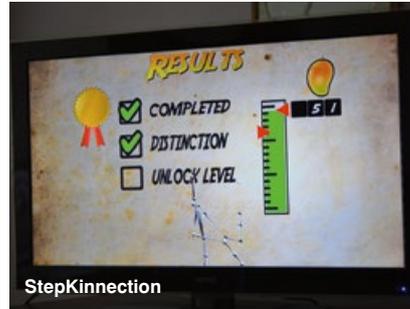


# Stepping game study reaps promising results



All participants in a home training program piloting a clinically-based interactive video game developed by Australian researchers improved their reflexes, quick-stepping and walking abilities, which are good indicators of a reduced risk of falling, write **Dr Jaime Garcia** and **Dr Karla Felix Navarro**.

**E**rika is a 75-year-old Sydneysider who, like many older Australians, was enjoying an afternoon walk in the park when she tripped over an uneven piece of asphalt and fell over. As a consequence of falling, she broke her arm and had to get medical treatment.

This affected her mobility and self-sufficiency quite significantly as she was unable to perform simple daily activities such as getting dressed, cooking and showering. This is one of the many cases where a simple fall can have a severe impact on a senior's lifestyle and independence.

Falls affect people in different ways. In the majority of the cases, a fall can result in injuries and fractures, as in Erika's case, as well as affect self-confidence and mobility. But in other cases, falling may result in severe traumatic brain injuries that can lead to death. Falls are considered the main cause of fatality and disability among the senior community, affecting one in three people every year.

As previously reported in *Technology Review* magazine (September 2014), the team at the mHealth Lab at the University of Technology Sydney (UTS) has developed the StepKinnection game, which is a novel solution that aims to prevent the risk of falling in the elderly. Easy to set up and use, the system is an interactive video game connected to the TV that helps seniors strengthen their lower limbs and improve their reflexes in the comfort of their own home.

As research shows that increased physical activity can decrease falls by 40 per cent, our study wanted to use cutting-edge technology and apply it to this health problem.

The game involves a series of stepping routines that increase in speed and difficulty

as the player progresses through the game. The idea behind the stepping routines is to get seniors to train their ability to take quick short steps, which is known to be the best strategy to prevent a fall from happening.

This system uses the Microsoft Kinect, an infrared-based camera that tracks the player's movements and translates them into the game. An ideal feature of the platform is that it allows players with low computer literacy to interact with this system in a very intuitive and, most importantly, safe manner.

To play the game, the player stands facing the Kinect. Shortly after, an avatar mimicking the player's moves appears on the TV. The aim is for the player to travel through the world collecting exotic fruits from 32 different countries, where a country corresponds to a gaming level. To collect a fruit, the player must step very quickly on the items as they appear on the screen. This repeated action and a gradual increase in speed and difficulty helps players improve their reflexes and balance.

## FINDINGS

Last year, the StepKinnection game was put to the test with 10 independent-living older adults, including Erika. They participated in a 16-week pilot with the aim of evaluating the feasibility of the StepKinnection game. The game was installed at the participants' homes and monthly assessments were conducted.

The study looked at different dimensions, such as the levels of acceptance and adherence and changes in physical health of participants. The results are very promising.

Surveys revealed that participants had very positive attitudes towards the game. When asked if they would like to use the game as a means to exercise, most answered positively.

One participant said: "Yes, it is quite different to the usual type of exercise we are given."

Very noticeable improvements were also observed in the participants' physical health. Overall, they all improved their reflexes and ability to take quick steps by 17 per cent. Statistical analysis also showed that playing the StepKinnection game significantly changed the participants' ability to walk.

More importantly, no adverse events were registered throughout the experiment. This all suggests that the StepKinnection game is not only feasible and engaging but also safe to administer. This is an ideal feature for a home-based training program and it is also a good way to continuously monitor the user's health performance in the cloud.

While the limitations in the sample size make it difficult to generalise these findings, the obtained outcomes are still relevant and clinically meaningful as these are in agreement with the results of several studies with larger interventions found in the literature.

The team is now looking for funding opportunities to extend this project. With larger and longer trials we would be able to generalise these findings. With more data on the effectiveness of these interventions, another iteration of this game could be developed and deployed to benefit the increasing numbers of elderly people in Australia and worldwide.

See [youtu.be/Aw8MKCB5TCA](http://youtu.be/Aw8MKCB5TCA) to watch a demonstration. **TR**

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