

*how the fear in our step can cause a fall
&
how bespoke technology can help*

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Tri-Nations Falls Forum

Monday 18th September 2017

www.NeuRA.edu.au

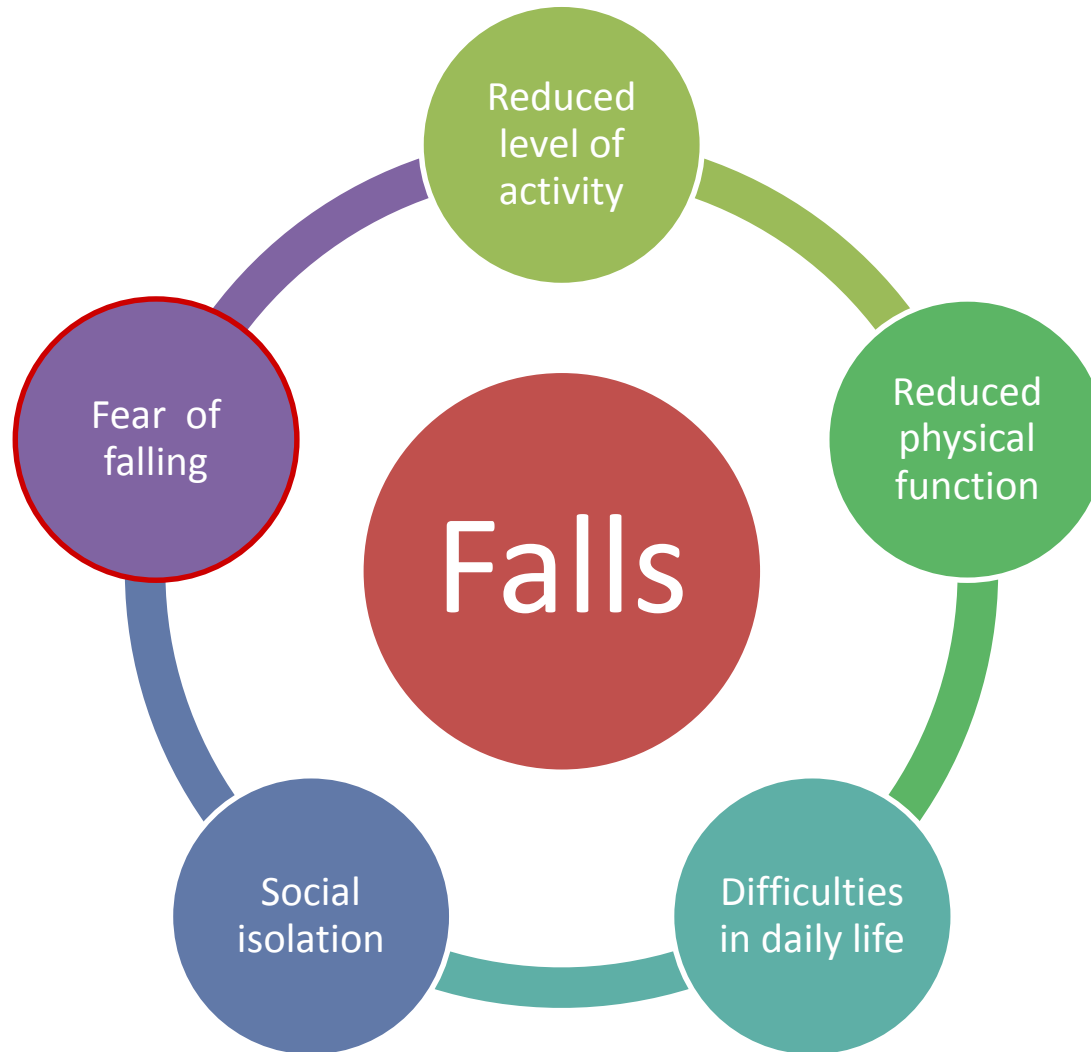
1. how the fear in our step can cause a fall

2. how a bespoke technology-based exercise program can help

Fear of falling

- Important psychological factor associated with falls in older people (since 1982)
 - Fear of falling is a persistent feeling related to the risk of falling during one or more activities of daily living
- Prevalence
 - 29-92% in older people who have already fallen
 - 12-65% in older people who have NOT fallen
 - Women > men, Increases with age
- Many associated factors
 - Falls
 - Physical factors: frailty, poor balance, poor gait
 - Psychological factors: depressed mood, anxiety, social isolation

Mechanisms in relation to falls



Fear of falling – its helpful side

- Fear of falling may reflect a realistic appraisal of reduced functional abilities and consequent increased risk of suffering a fall and fall injuries.
- Such a fear may result from
 - First-hand experience, e.g. a near fall or a recent fall that resulted in pain, embarrassment or injury
 - Actual falls risk, as is reflected in the high correlation between objective measures of physiological factors and fear of falling.
- Fear of falling can be a normal adaptive response to challenged equilibrium. Such insight might prevent people from undertaking activities that could expose them to risky situations.

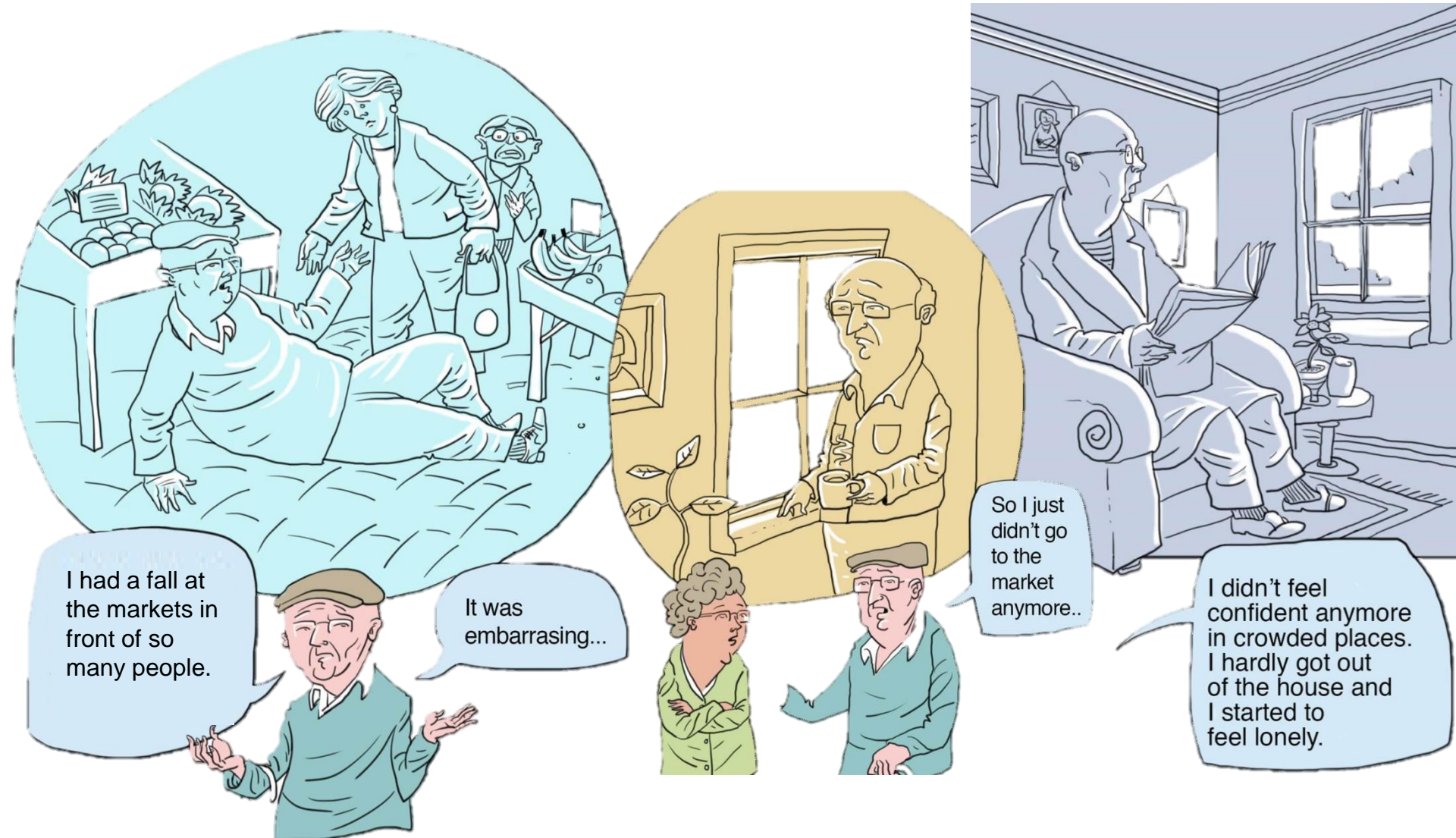
How would you feel about your risk of falling during these activities?



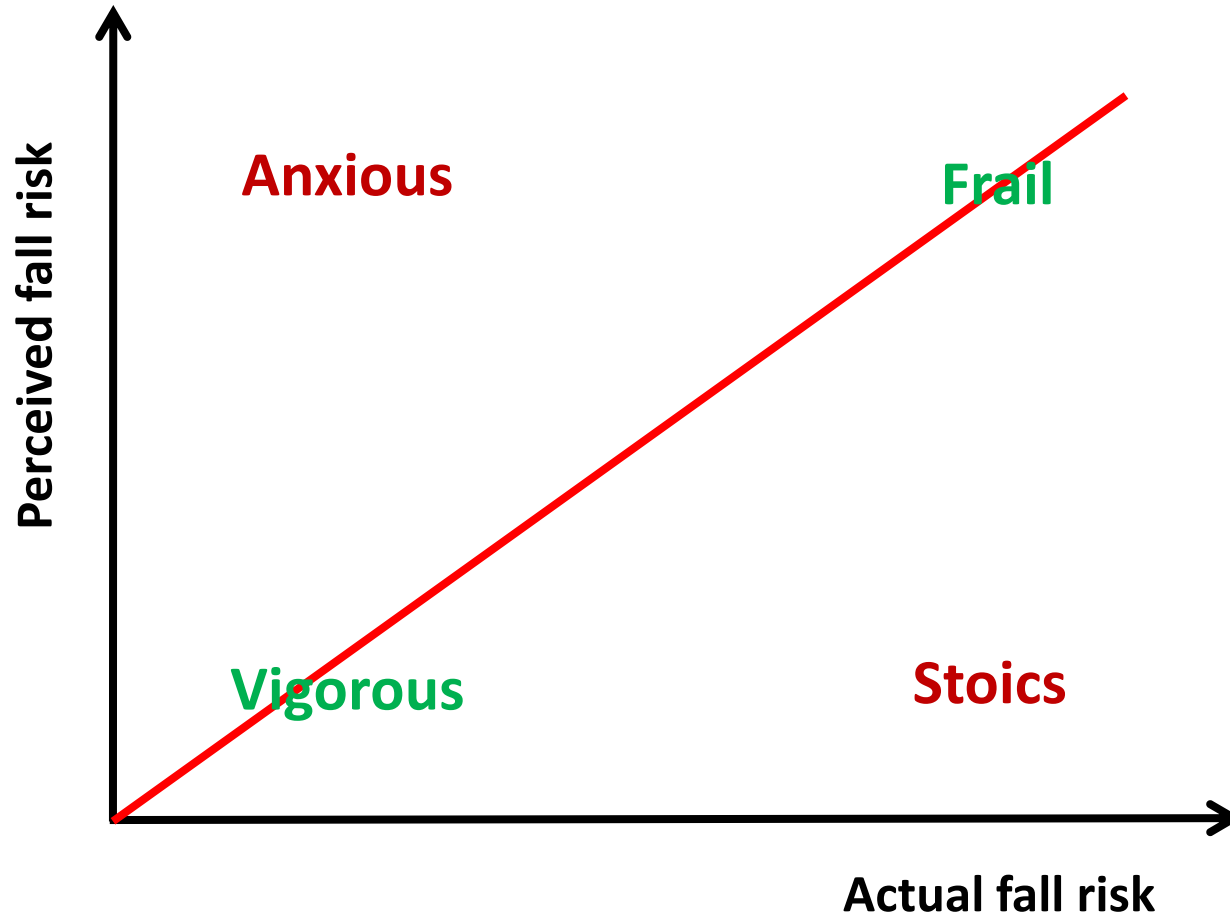
Fear of falling – its unhelpful side

- Fear of falling can be irrational, excessive or phobic which then results in a persistent and dysfunctional disruption of attention and behaviour.
- Such a fear may result from
 - Catastrophizing or thinking the worst of events
- Fear of falling may then have a detrimental effect upon several domains of life, including the needless restriction of activities of daily living and enjoyable pastimes, which may, then, lead to physical inactivity and social isolation.

Fear of falling – its unhelpful side

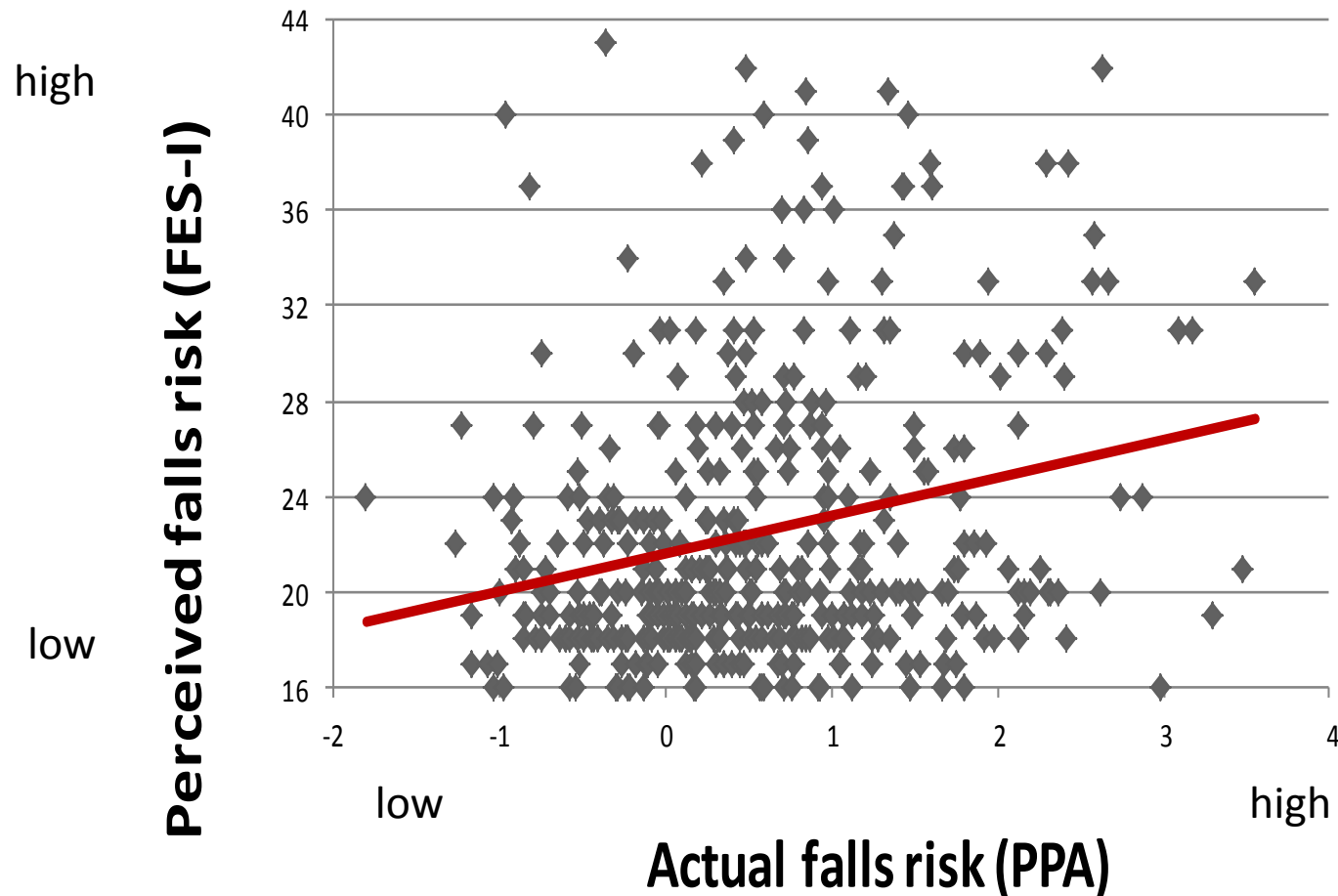


Fear of falling: **helpful** vs **unhelpful**?



DELBAERE K, Close JCT, Brodaty H, Sachdev P, Lord SR. Determinants of disparities between perceived and physiological risk of falling among elderly people: Cohort study. *BMJ*. 2010;341(c4165): 1-8

Fear of falling: **helpful** vs **unhelpful**?

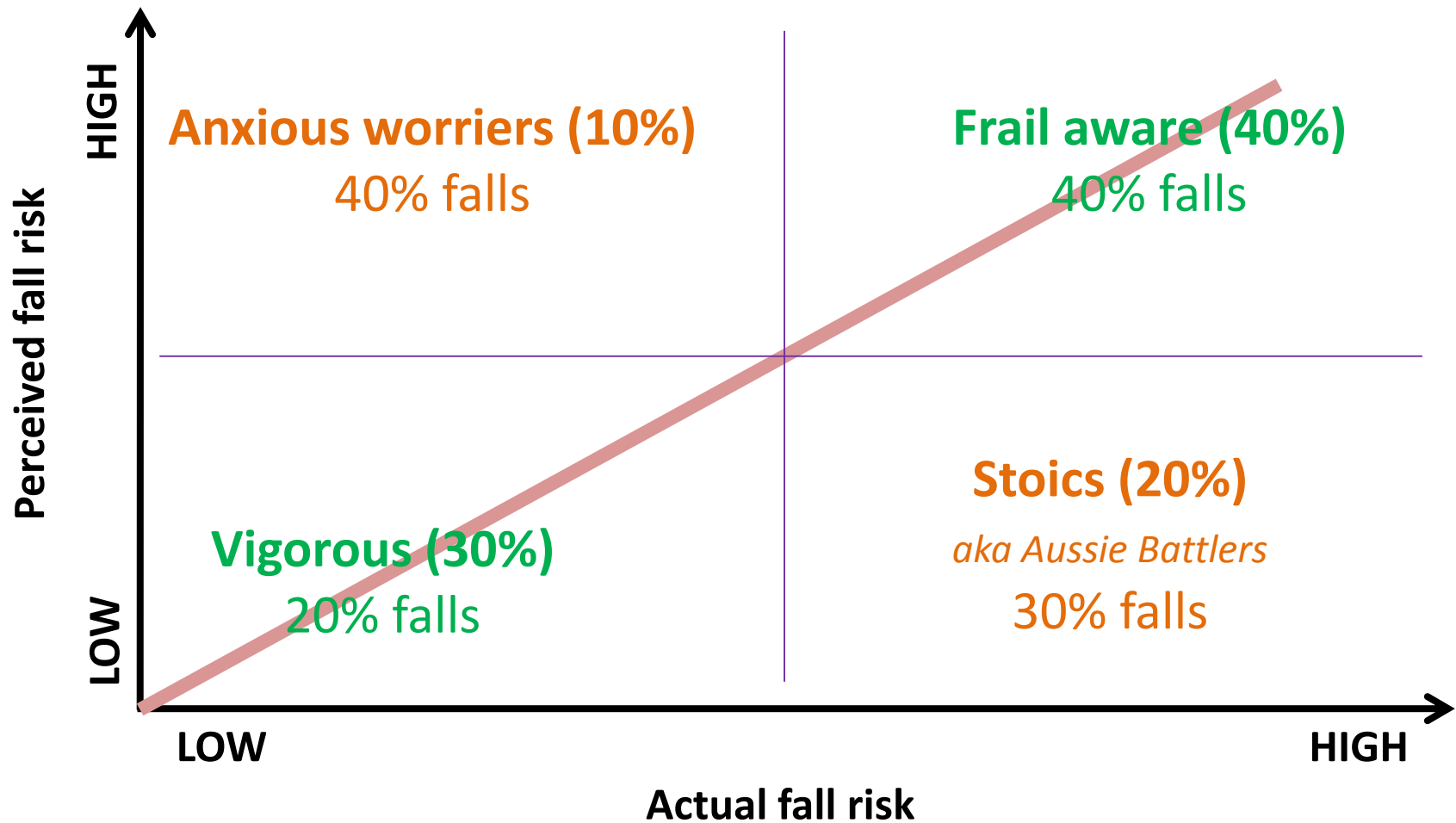


Pearson's $R=0.19$

$F_{1,499}=17.14$

$p<0.001$

Fear of falling: **helpful** vs **unhelpful**?



Worrier



- No obvious identifiable (instability-related) fall risk
- **Psychological profile:** neurotic personality traits, i.e. increased vulnerability to develop irrational fears
- Worse self-perceived health
- More depressive symptoms
- Lower quality of life

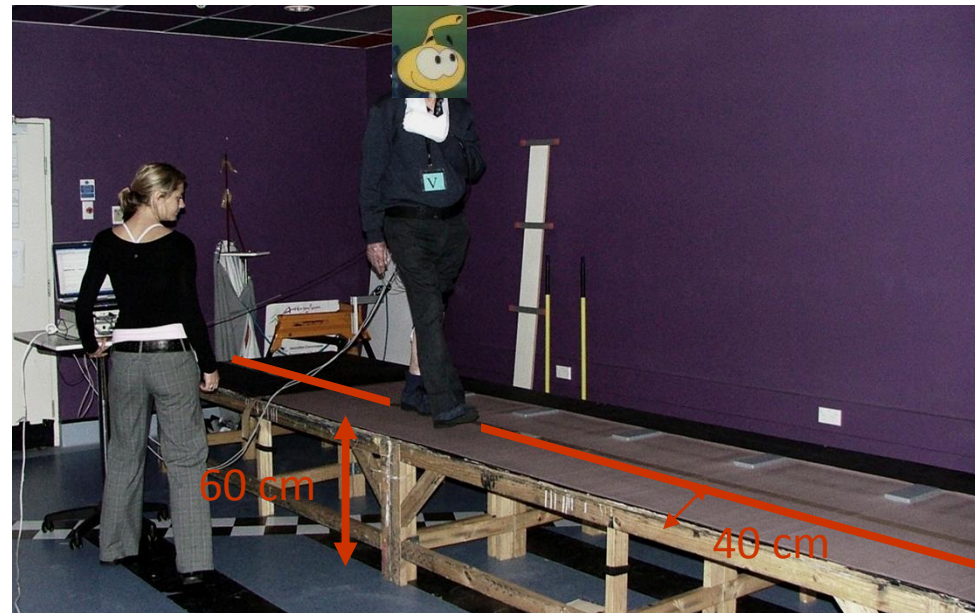
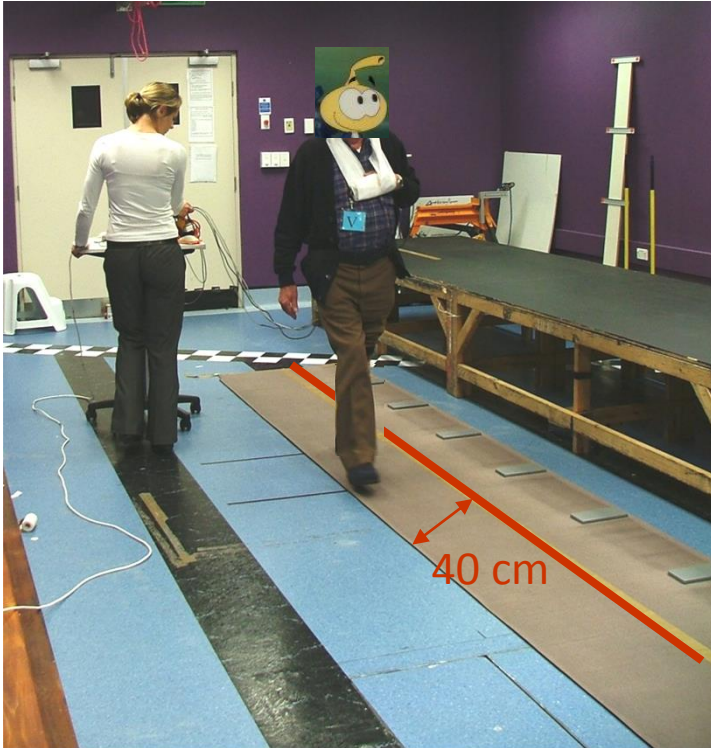
Age-related physical decline is normal

- Age-related physical decline requires continuous adjustments of the perception of how well people are able to do certain activities.
- Based on their perception, they will have to select an appropriate behaviour as well as motor strategy to be able to conduct the activity without falling.
- **How do people achieve this? And can people 'over-do' it?**

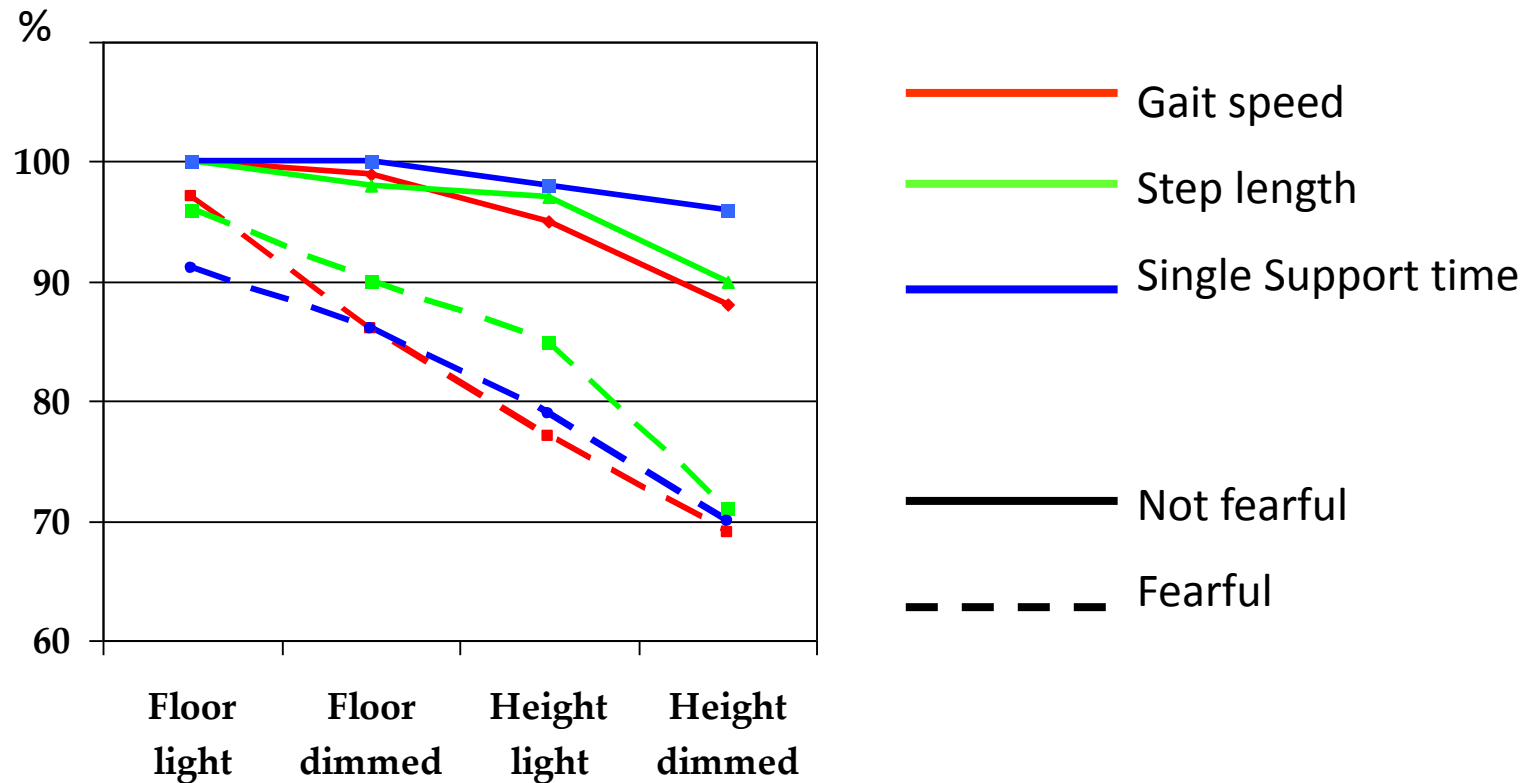
Experiment

Walking on floor (near the edge)

Walking on height without safety harness

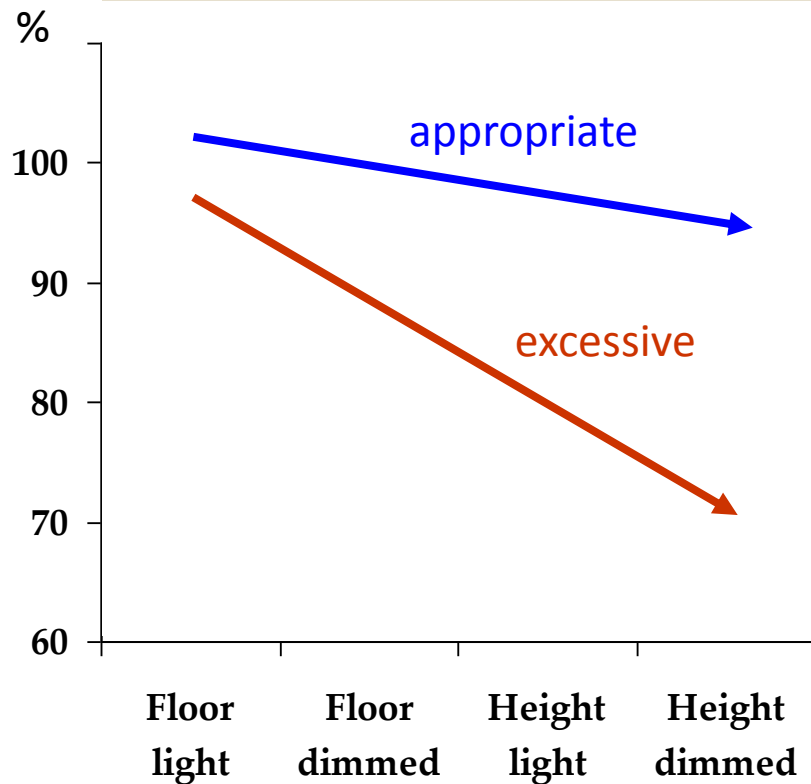


Fear of falling induces gait adaptations



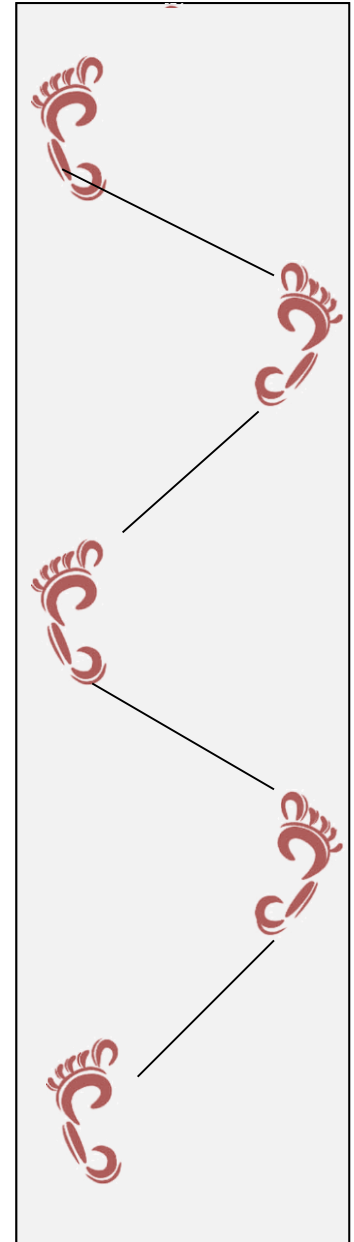
DELBAERE K, Sturnieks DL, Crombez G, Lord SR. Concern about falls elicits changes in gait parameters in conditions of postural threat in older people. *J Gerontol Med Sci*. 2009;64(2):237-242

Fear of falling induces gait adaptations



*Cautious
gait:*

Decreases walking stability and could therefore increase fall risk rather than protect against it



What does fear of falling tell us?

- The presence of fear of falling is likely to be a sign that something is wrong:
 - The person has an accurate perception of falls risk
 - The person is spiralling into a vicious circle of general frailty through depression or other psychological factors

Battler



- Lower levels of fear of falling
- **Psychological profile:** emotionally stable, less reactive to stress, happy and satisfied with life
- High fall risk, medical conditions
- Better self-perceived health
- Better quality of life
- More planned exercise

WHAT CAN WE LEARN FROM OUR AUSSIE BATTLEERS?

What does fear of falling tell us?

- The presence of fear of falling is likely to be a sign that something is wrong:
 - The person has an accurate perception of falls risk
 - The person is spiralling into a vicious circle of general frailty through depression or other psychological factors
- Lower levels of fear of falling are likely to be protective of falls:
 - The person has a low actual falls risk
 - The person has a positive attitude to life and has engaged him/herself in falls preventative activities

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Exercise to reduce fear of falling

- 25 studies including a total of 2,578 community-dwelling older adults
- Provided or prescribed exercise was associated with a significant reduction in fear of falling, immediately post-intervention (SMD 0.24, 95% CI 0.14 to 0.34)
- There was **no significant effect of exercise interventions on fear of falling beyond the end of the intervention period** (3 studies included data up to 6 months and 2 included data at 6 months and beyond).

Kendrick D, ..., Delbaere K. Exercise for reducing fear of falling in older people living in the community. Cochrane Database of Systematic Reviews 2014, 11: CD009848.

Adherence to exercise interventions

- **Problem** : adherence to exercise interventions
 - On average, by **12 months**, **half of community-dwelling older people are likely to be adhering** to trial interventions.
(Nyman and Victor, 2012)
 - Average attrition rate
 - **After 1 year**: 52% (range 43-61) (Simek et al., 2012)
 - **After 2 years**: 65% (Campbell et al., 1999)
- **How can we maximize long-term adherence?**
 - Surveys say that home-based exercise programs, including balance training are preferred
 - Using behavioural strategies
 - Education
 - Feedback
 - Goal-setting

Adherence to exercise interventions

- **Solution:** Technology can help
 - **For the patient:**
 - by enabling self-management and behaviour change
 - **For the clinician:**
 - by assisting time-poor professionals to deliver better high-quality care (e.g. staged multifactorial and progressive intervention program, communication with patient and other disciplines)
- **Key features**

| Accessibility |
|---|
| <ul style="list-style-type: none">• Home-based• Reliable• User-friendly |

| Beneficial |
|--|
| <ul style="list-style-type: none">• Physically• Mentally• Motivating |

| Stimulating |
|--|
| <ul style="list-style-type: none">• FUN• Challenging• Achievable |

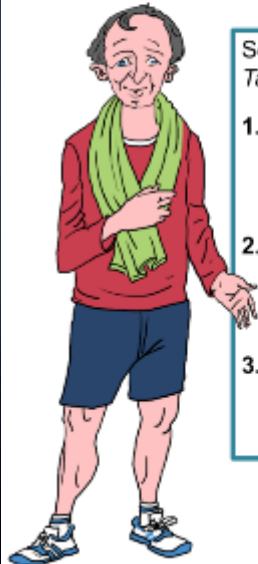
Recent research and development in technology suggests that using a **tablet computer** to deliver an exercise program would be highly effective

Balance exercises

STANDING TALL



Standing Tall will help you towards doing 2 hours of balance exercises per week for 6 months (and longer).



Some **key features** of our *Standing Tall* balance exercise program:

1. Convenient:

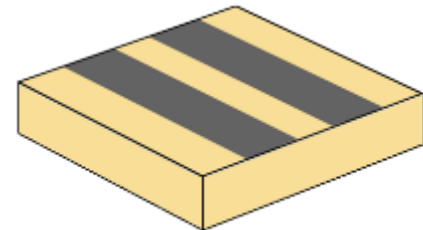
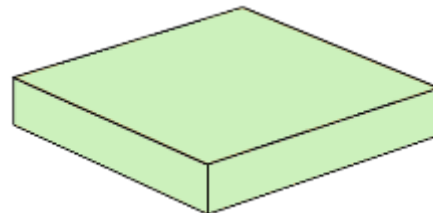
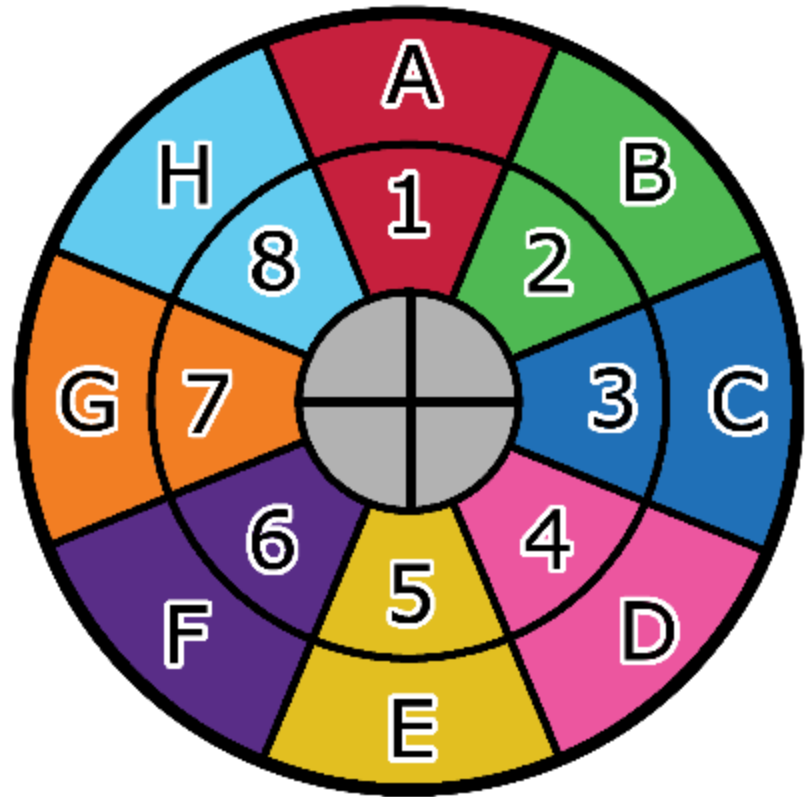
- In your own home
- At your own time

2. Individual:

- Tailored to your ability
- Progress at your pace

3. Motivating:

- Variety with 2,000+ exercises
- Feedback on your progress



CONVENIENT

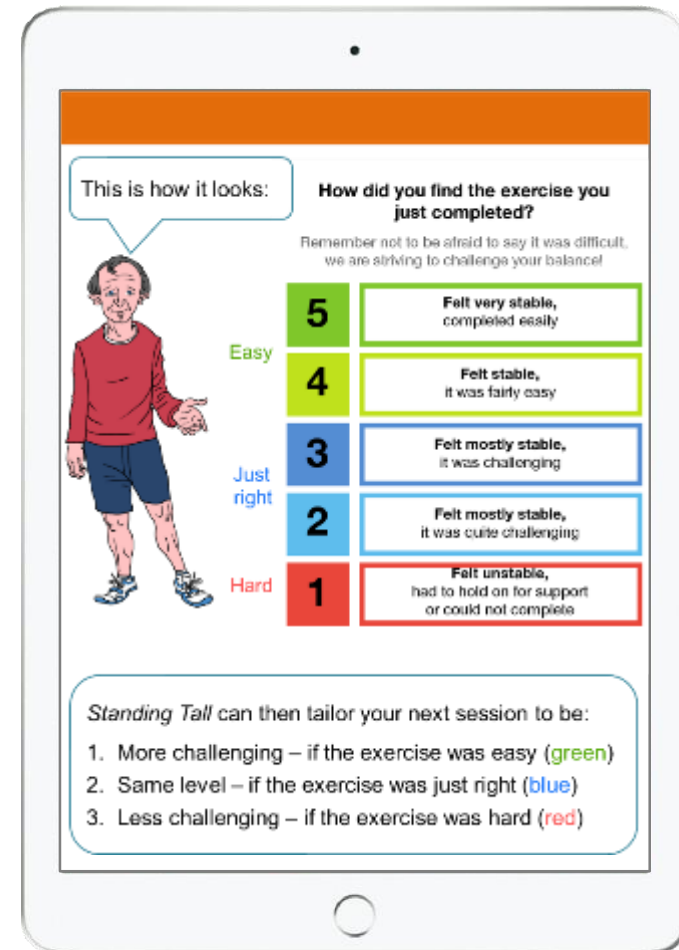
- ✔ Exercise in the comfort of **their own home**
- ✔ Choose a **duration and time of the day** to exercise that best suits them – with programmable
- ✔ reminders

Accessible **anywhere** and **any time**



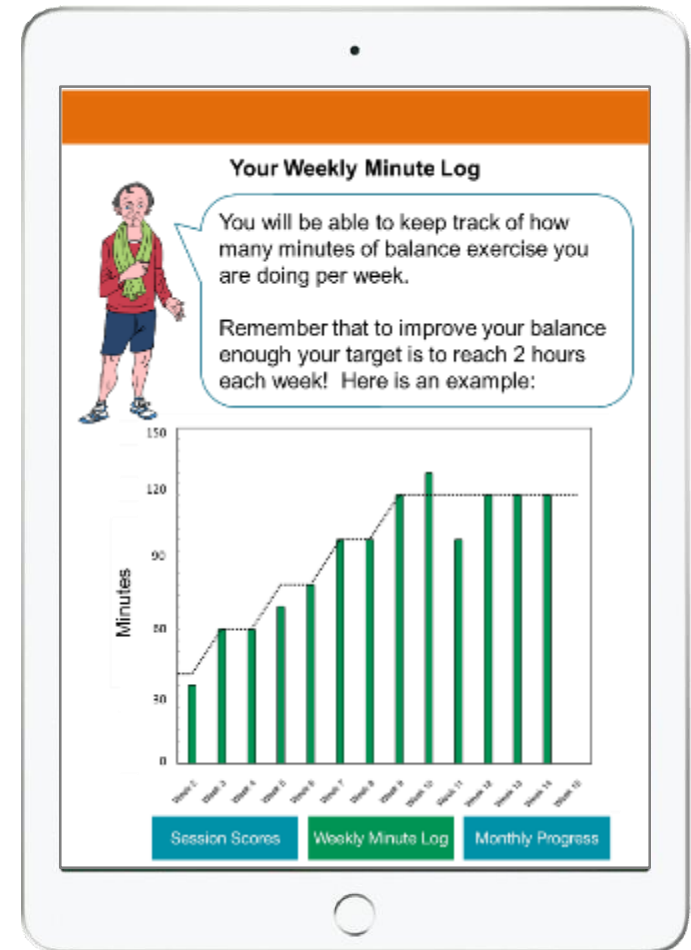
INDIVIDUAL

- ✓ Individually tailors intensity to **their ability**
- ✓ Unlocks different exercises to **add variety**, combining three key elements of balance training: weight shifting, knee bending and stepping
- ✓ Intensity **progresses** as performance improves:
 - reducing upper limb support
 - narrowing base of support
 - arm movements (e.g. reaching),
 - Step box, compliant surface, step mat and combinations



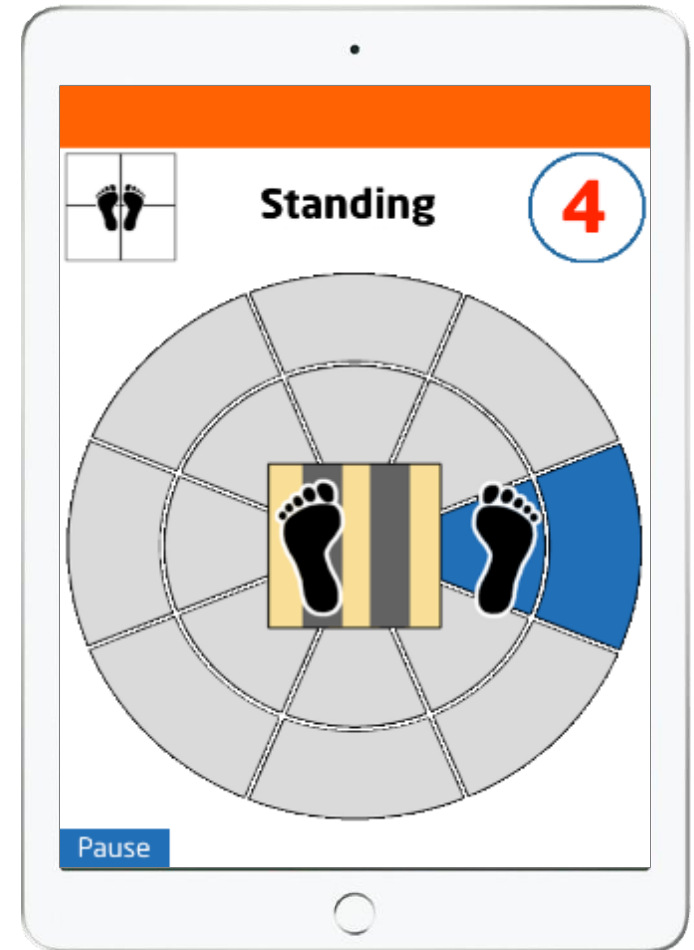
MOTIVATING

- ✓ A scoring system allows you to **track progress** – weekly or monthly
- ✓ Weekly **health education newsletters** specific to older adults – includes information about falls, falls prevention, general health, health issues, etc.



USER-FRIENDLY

- ✓ Designed especially for older adults
- ✓ Demonstration videos – for correct technique and safety
- ✓ Diagrams and animations showing foot positioning



OTHER FEATURES



Activity Planner

- Schedule exercise sessions
- Program reminders
- Keep track of how much exercise has been done and how much more needs to be done



Goal Setting

- Set short, intermediate and long term exercise goals
- Set personal goals

Save and continue

Before you set your goal, reflect on the following questions to see if it is a good goal for you.

- ✓ Is your goal clear and specific?
- ✓ Is it something that will likely improve with practice?
- ✓ Can you work towards this goal in the next few weeks or months?
- ✓ Will achieving this goal have an impact on your daily life?

What is it that I want to work on?
Perform 2 hours of balance exercise per week

When do I want to review my progress?
19/08/2016

Save and continue

Perform 2 hours of balance exercise per week

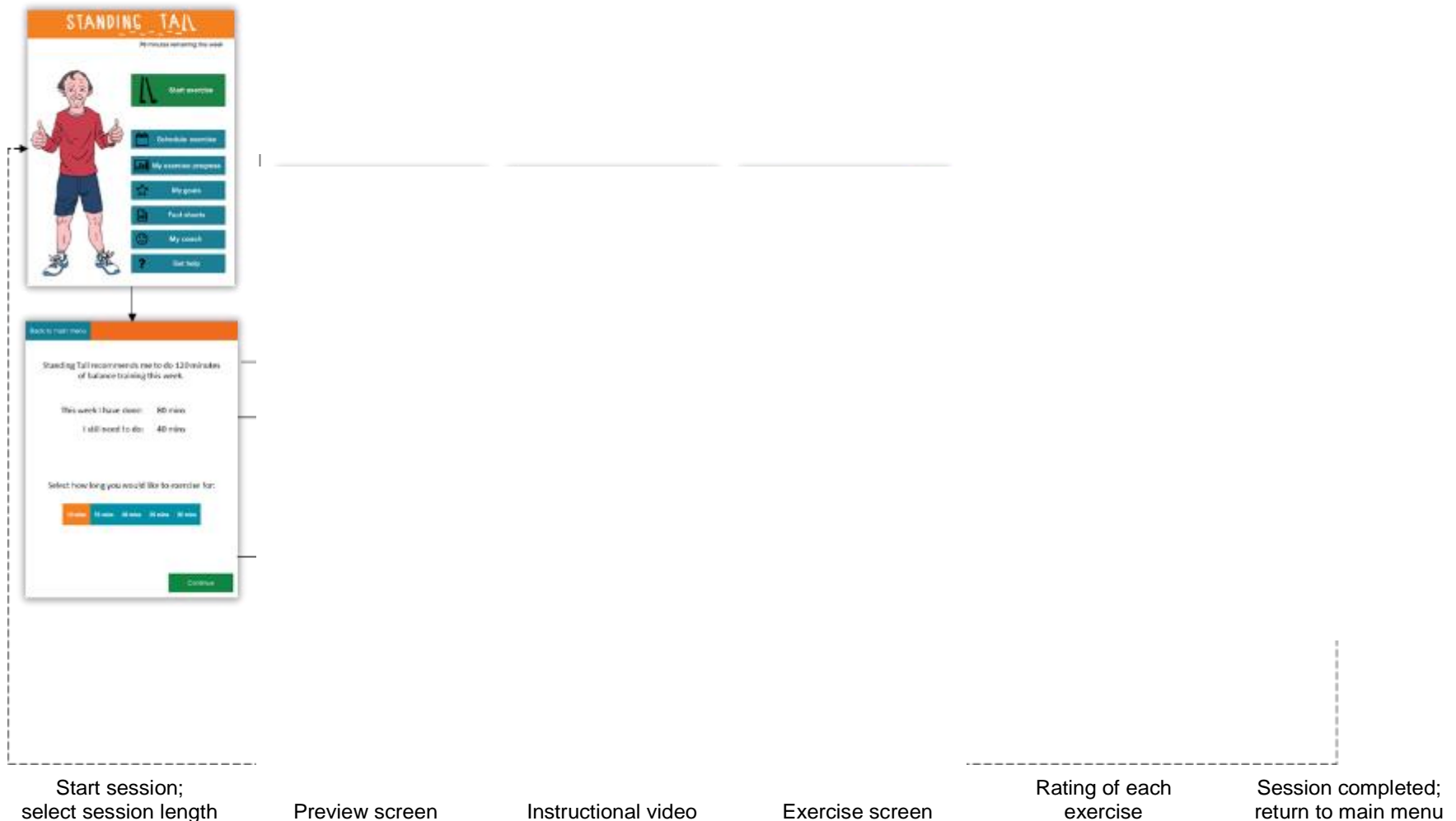
Step name:

When will I review my progress... No Date

Reflect on the following questions to help you break down your goal.

- ✓ What is it that limits you from doing this activity or task?
- ✓ What will be your first step?
- ✓ What resources can you call upon?
- ✓ Do you feel confident that you can achieve your goals by following these steps?

Example of the flow of an exercise session



Randomised Control Trial

Recruitment of community-dwelling older adults aged 70 years and older (n=500)

Baseline assessment

Concealed randomization

Exercise intervention group
(n=250)

Health promotion education control group
(n=250)

Time 0

Home visit – initiation

Home visit – initiation

4 weeks

Home visit – follow-up

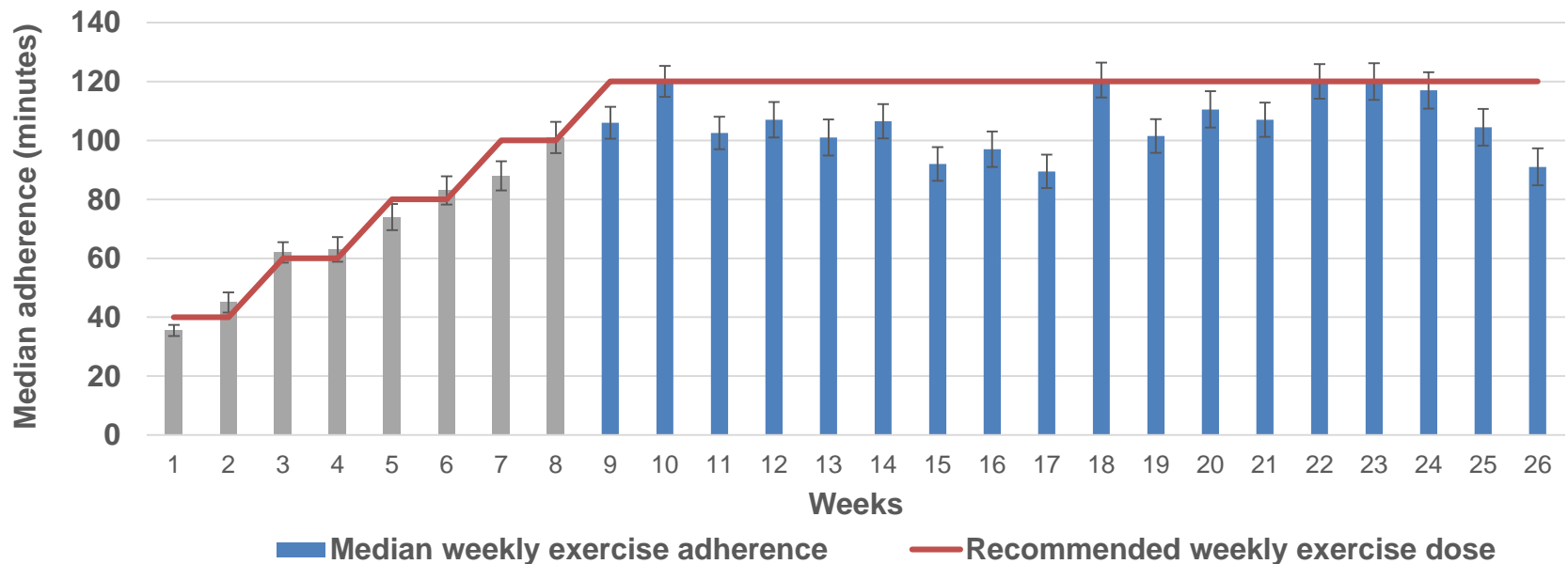


Follow-up phone call

<https://www.anzctr.org.au/Trial/Registration/TrialReview.aspx?id=367746>

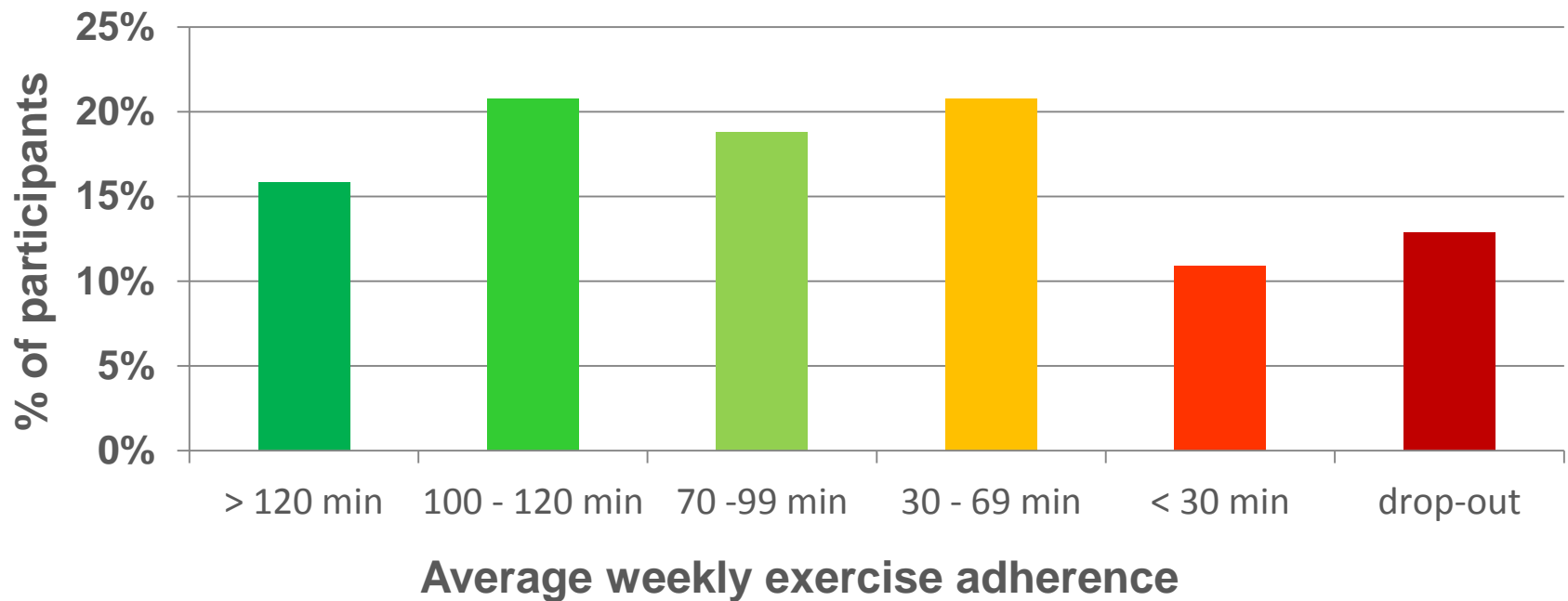
Adherence

Participants reached a median of 90.4 minutes of exercise per week, and 33.3 hours (SD 78.4) in total, which is equivalent to 74% of the recommended dose over the first six months of the study.

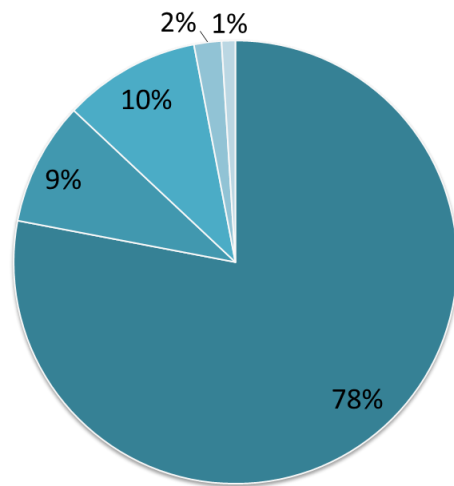


Adherence

Participants reached a median of 90.4 minutes of exercise per week, and 33.3 hours (SD 78.4) in total, which is equivalent to 74% of the recommended dose over the first six months of the study.



■ Agree ■ Slightly agree ■ Neither agree nor disagree ■ Slightly disagree ■ Disagree



I enjoy using *StandingTall* to exercise my balance

■ Very good ■ Good ■ Neither good not bad ■ Poor ■ Very poor

Participant ratings of four items:

(a) enjoyment,

(b) continuing use,

(c) user-friendliness,

(d) overall rating of the Standing Tall program.

Data collected using the user experience questionnaire at the 6 month re-assessment point.

Examples of perceived benefits of using the Standing Tall program

| | |
|--|-------------------------------|
| 'It helps me to exercise regularly.' | June, 71 year old female |
| 'I am more confident about not falling.' | Christine, 73 year old female |
| 'It has improved my balance and developed some muscles that I didn't know I had, for example, the muscles used in standing on my toe and heels. Also, it has motivated me to exercise more regularly.' | Paul, 75 year old male |
| 'I am walking longer distances with more confidence and without my stick – but I still like to know it's not too far from me.' | Fay, 89 year old female |
| 'I feel more confident and I think there has been a general improvement in my health both physically and mentally.' | Kenneth, 83 year old male |
| 'I do more exercise than I would otherwise.' | Bev, 71 year old female |
| 'I think it has helped me to be conscious about my balance and also to exercise regularly.' | Beverly, 70 year old female |
| 'I feel a bit fitter, feel pleased at the discipline, even just having the framework there. I've noticed I'm motivated to do better at the exercises.' | Grace, 77 year old female |
| 'I am now doing 2 hours of exercise per week in my home, this was not the case previously.' | Robert, 72 year old male |

Conclusion

Conclusions

- A fear of falling can be a realistic appraisal of risk, although excessive fear has adverse effects for mobility and quality of life
- Exercise interventions are likely to have beneficial effects to prevent falls and reduce fear of falling
- To achieve long-term effects, it is important to achieve long-term exercise adherence.
- The most successful approach to fall prevention may combine simultaneous attempts to improve both efficacy and physical skills

Thank you!



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