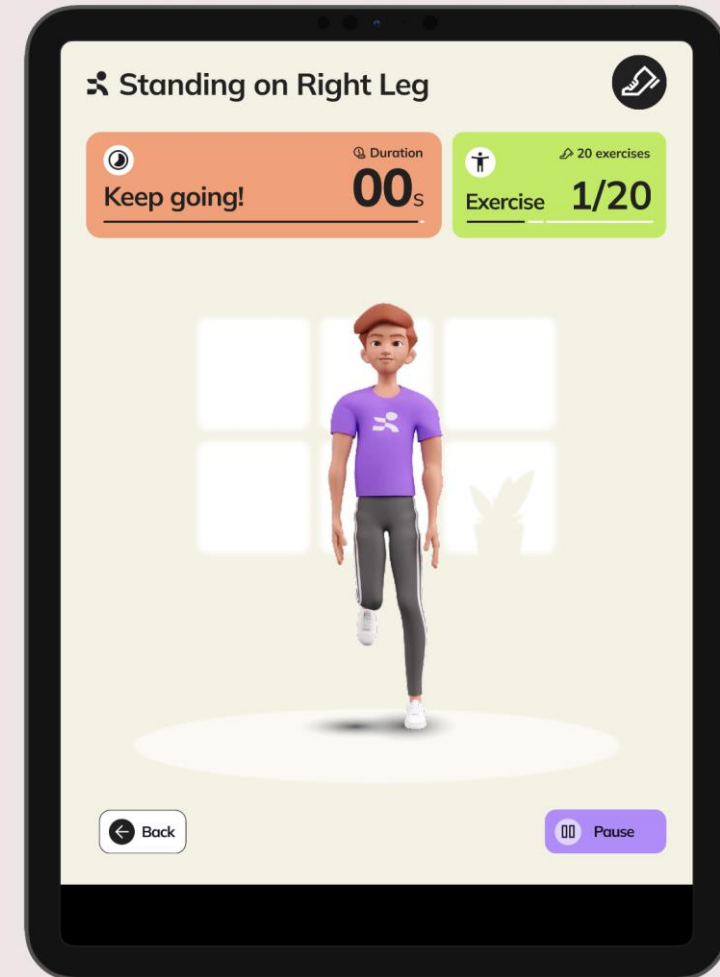
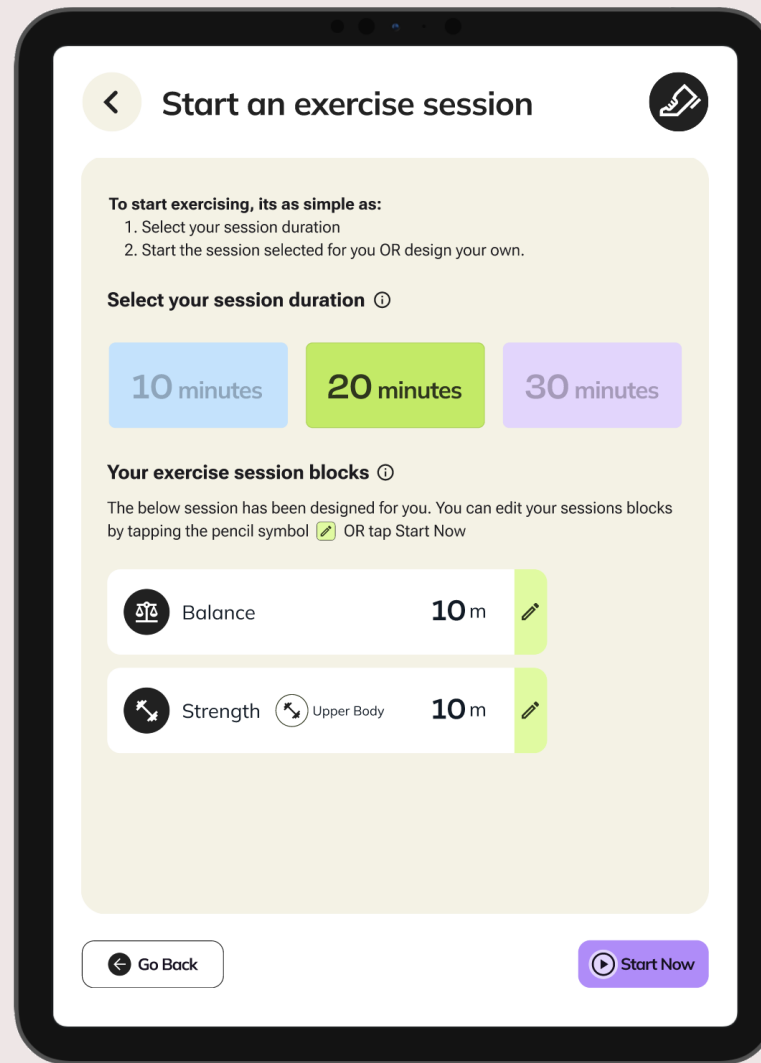
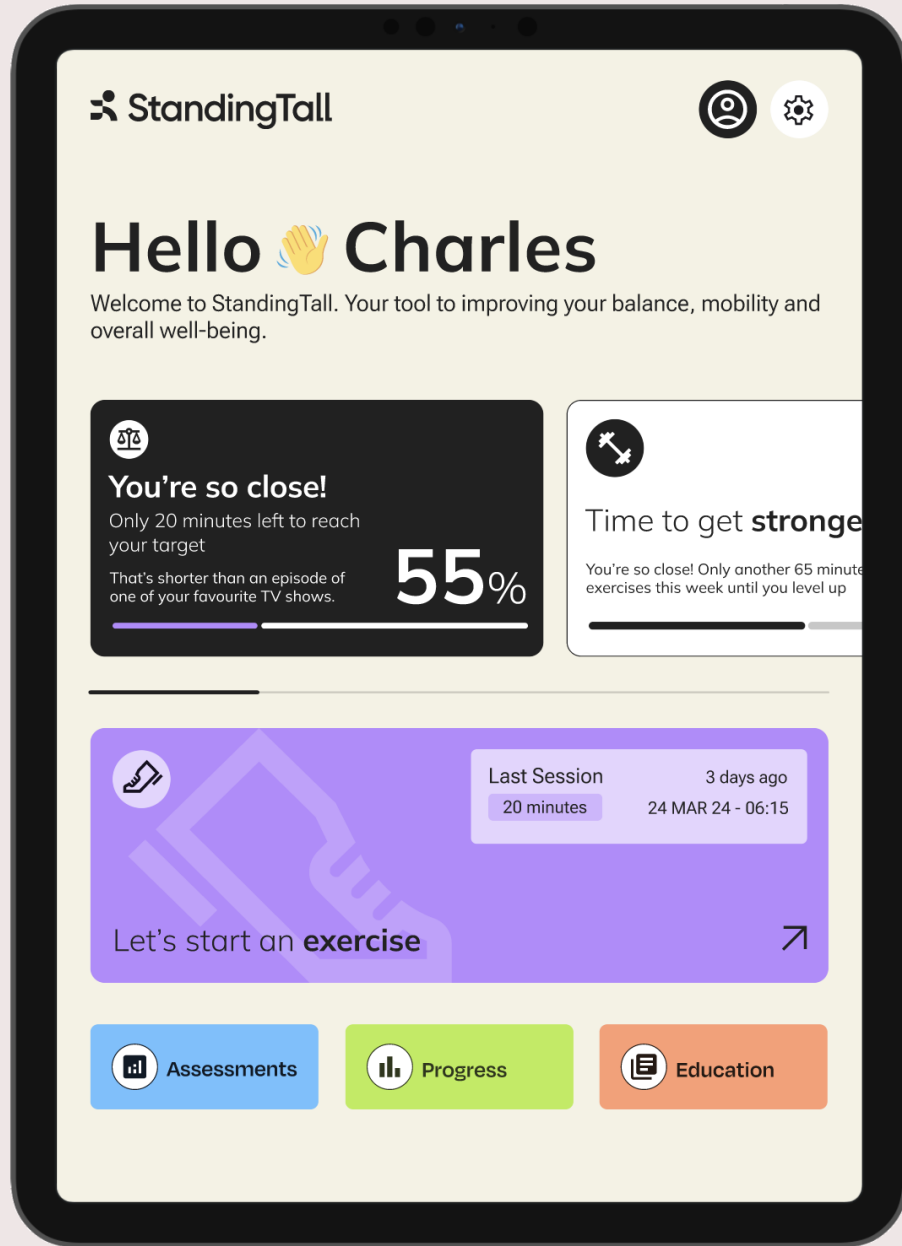
### Media Releases

<https://communitycarereview.com.au/2024/01/17/gaming-exercise-prevents-falls/>

<https://insideageing.com.au/gamified-step-exercises-proven-effective-in-preventing-falls/>

<https://newsroom.unsw.edu.au/news/health/gamified-home-exercises-can-help-prevent-fall>





Prof Kim Delbaere  
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# StandingTall

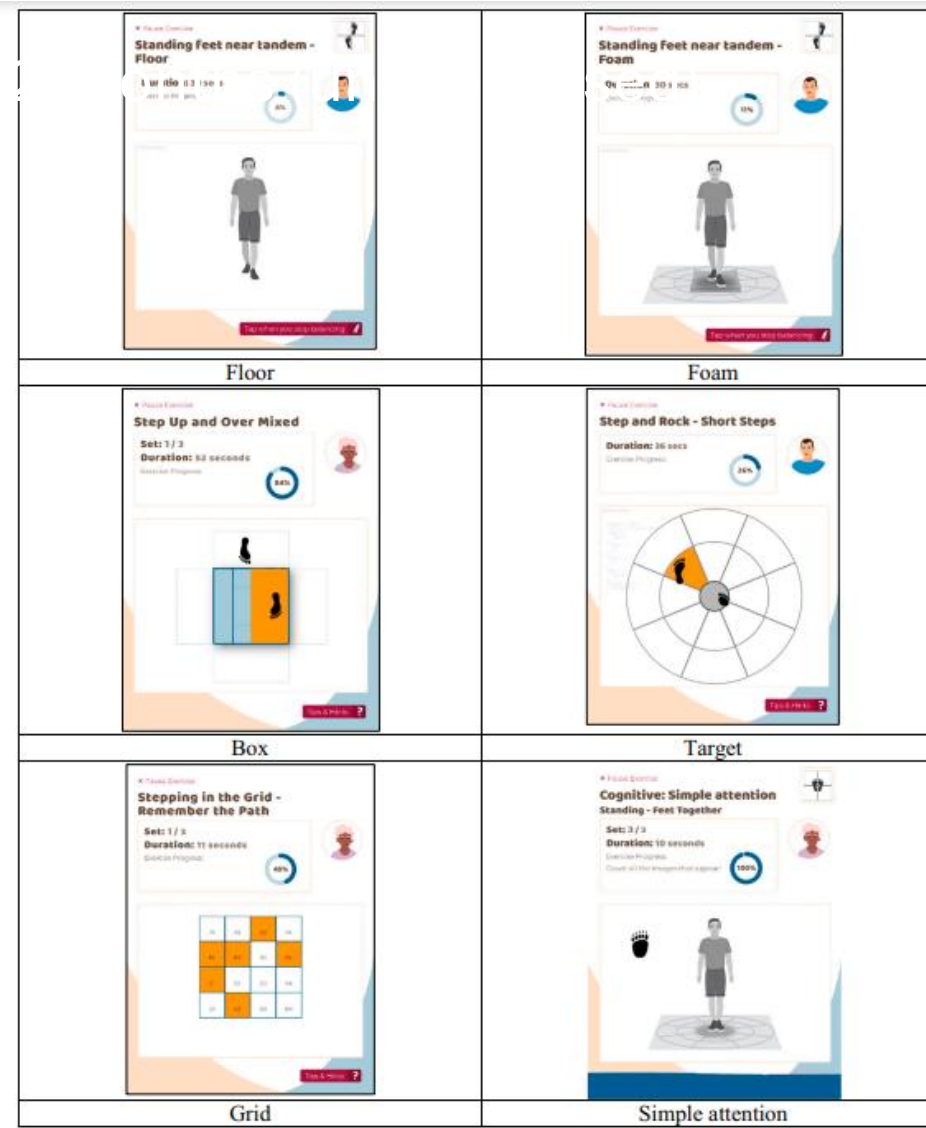


Fig. 2. Examples of exercises from the *StandingTall* program.

Delbaere K, Valenzuela T, Lord S R, Clemson L, Zijlstra G A R, Close J C T et al. E-health StandingTall balance exercise for fall prevention in older people: results of a two year randomised controlled trial *BMJ* 2021; 373 :n740 doi:10.1136/bmj.n740

# Summary – Smartstep and Standing Tall

Evidence Based Interventions Designed by NeuRA for Falls Prevention (and Healthy Ageing)		
Name	Smart Step	Standing Tall
Product	Exergame (Mat and small pc)	Tablet based app for Smart TV, monitor, tablet
Launch	Soft launch soon 1. Aged care, rehab, allied health, gyms etc 2. Individuals for home use (later date)	Early 2025?
Acceptance	Good adherence, likeability and usability	
Home use	Safe for home use (community dwelling people over 65, nil neurological conditions) Pilot study also considered safe for people with Parkinson's (currently undergoing more research)	Safe for home use Anyone can <u>access</u> . Recommendations for support included (e.g nearby chair)
Other	Aged Care <u>organisations</u> with supervision (rec centres, residential), rehab, gyms...	
Cost	One off purchase	Mthly fee
Adverse events	Nil or minimal adverse events at home (including pilot study with people with <u>Parkinsons</u> )	Minimal. 1 person with dementia fell without sustained injury
Target age	Originally for 65+ for falls prevention.	Originally 60+ Anyone can access on app stores?

Name	Smart Step	Standing Tall
<b>Target audience</b>	<p>Julia has used it in clinic with people of younger age, people with history of falls, depression, poor balance, Parkinson's, stroke, fear of falling, poor standing tolerance, (safely set up, used with supervision only)</p> <p>People say they can feel their brain working</p>	<p>People over 60?</p> <p>Regular app payments</p> <p>Need access to tablet or smart TV</p>
<b>Impact on cognition</b>	<p>2 studies:</p> <ol style="list-style-type: none"> <li>1. Unsupervised training led to improvement in significant cognitive functions (older people living in independent living, retirement village – nil major cognitive or physical impairments)</li> <li>2. Community study – low adherers improved in less complex functions (processing speed, visual scanning), high adherers improved in exec functioning</li> </ol>	<p>2 other studies</p> <p>A. Pilot- participants with dementia with carer supervision. Considered usable, feasible, with good adherence. (At end of 12 week trial 5/15 people = 115mins per week, mean at week 12 was 65mins/week). <u>Further</u> study via RCT supported</p> <p>B. People with MCI showed a trend toward improving gait speed. (Slow gait speed is linked with cognitive decline). Nil significance. Covid affected sample number. Good adherence, usability</p>
<b>Other studies</b>	<p>Incl: participants with Parkinsons, Peripheral Neuropathy from chemo</p>	

Information collated by Julia Dayhew (Oct 2024). Draft version



# Article links

- Pilot studies of step training (linked articles) -Smartstep:
  1. [A randomized controlled pilot study of home-based step training in older people using videogame technology](#)
  2. [Interactive Cognitive-Motor Step Training Improves Cognitive Risk Factors of Falling in Older Adults - A Randomized Controlled Trial](#)
- [StandingTall](#)
  - A. [Pilot feasibility study of a home-based fall prevention exercise program \(StandingTall\) delivered through a tablet computer \(iPad\) in older people with dementia](#)
  - A. [A novel cognitive-motor exercise program delivered via a tablet to improve mobility in older people with cognitive impairment – StandingTall Cognition and Mobility Michele L. Callisaya a,b,\\* , Oshadi Jayakody b , Anagha Vaidya a , Velandai Srikanth a , Maree Farrow c , Kim Delbaere d,e](#)



# Helpful resources

- [Choose active booklets](#)
- [Active and Healthy website](#)
- [StandingTall website](#)
- [Health Direct Physical Activity for Older People Guidelines](#)
- [Better Health Vic Govt Physical Activity for Seniors](#)
- [Alzheimers Australia – Physical Activity for Brain Health and Fighting Dementia fact sheet](#)

