

PAYING ATTENTION IN THE WONDERFUL WORLD OF TALI



Photo 123rf

An animated computer ‘game’ – backed by hard science – is helping children with learning difficulties to better concentrate in class, improving academic performance and life prospects.

Story **Melissa Marino**

In the world of TALI there are adventures, challenges and player avatars, like any other computer game – but with an important, life-changing difference. TALI, the Training Attention and Learning Initiative, is serious science.

And it’s teaching children with learning difficulties characterised by an inability to concentrate to train their brains to pay attention. In the classroom this is the gateway to education, to an equal start in life that otherwise eludes children with developmental disorders.

TALI is an interactive program co-founded by Professor Kim Cornish and Dr Hannah Kirk, whose PhD was based on its development. It’s the only one of its kind based on clinical research, and took a multidisciplinary team of specialists three years to build.

Professor Cornish says children with developmental disorders, from autism to Down syndrome, share a common challenge – they all have difficulty concentrating for longer than a few moments. “Behaviourally they look like they have ADHD [attention deficit hyperactivity disorder],” says Professor Cornish, director of the Monash Institute of Cognitive and Clinical Neurosciences. “In the classroom they’re restless, they shuffle their chairs, are always looking around, and often distracting their classmates.”

This inability to stay focused holds them back academically, says Professor Cornish, who’s been researching children with attention deficits for more than 20 years. “Attention is the absolute fundamental building block for learning. If your attention is impaired, the other building blocks such as working memory, numeracy and literacy are unable to develop. That’s when children fall

behind.” And it’s not just children with diagnosed developmental ‘disorders’ who are affected. One in 10 children who enter school have difficulty maintaining attention, Professor Cornish notes.

Left untreated, inattentive behaviour can spiral into lifelong problems, from delinquency in the school years to anxiety and depression as adults.

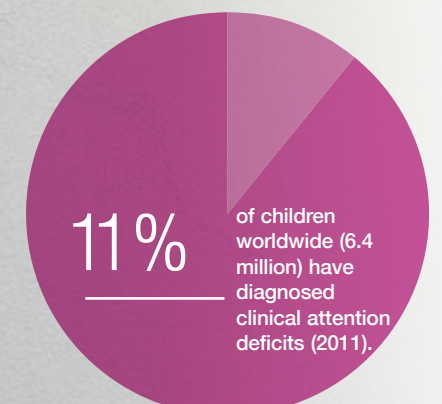
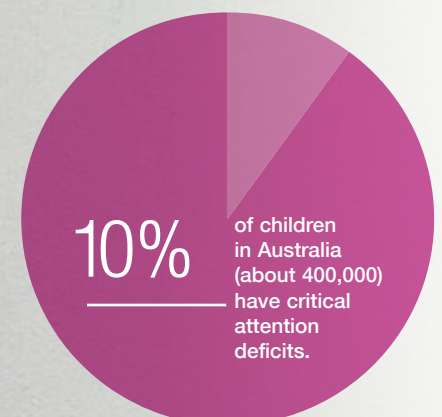
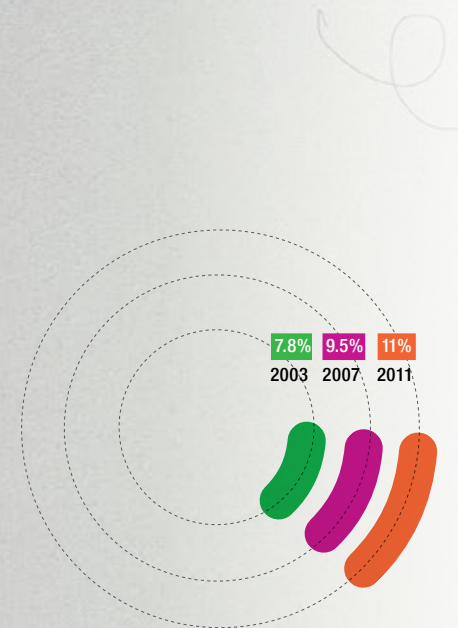
Now Professor Cornish, who also heads the Cornish Developmental Laboratory at Monash University, has high hopes that the new game-based early-intervention tool will be the long sought-after change agent.

Aimed at children aged three to six and easily downloadable onto everyday tablet devices, TALI has animal avatars that lead children through a series of ‘adventures’ – or tasks – where they have to catch fish of a particular colour and size, or find hidden treasure on a ship.

Transforming Professor Cornish and Dr Kirk’s hard psychological data into the TALI interactive program has involved practical know-how and animation design from Torus Games, and sophisticated engineering and analytics from commercialisation technology company Grey Innovation.

Behind the pretty pictures, TALI exercises some serious brain training that continually adapts to each child’s performance, targeting specific concentration skills across multiple levels.

The initiative is achieving some spectacular results. A randomised controlled trial involving 75 children with developmental delays showed that after using the program for 20 minutes, five times a week for five weeks, their concentration and selective attention significantly improved. Skills such as numeracy also improved. And these results were sustained, the improvements →



still evident three months after the children completed the five-week program.

This indicates, says Dr Kirk, that the activities are effectively 'rewiring' neural networks, strengthening children's capacity to pay attention. "The brain has great plasticity and is most flexible to change in early childhood," she says. "Implementing this type of intervention early in development is likely to promote larger, more sustainable changes."

Using this window of opportunity to increase children's capacity to focus, and to facilitate learning and engagement within the classroom, is incredibly rewarding, says Dr Kirk. "Working in this field, it's vital that there's impact in the community, and I love that collectively we've been able to produce something that has the potential to help a significant number of children."

The TALI project manager for Grey Innovation, Grace Lethlean, says academic improvements suggest children who've been part of the trial are paying more attention at school. "It's translating into actual classroom outcomes, which is really exciting."

And it's not only the children benefiting from the TALI technology, she says. The app generates reports based on the child's performance, which give clinicians, teachers and parents an insight into the child's progress. Data-analysis software underpinning the game not only measures results, but also considers factors such as the time it takes a child to complete a task.

Ms Lethlean says work is underway to develop TALI as a diagnostic tool for clinicians and teachers. Chaired



BY TAKING THIS RESEARCH INTO THE COMMUNITY, CHILDREN CAN HAVE BETTER ATTENTION SKILLS THAT MAKE THEM BETTER LEARNERS, MAKE THEM BETTER-EQUIPPED TO MAKE FRIENDS, AND HELP THEM HAVE A BETTER LIFE OUTSIDE SCHOOL WHEN THEY GROW UP. PROFESSOR KIM CORNISH

Below left
Professor Kim Cornish
works with TALI.
Photo Eamon Gallagher



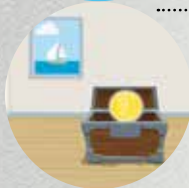
Every facet of TALI – every colour, character, shape and sound, every time lapse between activities – has a neuroscientific reason for being there, designed to train specific networks of the brain responsible for attentiveness.



The concentration skills particular games are targeting are:



Selective attention – ability to select a target from distractors by catching a fish of a particular colour and size.



Sustained attention – ability to keep focus by touching the coin only when it begins to fall.



Attentional control – ability to inhibit impulsive responding by pressing on a group of elephants when their trunks are all facing the same direction.

Source: Academic research papers



by Professor Cornish, an international scientific advisory board with researchers from the University of Oxford, the University of South Carolina, Monash and the Murdoch Children's Research Institute is being assembled to guide future technology refinement so a program may target children with specific disorders and needs through particular activities. "It's all about personalised treatment depending on the disability," Professor Cornish says.

While clinicians will find obvious value in the technology, its beauty is that it can be played anywhere – at home, in the car, or at the park – and by any child having difficulty focusing, she says. "By taking this research into the community, children can have better attention skills that make them better learners, make them better-equipped to make friends and help them have a better life outside school when they grow up," she says.

Commercialisation, led by Grey Innovation, is in full swing, with the program due for release in 2017. The IP generated by Monash, Grey Innovation and Torus Games was licensed to Tali Health, which has been acquired by medical technology company Avexa. Avexa now employs Dr Kirk as chief research officer continuing to optimise the TALI system.

Ms Lethlean says the commercial structure will secure the future of TALI. "Monash now has royalties flowing from a listed company because of this collaboration, and that will allow us to access global markets and to make money through the stock market," she says.

It's a result made possible, says Professor Cornish, by the diverse mix of experience brought together through an Australian Research Council Linkage grant she instigated in 2012. That funding allowed neuroscientists, computer engineers and games developers to come together to produce this world-first technology, and carry out trials to prove its effectiveness and take it to the market.

"This was an amazing opportunity – and I knew, because of all the years I had spent looking at different types of attention deficits in children and developing activities to improve concentration, that if we could capture their attention using computerised games we could make a real difference," Professor Cornish says. **M**