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Translation of an Evidence-Based Therapeutic Exercise Program for Patients with Peripheral Artery Disease

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Abstract

Purpose—The purpose of this study was to implement and evaluate quality outcomes including referral, enrollment, and completion rates of a new PAD-specific supervised exercise therapy (SET) program within a pre-existing clinical exercise wellness program, and to evaluate the clinical effectiveness and patient-centered outcomes derived from 12 weeks of PAD-specific SET.

Methods—Recruited participants completed an individualized, minimally supervised, PAD-specific SET program based on the AHA-ACC guidelines. Exercise workloads (METS) were tracked and evaluated throughout the program. Short Physical Performance Battery, 6-minute walk test (6MWT) Walking Impairment Questionnaire, Short Form (SF) - 36 and Peripheral Artery Disease Quality of Life Questionnaire (PADQOL) were assessed before and after the program. Paired t-tests were used to examine differences between baseline and follow-up outcome variables.

Results—On average, participants (n=46) attended 23 (SD 12.9) out of the possible 36 training sessions, for a 64% attendance rate. Among participants who used treadmill walking as the primary mode of exercise (n=40), the overall mean MET level just prior to program completion was 3.79 (SD 1.49), which represented an increase of 0.92 (34%) METS compared to baseline (p<.001). Total distance on the 6MWT increased 115 (11%) feet (p=0.011), which is considered a clinically meaningful improvement. Significant improvements were noted in the PADQOL: symptoms and limitations in physical functioning (p=.007).

Conclusions—This study demonstrates that a minimally staffed PAD-specific SET program can improve functional performance in patients with claudication due to PAD and serves as a foundation to help build a clinically effective, Centers for Medicare and Medicaid (CMS) reimbursed PAD-specific rehabilitation program.

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Keywords

peripheral artery disease; claudication; supervised exercise therapy; rehabilitation

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Introduction

Lower extremity peripheral artery disease (PAD) affects at least 8.5 million Americans over age 40, greater than 10% of the population over age 70, and the incidence of PAD (in contrast to coronary artery disease and ischemic stroke) is increasing.^{1–3} PAD has a devastating effect on quality of life of those afflicted. PAD reduces functional status (pain-free walking) and results in substantial morbidity and mortality. Individuals with PAD suffer very high short term rates of heart attack and stroke.⁴ The primary manifestation of PAD is claudication, which is experienced by an estimated 2 million Americans, profoundly limits physical functioning^{5,6} and results in sedentary lifestyle,⁷ perceived ambulatory dysfunction,⁸ and poor health-related quality of life.^{5,6,9,10} Due to the impact of PAD on both limb and central cardiovascular events, PAD is one of the most costly of cardiovascular diseases, with health economic costs exceeding \$21 billion annually.^{4,11}

Robust data from clinical investigations have documented that supervised exercise training (SET) can serve as a clinically effective claudication treatment and can be considered the gold standard treatment for claudication.^{12–15} Most notably, results of the multicenter clinical trial, “Claudication: Exercise Versus Endoluminal Revascularization (CLEVER)” recently demonstrated that in patients with claudication-inducing aortoiliac PAD, both a supervised, aerobic exercise training program and iliac stenting improve walking performance and quality of life to a greater extent than optimal medical therapy. However, SET noted greater improvement in peak walking time compared to stenting.¹⁵ Such research is the foundation for the first-line therapy recommendations for the treatment of claudication due to PAD provided by current national and international PAD patient care guidelines.^{4,16} Furthermore, therapeutic exercise has been unequivocally proven to be cost and clinically effective in those with PAD. For example, a pre-planned health economic study demonstrated the cost-effectiveness ratio for aortoiliac stenting versus supervised exercise training to be \$122,600 per quality of life year gained.¹⁷ However, despite the evidence of comparable or superior benefits compared with invasive revascularization strategies, SET for PAD is not widely used. Many barriers to such use are now diminishing as one barrier, reimbursement by Centers for Medicare and Medicaid Services (CMS), is now resolved. The large clinical benefit and lowering of access barriers to SET provides a rationale to evaluate program dissemination in real world settings.

The objectives of this study were 1) to implement and evaluate quality outcomes from a new PAD-specific SET program including referral, enrollment, and completion rates within a pre-existing exercise wellness program, and 2) to evaluate the subjective and objective clinical, functional, and quality of life outcomes following a 12-week clinical therapeutic PAD-specific SET program.

Methods

Sample

Participants were recruited through mailed letters of invitation to patients in the Fairview Health System with a documented diagnosis of PAD in their medical record, as well as through direct referrals from providers (i.e. vascular medicine specialists) in the Fairview Health System. Inclusion criteria were lifestyle-limiting claudication and referral by a healthcare provider for exercise therapy for PAD. Additionally, patients had to be able to speak and read English and provide informed consent. Exclusionary criteria included ischemic leg/foot pain at rest, leg/foot ulceration, limited exercise capacity due to conditions other than claudication (e.g., unstable angina, severe arthritis, extreme dyspnea on exertion, or unstable coronary artery disease), class IV heart failure, uncontrolled sustained arrhythmias, severe/symptomatic aortic or mitral valve stenosis, hypertrophic obstructive cardiomyopathy, severe pulmonary hypertension, and other conditions aggravated by exercise, such as resting systolic blood pressure >200 mmHg or resting diastolic blood pressure >110 mmHg, active myocarditis/pericarditis, thrombophlebitis, and recent systemic/pulmonary embolus.

Data Collection

Data on subjective and objective clinical, functional, and quality of life outcomes were collected at baseline (time of enrollment) and at 12-weeks follow-up.

Objective Tests of Physical Function—Physical function was assessed objectively using the 6-minute walk test (6MWT) and the Short Physical Performance Battery (SPPB). The 6MWT is a performance-based functional measure in which the participant is asked to walk as far as possible in 6 minutes.¹⁸ The 6MWT has been used extensively in cardiovascular research, including PAD, as a method of monitoring disease status and the effects of interventions.¹⁹ In addition to total distance covered in 6 minutes (peak walking distance), the time and distance at which the participant first reported claudication (onset to claudication time and onset to claudication distance, respectively) were also recorded.

The SPPB consists of three measures: standing balance, 4-meter walking velocity, and repeated chair rises.²⁰ This testing series has been used extensively with older adults, including individuals with PAD, to evaluate functional status and risk of falling.^{19, 21} Scores on the SPPB range from 0 to 12, with higher scores indicative of greater function.

Subjective Measures of Physical Function and Quality of Life—Physical function was also evaluated using a self-report measure, the Walking Impairment Questionnaire (WIQ). The WIQ was developed specifically for patients with PAD²² and consists of three subscales: walking distance, speed, and stair climbing. Scores range from 0 to 100, with 100 representing no impairment and 0 representing complete impairment. This questionnaire has been shown to be well-correlated with treadmill walking distance and to be sensitive to change over time.²²

Quality of life was also assessed, using two measures: the Peripheral Artery Disease Quality of Life Questionnaire (PADQOL) and the Short-Form 36 (SF-36). Developed by Treat-

Jacobson and colleagues, the PADQOL is 38-item questionnaire designed to specifically examine PAD-related quality of life.²³ The PADQOL contains five factors: social relationships and interactions, self-concept and feelings, symptoms and limitations in physical functioning, fear and uncertainty, and positive adaptation, in addition to three individual items on sexual function, intimate relationships, and job function. Higher scores on the PADQOL indicate greater quality of life.

The SF-36 is a 36-item, validated questionnaire assessing health-related QOL.²⁴ It has 8 subscales: physical functioning, role physical, body pain, general health, vitality, social functioning, role emotional, and mental health index. In addition, the SF-36 includes summary scores (physical component summary and mental component summary). SF-36 total scores range from 0 to 100, with higher scores representing better health-related QOL.

Assessment of Change in Submaximal Energy Expenditure/Functional Capacity due to PAD-Specific SET

Metabolic equivalents of task (MET) were used to assess any change in submaximal energy expenditure/functional capacity due to exercise training. METS, while exercise training on the treadmill, were estimated on the basis of the speed and grade recorded by study staff during each exercise session. In order to ensure that the correct exercise intensity was being utilized at the start of the program study staff adjusted the treadmill intensity to allow for moderate 3–4/5 level claudication to be achieved in approximately 8 minutes. The start of the PAD SET program was defined as the average MET level of the second and third sessions. Likewise, the MET level upon completion of the PAD SET program was defined as the average MET level of the final two exercise sessions.

Finally, data on demographic characteristics, medications, comorbid conditions, history of surgical or endovascular interventions for PAD, and most recent ankle-brachial index were also collected via medical record review.

PAD-Specific SET

Our PAD-specific SET program was added to a pre-existing phase III cardiac rehabilitation program called Wellness and Exercise for Life (WEL) and was offered 3 to 5 days per week at five hospitals in the Twin Cities Metropolitan Area. WEL is a self-pay program through Fairview Health Services and targets patients with cardiovascular, pulmonary, and metabolic diseases. The PAD-specific SET program was developed based on AHA/ACC guidelines and delivered by trained study staff comprised of exercise physiologists and nurses.²⁵ Briefly, this program included a 1-hour baseline patient evaluation, which included a health and medical history assessment, foot inspection, and 6MWT with telemetry. After completion of the baseline assessment, the first exercise session was supervised by study staff. The objectives of the first session were to 1) review the SET protocols available, 2) ensure that the proper starting, individualized exercise intensity was implemented, and 3) educate patients how to complete their exercise logs (Appendix) that documented the following for each session or bout of exercise: intensity used (speed, grade, rpm, etc.), bout duration, effort rating, claudication rating at cessation of bout (if applicable), and rest duration (if applicable). Thereafter, study staff checked in with participants weekly, and were available as needed for questions or monitoring. Additionally, all exercise logs were

reviewed weekly by the lead exercise physiologist to ensure exercise prescription compliance.

Multiple exercise modalities including treadmill, arm ergometry, leg ergometry, and NuStep were available during each session. Patients were encouraged to use the treadmill as the primary modality for their exercise training.²⁵ For individuals who had exercise limitations in addition to claudication (i.e. orthopedic issues, etc), the exercise modality that was best tolerated was used as the primary exercise modality for PAD-specific SET. Non-responders to treadmill exercise, or individuals whose treadmill performance was severely limited by claudication were also encouraged to use an alternative exercise training modality. Exercise sessions were scheduled for 60 minutes in duration, which included a 5-minute warm up and cool down.

Treadmill exercise prescriptions were modified from the previously developed CLEVER protocol.²⁶ Since there was no graded treadmill test prior to study enrollment, the goal of the first exercise session was to find the speed and grade that induced moderate level claudication (3–4/5 on a 0 to 5 claudication scale) within 8 to 10 minutes. This exercise intensity was documented and used as the starting treadmill exercise prescription. Interval treadmill training then ensued as participants were instructed to walk to a moderate level of claudication, stop, sit down and rest until the claudication symptoms had completely ceased, and then resume walking. This work/rest cycle was continued for the remainder of the 60-minute session. Progressions in exercise intensity were based on walking bout duration and reported claudication ratings. If a participant was able to walk at their prescribed workload for 8 minutes or more before experiencing moderate claudication, the speed or grade was increased by 0.1mph or 1%, respectively, at the next session. The decision whether to increase by speed or grade was based on patient tolerability.

Upper body ergometry exercise prescriptions were modified from a previously developed protocol investigating its efficacy in patients with claudication.¹⁴ Exercise training was initiated at 50 rpm and 20–30 Watts. Exercise was initially performed at work to rest ratio of 2 minutes: 2 minutes. Work to rest ratios were progressively increased every 2 weeks to 3:2, 3:1, 4:1, and 5:1. The ergometer resistance was adjusted as needed to maintain a rating of perceived exertion (RPE) of 12–15, using the Borg 6–20 RPE scale²⁷ or an OMNI effort rating of 4–7 using the 0–10 OMNI effort scale,²⁸ during all work intervals.

Leg ergometry and NuStep exercise prescriptions were also based on AHA-ACC guidelines for exercise treatment of claudication and intensity was further modified to meet current cardiac rehabilitation practices²⁹ unless claudication limited the exercise performance. Briefly, continuous exercise was performed at a comfortable cycling/stepping rate and resistance was adjusted as needed to promote moderate-vigorous exertion.³⁰ If claudication limited the ability to complete the exercise, the participant was instructed to exercise until moderate claudication symptoms developed, rest until the claudication symptoms had completely ceased and then resume the cycling or stepping.

Statistical Analysis

Descriptive statistics were used to characterize the sample. Means and standard deviations or percentages were calculated for continuous and count data, respectively. Paired t-tests were used to examine differences between baseline and follow-up in outcome variables. $P < 0.05$ was considered statistically significant.

Results

Participant Characteristics

Forty-six participants (61% male, mean age 70.5[SD 7.5] years) enrolled in the rehabilitation program over a 9-month period. The study sample consisted predominantly of male Caucasians with mild-moderate symptomatic PAD. The majority had medical histories that included hypertension, hypercholesterolemia, and concurrent coronary artery disease that were being treated pharmacologically. The majority of the sample was also currently married and retired (Tables 1 & 2). Fifty percent of the sample had had a prior lower extremity revascularization procedure (endovascular or surgical).

Participant Uptake into SET and Program Adherence

Data for participant uptake and adherence are found in Figure 1 and Table 3. On average, participants attended 23 (SD 12.9) out of the possible 36 training sessions, for a 64% session attendance rate. This corresponded to an average 2 day per week session attendance. The average duration between baseline and follow up testing was 90.9 (SD 36.4) days (range 23–199 days). Treadmill walking was the primary mode of exercise ($n=40$), the remaining 6 participants used different training modalities. For individuals who completed follow up testing ($n=37$), 36 used the treadmill as the primary training modality.

Objective Tests of Physical Function

After completion of the PAD-specific SET program, participants significantly increased total walking distance in the 6 MWT by 11% from 1016 to 1131 feet ($p=0.011$). Changes in the onset to claudication time and onset to claudication distance increased by 16 seconds and 34 feet respectively, however, these changes were not statistically significant. The changes in the SPPB total score, balance, repeated chair stand, and 4-meter walk subscale scores were also not significant.

Change in Submaximal Energy Expenditure/Functional Capacity due to PAD-Exercise Rehabilitation

In participants who used treadmill exercise as the primary mode of exercise therapy, the overall mean MET level upon completion of the PAD-specific SET program was 3.79 (1.49) (Table 4). The overall average increase in exercise training workload over the course of the PAD SET program was 0.92 METS, which was statistically significant ($p<.001$) and represented a 34% increase from baseline.

Subjective Measurements of Physical Function and Quality of Life

There were no significant differences between baseline and follow-up in WIQ scores (p values >0.5) (Table 5). Significant improvements were noted in one factor of the PADQOL: symptoms and limitations in physical functioning ($p=.007$), as well as in the two items of sexual function ($p=.017$) and intimate relationships ($p=.002$). Although not significant, there was a trend toward improvement in scores on Factor 4, fear and uncertainty ($p=.069$). There was also a small, but statistically significant improvement in the physical function subscale of the SF-36 ($p=.022$). There were no other differences on the SF-36 between baseline and follow-up.

Discussion

To our knowledge, this is the first study that has attempted to implement and evaluate a PAD-specific SET program within a pre-existing exercise wellness program that is comparable to a phase III or IV cardiac rehabilitation program model. In comparison to traditional reimbursed cardiac rehabilitation programs, which include: baseline patient assessment, nutritional counseling, risk factor management, psychosocial management, physical activity counseling, and exercise training,³¹ our minimally resourced PAD-specific SET program was only able to focus on the baseline patient assessment and exercise training. Despite the limited resources, the findings pertaining to our primary objectives can be taken positively.

PAD-specific SET in a cardiac rehabilitation setting is a feasible and effective therapy for the treatment of symptomatic PAD. Rapid enrollment of study participants (46 patients over the course of 9 months) was made possible through direct communication and collaboration with clinicians who treat patients with PAD. The uptake into our PAD-specific SET was 61.3%, which is higher than the 14–40% of eligible patients reported to enroll in traditional cardiac rehabilitation programs referred for coronary artery disease, myocardial infarction, or coronary artery bypass graft.³² Twenty-nine of those that were screened either were ineligible ($n=4$) or declined to participate ($n=25$), of this subset, the most common reported reason was a lack of interest or motivation. This is also the most common descriptor for lack of participation in SET programs for claudication reported in randomized controlled trials³³ (RCTs), and is a common predictor of poor uptake in traditional cardiac rehabilitation.³² In addition to poor motivation, other explanations given for declining SET participation were time commitment and cost, both of which have been reported as barriers for participation in SET-focused RCTs and cardiac rehabilitation.^{32,33} Nine participants (20%) did not perform follow-up testing, although most ($n=4$) dropped out and could not be reached, the remaining justifications reported for discontinuing the SET program were transportation issues, lack of perceived results, and deterioration in health status, which are all common reasons reported for dropout in SET-focused RCTs and cardiac rehabilitation.^{32,33} In our PAD-specific SET program, 80% of participants completed follow-up testing. In addition, 6 participants completed 36 sessions, 12 participants completed 24–35 sessions, while the remaining 19 completed less than 24 sessions in 12 weeks. Despite the wide range of participation (4–58 sessions), on average, participants completed 23 out of the possible 36 training sessions (64% adherence rate), with the average time between uptake and follow up testing being 90

days (12 weeks). This equates to an average training frequency of 2 days per week, which is a common training frequency seen in traditional cardiac rehabilitation programs. Furthermore, our program adherence is similar in comparison to the 75.1% program completion rate reported in a meta-analysis of RCTs involving SET for treatment of claudication.³³ It should be noted that a limitation of this meta-analysis was that no article used gave a clear definition of the number of sessions attended that was considered the minimum for a subject to have completed the SET program. The high uptake, low dropout, and good adherence shown in our program relative to historical comparisons,³² suggest that implementation of PAD-specific SET in this setting is feasible, despite the limited resources available for this study.

In our cohort, after completion of the PAD-specific SET program, distance covered in the 6MWT significant increased by 11% (115 feet or 35m). As discussed earlier, 36 of the 37 participants who completed follow-up testing used the treadmill as the primary exercise training modality, the other participant utilized only the total body recumbent stepping apparatus (i.e. NuStep), and still improved walking distance by 217 feet (66m) in the 6MWT. Small and large clinically meaningful change in 6MWT total distance is reported to be 20m and 50m respectively.³⁴ This moderately clinically meaningful change in 6MWT difference is also similar to findings documented in well-controlled, clinical trials that have investigated the effects of 12–24 weeks of aerobic SET in patients with symptomatic PAD.^{35,36} Additionally, the 11% (35m) change in 6MWT distance is also similar to the 36m improvements seen in cardiac rehabilitation programs that have employed 1-hour exercise sessions twice weekly in patients with a diagnosis of myocardial infarction, angina, controlled arrhythmias, coronary artery disease with or without intervention, or defibrillator or pacemaker transplantation.³⁷ The results of the study also suggest that PAD-specific SET surpasses the threshold of a clinically meaningful improvement in 6MWT test following cardiac rehabilitation, which is considered to be 25m.³⁸

The American Association of Cardiovascular and Pulmonary Rehabilitation accepts mean change in MET level as a measure that meets the functional capacity outcome requirement within the clinical domain for program certification. In our large subset of participants who used the treadmill for exercise training, there was a significant 34% increase in MET level which reflects an increase in exercise training workload throughout the duration of the rehabilitation program. The MET level at the start (2.87) and end (3.79) of PAD exercise rehabilitation and the change in exercise training workload (34%), were slightly lower than previously documented values from archives from cardiac rehabilitation participants. Keteyian and colleagues³⁹ report that in men (n=5780), MET level at the start of the cardiac rehabilitation program was 2.9 METS and 4.1 METS upon exit, reflecting a relative 45% change. In women (n=2539), these values were 2.4 METS, 3.3 METS, and 40% respectively. It should be noted that in their study population, subanalysis of patients of PAD was not provided. The absolute change in METS following PAD-specific SET was 0.92, which was comparable to the 1.3 and 0.9 change scores reported for males and females, respectively.³⁹ The 0.92 absolute change and 3.79 MET average at exit from the PAD-specific SET program both represent important clinical findings. Feuerstadt et al. have shown that for each 1 MET level increase for those participating in cardiac rehabilitation there was a 28% reduction in mortality.⁴⁰ Furthermore, MET levels below 3.5 upon exit from cardiac

rehabilitation programs have been associated with higher 1 and 3 year adjusted mortality rates.⁴¹ Despite the improvements in 6MWT distance, there was no dose-response relationship found between change in 6MWT distance and MET-minutes of exercise accumulated or sessions attended.

It is also important to note that significant improvements were observed in both PAD-specific and general quality of life. Self-reported improvements in symptoms and limitations in physical functioning, and an improvement in the physical function subscale of the SF-36, are consistent with the improvements noted in objective measures of physical function and consistent with previous studies of structured exercise therapy for PAD. Fokkenrood and colleagues observed a similar change in SF-36 physical function (approximately 2 points) in a similarly sized study of 3 months of structured exercise therapy.⁴²

Strengths and Limitations

The primary strengths of this study pertained to the avenues used for recruitment, implementation of the cost-effective PAD-specific SET program, and the clinical utility of the outcome measures. The organization of the research team provided direct communication and collaboration with clinicians who care for patients with PAD. This allowed for efficient and effective recruitment and represents a feasible model for facilitating referrals for future PAD-specific SET programs. Secondly, the research assistants (nurses and nursing students) and cardiac rehabilitation staff were well-educated in implementing exercise training for improving walking capacity in patients with claudication. Furthermore, direct communication with the lead exercise physiologist, who reviewed all training logs, helped ensure that appropriate progressions in exercise intensity were made. Finally, the use of the 6MWT, and documentation of exercise workloads (METS) allowed for direct comparison of findings from our PAD-specific SET program to other traditional cardiac rehabilitation programs, and allowed for clinically relevant conclusions to be made.

There are a few limitations that should be noted. The results of this study may be representative of retired, older populations that suffer from symptomatic PAD. Many potential candidates were working outside the home, and were therefore unable to participate. This is in part due to inability to get time away from work. This is seen in traditional cardiac rehabilitation programs, however, to a lesser extent, as participants who are referred have likely experienced a recent cardiac event and have scheduled time off work during the recovery period. Secondly, although physical activity counseling was not a component of our PAD-specific SET program, we did not measure physical activity outside of the supervised setting. The 11% change in 6MWT and 34% improvement in treadmill workload were important clinical findings that were achieved despite several limitations which included 1) no structured education component on risk factors of PAD; 2) limited staffing that resulted in a staff/participant ratio of 1:15 and; 3) several of the participants were already involved in aerobic exercise training programs upon recruitment, thus a likelihood of seeing diminishing physiological returns with the PAD-specific SET program.

Future Directions

This study demonstrates the effectiveness of a self-pay phase 3 model in improving peak walking distance, submaximal energy expenditure, and quality of life in older adults engaging in a clinic-based PAD-specific SET program. While these results are both statistically and clinically significant, a phase 2 model with improved staff to participant ratio, greater attention to PAD risk factors, and additional financial resources would likely result in even greater outcomes. This model should include some of the core components of cardiac rehabilitation including: patient assessment (medical history, physical examination, graded exercise testing), nutritional counseling, medication and risk factor management, physical activity counseling, and exercise training. The components should be tailored to the treatment and management of PAD, with the goals of reducing incidence of a secondary cardiovascular event, improving walking capacity, and enhancing quality of life.

Conclusions

PAD-specific SET is known to be feasible, clinically and cost-effective, and is recommended as a primary Class1A treatment for patients with claudication. This study demonstrates that a minimally staffed PAD-specific SET program can improve functional performance in patients with claudication due to PAD. Findings from this study would likely be enhanced with greater resources, including a stronger staff to participant ratio, and the addition of other core components found in traditional cardiac rehabilitation programs (e.g. education on risk factor management, proper nutritional advice, etc.). This study serves as a foundation to help build a clinically effective, CMS-reimbursed PAD-specific rehabilitation program with the potential to significantly improve the lives of patients with PAD.

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Highlights

- SET for PAD, performed in a phase III cardiac rehabilitation setting, is feasible.
- SET improves both 6-minute walk test variables and treadmill walking capacity.
- Improvements are comparable to those seen following cardiac rehabilitation.
- SET improves some self-report measures of quality of life.

Figure 1.
Participant Recruitment, Uptake, and Adherence to SET

Table 1

Demographic Characteristics

Characteristic	Mean (SD)	Range	N [%]
Age (years)	70.5 (7.7)	46–84	
Sex			
Male			28 [60.9]
Female			18 [39.1]
Race			
Caucasian			45 [97.8]
Other			1 [2.2]
Ethnicity			
Hispanic			0
Non-Hispanic			45 [100]
Height (meters)	1.57 (0.09)	1.44–1.78	
Weight (kg)	82.9 (17.5)	48.6–127.7	
BMI (kg/m ²)	33.2 (5.6)	22.0–49.4	
Marital Status			
Single			3 [6.5]
Married/Living with Partner			33 [71.7]
Divorced			7 [15.2]
Widowed			3 [6.5]
Education			
Less Than High School Diploma			2 [4.3]
High School Diploma			10 [21.7]
Some College			19 [41.3]
4 Year College Degree			8 [17.4]
Graduate School			7 [15.2]
Employment Status			
Full-Time			3 [6.5]
Part-Time			1 [2.2]
Homemaker			1 [2.2]
Retired			40 [87.0]

Table 2

PAD History/Severity, Risk Factors, Medical Comorbidities, and Medication Use

Characteristic	Mean (SD)	Range	N [%]
ABI (lower leg)	0.61 (0.26)	0.29–1.19	
History of Revascularization			23 [50.0]
Percutaneous			16 [69.6]
Bypass			14 [60.9]
Amputation			3 [6.5]
Current Smoker			4 [8.7]
Former Smoker			36 [78.3]
Pack Years	43.5 (32.1)	4–140	
Hypertension			44 [95.7]
On Medication for Hypertension?			40 [90.9]
Hypercholesterolemia			43 [93.5]
On Medication for Hypercholesterolemia?			42 [97.7]
Diabetes			18 [39.1]
Anti-Platelet Agent			36 [83.7]
Currently Use of FDA-approved medication for PAD (cilostazol, pentoxifylline)			7 [15.2]
Coronary Artery Disease (diagnosis of CAD or history of MI)			24 [52.2]
Carotid Endarterectomy			5 [10.9]
Stroke/TIA			5 [10.9]

Table 3

Sessions Attended

Characteristic	Mean (SD)	Range
Number of Sessions Attended	23.1 (12.9)	4–58
Number of Days Between Baseline and Follow-up	90.9 (36.4)	23–199
Average Sessions Per Week	2.0 (0.9)	0.2–4.2

Table 4
Physical Function and Submaximal Energy Expenditure/Functional Capacity Outcomes

Characteristic	Mean (SD)		t	p
	Baseline	Follow-up		
Short Physical Performance Battery				
Balance (points out of 4 possible)	3.54 (0.78)	3.51 (0.78)	0.30	.77
Chair Stand (seconds)	14.4 (5.0)	12.6 (5.6]	1.49	.15
4 Meter Walk (seconds)	4.11 (1.22)	4.07 (1.13)	0.26	.80
6 Minute Walk Test				
Onset to Claudication Time (seconds)	131.8 (56.4)	147.1 (48.8)	-1.30	.21
Onset to Claudication Distance (feet)	431.9 (217.1)	465.3 (180.1)	-0.70	.49
Total Distance	1016.3 (396.4)	1131.4 (422.2)	-2.71	.011
Treadmill METS	2.88 (1.11)	3.80 (1.50)	-6.36	<.001

Table 5

Questionnaire Outcomes

Characteristic	Mean (SD)		t	p
	Baseline	Follow-up		
WIIQ				
Distance	33.4 (27.8)	36.0 (30.0)	0.68	.51
Speed	36.5 (24.2)	35.4 (24.9)	0.40	.69
Stairs	40.6 (29.9)	42.9 (29.6)	0.67	.51
Combined	37.4 (25.2)	38.4 (23.7)	0.46	.65
PADQOL				
Factor 1 – Social Relationships and Interactions	50.7 (21.7)	53.9 (22.9)	1.25	.22
Factor 2 – Self-Concept and Feelings	58.5 (21.6)	60.2 (23.1)	0.64	.53
Factor 3 – Symptoms and Limitations in Physical Functioning	29.8 (14.8)	36.0 (20.8)	2.88	.007
Factor 4 – Fear and Uncertainty	51.8 (19.9)	56.4 (21.0)	1.88	.069
Factor 5 – Positive Adaptation	67.0 (11.2)	65.5 (15.0)	0.79	.44
Job	57.5 (31.9)	60.8 (33.6)	0.49	.63
Sexual Function	47.9 (27.4)	61.4 (26.6)	2.54	.017
Intimate Relationships	57.2 (27.6)	72.4 (24.7)	3.45	.002
SF-36				
Physical Functioning	33.5 (8.3)	35.2 (8.4)	2.23	.033
Role – Physical	35.8 (9.6)	35.8 (10.5)	0	1
Bodily Pain	40.1 (8.3)	41.5 (10.7)	1.04	.31
General Health	39.7 (8.7)	41.1 (10.1)	1.21	.24
Vitality	44.5 (10.8)	45.8 (12.2)	1.22	.23
Social Functioning	44.4 (11.4)	43.9 (13.0)	0.31	.76
Role – Emotional	40.9 (13.4)	39.8 (16.0)	0.42	.68
Mental Health	48.0 (13.4)	47.6 (14.3)	0.26	.80
Physical Composite Score	34.7 (6.9)	36.5 (7.8)	−1.66	.11
Mental Composite Score	48.6 (14.3)	47.9 (16.1)	0.36	.72