

# Computerized Cognitive Training

## A Simple Tool to Build Confidence after Brain Injury

Kellie Velez  
Healthcare Studies

### Introduction

Supportive Living Inc. (SLI) is a non-profit organization that focuses on enhancing the lives of traumatic brain injury (TBI) and acquired brain injury (ABI) survivors. The organization provides and coordinates residential programs, fitness programs, and education for rehabilitation (Supportive Living, 2020).

Traumatic Brain Injury occurs when a sudden trauma causes damage to the brain from a violent jolt or blow to the head. Acquired brain injury is damage to the brain that has occurred after birth and can result from stroke, illness, or infection (CDC, 2020).

During my internship I participated in administering an intensive fitness program for survivors with TBI and ABI. I was able to work hands-on, with patients of the program, demonstrating and supervising exercises for their routines. I also completed weekly projects relating to brain injury, roles of staff in various fitness facilities, goal setting, and exercise programming over the course of the semester.



Don from Douglas House works on upper body strength

Retrieved from <https://www.supportivelivinginc.org/>

### Objectives

The objective of my project was to document the outcomes of CCT utilization and any changes in workout performance.

Physical fitness has been proven to enhance balance, endurance, and activities of daily living, and the overall outlook on life for TBI and ABI survivors. Along with physical exercise, it is also important to consider cognitive exercises. Just like how our body needs exercise to stay healthy, the brain needs to stay active in order to recover and operate properly.

With TBI and ABI it is important to exercise the brain so it can naturally rewire itself via neuroplasticity. Computerized cognitive training (CCT) challenges the brain to think in distinctive ways which creates new neural pathways. CCT programs have demonstrated their ability to improve learning and memory, supplementing traditional face-to-face therapy.

### Related Literature

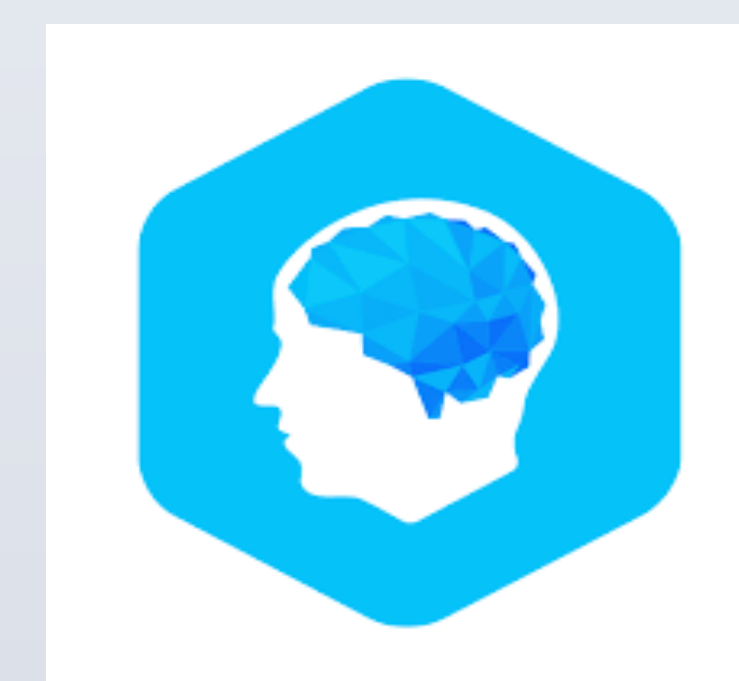
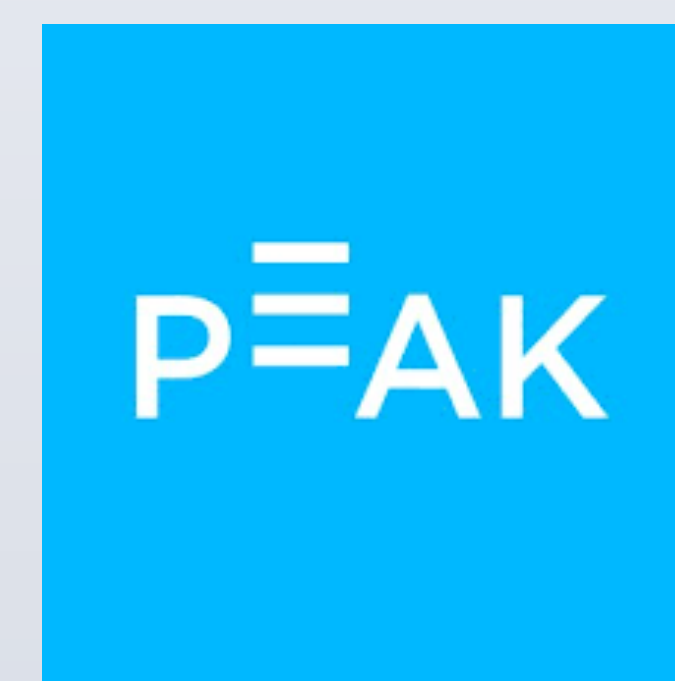
"The CCT automatically adjusts the game complexity based on patients' performance was thought to maintain motivation" – (Corti, 2020, p. 3).

"Helps aid the stroke recovery process. They can help one to track appointments and medications, provide language therapy, train the brain, and even lower some risk factors for future strokes"- (Medical News Today, 2018).

"I use Peak to help my personal cognitive rehabilitation like brain training post injury. I thoroughly enjoy playing and feel like I have recovered better from doing so. I also have my 3-year-old son play some of the easier fun games too"- (Dean Middleton, Peak Blog, 2020).

### Materials and Methods

- Before each patient's workout I had them begin with 5-10 minutes on the apps Elevate or Peak.
- I selected the apps based on evidence of their cognitive improvement ability with stroke and other patients.
- The apps aim to help with attention level, making connections as well as reading and reasoning skills.
- The apps are commercially available CCT designed to boost cognitive abilities in the general population, without specific clinical aims.
- Throughout the 12 weeks in the internship I worked with 4 different patients and have collected feedback and observations on their workouts.



### Results

- Both CCT and physical exercise have benefited the patients.
- The apps were not developed with a specific rehabilitative purpose, but it did adapt to the user's performance and their abilities.
- Due to only seeing each patient twice a week for an hour there were only small and short-lasting effects obtained after the games.

#### Pre CCT

- Easily distracted, often it was difficult to finish the workout.
- Had trouble with spatial awareness. They misjudged the height of stairs and reached too far or too short for exercise equipment.
- Patients lacked motivation; they were sluggish at the beginning of the work out.

#### Post CCT

- Because they were focused on completing the game, patients were able to transfer enhanced focus to the actual workout.
- Had better judgement of distance, and the position of objects in relation to themselves.
- As patients saw their scores improve, their motivation and energy increased to fulfill the workouts.

"I like the games. They are fun and interesting".

"During the games I knew my brain was trying hard to focus".

"I love doing these games!"

### Conclusion

All the patients I worked with reacted positively to the CCT apps. I have noticed the patients' confidence, enthusiasm, and outlook grew in the short time we were together. CCT is an easy item that can be incorporated into their program that only takes a few minutes to complete. We are rapidly developing technology that has the potential to enhance the affects of brain injury. I believe incorporating CCT at SLI for future interns to use would be beneficial for the patients and the interns. They are easily obtainable that the patient could download it on their device and continue the work while at home.

In order to ensure that TBI and ABI patients at Supportive Living Inc. can access the benefits of CCT in their workouts. I have developed two guides for Supportive Living Inc. staff and patients and their families.



#### What is CCT?

Computerized Cognitive Training (CCT) is said to improve cognitive functioning. It is becoming an increasingly popular intervention for people with TBI and ABI. CCT has been advertised to help a person's ability to improve memory, concentration, and other cognitive skills. During my internship, I used the apps Peak and Elevate between the 4 patients. They are brain-training apps that are designed to enhance speaking abilities, processing speed, focus, and memory.

#### Why Use it?

After a brain injury it can lead to many persistent cognitive deficits such as attention, learning, and memory. These deficits along with other side effects can have a detrimental effect and lead to further complications. Along with physical exercise, it is also important to consider cognitive exercises. Just like how our body needs exercise to stay healthy, the brain needs to stay active in order to recover and operate properly.

#### Evidence

Between the 4 patients I saw throughout the 12 weeks, I have noticed small changes that have helped them in their workout performance. Before, they were easily distracted and often times it was difficult to complete the workout. After using CCT because they were focused on completing the game, they were able to carry that on to the actual workout and less time was used to regain their attention. Before, few of my patients had trouble with spatial awareness. They had trouble with understanding how far an object is, misjudged the height of stairs, and reaching too far or too short. After, they had better judgement of distance and position of an objects in relation to themselves.

#### How to Incorporate CCT

Before I incorporated CCT into the patient's workout program, I sat down with each person and discussed what it was and its purpose. Each person agreed into including CCT into their program. In the beginning of each class I have the patients take my phone and complete the games that Elevate, or Peak chose for them to do.



#### Computerized Cognitive Training

Clients and Family



#### What is CCT?

Computerized Cognitive Training (CCT) is said to improve cognitive functioning. It is becoming an increasingly popular intervention for people with TBI and ABI. CCT has been advertised to help a person's ability to improve memory, concentration, and other cognitive skills. During my internship, I used the apps Peak and Elevate between the 4 patients. They are brain-training apps that are designed to enhance speaking abilities, processing speed, focus, and memory.

#### Why Use it?

After a brain injury, it can lead to many persistent cognitive deficits such as attention, learning, and memory. These deficits along with other side effects can have a detrimental effect and lead to further complications. Along with physical exercise, it is also important to consider cognitive exercises. Just like how our body needs exercise to stay healthy, the brain needs to stay active in order to recover and operate properly.

#### Incorporating CCT at SLI and At Home

Supportive Living Inc. offers Neuro-Fit exercise classes where participants attend a one-hour session aimed to improve cardiovascular fitness, functional exercise to improve strength and mobility, as well as challenging balance exercises with one-on-one support. While working with their interns' participants will have the option if they would like to incorporate CCT into their workout program. CCT is easily accessible on any Android or Apple Product and can be done in the comfort of your own home when not at SLI. To see better and longer lasting results it is recommended to do daily to see better results!



My time at SLI has been an amazing opportunity. The internship has given me a sense of direction. It has solidified my idea of working in the healthcare field. I was able to get hands-on experience leading one on one sessions with the patients. This experience has transformed my understanding of myself, my assumptions, and the view of the world. It has helped me form a better understanding of what I would like my plans to be after I graduate.

### References

- Charrette, A. L., Lorenz, L. S., Fong, J., O'Neil-Pirozzi, T. M., Lamson, K., Demore-Taber, M., & Lilley, R. (2016). Pilot study of intensive exercise on endurance, advanced mobility and gait speed in adults with chronic severe acquired brain injury. *Brain Injury*, 30(10), 1213-1219
- Corti, C., Urgesi, C., Poggi, G., Strazzer, S., Borgatti, R., & Bardoni, A. (2020). Home-based cognitive training in pediatric patients with acquired brain injury: preliminary results on efficacy of a randomized clinical trial. *Scientific reports*, 10(1), 1-15.
- Ghroubi, S., Allila, S., Feki, I., & Elleuch, M. H. (2016). Quality of life after traumatic brain injury. *Annals of physical and rehabilitation medicine*, 59, e135.
- Ivey, F. M., Hafer-Macko, C. E., & Macko, R. F. (2006). Exercise rehabilitation after stroke. *NeuroRx*, 3(4), 439-450.
- Traumatic Brain Injury / Concussion. (2020, August 28). Retrieved October 07, 2020, from <https://www.cdc.gov/traumaticbraininjury/index.htm>
- Rehabilitation After Traumatic Brain Injury." Rehabilitation After Traumatic Brain Injury | Johns Hopkins Medicine, [www.hopkinsmedicine.org/health/treatment-tests-and-therapies/rehabilitation-after-traumatic-brain-injury](http://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/rehabilitation-after-traumatic-brain-injury).