



**Neuroscience
Research Australia**

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***StandingTall* Exercise Program and other healthy retirement interventions**

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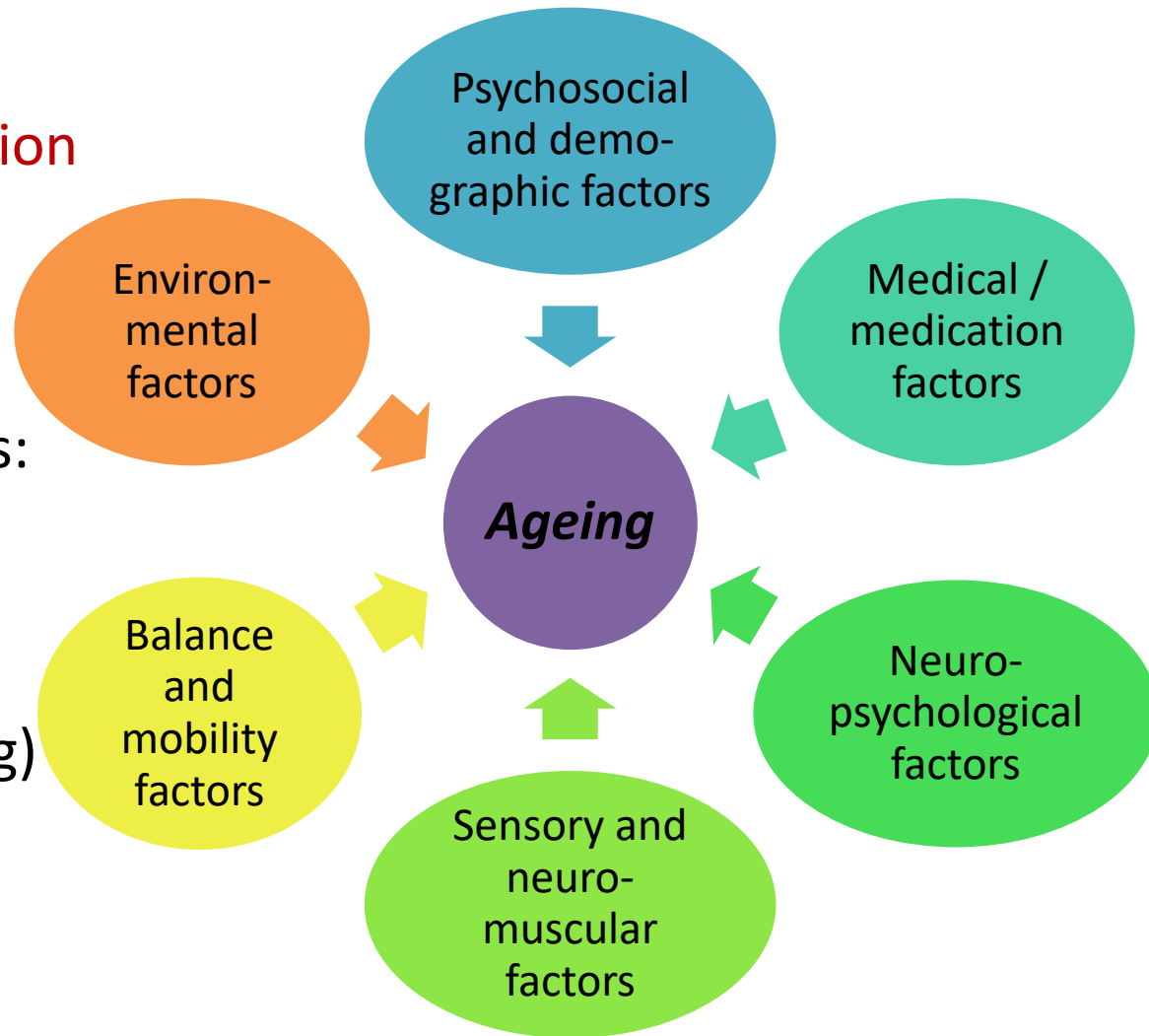
www.NeuRA.edu.au

Healthy ageing and pathological ageing

Healthy ageing results from a **complex interaction** of different risk factors.

There are 3 key domains:

- Physical (balance, strength)
- Affective (mood, fear of falling)
- Cognitive (executive function)



Growing ageing population

Upsurge in chronic conditions results in unsustainable health care demands into the future



Novel methods for delivery of quality healthcare are required to increase effectiveness of health services

- More accurate diagnosis for better targeting and tailoring of interventions
- Active engagement by the older person through self-management
 - Optimised delivery and dissemination by using technology
 - Maximizing adherence through continuous monitoring
 - Containing costs towards increased cost-effectiveness

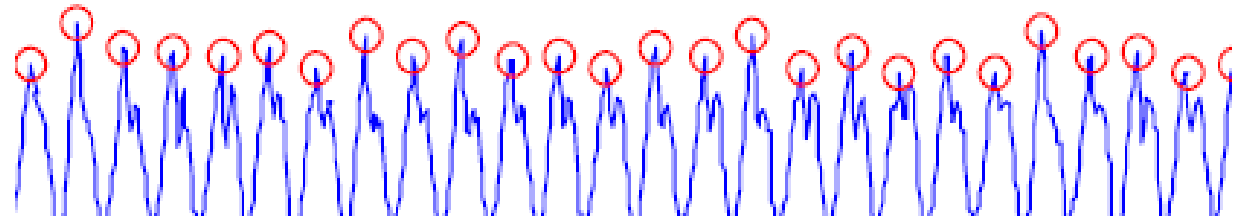
Daily activity monitoring

Examples:

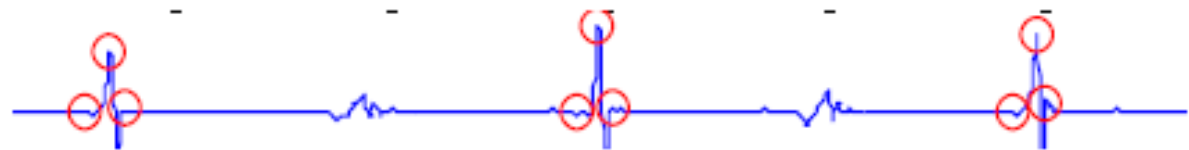
Overall activity monitoring



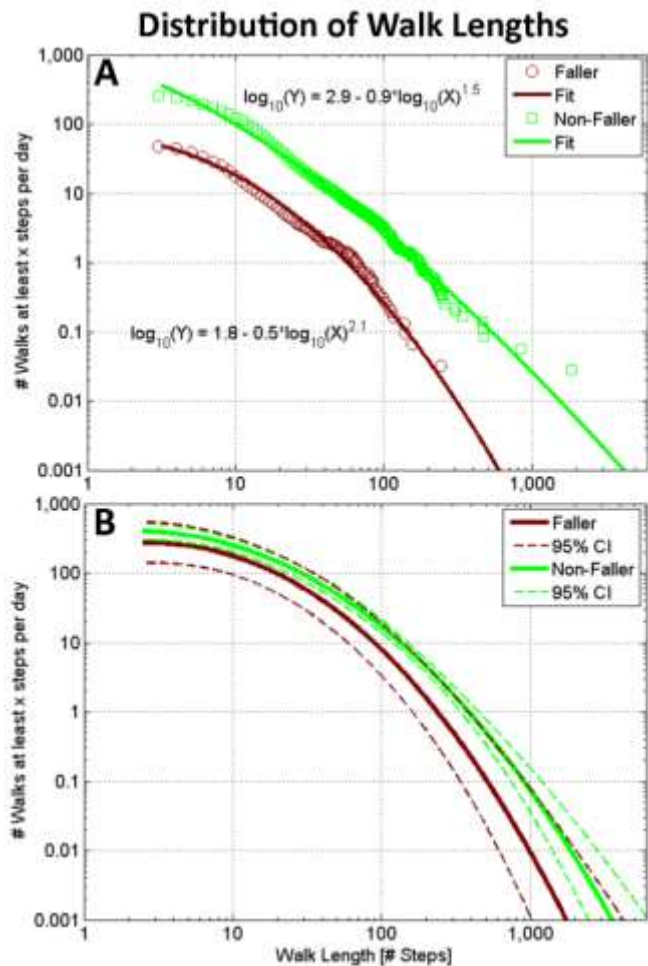
Walking



Chair rise transfers

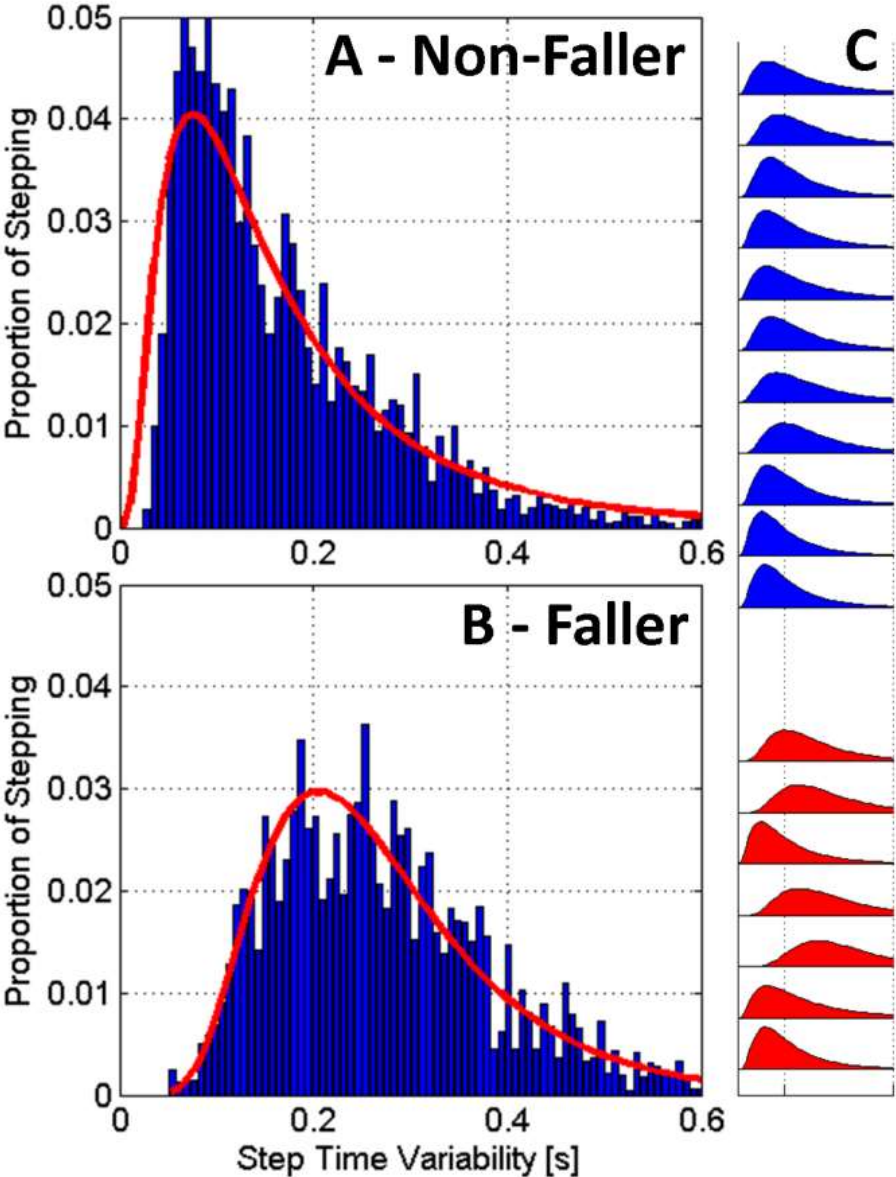


People take more short walks than long walks



- Panel A: non-fallers completed
 - more walks (visualised by the vertical shift to the line of best fit).
 - a greater proportion of longer walks (visualised by the flatter line of best fit) .
- Panel B: non-fallers completed
 - more walks of all lengths
 - Note: group separation between fallers and non-fallers increased with walk length

Gait Quality



Mode of step time variability

- Greater in fallers (0.12 seconds)
- Smaller in non-fallers (0.08 seconds)
- $p=0.04$

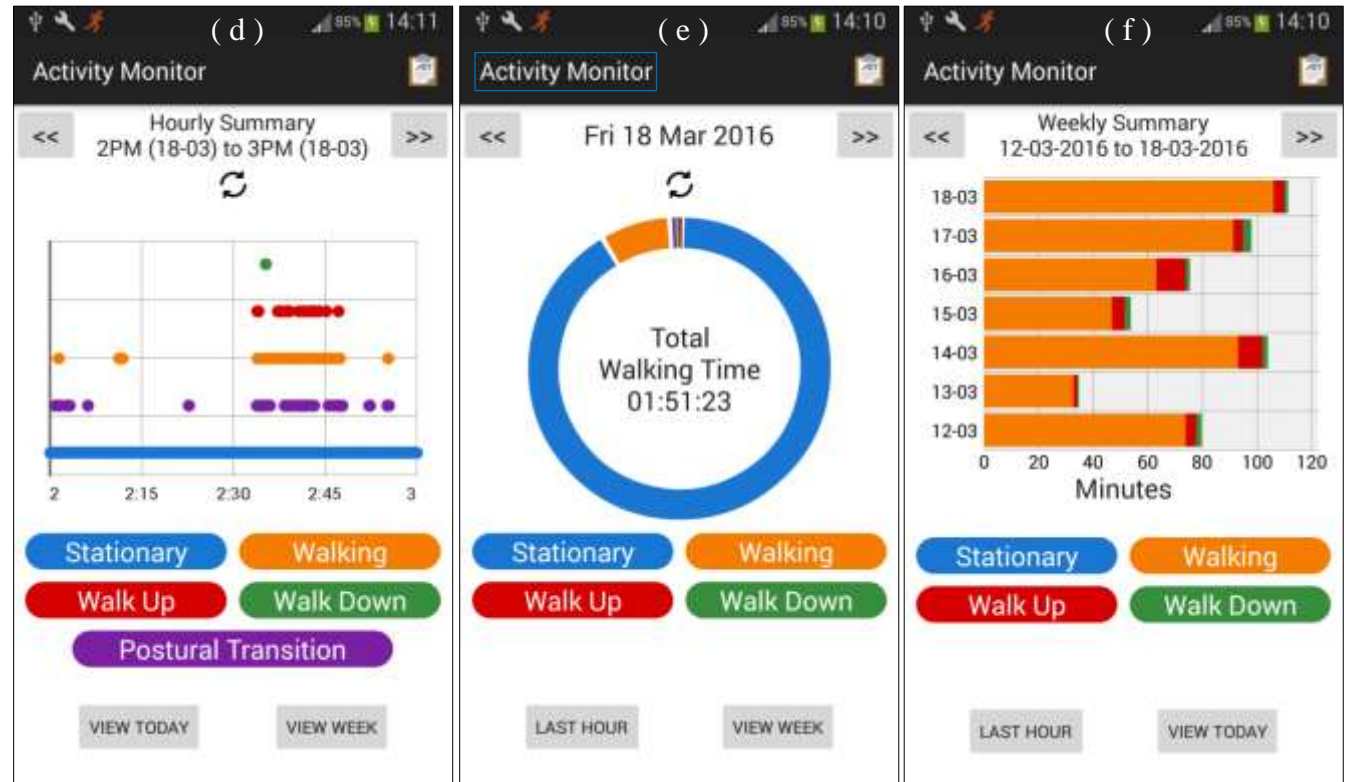
Brodie, et al. Eight weeks remote monitoring using a freely worn device reveals unstable gait patterns in older fallers. Biomedical Engineering, IEEE Transactions. 2015. 62 (11): 2588-2594

Smartphone technology provides a viable platform on which to perform long-term activity monitoring



Del Rosario et al. *Physiol Meas*, 2014

Del Rosario et al. *IEEE J Biomed Health Inform.* Epub 11/12/2017

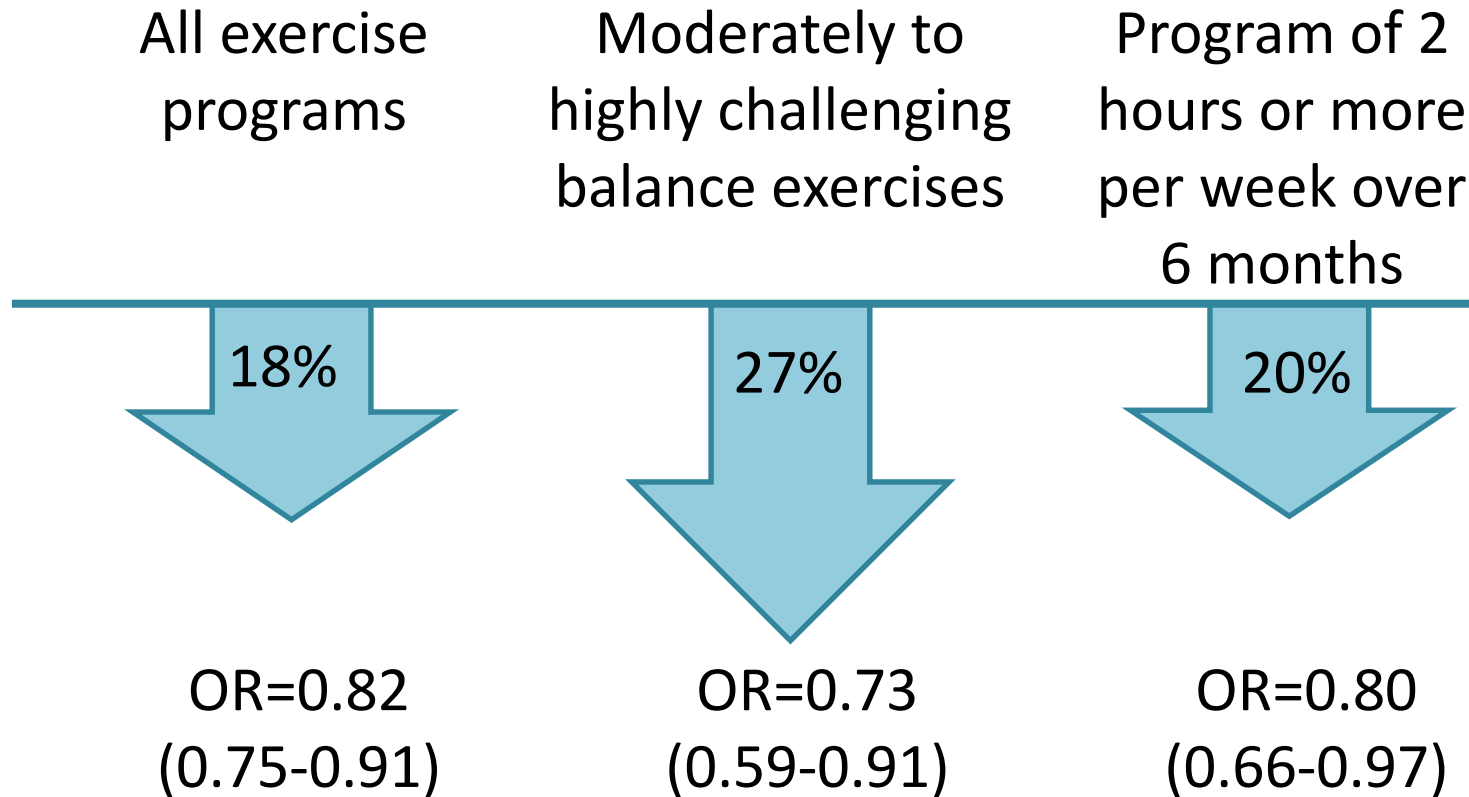


Exercise can reduce falls



- **Exercise interventions** are the single most effective strategies to reduce the rate of falls (Gillespie et al., 2012)
- Moderately to highly challenging **balance exercises** and performed for at least **two hours a week** over a 6-month period (Sherrington et al., 2008)
- **Falls reductions of 37% to 42%** (Sherrington et al., 2008-2015)

Exercise can reduce falls



Falls reductions by 42%

Challenges in the real-world setting

- **Uptake**

- Most older people do not know that exercise can reduce fall risk and other co-morbidities.
- Education addressing the individual's beliefs about their health and treatment.

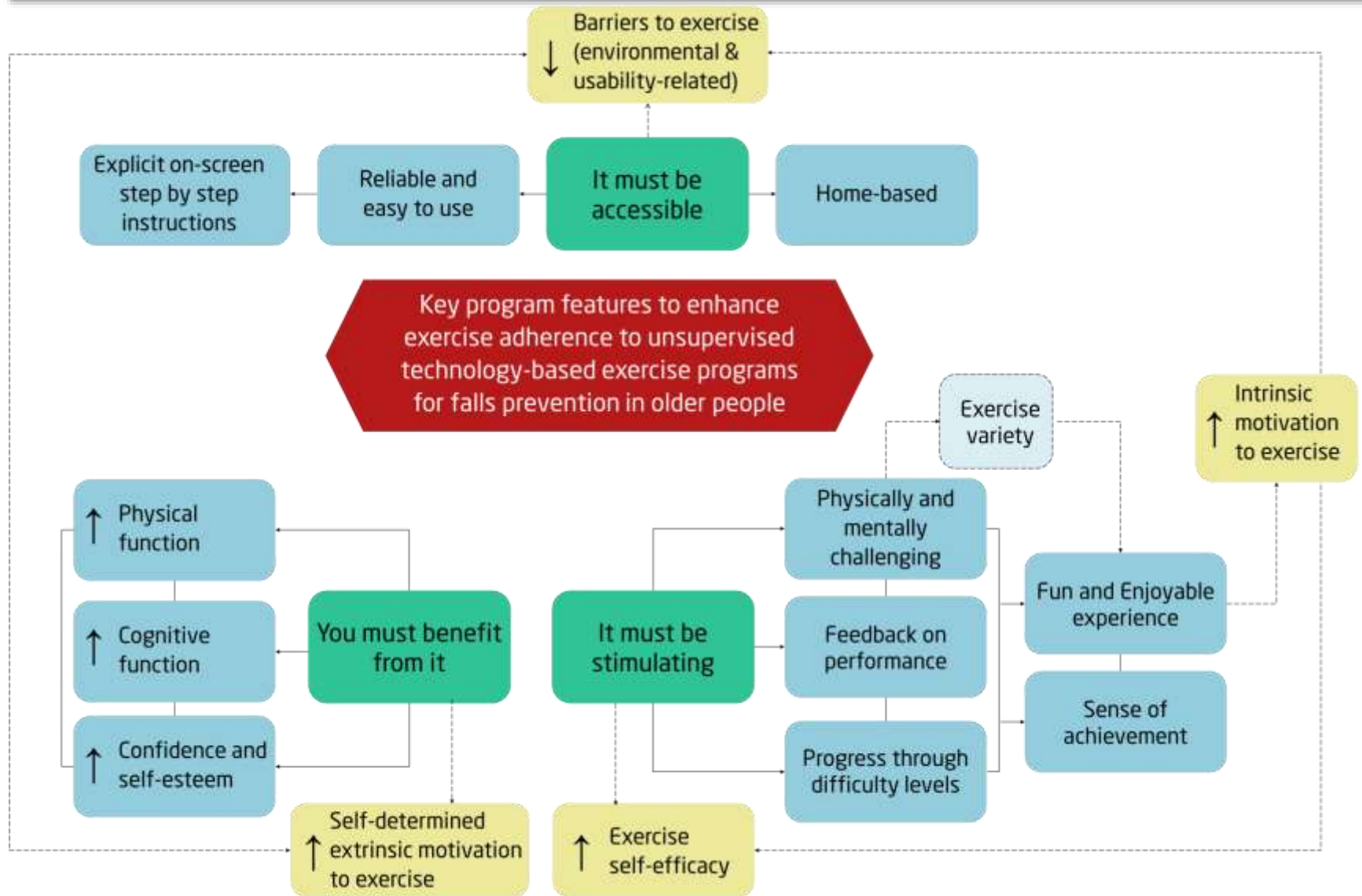


- **Long-term adherence**

- Compliance with recommended dose (duration and intensity)
- Attendance
- Completion (retention)
- Challenging yet feasible program, tailored to personal circumstances and abilities.

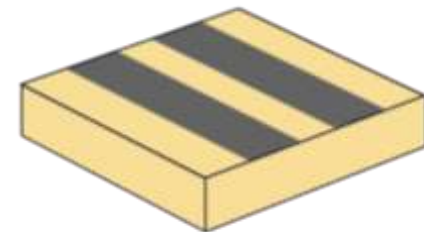
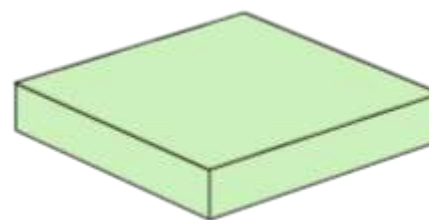
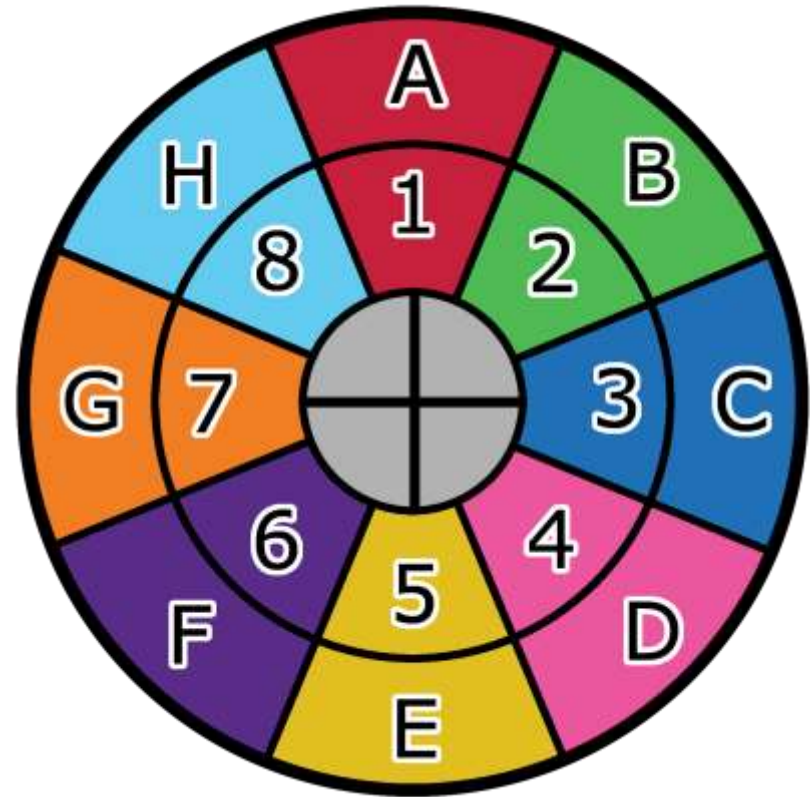
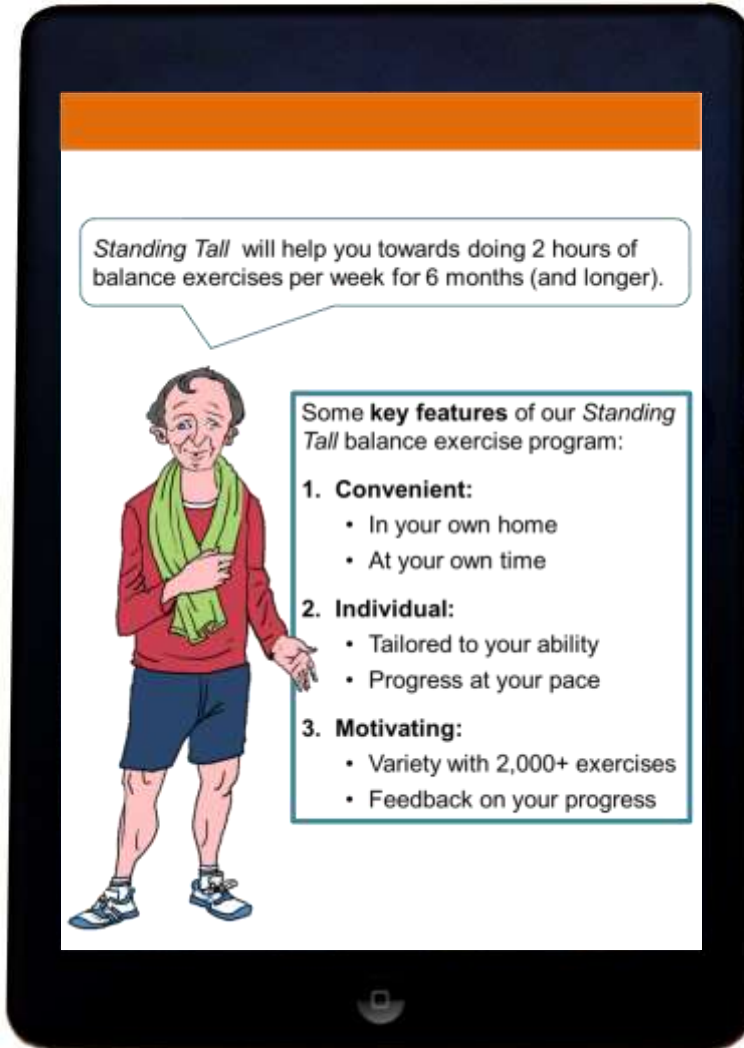


Designing an exercise program using technology

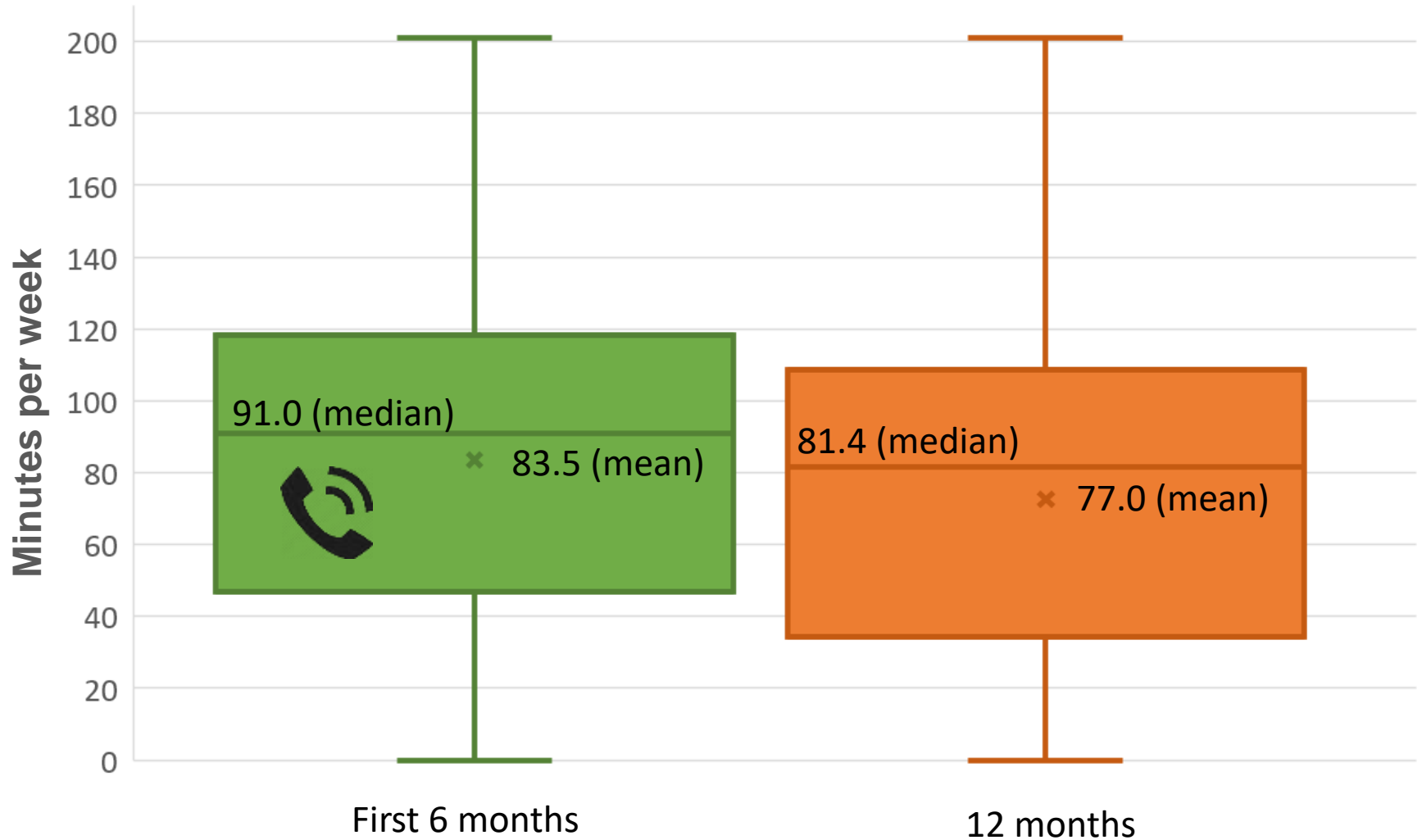


Example of tablet app

STANDING TALL

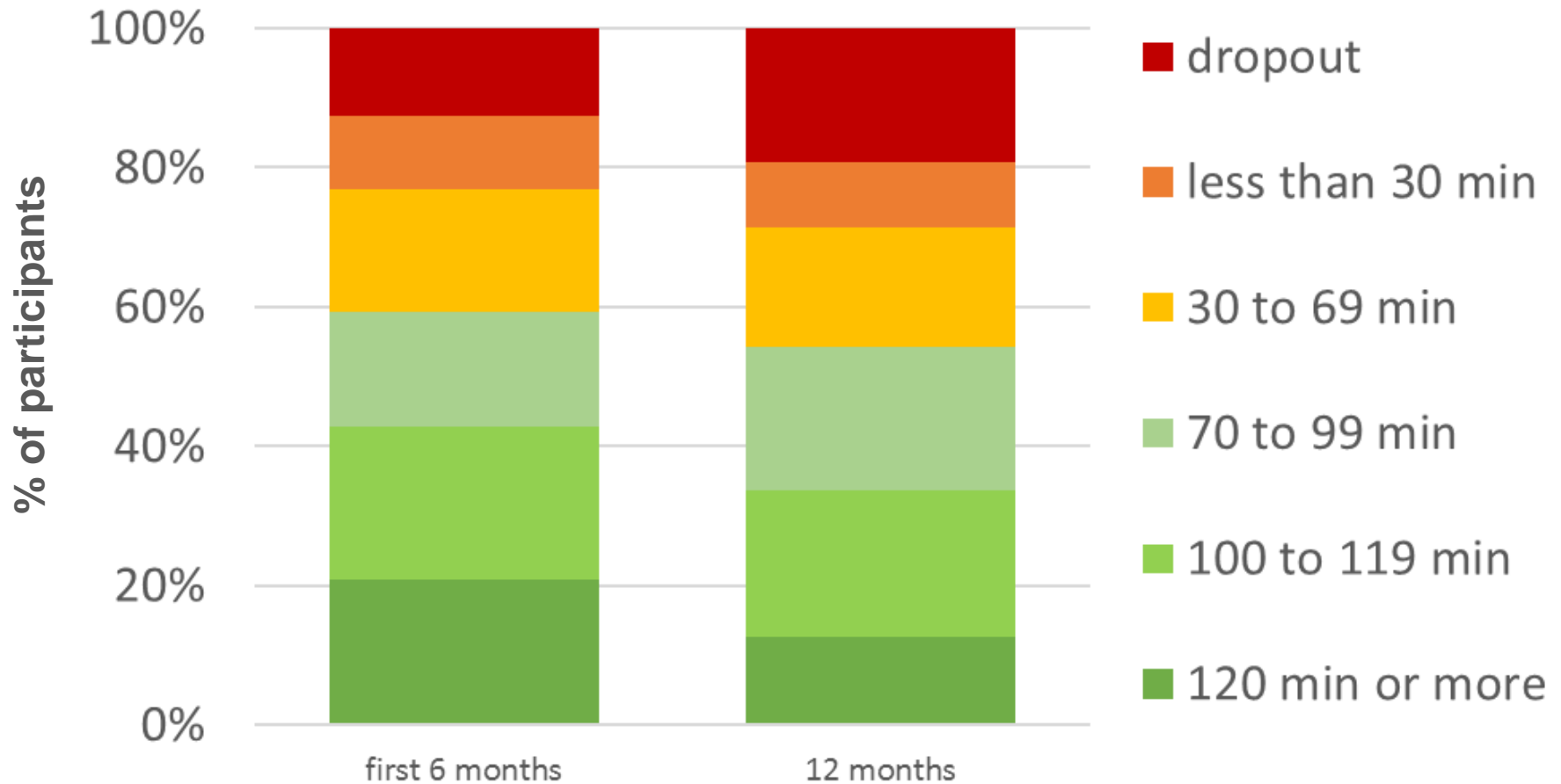


Adherence

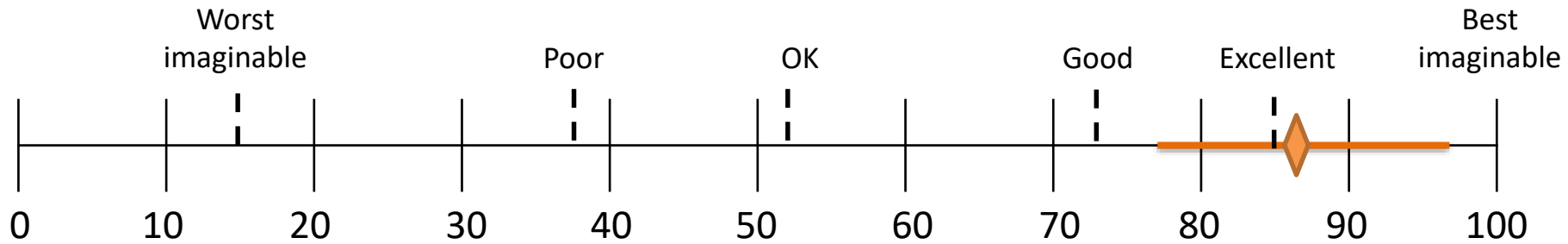


Adherence

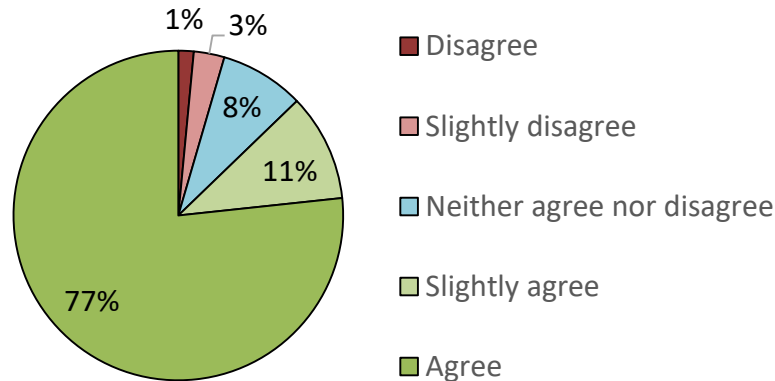
Average minutes per week



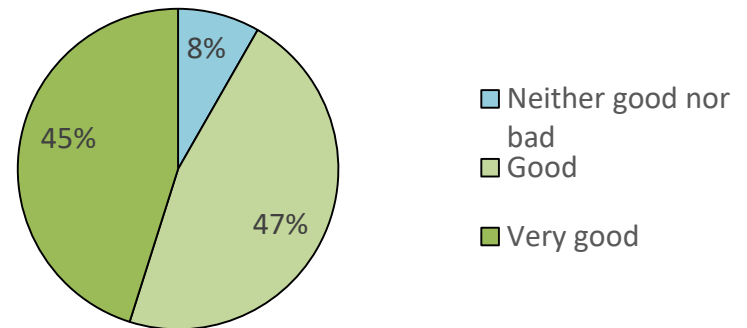
Enjoyment and Usability



I enjoy using the *StandingTall* Program as a means to exercise my balance



I would rate the user-friendliness of the *StandingTall* Program as



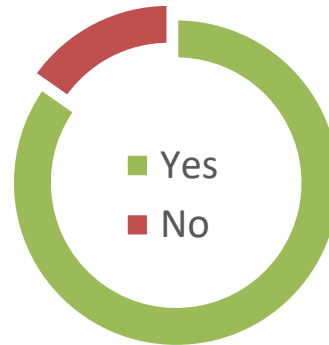
I am more agile. I can pick things up from the floor, stand up from sitting quite easily and can get in and out of the bath.

It is making me stronger and more in control of my balance. Some of the exercises I still find quite difficult. Others I find quite easy. It is now a part of my life

So far, has *StandingTall* benefited you in any way?



Given me peace of mind, helping balance and knowing I am doing all and what I can for better quality of life.



Vastly improved balance; quick recovery to threatening fall situations

Helped greatly with balance

Given me confidence with regard to balance and walking.

Established the habit of weekly exercise and improved strength

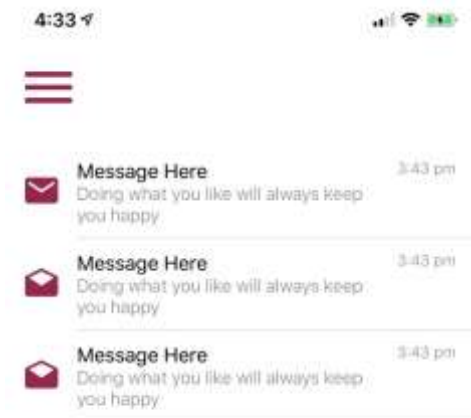
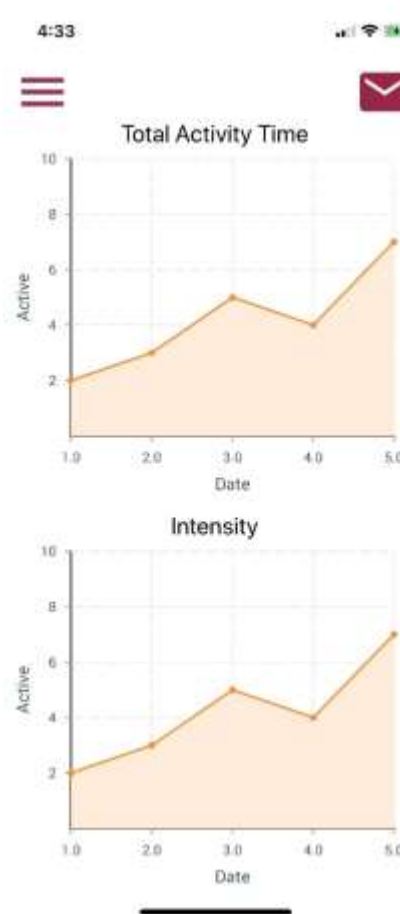
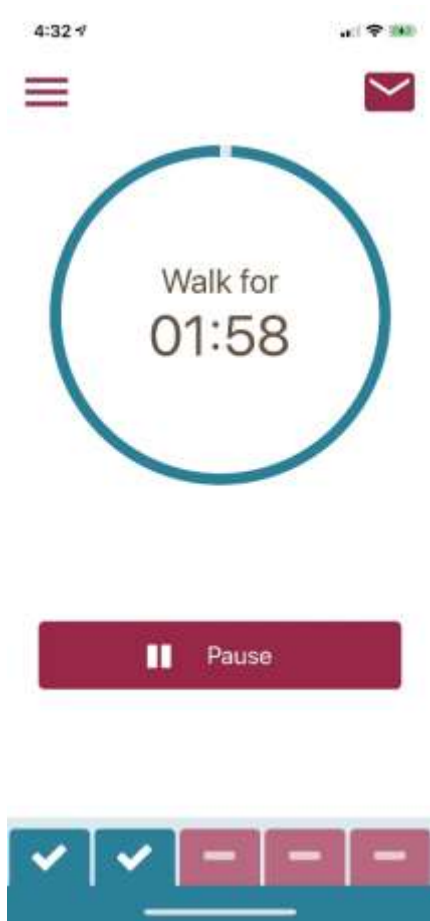
The program has benefitted my physical and psychological health and made me feel more aware of my body and health

I have integrated an exercise program into my daily routine



Example of smartphone program

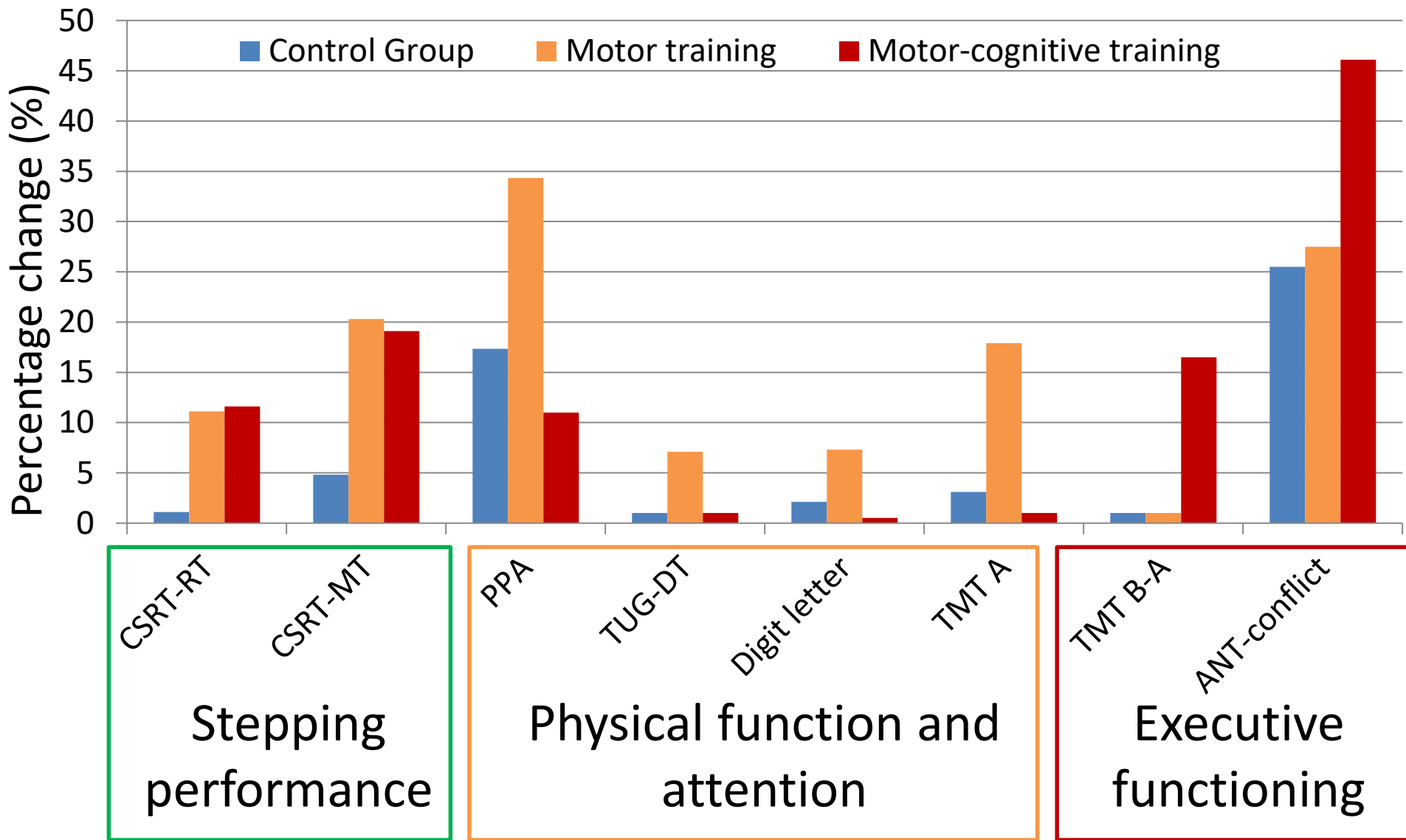
Interval walking app:



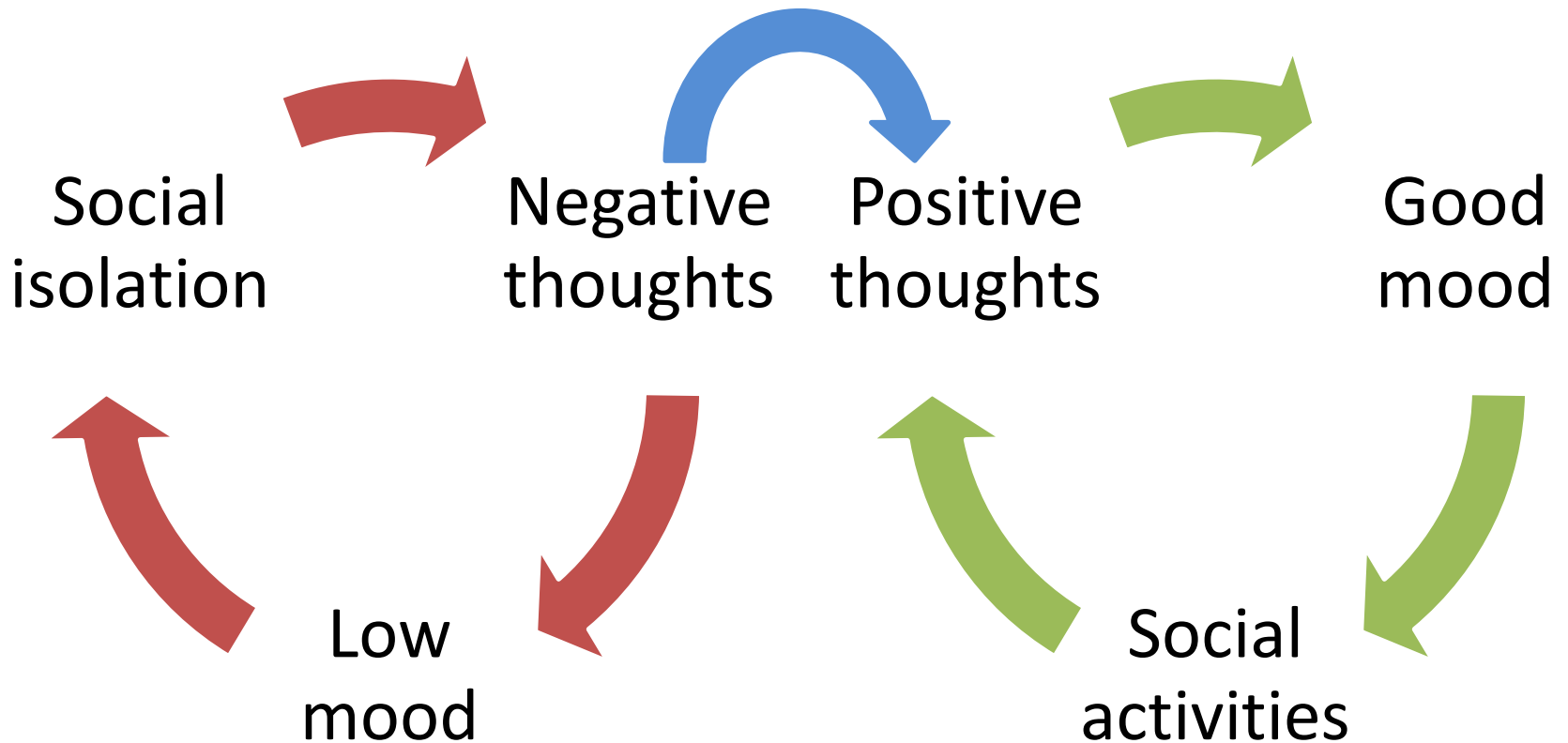
Cognitive motor training

- **Dose:** 60 minutes per week
- **Intensity:** moderately to highly challenging
- **Exercises:**
 - The motor component trains people to have a good static/dynamic balance (standing) and to take quick and accurate lateral and anterior-posterior steps (stepping) .
 - The cognitive component, delivered as fun ‘games’, trains specific executive functions including working memory, visuo-spatial skills, dual-tasking, inhibition and attention.
- **Progressions:** increase complexity and engagement by adding challenging cognitive tasks.

Dual-task training



Cognitive behavioural approach



Cognitive behavioural therapy

Best-practice principles used in CBT towards fall prevention

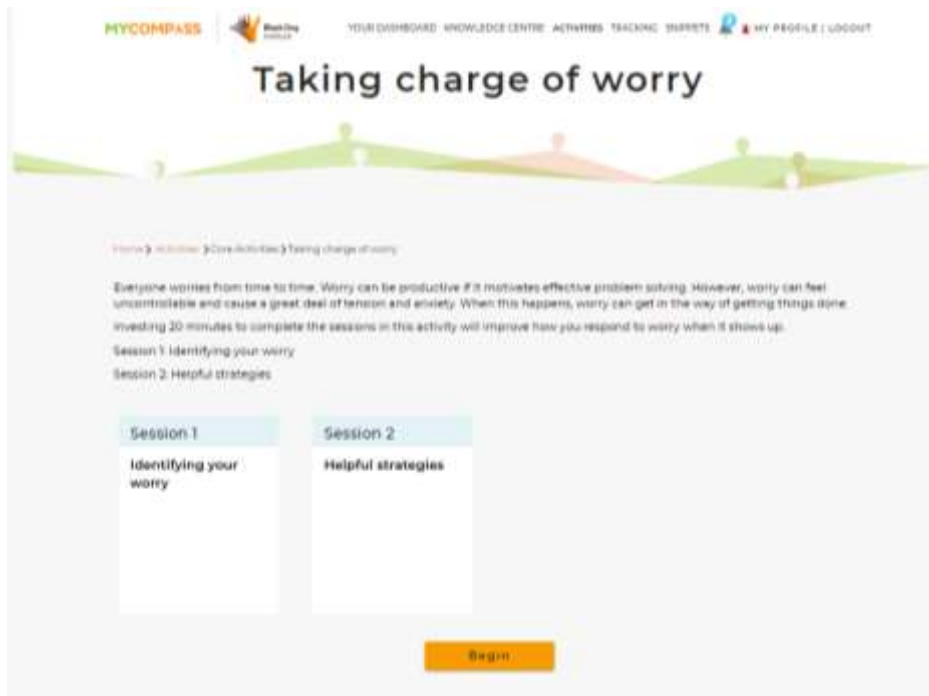
- Cognitive restructuring of misconceptions to promote a view of fall risk and fear of falling as controllable
 - E.g. **education** on commonness of fear of falling
- Behavioural activation, graded **exposure**: setting goals to encourage patients to approach activities that they are avoiding
 - e.g. first time together with someone else
- **Problem solving** towards activity avoidance, unsafe behaviour, and unsafe environment
 - e.g. install a handrail next to the bath tub
- **Assertiveness training** explaining the relevance of own assertive behaviour in fall prevention and learning to communicate in a considerate assertive way when they need assistance
 - e.g. ask for assistance

myCompass - Cognitive-Behavioural Therapy

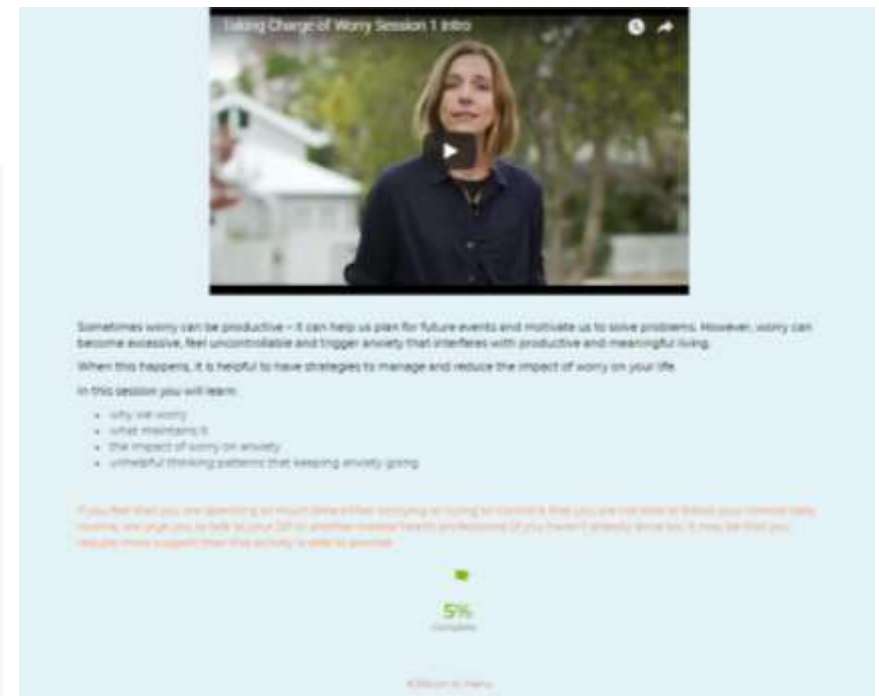
 Edit your tracking settings

myCompass Tracking will help you recognise unhelpful thoughts, feelings and behaviors that may impact your mental health.

Lets get started! >



The screenshot shows the myCompass dashboard for the 'Taking charge of worry' activity. At the top, there is a navigation bar with 'MYCOMPASS', the Black Dog Institute logo, and links for 'YOUR DASHBOARD', 'KNOWLEDGE CENTRE', 'ACTIVITIES', 'TRACKING', 'SHORTS', 'MY PEOPLE', and 'LOGOUT'. The main heading is 'Taking charge of worry'. Below this, there is a progress indicator showing 'Home > Activities > Core Activities > Taking charge of worry'. The text explains that worry can be productive but can also be unhelpful, and that completing the sessions will improve how one responds to worry. There are two session cards: 'Session 1: Identifying your worry' and 'Session 2: Helpful strategies'. A 'Begin' button is located at the bottom right.



The screenshot shows a video player for 'Taking Charge of Worry Session 1 Intro'. The video features a woman speaking. Below the video, there is text explaining that worry can be productive but can also become excessive and trigger anxiety. It lists what users will learn in this session: why we worry, what maintains it, the impact of worry on anxiety, and unhelpful thinking patterns that keep anxiety going. A progress bar at the bottom shows 5% completion. A small note at the bottom right says 'A video to watch'.

Health literacy and education program

Anxiety and Depression

Anxiety and depression can increase your risk of falling:

It is important to take care of your mental and cognitive health as you get older. Certain mental health conditions are common in older people e.g. 10-15% of people aged 65 and over have depression and about 10% experience anxiety. Depression, anxiety, sleep disturbances, and cognitive decline are all risk factors for falls.



Did you know?

Medicines used to manage depression, anxiety and poor sleep can increase your risk of falls, but you shouldn't stop or change your medication without consulting your doctor first.

Anxiety

Anxiety is a normal feeling people experience in response to threats in the environment and we all feel anxiety at some point in time. However, if a person is in a constant state of worry that affects their day to day life, they may have an anxiety disorder. Feeling anxious can increase your risk of falling. Anxiety can be expressed in different ways, examples are given below:

Behavioural	Feelings	Thoughts	Physical symptoms
Difficulty making decisions	Overwhelmed	Finding it hard to stop worrying	Racing heart
Being startled easily	Fear	"People are judging me"	Yawning and nausea
Avoiding objects or situations	Worry	"I'm going crazy"	Sleep disturbances
Avoiding eye contact	Dread	"I'm going to die"	Muscle tension

Depression

Depression is a mood disorder characterised by sadness or loss of interest in activities that used to bring happiness to a person. Depression may also manifest as persistent fatigue, feelings of guilt and low self-worth or disturbances in sleep, concentration or appetite. If you have felt sad, down or miserable for more than 2 weeks, you may have depression. This can increase your risk of falling. Examples of depressive symptoms are given below:

Behavioural	Feelings	Thoughts	Physical symptoms
Inability to find pleasure in any activity	Sadness	Indecisive	Sleeping more or less
Difficulty getting motivated in the morning	Emptiness	Loss of self-esteem	Fatigue
Withdrawing from family/friends	Mindless	Persistent suicidal thoughts	Slowed movement
	Worthless	"I'm a failure", "It's my fault"	Memory problems

Mental health, physical activity and other treatments

- Increasing your physical activity levels can help manage anxiety, depression and sleep problems
- Being physically active can also help manage/prevent other medical conditions e.g. cognitive decline, cardiovascular health
- Other treatments can also help conditions like depression and anxiety e.g. Cognitive Behavioural Therapy, or Interpersonal therapy – they focus primarily on education, problem solving, goal setting and behaviour change
- Sometimes medication might be needed too, your doctor will help determine this – it often depends on how severe the condition is and whether you respond to other therapy

Anxiety and Depression



Key points to remember:

- Anxiety and depression are relatively common in older people
- Anxiety and depression are risk factors for falls
- Certain medicines used to manage anxiety, depression and poor sleep can also increase your risk of falling – if you are taking medicines to manage these conditions, don't stop or change your medications without discussing with your doctor first
- If you are experiencing symptoms of anxiety or depression, talk to your doctor
- Physical activity and exercise can help manage anxiety, depression, stress and sleep problems
- There are other treatments for anxiety and depression too, consult your doctor or health care provider and come up with a plan that is right for you

What can I do right now?

- Talk to your doctor if you have symptoms of low mood, depression or anxiety
- Talk to someone you know and trust about the way you are feeling
- Consider being more physically active – if you haven't exercised for a while, start slow, with short sessions and gradually build up, if you have chronic health conditions talk to your doctor or physiotherapist before starting
- Consider other treatments for anxiety and depression, talk to your health care provider and come up with a plan that is right for you

For more information visit on anxiety and depression visit:

<https://www.blackdoginstitute.org.au/>
<https://www.beyondblue.org.au/>
<https://www.healthdirect.gov.au/depression-and-older-people>
<https://www.healthdirect.gov.au/anxiety>

*Please note: This information was current at the time of development and a generalisation for people 65 years+. The associations between mental health conditions and falls may not be the same, but we have presented the best evidence at this point in time.

CBT trials

1. RCT in 720 community-based people with mild-to-moderate depression or anxiety showed

- 7 weeks of myCompass - an interactive online cognitive-behavioural therapy program tailored to individuals with depression and anxiety.
- Significant between-group differences at 3 months follow-up on symptoms of depression and anxiety

Proudfoot et al. BMC Psychiatry 2013

2. RCT in 540 community-based people with fear of falling, aged 70+ years

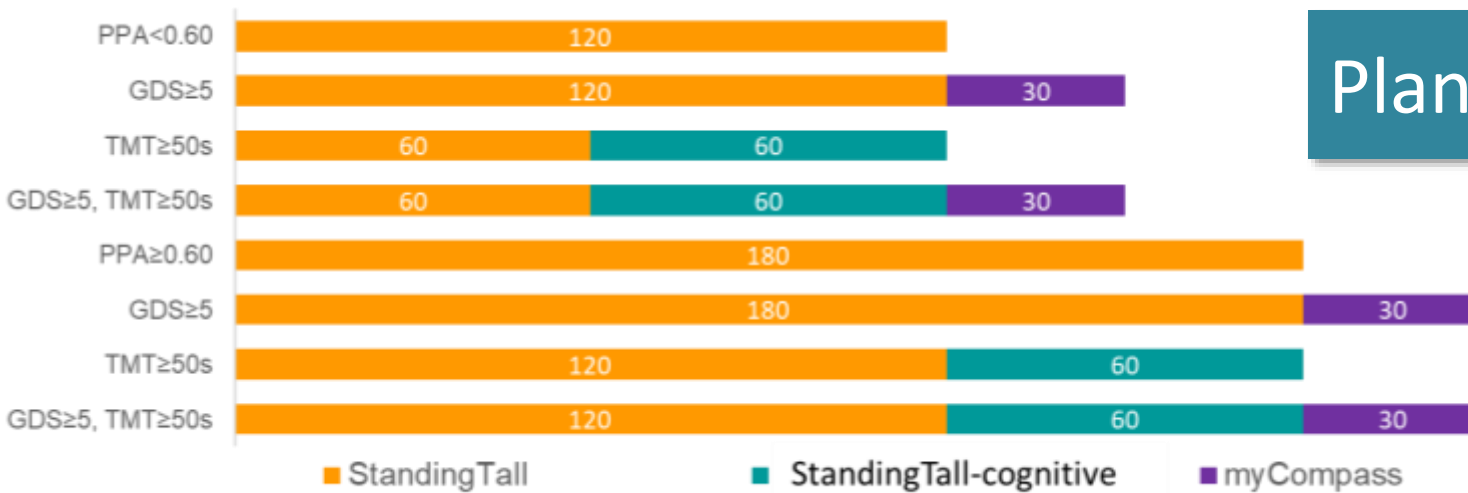
- 8 weekly CBT group sessions over 2 months aimed at instilling adaptive and realistic views on falls, reducing fall risk, and increasing activity and safe behaviour
- Significant between-group differences at 2 months and 14 months follow-up on fear of falling, activity avoidance, and daily activity levels

Zijlstra et al. J Am Geriatr Soc 2009

PROs and CONs of multifactorial interventions

- THEORY:
 - benefits of multifactorial interventions > benefits of single interventions
 - considering the multifactorial aetiology of many ageing related conditions
- IN PRACTICE:
 - The cost in both time and other resources is most likely to be greater than with single interventions.
 - Uptake, adherence, and long-term participation in the program may be less when more is required of the participants.
 - More interventions also mean more potential adverse affects.
 - In multifactorial trials, it is also difficult to determine the effective component.

Planned RCT



- A randomised controlled trial will be conducted in 518 community-dwelling older adults at high-risk of falls.
 - Primary outcome measures include number of fallers and fall rate recorded in weekly fall diaries at 12 months.
 - Secondary outcome measures include physical, affective and cognitive function at 6 months.
 - Economic analyses will be assessed from a health and community care provider perspective.
- We hypothesize that our program will improve balance, cognitive function and mood, increase physical activity levels and reduce falls in older people, when compared to a health promotion program.
- This trial addresses a key gap in the translation of current knowledge in fall prevention research and will provide direct evidence about the cost and effectiveness of a tailored “best-bet” solution.

Conclusion

Over the years, technology has made us more efficient and productive, across many different areas.

Novel technologies have an important role for successful fall prevention.

Conclusion

- **Findings:**
 - Effective at improving balance, mood and cognitive function
 - Feasible to deliver exercise programs in the homes of older adults
- **Advantages:**
 - Enables greater choice in preferred exercise options, increased convenience and greater level of engagement.
 - Automated tailoring and progression.
 - Monitoring of progress and adherence to the program
 - Immediate performance feedback
 - Highly accessible to large populations, including people living in regional and remote areas
- **Implementation studies needed to trial in clinical practice:**
 - Information for feedback to health care practitioners, older adults
 - Support within existing services
 - Fidelity and real-world effectiveness

StandingTall implementation in Lismore

Lismore will be our first test site to try *StandingTall* in real life.

Return Home

How-to: Step Up and Over Forwards



Let's learn how to do the exercise. If you already know how, or kind of remember, you can use the Quick Refresh or Skip Buttons below.



00:00

00:54

Quick Refresh

Back to exercise

Pause Exercise

Sit-To-Stands with arm support



Set: 1 / 3

Duration: 12 seconds

Exercise Progress



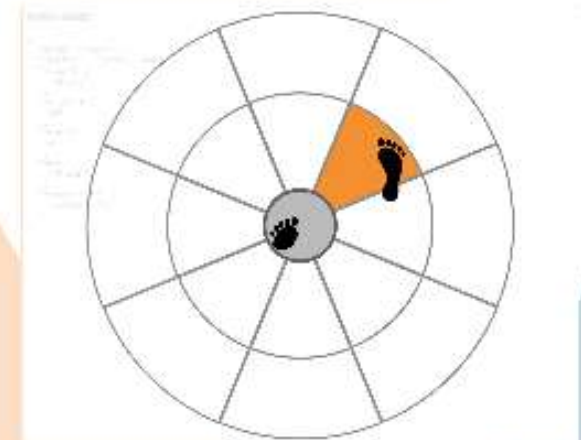
Tips & Hints ?

Pause Exercise

Step and Rock - Short Steps

Duration: 36 secs

Exercise Progress



Tips & Hints ?

StandingTall implementation in Lismore

Lismore will be our first test site to try *StandingTall* in real life.

- Available on all devices
- Remote access to settings and adherence



Settings: Exercises

You can modify which exercises are included in the app by switching on and off the following options.

Type	Checkpoint	Include
Floor	1 ▼	<input type="checkbox"/>
Foam	1 ▼	<input checked="" type="checkbox"/>
Box	1 ▼	<input checked="" type="checkbox"/>
Dartboard	1 ▼	<input checked="" type="checkbox"/>
4x4 Grid	1 ▼	<input checked="" type="checkbox"/>

Standing Tall

Filter: All Members

Information

Columns & Views

Team & Projects

Filter

Overview

Task Structure

Tasks

Member	Task Name	Status	Progress	Start Date	Due Date	Assignee	Priority	Comments
john.doe@corp.com	Task A	Complete	100%	2023-01-01	2023-01-05	John Doe	High	Task completed successfully.
john.doe@corp.com	Task B	In Progress	75%	2023-01-02	2023-01-10	John Doe	Medium	Task is 75% complete.
john.doe@corp.com	Task C	Not Started	0%	2023-01-03	2023-01-15	John Doe	Low	Task not started yet.
john.doe@corp.com	Task D	Complete	100%	2023-01-04	2023-01-08	John Doe	High	Task completed successfully.
john.doe@corp.com	Task E	In Progress	50%	2023-01-05	2023-01-12	John Doe	Medium	Task is 50% complete.
john.doe@corp.com	Task F	Not Started	0%	2023-01-06	2023-01-20	John Doe	Low	Task not started yet.
john.doe@corp.com	Task G	Complete	100%	2023-01-07	2023-01-10	John Doe	High	Task completed successfully.
john.doe@corp.com	Task H	In Progress	20%	2023-01-08	2023-01-18	John Doe	Medium	Task is 20% complete.
john.doe@corp.com	Task I	Not Started	0%	2023-01-09	2023-02-01	John Doe	Low	Task not started yet.
john.doe@corp.com	Task J	Complete	100%	2023-01-10	2023-01-15	John Doe	High	Task completed successfully.

Download Report

Standing Tall

Filter: All Members

Information

Columns & Views

Team & Projects

Filter

Overview

Task Structure

Tasks

Task Details

Task Name: Task A

Status: Complete

Progress: 100%

Start Date: 2023-01-01

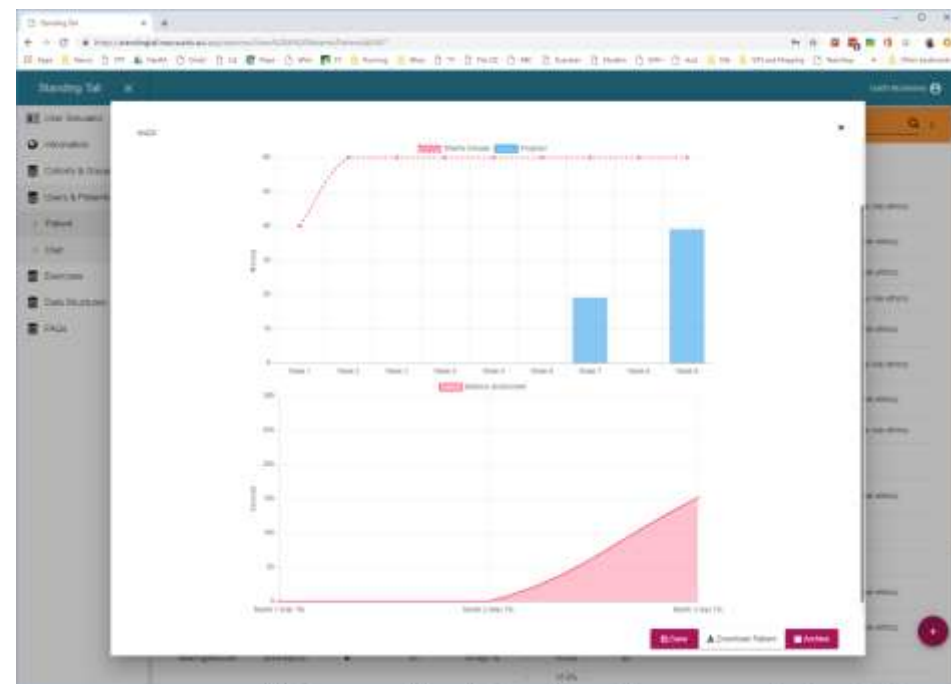
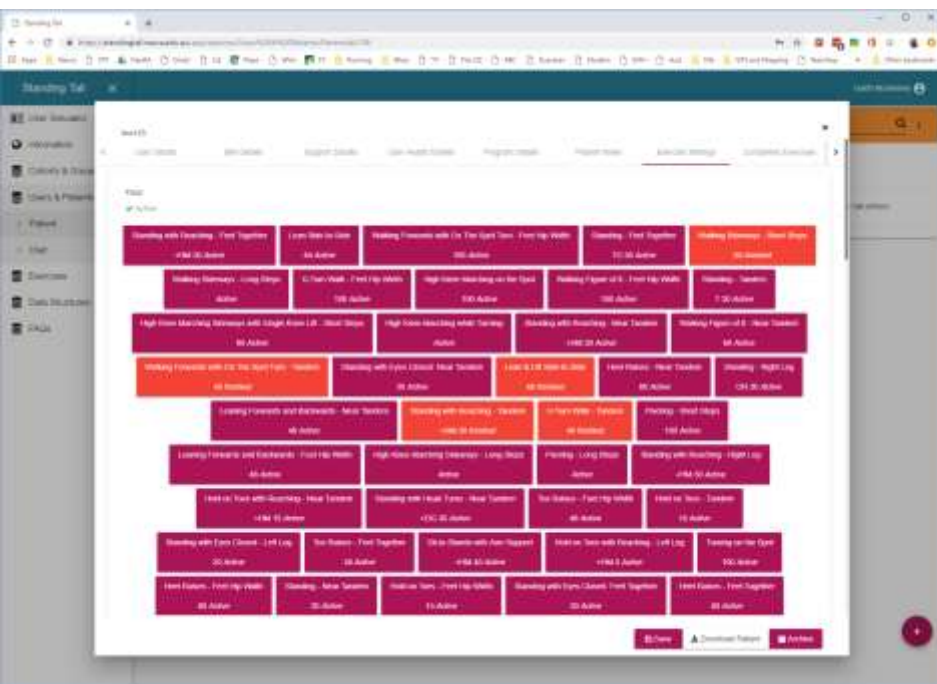
Due Date: 2023-01-05

Assignee: John Doe

Priority: High

Comments: Task completed successfully.

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Thank you!

For further questions

Contact:

Kim Delbaere

k.delbaere@neura.edu.au



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