

# Balance Training

## The Effectiveness of Exercise in Traumatic Brain Injury

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### INTRODUCTION

- Supportive Living, Inc. is a non-profit organization that was founded in 1991 by Carrol and Doug Stephens that helps improve the lives of brain injury survivors. (Supportive Living, Inc. 2020)
- Carrol and Doug's son Scott acquired a brain injury due to a traumatic car accident, and they wanted the best care for him and other TBI survivors, which was the reason they started Supportive Living, Inc. (Supportive Living, Inc. 2020)
- Supportive Living offers residential services and a Neuro Fit program to individuals who have acquired a traumatic brain injury (TBI) or have suffered from other kinds of brain injuries called acquired brain injuries (ABI) to help them recover and live healthy lives. (Supportive Living, Inc. 2020)

### BRAIN INJURIES

- A traumatic brain injury (TBI) occurs when a bump or blow happen to the head. Examples of the causes are motor vehicle accidents, falls, sports injuries, attacks, etc. (U.S. National Library of Medicine, 2021)
- Hypoxic brain injury is when there is still some oxygen getting to the brain, but not enough. Anoxic brain injury is when there is no oxygen at all going to the brain. Both of these injuries result in death of brain cells. (Shepherd Center, 2021)
- A diffuse axonal injury(DAI) is a brain injury that results in the tearing of the axons. (Healthline, 2018)

### RELATED LITERATURE

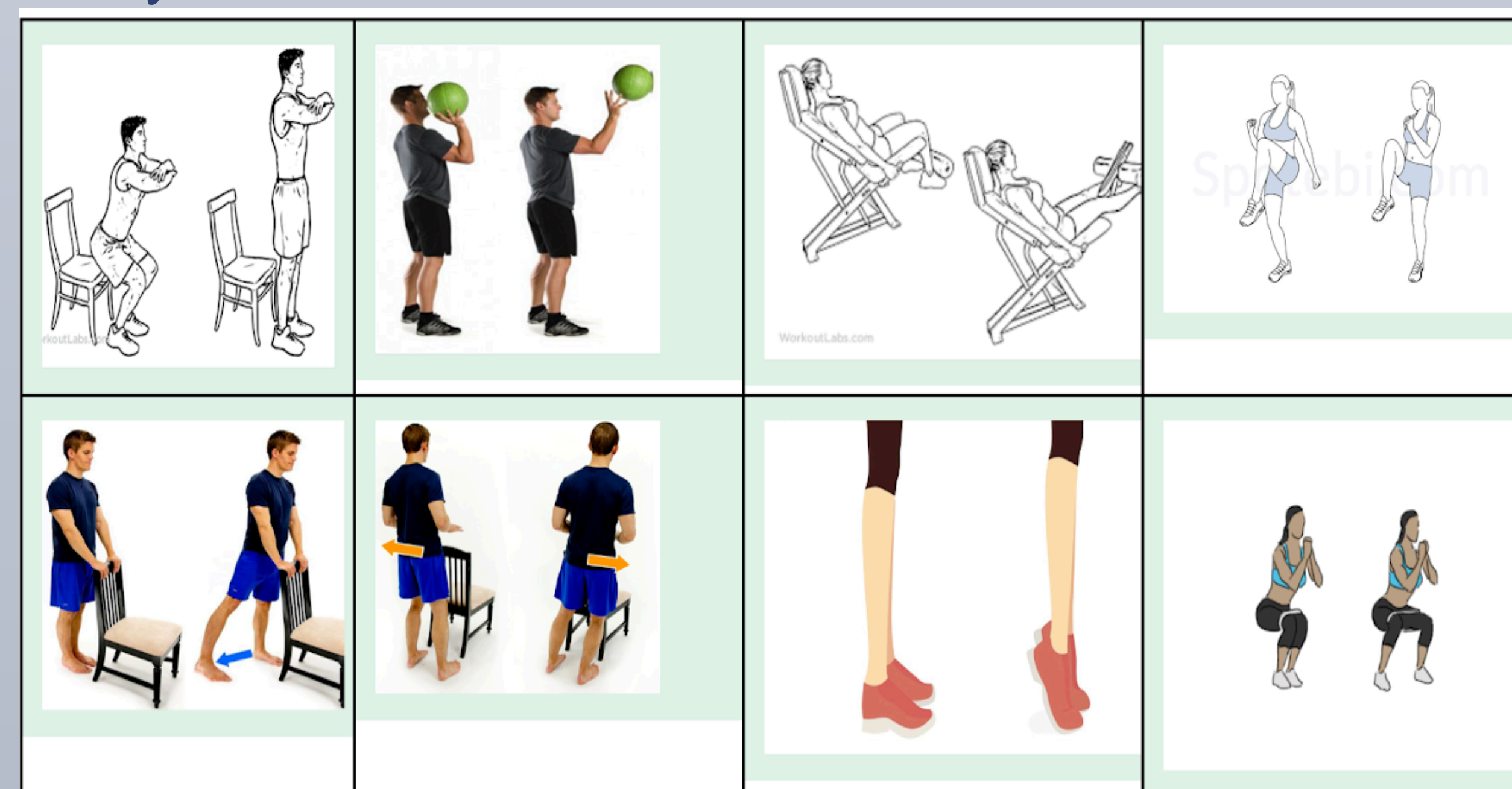
- "Survivors of brain injury can continue to improve their physical and cognitive fitness long after their initial injuries." (Supportive Living, Inc. 2021)
- "The structural and functional changes in the neural tissue resulting from neural plasticity, together with stimuli during the performance of repetitive exercises are capable of producing changes in the structures of the motor cortex. The evidence points out that in addition to the rehabilitation helping with the acute phase, the benefits are numerous years after the injury since the persistence of functional limitations is very common." (Borges, C.S.S. & Neto, G.R.2020)

### MATERIALS & METHODS

- Participants attended the SLI Neuro Fit program on Tuesdays & Thursdays to exercise and reach their personal fitness goals. Example: improve balance & improve overall body strength. Each participant had exercise plans created each week that catered to their own physical abilities and goals.
- The plans consisted of five sections: Upper Body, Lower Body, Core, Balance, & Cardio. All participants had different abilities according to their mobility.

Exercise	Modifications	Goals:												
		1)	2)	3)	4)	5)	6)	7)	8)	9)	10)			
Upper Body Strength/Mobility														
Lower Body Strength/Mobility														
Core Strength/Stability														
Goal/Balance/Fall Prevention														
Aerobic Exercise														
Type:														
Level:														
Time:														
Additional Comments:	INTERN NAME:													

- When working with this population, I have observed that exercises often need to be modified or changed for the participant to be able to perform them with their disabilities which can be called "adaptive exercises".
- Exercise plans were created for 3 individuals to improve their balance by including balance focused exercises (shown below), lower body strength training, adjusting the height of the seat for the sit to stand exercise, and focused on getting their bodies moving with walking practice. At the start of the 12 weeks, participants were first asked to perform the "sit to stand" exercise and walk independently to the best of their ability to be observed.



### RESULTS

- After 12 weeks of balance training, the participants made great improvement with their balance skills, which has resulted in better exercise form and ability to increase exercise intensity.
- The Sit-to-Stand exercise proved to show the most improvement among participants. Participants moved from needing assistance to performing them independently.
- Participants' walking abilities improved by being able to walk longer distances and improved posture.
- Participants also showed greater levels of confidence while working out, which motivated them during their healing process
- 3 out of the 3 participants could walk independently at a faster and more controlled pace and experience less leg tremors during physical activity.
- By the end of the program, participants were capable of doing more complex exercises such as adding heavier weights, as well as gaining stability to use exercise machinery. Example: treadmill, leg extension machine, squat press machine, hamstring curl machine.

### CONCLUSION

- Though brain injury rehabilitation is not a quick process, balance training has been beneficial for the assigned participants because of their physical improvements.
- Balance played a major role in everyday life activities, and an emphasized focus on this area of exercise has shown positive results in the brain injury survivor population.
- The pandemic had caused a set back for the TBI survivors, which made the exercise plan a slow process by starting with weightless exercises to eventually adding in ankle weights, medicine balls, and the use of exercise machines.
- This internship was a great opportunity to get hands on experience which reassures me that I would like to pursue a clinical career.
- I have learned that the brain injury survivors of Supportive Living, Inc. are very capable and driven individuals who have made me look forward to working in healthcare.
- I feel more prepared because of this internship due to the amount of in person experience I have gained. Getting to meet new people and assist them while recovering from a traumatic injury has been a rewarding experience.