



SLI Brain Injury Research Council - Research Brief

Exercise to improve physical fitness and function in adults with chronic moderate to severe acquired brain injury

This study investigated the capacity of a group of people with chronic acquired brain injury (ABI) to improve their physical fitness and function with 6 weeks of intensive exercise. Findings indicate that the program improved participants' endurance and ability to walk in the community as well as capacity to achieve advanced gait, and have informed program expansion. Utilization includes identifying health, healthcare utilization, and function measures to use to track outcomes over time.

Background

Any acquired brain injury (ABI) can result in long-term impairments that affect physical, cognitive, and social function. ABIs include Traumatic Brain Injury (TBI), stroke, brain tumors, and anoxia. Exercise has been shown to improve physical function outcomes such as mobility, strength, endurance and capacity to perform activities of daily living as well as cognitive function, mood, and social interactions for people with brain injury. This study investigated the effects of an intensive exercise program on the physical fitness and function of people with chronic moderate-to-severe ABI.

Methods

The 14 study participants exercised for 6 weeks, 3 days/week for 60-90 minutes each session, assisted by personal trainers under the supervision of a physical therapist. Participants' endurance, activity level, and gait speed were assessed at the start of the program, when the program ended 6 weeks later, and a third time 6 weeks after that. Data analysis methods included repeated measures T test and the Wilcoxon Signed Ranks Test.

Findings

- Participants' average age was 45, and they had been living with their injuries for between 9 and 31 years. Twelve of the 14 were men. Their injuries were TBI (9), stroke (3), brain tumor (1), and anoxic encephalopathy (1).
- Changes in the three physical outcome measures (6MWT, HiMAT, and 10MWT)¹ for the group as a whole were statistically and clinically significant immediately after the program and again 6 weeks later.
- On average, change in participants' endurance (6MWT) immediately after the program was greater than 5 times the minimal detectable clinical change (MDC) for people with chronic stroke.
- Three of the eight participants who were slow or minimal walkers at the start of the project were walking at a speed considered safe for walking in the community (10MWT) when the program ended and again six weeks later (see Table 1).

Table 1. Intervention impact on walking speed, measured immediately post-intervention and six weeks later using 10MWT¹

	Low Ambulatory Status ^a	High Ambulatory Status ^b
Baseline	8	6
After intervention	5	9
6 weeks later	5	9

^a ≤ 0.8 m/sec and includes Home Walkers (≤0.4 m/sec) and Limited Community Ambulators (0.4 m/sec to 0.8 m/sec)³

^b >0.8 m/sec and includes Community Ambulators (> 0.8 m/sec to 1.2 m/sec) and Cross Streets & Normal Walking Speed (>1.2 m/sec)³

¹ 6MWT(feet)=Six Minute Walk Test; HiMAT=High-level Mobility Assessment Test; 10MWT=Ten Meter Walk Test (Gait Speed calculation)

Discussion

- People with chronic moderate-to-severe ABI can improve endurance and walking speed and achieve advanced gait with just 6 weeks of intensive exercise.
- Despite the physical function gains found, barriers to participation in physical activity and community life remain. These barriers include lack of motivation by participants and program cost.
- Overcoming personal and environmental barriers to participating in community life will require complementary interventions.
- Transportation to the SLI Brain Injury Wellness Center in Lexington, MA was a major challenge to participation in exercise for people in our study sample.

Utilization

- **Program expansion:** Twenty-eight (out of 39) residents now work out alongside each other. More than a dozen people living in the community with ABI now come to the Wellness Center to work out.
- **Formalization:** SLI Research Council members are identifying key beneficial characteristics of the program and developing a sustainable model to support physical fitness programs for this population.
- **Tracking outcomes:** SLI Research Council members are determining standard measures to collect for all participants in exercise programming. They include physical, health and wellbeing, and healthcare utilization measures.
- **Training students:** College student interns are eager for hands-on opportunities to work with people with ABI, and they are vital to exercise program sustainability. SLI is formalizing its intern training and orientation program in collaboration with UMASS Lowell, Brandeis University and Gordon College.

References

Charrette, AL, Lorenz, LS, Fong, J, O'Neil-Pirozzi, TM, Demore-Taber, M, Lamson, KS, Lilley, R. (*Under peer review*). A pilot study of intensive exercise effects on endurance, advanced mobility, and gait speed in adults with chronic moderate-to-severe acquired brain injury.

Charrette, AL, Lorenz, LS, Fong, J, O'Neil-Pirozzi, T, Demore-Taber, M. and Lamson, KS. (2015). Impact of Intensive Exercise on Physical Function of Adults with Chronic-Moderate-to-Severe Brain Injury. Poster presentation. American Congress of Rehabilitation Medicine (ACRM) 92nd Annual Conference, Progress in Rehabilitation Research, October 25-30, Dallas, Texas.

The SLI Brain Injury Research Council is an inter-disciplinary group of researchers and clinicians doing collaborative research to support the physical, cognitive, and social fitness of people with chronic ABI living in the community.

Supportive Living Inc., a non-profit charity, strives to raise the quality of life for survivors of brain injury. To achieve this mission, SLI develops appropriate and affordable supportive housing; provides life-long physical, cognitive, and social fitness through wellness programs; and fosters research aimed at improving the lives of those affected by brain injury.

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