

ACADEMY OF SPINAL CORD INJURY PROFESSIONALS

Compliance and Adherence During a 16-week High-Intensity Interval Training Program for Individuals with Paraplegia

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Abstract

Background

The Centers for Disease Control and Prevention (CDC) recommend ≥ 75 minutes of vigorous-intensity aerobic physical activity for individuals with spinal cord injury (SCI) per week to improve cardiometabolic outcomes. High-intensity interval training (HIIT) involves multiple short bursts of intense activity followed by recovery over a shortened duration, and has shown similar outcomes to longer duration, moderate-intensity activity for the able-bodied population. HIIT at-home may be a feasible program for individuals with paraplegia caused by SCI.

Objective

Implement at-home HIIT programming and assess compliance and adherence virtually for individuals with paraplegia.

Design

An at-home 16-week HIIT program using an arm cycle with mobile applications for data tracking and performance feedback.

Methods

An arm cycle, hydraulic table and heart rate monitor were delivered to participant's home. Maximal exercise testing carried out on site at Mayo Clinic determined individualized target HR. HIIT programming was set at 3x/week for 24 minutes. 6x1-minute high-intensity intervals at 70% heart rate reserve (HRR) each followed by a 2-minute recovery interval (30% HRR).

Results

Average adherence for participants was 87% (range 38-100%). All participants were compliant in achieving 70% HRR within the training sessions at an average rate of 80%. Recovery targets were achieved 35% of the time.

Conclusions

HIIT was easily monitored by the study team. Participants achieved high adherence and compliance during the 16-week program likely due to reduced barriers including adaptive equipment provided in-home, motivational follow-along recordings and real time feedback from mobile applications.

Methods

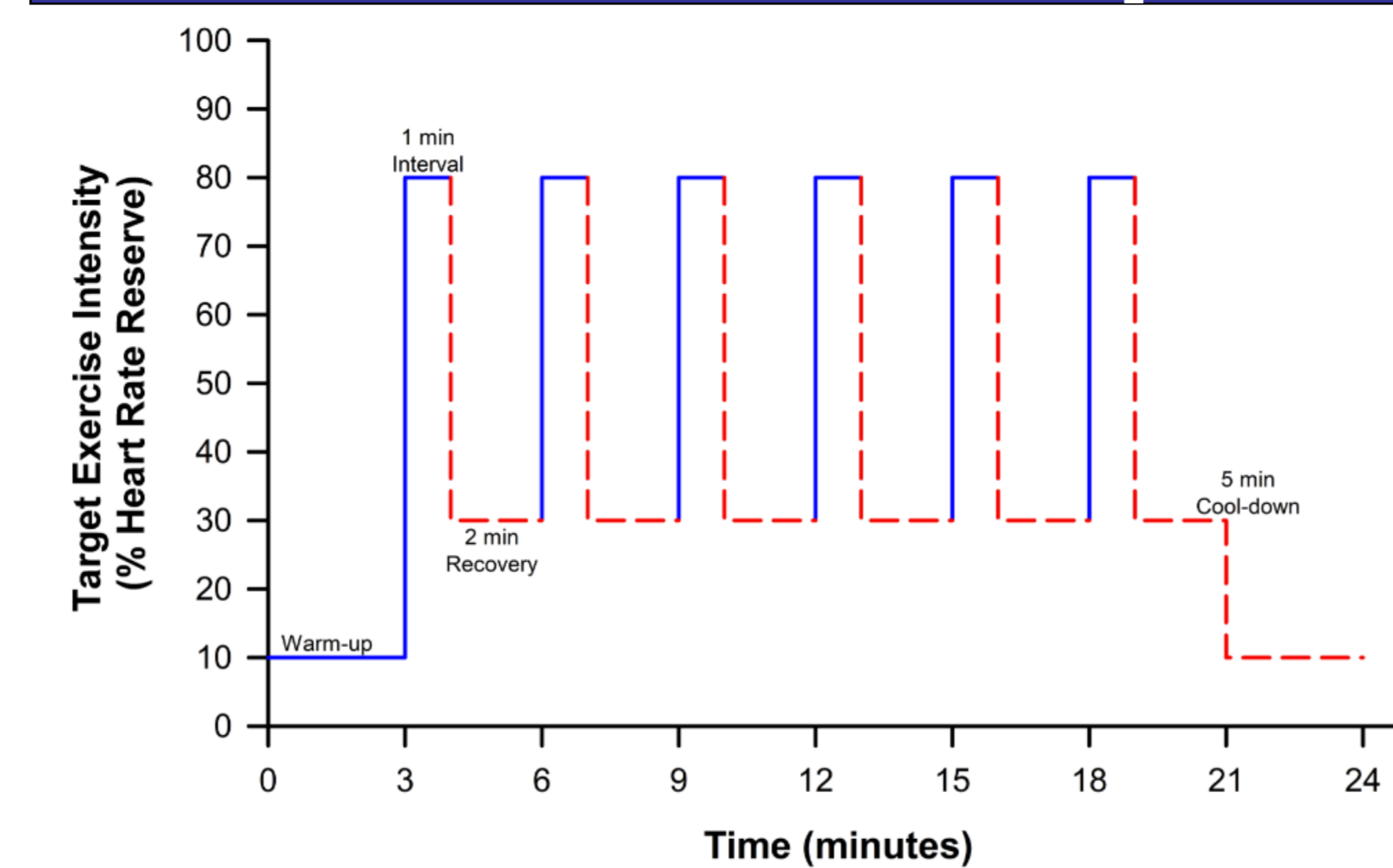
Study Design: 16-week, in home program.

Participants: Individuals with SCI below the 6th thoracic vertebrae and manual wheelchair users.

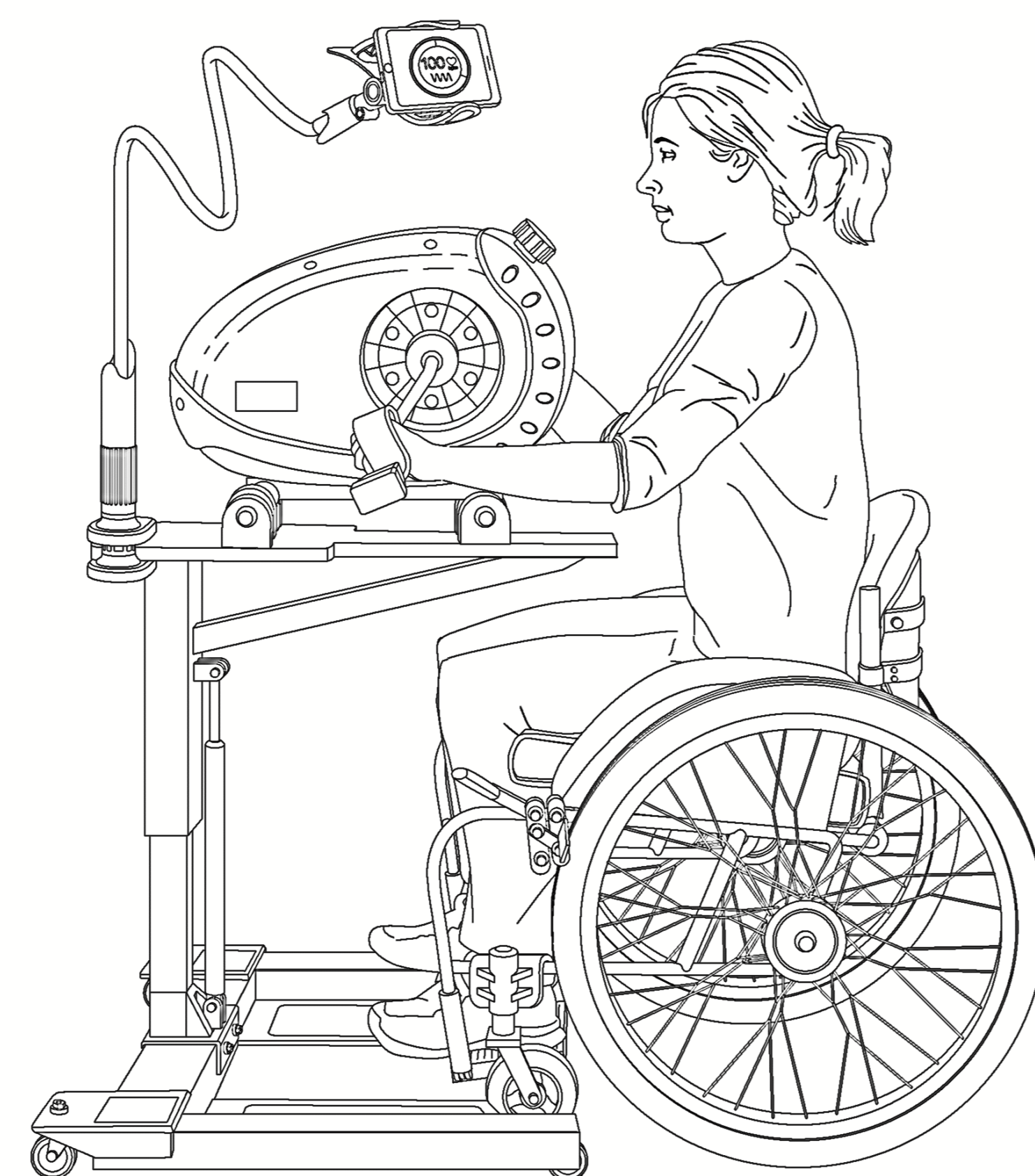
At-Home Intervention: 24-minute session with 3 minute warm up, 6x1-minute high-intensity intervals, each followed by a 2-minute recovery intervals, and a 3-minute cooldown.

Data Analysis: Compliance was averaged over the 16 weeks for the 8 participants with individualized HRR outlined for each.

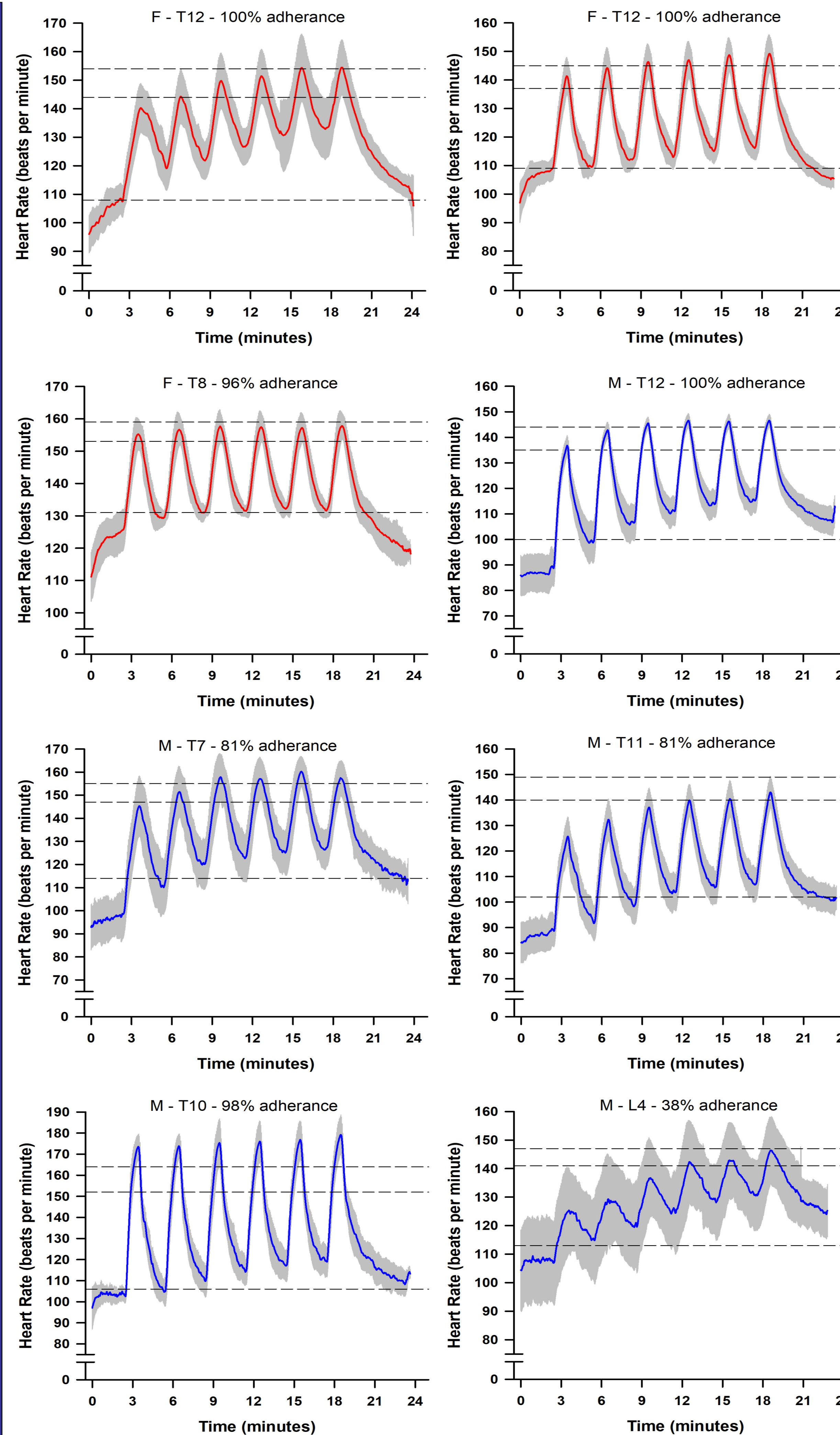
Exercise Prescription



Home Setup



Individual Compliance Data



The top dashed line represents the prescribed high-intensity target of 80% HRR, with the middle-dashed line representing the acceptable high-intensity threshold of 70% HRR, and bottom dashed line represents the recovery target of 30% HRR. Red/blue bold lines and gray error bands represent mean and standard deviation, respectively. (M = male, F = female, HRR = heart rate reserve)

Results

Participant	Attendance/Adherence, %	Intervals above 80%HRR, n (%)	Intervals above 70%HRR, n (%)	Intervals below 30%HRR, n (%)
P1	100%	159 (55.2%)	252 (87.5%)	5 (1.7%)
P2	100%	253 (87.9%)	286 (99.3%)	87 (30.2%)
P3	96%	217 (78.6%)	269 (97.5%)	209 (77.4%)
P4	100%	177 (61.5%)	267 (92.7%)	55 (19.1%)
P5	81%	165 (70.5%)	205 (87.6%)	84 (35.9%)
P6	81%	26 (9.0%)	123 (42.7%)	143 (53.0%)
P7	100%	258 (89.6%)	264 (91.7%)	90 (31.9%)
P8	38%	33 (30.6%)	52 (48.2%)	31 (28.7%)
Mean ± SD	87 ± 20%	57 ± 28%	80 ± 21%	35 ± 23%

Most participants had high adherence to exercise. Several participants demonstrated increased ability to achieve their high-intensity HR target after the first few intervals and all participants were able to achieve 70% HRR or above the latter half of the six high-intensity intervals. Conversely, participants were not able to lower their HR consistently following high-intensity bouts during the two-minute recovery.

Discussion

It is unclear whether recovery influences the achievement of subsequent high-intensity bouts. More work pertaining to interval timing, resulting in desired HRR is necessary to determine if HIIT is an effective and appropriate mode of exercise for individuals with SCI below T6.

Conclusions

The HIIT program was easily implemented at-home for our study population of individuals with SCI below the T6 level. Participants achieved high attendance and compliance within the 16-week program. HIIT is an independent, feasible long-term program for individuals with SCI below T6.

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