

## Background

- Stroke is a leading cause of long-term disability. Gait speed and walking endurance are often reduced after a stroke, leading to a decrease in community mobility and participation. High intensity interval training (HIIT) has been found to increase walking speed, step length, and endurance for people post stroke.<sup>1,2,4</sup>
- No studies have determined the effectiveness of high intensity interval training (HIIT) for increasing community reentry and participation.

## Objectives

- The purpose of this single subject-design study was to examine the effectiveness of HIIT walking on a treadmill for improving community reentry and participation for an individual with chronic stroke.

## Case Description

- 63-year-old male 5 years status post left cerebral vascular accident completed the protocol.
- The subject utilized a single point cane and an ankle-foot orthosis with minimal assistance for community ambulation.
- Visited local fitness center 3x/week for 30-45min to use the recumbent cross-trainer, walk on the treadmill, and use the leg press machine.
- Had significant support from his wife for transportation, appointment scheduling, and assisting with ambulation and communication when needed.

## Methods

- This single subject A, B, A' study design was approved by the Midwestern University IRB and the subject provided written, informed consent
- One subject was identified with the ability to ambulate within the community with less than minimal assistance
- The design was as follows:
  - Two weeks of pre-training (A phase, baseline data)
  - Five weeks of twelve 30-minute HIIT sessions (B phase)
  - Five weeks of post-training phase (A' phase, collect follow up data)
- The subject performed HIIT walking on a treadmill (Figure 1) with a mobile, overhead harness system (LiteGait®, Mobility Research). The ECG was monitored with a 2-lead ECG (Checkme™, Wellue) and Borg scale for safety and intensity
- Each HIIT session included eight, 30-second intervals of walking at 70-80% of age-predicted max HR (adjusted for the use of beta blocker) at 8-11% grade with one minute of active walking recovery between intervals (Figure 2)
- The Pacer (Pacer Health, Inc.) app tracked distance walked, steps taken with daily routine, and number and location of daily trips
- Trips: defined as travel between any two locations where the subject stopped during the day based on pacer app.
- Top 10 Targets: defined as the top 10 locations chosen by the subject that were important for his social, personal, health, and leisure goals.

Figure 1. High Intensity Interval Training Set-Up

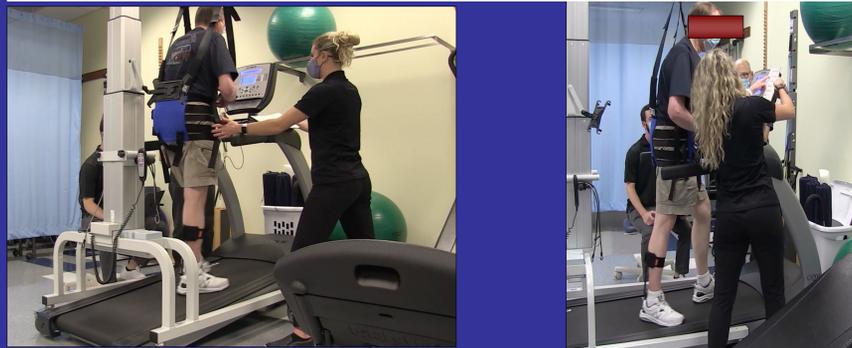


Figure 3. Average Trips Per Week to Location Categories

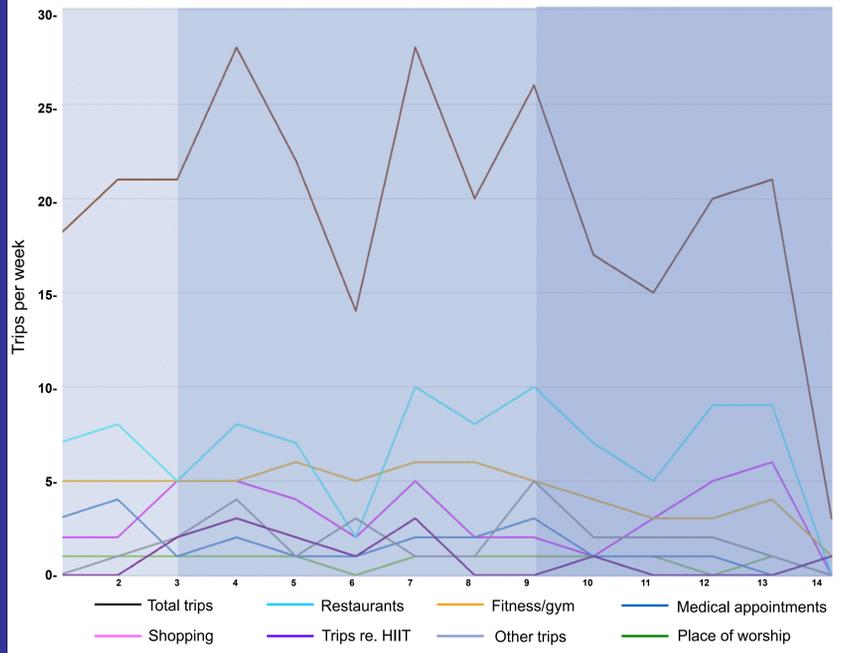


Figure 5. Six-Minute Walk Test

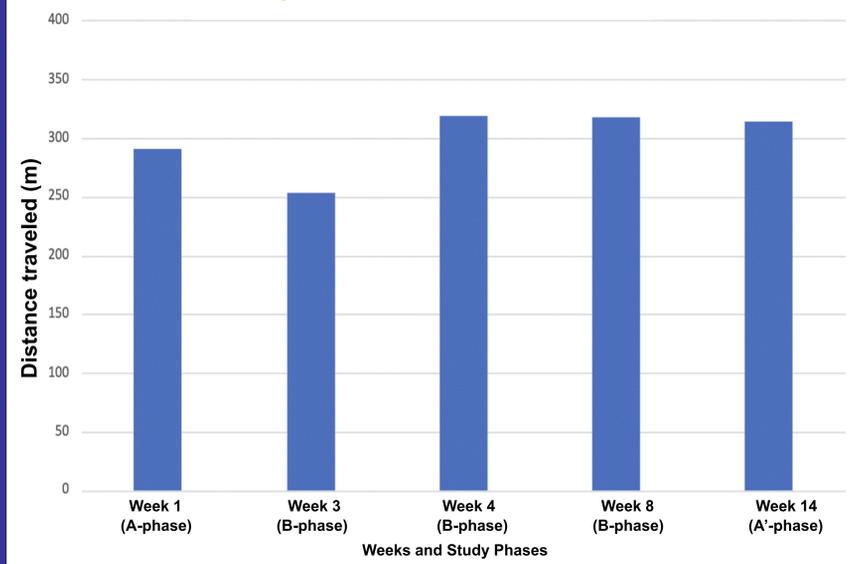


Figure 2. Mean Weekly High Intensity Training Heart Rates

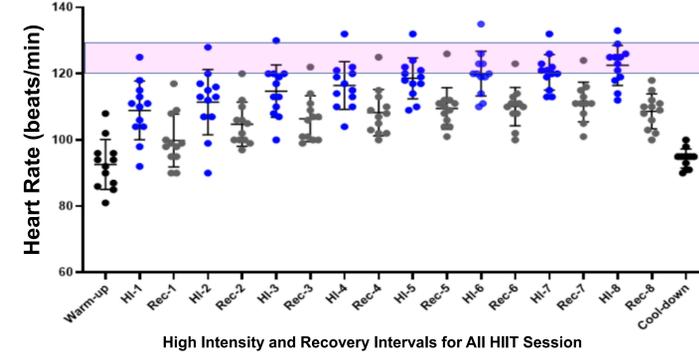


Figure 4. Average Target Visits Per Day

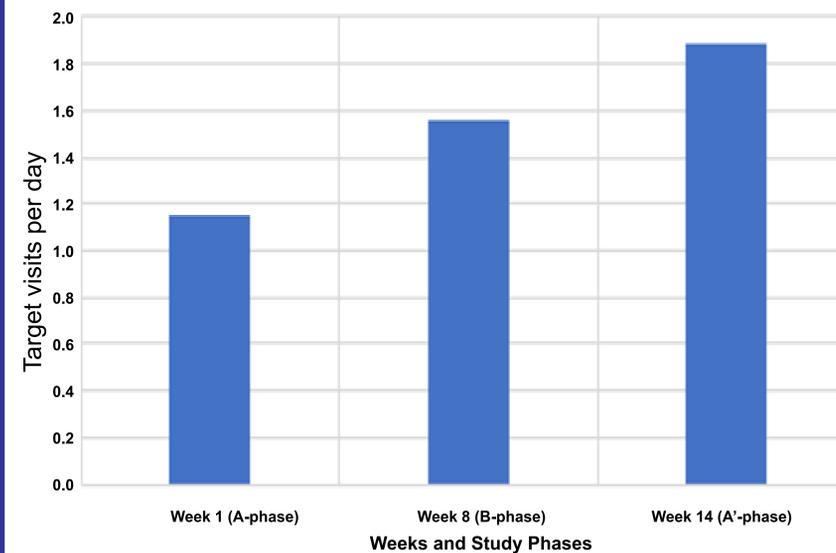
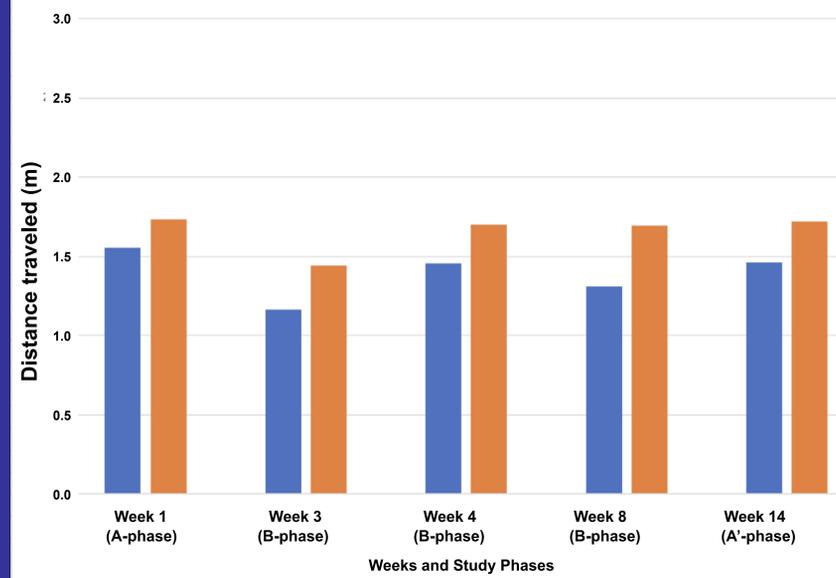


Figure 6. 10-Minute Walk Test



## Primary Outcome Measures

- Trips into the community (Figure 3)
- Top 10 Target Locations (Figure 4)
- Berg Balance Test (data not shown)
- 6 Minute Walk Test (6 MWT) (Figure 5)
- 10 Meter Walk Test (10 MWT) (Figure 6)

## Results

- Based on HR response (Figure 2) and perceived rate of exertion, the subject met the criteria for HIIT, performing work between 65-85% of maximum HR and 12-15 on the Borg scale.
- Gait speed, endurance, and balance (data not shown) were measured via 10-M walk test, 6-min walk test, and Berg Balance Scale. All measures improved following HIIT, exceeding the established minimally clinically important difference when comparing baseline to 5-weeks post phase B.
- From baseline through phase B, the subject increased his mean steps per day by 634 steps (data not shown).
- The number of trips taken in the last week of phase A, B, and A' were 25, 19 and 21 trips, respectively (Figure 3).
- The subject increased his average target visits by 0.4 (phase A to B) and by 0.33 per day (phase B to A').
- The subject reported subjective improvement in endurance, but no change in stability or adaptability when walking on uneven ground or curbs.

## Conclusion/Clinical Relevance

- The HIIT protocol was well tolerated and resulted in improvements in walking speed, endurance, and balance.
- While HIIT did result in greater travel to target locations, the subject reported no improvement navigating challenging environments such as curbs and uneven surfaces. This may have been due to a lack of effect of HIIT on stability and adaptability in gait.
- A combination of HIIT and task-specific functional mobility training may have resulted in better carry-over into community reentry for this subject.
- This was a single-subject design study with n=1; therefore, results cannot be extrapolated to all survivors of stroke and additional research is needed.

## References

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