



Supportive Living, Inc.
BRAIN INJURY PROGRAMS

Outcomes, supports and barriers related to intensive exercise participation for adults with chronic moderate to severe acquired brain injury

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Disclosures

Presenter has no interest to disclose.

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Background and Purpose

Effects of high-intensity group exercise on:

- endurance
- advanced mobility
- gait speed

of adults with chronic severe acquired brain injury (ABI) living in brain injury group homes **were investigated.**

A subsequent **qualitative study investigated supports and barriers** related to participation in exercise from the perspectives of:

- Participants
- Residential staff
- Family members



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Participants

Intervention: Fourteen adults with chronic moderate-to-severe ABI in supported independent living who could:

- stand with minimal or no assist
- and walk with or without ambulation device.

Initially, **eight presented with low ambulatory status, six with high ambulatory status.**

Qualitative Study: Survey was implemented with all 14 intervention subjects; Interviews were conducted with intervention subjects, one person who dropped out, four family members and four residential staff.



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Participant Characteristic at Baseline	Value
Age (y) (mean \pm SD)	44.8 \pm 8.7
Years Since Injury (y) (mean \pm SD)	20.5 \pm 11.2
Men (n) (%)	12 (83%)
Women (n) (%)	2 (17%)
TBI (n) (%)	9 (64%)
CVA (n) (%)	3 (21%)
Brain tumor (n) (%)	1 (.07%)
Anoxic encephalopathy (n) (%)	1 (.07%)



Methods – Intervention

Participants received a 6-week high-intensity exercise group intervention for 60-90 minutes, 3 days per week assisted by personal trainers under physical therapist supervision.

Measures:

- 6 Minute Walk Test
- High-level Mobility Assessment Tool
- 10 Meter Walk Test

were collected at baseline, post- intervention, and 6 weeks later.

Measures were administered by PI at all 3 time-points



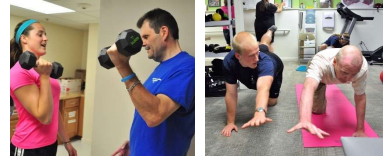
Frequency: 3 times per week
Intensity: Aiming for 80-140 bpm
Time: 60-90 minutes
Type:

Endurance Exercises:

- Treadmill walking with and without body weight support
- Stationary bike
- Overground walking
- Stairs and step ups
- Obstacle courses

Strength exercises: 10-15 repetitions in 2-3 sets

- Arms and chest (uppers):
- Free weights
- TRX hanging system
- Modified ground bases training using body weight- push-ups, buddy lat pulls
- Legs (lowers):
- Modified ground based training using body weight- squats, hamstring slides on discs, bridging



- Leg presses against weight of trainers
- Prone leg curls against trainer hand resistance
- Abdominals/ core/ stomach:
- Planks, assisted as needed
- Burpees (modified push-up followed by standing up from the ground, assisted as needed) and other total body exercises
- Crunches on slant board

Stretching exercises:

- On mat targeting shortened muscles

Balance exercises: at bar

- Standing with a narrowed base of support
- Challenging standing balance utilizing equipment such as a dyna disc and Bosu ball.
- Lateral stepping, side to side swaying, standing on one leg- usually with assist.

Methods

Intervention:

- Administered functional measures at 3 time points: pre-test, post-test, and 6 weeks later.
- Quantitative data analysis included repeated measures T test and the Wilcoxon Signed Ranks Test.

Qualitative Study:

- A brief survey and semi-structured interviews, conducted 2-3 months after the intervention, audio recorded and transcribed verbatim.
- Qualitative data analysis used pre-existing and emerging codes (concepts). Data were double coded using qualitative data analysis software (atlas.ti).
- *Sample codes:* challenges, format, function, independence, impact, POS, NEG, suggest

Results - Intervention

Significant post-intervention group improvements were achieved on all three outcome measures:

- 6MWT
- HiMAT
- 10MWT

and greater than the minimal detectable change (MDC) for this population.

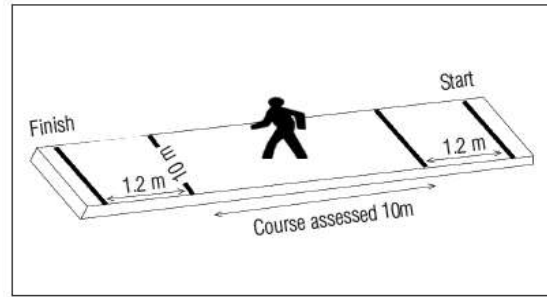


Figure 1. Representative diagram of the 10-meter walk test.

Image from: http://www.scielo.br/scielo.php?pid=S1413-35552011000200006&script=sci_arttext



Outcome measures for participants at baseline, post-intervention and 6 weeks later (n=14)

Measure	Low ambulatory status (n=8)	High ambulatory status (n=6)	All (n=14)
6MWT (feet)			
Baseline	185 (45, 381)	1313 (872, 1805)	431 (87, 1294)
After	319 (193, 734)	1878 (1706, 2363)	1016 (298, 1876)
6 weeks	293 (255, 563)	1594(1341, 2016)	712 (281, 1566)
HiMAT			
Baseline	1 (1, 3)	29 (21, 38)	3.5 (1, 27)
After	4 (2, 4)	33 (24, 40)	9 (3.75, 33)
6 weeks	3 (1, 4)	31 (24, 42)	8 (2.75, 29)
10MWT (m/sec)			
Baseline	0.36 (0.12, 0.50)	1.58 (1.36, 2.19)	0.59 (0.25, 1.5)
After	0.62 (0.25, 0.96)	1.97 (1.3, 2.22)‡	1.11 (0.53, 1.96)
6 weeks	0.48 (0.26, 0.88)	1.78 (1.47, 2.20)‡	1.10 (0.46, 1.77)

Intervention impact on ambulatory status post-intervention and 6 weeks later.

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

10MWT outcomes indicate that three participants transitioned from low to high ambulatory status and maintained the change six weeks later.



Results – Qualitative Study



More than 80% of participants agreed that:

- the program was stimulating
- they liked working out in a group
- they liked the trainers
- they felt better being active.

More than 70% agreed that the program was making a difference for them.



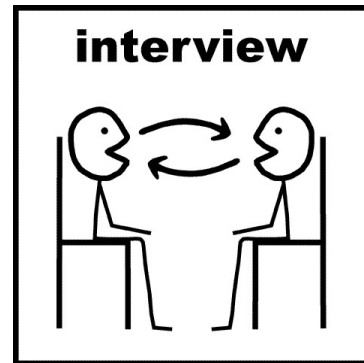
Results – Qualitative Study

Environmental barriers to participation:

- transportation (inconsistent, delayed)
- group format (not always person-centered)
- negative family attitudes towards programming developed in-house

Personal barriers to participation:

- physical (vision, balance, incontinence)
- cognitive (memory, executive function, lack of self-awareness)
- behavioral (anxiety)
- tendency toward a sedentary lifestyle (watching television).



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Results – Qualitative Study

Environmental barriers to being physically active between exercise sessions:

- Transportation challenges
- staff fear for participant safety
- limited staff time
- broken outdoor equipment
- lack of access to supportive and affordable fitness opportunities for this population



Personal barriers to being physically active between exercise sessions:

- Tendency toward a sedentary lifestyle



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Results – Qualitative Study

Environmental supports for participation:

- enthusiasm of trainers
- group format (encouraged mutual support)
- investments in transportation

Personal supports for participation:

- pre-injury participation in sports
- interest in pushing self beyond limits
- motivation to be more fit, stronger and walk more
- motivation to do something meaningful that involved interacting with others
- support, enthusiasm from family members (for participation, gains made)
- family ability & interest in paying privately for outside exercise opportunities

Discussion and Conclusion

People living with chronic ABI can improve endurance, demonstrate ability to do advanced gait, and improve ambulatory status with six weeks of intensive exercise.

Challenges to sustainability include costs, transportation and ability to recruit trainers/interns.

Efforts to support better lifestyle choices (improved nutritional choices, increased physical activity between sessions) are needed to enhance functional benefits of the intervention.

In future: Investigate cost-benefit of participation in intensive exercise for this population, and any cognitive and social benefits that result

