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PREDICTORS OF HEALTH-RELATED QUALITY OF LIFE IN PATIENTS WITH SYMPTOMATIC PERIPHERAL ARTERY DISEASE

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Abstract

Objectives—To identify predictors of baseline measures of health-related quality of life (HRQoL) in symptomatic patients with peripheral artery disease (PAD) from objective markers of severity of PAD, clinical and demographic characteristics, comorbid conditions, cardiovascular risk factors, objectively measured physical activity, and patient-based measures of physical function.

Methods—HRQoL measurements of 216 symptomatic men and women with PAD were assessed with the Medical Outcomes Study Short-Form 36 survey. Patients were further characterized on demographic variables, comorbid conditions, cardiovascular risk factors, ankle/brachial index, peak walking time (PWT) during a maximal treadmill test, 6-minute walk distance (6MWD), gait speed, ambulatory activity monitored during one week, activities of daily living (ADL), mini-mental state examination questionnaire, and walking impairment questionnaire (WIQ).

Results—For the physical function HRQoL subscale, the significant predictors included WIQ speed score ($p < 0.001$), a history of stumbling ($p < 0.001$), WIQ stair climbing score ($p < 0.001$), the ADL associated with bathing ($p = 0.001$), 6MWD ($p = 0.004$), and daily walking cadence ($p = 0.043$). For the role emotional function HRQoL subscale, the significant predictors included a history of stumbling ($p < 0.001$), the ADL associated with transferring from a bed to a chair ($p < 0.001$), and the WIQ distance score ($p = 0.022$).

Conclusions—Physical and mental subscales of HRQoL in symptomatic patients with PAD are primarily predicted by patient-based physical function, rather than by more specific markers of PAD severity and comorbid conditions. The clinical significance is that interventions designed to improve HRQoL should focus on improving the quality of executing functional tasks such as walking more steadily without stumbling, completing ADL's that are not specific to walking, such

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as bathing and transferring, and improving patient-based ability to walk various distances, speeds, and to climb stairs.

INTRODUCTION

Peripheral artery disease (PAD) is not only highly prevalent,[1] costly,[2] and deadly,[3] but it also results in high rates of disability that may not be fully appreciated. Between 50 and 85 percent of those with PAD experience exercise leg pain that is either typical or atypical of classic claudication,[4] resulting in ambulatory dysfunction,[5] impaired physical function which declines over time,[6,7] and low daily physical activity.[8] Consequently, it is not surprising that symptomatic patients with PAD have impaired health-related quality of life (HRQoL) compared to controls,[9–11] and even worse scores than individuals with coronary artery disease and congestive heart failure.[12]

The primary goal in treating symptoms is to improve ambulatory function and HRQoL.[13] Although much has been studied on exercise, pharmacologic, and peripheral revascularization interventions to treat ambulatory dysfunction,[14–16] comparatively little attention has focused on HRQoL in symptomatic patients with PAD, which may be of equal or greater concern to patients. Objective measures of PAD severity are related to HRQoL,[10,17–19] but the strength of the associations are not strong, suggesting that quality of life is only partially attributed to PAD-specific outcomes.[18] This is further evident by observing that improvements in walking distances following an exercise program are greater than changes in HRQoL.[20] Consequently, other factors may be associated with HRQoL in symptomatic patients with PAD.

We have previously found that metabolic syndrome[21] and lower cognitive status [22] are both negatively associated with HRQoL in symptomatic patients with PAD, and another investigation found that hypertension is negatively associated with overall quality of life and general health.[18] However, the identification of factors associated with baseline HRQoL in symptomatic patients with PAD has been primarily limited to PAD-specific markers, and has rarely considered comorbid conditions,[18] patient-based measures of overall physical function, and objective measurements of physical activity level.

The first step in designing appropriate interventions to improve HRQoL in symptomatic patients with PAD is to identify key baseline factors. The aim of this study was to identify predictors of baseline measures of HRQoL in symptomatic patients with PAD from objective markers of severity of PAD, clinical and demographic characteristics, comorbid conditions, cardiovascular risk factors, objectively measured physical activity, and patient-based measures of physical function.

METHODS

Patients

Approval and Informed Consent—The procedures of this study were approved by the institutional review board at the University of Oklahoma Health Sciences Center (HSC). Written informed consent was obtained from each patient at the beginning of investigation.

Recruitment—Patients who were not currently exercising were recruited from vascular laboratories and vascular clinics from the University of Oklahoma HSC for possible enrollment into exercise rehabilitation programs to treat leg pain secondary to PAD.[14,23]

Baseline Clinical Assessments

Protocol—Patients were evaluated in the Clinical Research Center (CRC), at the University of Oklahoma HSC. Patients arrived in the morning fasted, but were allowed to take their usual medications. To begin the study visit, patients completed the consent form, and their vital signs, demographic information, height, weight, body mass index, anthropometric measurements, and waist circumference[24] were recorded by research personnel. Subsequently, patients had blood samples drawn by study nurses, which were then sent to the central lab at the University of Oklahoma HSC for analyses for fasting blood chemistries. Patients then underwent a medical history and physical examination by study physicians, in which claudication history, co-morbid conditions, cardiovascular risk factors and current medications were recorded. Following this assessment, patients rested supine for 10 minutes under standardized laboratory conditions. Ankle and brachial systolic blood pressures were then obtained according to standard guidelines[25] by exercise physiologists for the calculation of the ankle/brachial index (ABI). Patients then performed a screening graded treadmill test in which the ABI was measured from the more affected leg immediately after exercise,[5] for the purpose of confirming that leg pain was of vascular origin, which was one of the criteria for study inclusion. Based on this battery of baseline assessments, patients were coded on cardiovascular risk factors and co-morbid conditions according to standard definitions,[26] and patients were characterized on the presence, severity, and symptoms of PAD.

Inclusion and Exclusion Criteria—Patients with symptomatic PAD were included in this study if they met the following criteria: (a) a history of ambulatory leg pain, (b) ambulatory leg pain confirmed by treadmill exercise,[5] and (c) an ABI ≤ 0.90 at rest[4] or ≤ 0.73 after exercise.[27] Patients were excluded for the following conditions: (a) absence of PAD (ABI > 0.90 at rest and ABI > 0.73 after exercise), (b) non-compressible vessels (ABI > 1.40), (c) asymptomatic PAD (Fontaine Stage I; Rutherford Grade 0),[4] (d) rest pain due to PAD (Fontaine stage III; Rutherford Grade II), (e) tissue loss due to PAD (Fontaine stage IV; Rutherford Grades III and IV), (f) use of medications indicated for the treatment of claudication (cilostazol or pentoxifylline) initiated within 3 months prior to investigation, (g) exercise limited by other diseases or conditions, (h) active cancer, (i) stage 5 chronic kidney disease (end stage), as defined by an estimated glomerular filtration rate < 15 ml/min per 1.73 m[28] and, (j) abnormal liver function. A total of 216 patients were eligible and included into the study.

Measurements

HRQoL—HRQoL was assessed with the Medical Outcomes Study Short-Form 36 (MOS SF-36) General Health Survey.[29] The MOS SF-36 is a reliable and valid generic instrument that includes multi-item questions, which assess eight health subscales. Four of the subscales are related to physical health, which includes physical function, role limitations due to physical problems, general health, and bodily pain. The remaining four subscales are related

to mental health, which includes social function, role limitations due to emotional problems, mental health, and vitality. For each subscale, multiple item scores are standardized into a scale from 0 to 100, with higher scores reflecting better health states. We previously found that of the four subscales related to physical health, the physical function subscale was the most impaired in patients with symptomatic PAD compared to national norms.[17] Furthermore, of the four subscales related to mental health, the role limitations due to emotional problems subscale was the only one in which patients with symptomatic PAD scored lower than national norms.[17] Thus, for the statistical analyses utilizing regression modeling, we selected the physical function subscale as the primary outcome measure representing physical health, and we selected the role limitations due to emotional problems subscale as the primary outcome measure representing mental health.

Maximal Treadmill Test—Patients performed a graded treadmill test to determine study eligibility and then repeated the test on a following visit within one week to obtain the outcome measures of claudication onset time (COT) and peak walking time (PWT) as previously described.[5]

6-Minute Walk Test—On another study visit after the maximal treadmill test, patients performed an over ground, 6-minute walk test in which two cones were placed 100 feet apart in a marked corridor.[30] Trained exercise physiologists supervised the test and instructed the patients to walk as many laps around the cones as possible. The total 6-minute walk distance (6MWD) was recorded in feet, and subsequently converted to meters.

Gait Speed from a 4-Meter Walk Test—Gait speed was measured from a 4-meter walk test in a hallway.[31] This test was performed twice at usual walking pace, and the walk with the faster speed was used in the analyses.

Ambulatory Activity Monitoring—Daily ambulatory activity was assessed during seven consecutive days using a step activity monitor (StepWatch3™, Orthoinnovations, Inc., Oklahoma City, OK) to determine both the amount of daily walking (strides/day) and the cadence, or rate, of walking (strides/min).[32]

Activities of Daily Living (ADL)—Patient-based physical functioning was determined from six ADL's primarily requiring lower extremity function as the major component.[31] Patients rated their ability to perform four lower level ADL's consisting of walking across a small room, bathing, transferring from a bed to a chair, and using the toilet.[33] Additionally, patients evaluated their ability to perform two higher level ADL's consisting of walking up and down stairs to the second floor without help, and walking a half mile without help.[34] Patients selected one answer for each ADL from the following three possible choices: no difficulty, some difficulty, or unable to do.

Mini-Mental State Examination (MMSE) Questionnaire—The MMSE is a 30-item measure of cognitive status.[35] It is the most commonly used screening measure for cognitive impairment and dementia, and includes items that examine orientation, registration, attention, calculation, memory, language, and ability to follow simple commands.

Walking Impairment Questionnaire (WIQ)—Patient-based ambulatory ability was obtained using a validated questionnaire for PAD patients that assesses ability to walk at various speeds and distances, and to climb stairs[36].

Statistical Analyses

Since this was an a priori exploration of risk factors on HRQoL based on a retrospective study, a power analysis was not performed. The summary statistics are presented as means and standard deviations (SD) for continuous variables, and frequencies with proportions for categorical variables. Due to high dimensionality and potential correlation of risk factors, we first conducted exploratory analysis based on univariate regression analyses, and only the variables with p-values less than 0.05 were considered for multivariate analysis. Afterwards, the linear regression with the selected variables from the pre-screening step was performed, and then stepwise selection based on the Akaike information criterion (AIC, a smaller value indicates a better model) as well as the Chi-square tests for nested models were further employed to choose the optimal model with less risk factors and lower mean square error. All hypothesis tests were two-sided with the significance level of 0.05. Data was analyzed using SAS 9.4 Software.

RESULTS

The clinical characteristics of 216 patients are shown in Table I. The group consisted of older patients who were borderline obese. For PAD-specific and ambulatory measures, the mean ABI, COT, PWT, 6MWD, and gait speed were all impaired, consistent with patients with claudication. Furthermore, the perceived ability to walk for various distances and speeds, and to climb stairs were impaired below a score of 40%, and the daily walking strides and cadence were low. As expected, there was a high prevalence of cardiovascular risk factors and comorbid conditions, with more than 80% of the patients having dyslipidemia, hypertension and metabolic syndrome. Approximately 10–17% of the patients reported having either some difficulty or unable to perform basic ADL’s, whereas the majority reported having either some difficulty or unable to perform higher level ADL’s consisting of walking up and down stairs (74%) and walking a half mile without help (85%).

The HRQoL measurements of the patients are shown in Table II. The scores of the physical health subscales were low and ranged between 45 and 60 for the domains of physical function, role limitations due to physical dysfunction, bodily pain, and general health. The scores for the mental health subscales were higher and ranged between 55 and 79 for vitality, mental health, role limitations due to emotional problems, and social function.

The regression coefficient summary for independent variables in univariate regression on the HRQoL subscales of physical function and role limitations due to emotional problems are presented in Table III. The variables that were significantly associated with the physical function subscale consisted of age, height, COT, PWT, 6MWD, gait speed, all WIQ measures, daily walking and daily walking cadence, all six ADL measures, sex, diabetes, abdominal obesity, chronic obstructive pulmonary disease, and history of stumbling while walking. The variables that were significantly associated with the role limitations due to emotional problems subscale consisted of PWT, 6MWD, all WIQ measures, daily walking

cadence, five of the six ADL measures, fear of falling, and history of stumbling while walking.

The regression coefficient summary for predictors included in a multivariate regression on the HRQoL subscale of physical function is shown in Table IV. The significant predictors of the physical function subscale included WIQ speed score ($p<0.001$), a history of stumbling while walking ($p<0.001$), WIQ stair climbing score ($p=0.001$), the ADL associated with bathing ($p=0.001$), 6MWD ($p=0.004$), and daily walking cadence ($p=0.043$). The R^2 for the overall model for the physical function subscale was 0.648 ($p<0.001$).

The regression coefficient summary for predictors included in a multivariate regression on the HRQoL subscale of role limitations due to emotional problems is displayed in Table V. The significant predictors of the role limitations due to emotional problems subscale included a history of stumbling while walking ($p<0.001$), the ADL associated with transferring from a bed to a chair ($p<0.001$), and the WIQ distance score ($p=0.022$). The R^2 for the overall model for the role limitations due to emotional problems subscale was 0.278 ($p<0.001$).

DISCUSSION

The primary novel finding was that patient-based measurements of physical function were the strongest predictors of both physical and mental subscales of HRQoL, with a history of stumbling while walking being particularly important. Objective measurements of physical function (6MWD and daily walking cadence) were only predictive of the physical function subscale. Finally, comorbid conditions and objective measures of PAD severity, such as ABI, COT, and PWT, were not predictive of either HRQoL subscale.

Predictors of Physical Function Subscale of HRQoL

It is interesting to note that the four strongest predictors of the physical function subscale of HRQoL were all patient-based measures of physical function in the following order of strength: WIQ speed score, history of stumbling while walking, WIQ stair climbing score, and the ADL associated with bathing. The WIQ speed and stair climbing scores were positively associated with the physical function subscale, indicating that higher patient-based ability to walk fast and climb stairs were associated with higher HRQoL, whereas those reporting a history of stumbling while walking and having any difficulty in bathing had lower HRQoL. The remaining two predictors in the model were objective measures of physical function, consisting of 6MWD, and daily walking cadence while being monitored in the community setting. Although all of the objective and patient-based measures of physical function were significantly associated with the physical function subscale of HRQoL on a univariate basis, our data indicates that the physical function subscale is more closely related to patient-based physical function in patients with symptomatic PAD than to objective measurements of physical function. It should be noted that the patient-based and objective measurements of physical function are all inter-related. When multivariate analyses are performed and the strongest predictor of the physical function subscale of HRQoL is entered into the model, the remaining objective and patient-based measures of physical function may become more weakly associated with the physical function subscale

or lose their significance altogether. Based on the multivariate findings, interventions designed to improve claudication must be effective enough to make meaningful changes in the patient's perceptions of functioning better in typical daily activities. Thus, a standard walking program to treat claudication[14] could be supplemented with a program of physical therapy that focuses on improving the quality of performing functional tasks such as walking with better balance, improving transferring skills, and negotiating up and down stairs more effectively.

Our results support previous studies which found that objective measures of PAD severity are only weakly related to HRQoL.[10,17–19] It is interesting to note that PWT during a treadmill test, which is considered an objective PAD-specific measure of ambulatory limitation, was only the seventh strongest predictor in the multivariate model for the physical function HRQoL subscale, and did not reach statistical significance. Furthermore, COT during a treadmill test and ABI were not included in the multivariate model predicting the physical function HRQoL subscale. Our results support a previous investigation that found ABI was not a significant predictor of the physical component score in individuals with PAD who were recruited from the community setting.[9] In our study, the weak associations between PAD-specific measures and HRQoL in patients with symptomatic PAD became even weaker and non-significant when they were considered along with patient-based measures of physical function and comorbid conditions. Consequently, the physical function HRQoL subscale can be better predicted in patients with symptomatic PAD from a battery of more general questions related to physical function, such as the ability to walk at various speeds and to climb stairs, and having a history of stumbling while walking, and having any difficulty in bathing.

Predictors of Role Limitations due to Emotional Problems Subscale of HRQoL

Similar to our observations with the physical function subscale of HRQoL, the three significant predictors of the role limitations due to emotional problems subscale were all patient-based measures of physical function in the following order of strength: history of stumbling while walking, the ADL associated with transferring from a bed to a chair, and WIQ distance score. Having a history of stumbling while walking and reporting any difficulty in transferring from a bed to a chair were both negatively associated with the role limitations due to emotional problems subscale, whereas the WIQ distance score was positively associated.

Our study supports previous investigations that found objective measures of PAD severity, such as ABI, COT, and PWT are not related to the role limitations due to emotional problems subscale of HRQoL in patients with symptomatic PAD,[10,17] but is in disagreement with one study that found absolute claudication distance during a treadmill test was a weak but significant predictor.[37] More importantly, the current study extends the literature by showing that patient-based measures of physical function were the primary predictors of the role limitations due to emotional problems subscale of HRQoL rather than objective measures of PAD severity. The is the first study to identify the importance of having a history of stumbling while walking and having any difficulty in performing the ADL associated with transferring from a bed to a chair, as they are the two most significant

predictors. This is not surprising given that the role limitations due to emotional problems subscale assesses how emotional problems result in the problems with work or with activities of daily living.[17] Having a history of stumbling while walking appears to be of particular significance, as it also was the second most significant predictor in the multivariate model for the physical function subscale of HRQoL, indicating that unsteadiness during walking negatively affects both physical and mental aspects of HRQoL in patients with symptomatic PAD. Furthermore, history of stumbling while walking is more predictive that objective functional measures of PAD severity, such as COT, PWT, and 6MWD, and suggests that patients with PAD have balance impairments while they ambulate. We have previously found that patients with PAD have worse balance and higher prevalence of falling than controls without PAD,[38] and that their impaired balance is correlated with greater rate of falling.[39]

Limitations

It is possible that there was a self-selection bias related to study participation, as patients were volunteers and may represent those with the highest interest in participating, the best access to transportation, and the best health compared to non-volunteers. Although prior exercise habits could be a potential bias, we believe this possibility is very small given that none of the patients reported that they were exercising on a regular basis, which was confirmed by the results from the seven days of activity monitoring. On average, the patients were extremely sedentary, as they took fewer than 3,300 strides per day (less than 6,600 steps per day) at a very slow mean cadence (rate of stepping). Another limitation is that we only focused our statistical analyses utilizing regression modeling on two of the eight HRQoL subscales, consisting of physical function and the role limitations due to emotional problems. As described in our methodology, we selected these two subscales based on our previous work in which they were the most impaired compared to national norms among all of the subscales representing both physical health and mental health.[17] Although it is likely that the regression models of the remaining six subscales would not have been identical to the models for the subscales of physical function and role limitations due to emotional problems, we believe that many of the predictors of these two subscales would have been included in the remaining six subscales because of the inter-relationships that exist among all of the subscales. Additionally, these results are only applicable to symptomatic PAD patients, and may not generalize to patients with different disease severity and to younger patients who may have better perceived and objectively measured physical function than the current patients, which could translate to better HRQoL scores. Finally, the cross-sectional design of this study is a limitation because significant associations found among variables do not provide evidence of causality. However, these results are generalizable to symptomatic patients with PAD who typically have high prevalence of comorbid conditions.

Conclusion and Clinical Significance

Physical and mental subscales of HRQoL in symptomatic patients with PAD are primarily predicted by patient-based physical function, rather than by more specific markers of PAD severity and comorbid conditions. The clinical significance is that interventions designed to improve HRQoL should focus on improving the quality of executing functional tasks such as walking more steadily without stumbling, completing ADL’s that are not specific to

walking, such as bathing and transferring, and improving patient-based ability to walk various distances, speeds, and to climb stairs.

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Take Home Message

Quality of life related to claudication in 216 patients with peripheral artery disease (PAD) better correlated with measures of physical function such as walking speed, stair climbing, and stumbling than traditional physiologic measures such as ankle-brachial index and walking distance.

Recommendation

The authors suggest that physicians caring for PAD patients ask about measures of physical function as well as measuring limb blood flow when making decisions about treatment of claudication.

Table I

Clinical characteristics of 216 patients with symptomatic peripheral artery disease.

Variables	Values
	Mean (SD)
Age (years)	65 (10)
Weight (kg)	83.9 (18.1)
Height (cm)	168.2 (9.1)
Body Mass Index (kg/m^2)	29.7 (6.2)
Ankle/Brachial Index	0.71 (0.24)
Claudication Onset Time (sec)	207 (170)
Peak Walking Time (sec)	412 (247)
6-Minute Walk Distance (m)	345 (94)
Gait Speed – 4 Meter Walk (m/sec)	1.08 (0.21)
WIQ Distance Score (%)	35 (32)
WIQ Speed Score (%)	33 (23)
WIQ Stair Climbing Score (%)	38 (29)
Mini-Mental State Examination Score (points)	28.8 (1.7)
Daily Walking (strides/day)	3287 (1668)
Daily Walking Cadence (strides/min)	11.7 (2.7)
	Number (Percentage %) who either have some difficulty or are unable to do each ADL
ADL 1 – Walking Across a Small Room	27 (13)
ADL 2 – Bathing	37 (17)
ADL 3 – Transferring from a Bed to a Chair	21 (10)
ADL 4 – Toileting	21 (10)
ADL 5 – Walk Up and Down Stairs Without Help	159 (74)
ADL 6 – Walk a Half Mile Without Help	184 (85)
	Number (Percentage %) with Characteristics Present
Sex (% Men)	106 (49)
Race (% Caucasian)	107 (50)
Current Smoking (% yes)	76 (35)
Hypertension (% yes)	191 (88)
Dyslipidemia (% yes)	195 (90)
Diabetes (% yes)	95 (44)
Metabolic Syndrome (% yes)	178 (82)
Abdominal Obesity (% yes)	122 (57)
Obesity (% yes)	101 (47)
Lower Extremity Revascularization (% yes)	73 (34)
Coronary Artery Disease (% yes)	71 (33)
Cerebrovascular Disease (% yes)	36 (17)
Chronic Kidney Disease (% yes)	52 (24)
Chronic Obstructive Pulmonary Disease (% yes)	57 (26)
Falling History (% yes)	63 (29)

Variables	Values
Fear of Falling (% yes)	65 (30)
Stumbling While Walking (% yes)	88 (41)

ADL = activity of daily living, WIQ = walking impairment questionnaire.

Table II

Health-related quality of life (HRQoL) in 216 patients with symptomatic peripheral artery disease.

HRQoL Variables	Mean (SD)
Physical Function	45 (21)
Role Limitations due to Physical Problems	46 (42)
Bodily Pain	60 (24)
General Health	57 (22)
Social Function	79 (25)
Role Limitations due to Emotional Problems	73 (40)
Mental Health	78 (17)
Vitality	55 (23)

Table III

Regression coefficient summary for independent variables in univariate regressions on health-related quality of life physical function and role limitations due to emotional problems.

Variables	Physical Function	Role Limitations due to Emotional Problems
	Estimate (95% CI)	Estimate (95% CI)
Age (years)	0.41 (0.12, 0.69)†	0.29 (−0.27, 0.85)
Weight (kg)	−0.04 (−0.20, 0.11)	−0.07 (−0.37, 0.23)
Height (cm)	0.43 (0.13, 0.74)†	0.18 (−0.42, 0.77)
Body Mass Index (kg/m^2)	−0.43 (−0.87, 0.02)	−0.21 (−1.08, 0.65)
Ankle/Brachial Index	9.86 (−1.82, 21.55)	−5.51 (−28.15, 17.13)
Claudication Onset Time (sec)	0.05 (0.04, 0.07)‡	0.03 (−0.01, 0.06)
Peak Walking Time (sec)	0.05 (0.04, 0.06)‡	0.03 (0.01, 0.05)*
6-Minute Walk Distance (m)	0.17 (0.10, 0.15)‡	0.06 (0.00, 0.12)*
Gait Speed – 4 Meter Walk (m/sec)	32.73 (20.19, 45.26)‡	22.55 (−2.86, 47.96)
WIQ Distance Score (%)	0.41 (0.34, 0.48)‡	0.29 (0.12, 0.45)†
WIQ Speed Score (%)	0.62 (0.53, 0.71)‡	0.36 (0.13, 0.58)†
WIQ Stair Climbing Score (%)	0.47 (0.40, 0.55)‡	0.35 (0.17, 0.53)‡
Mini-Mental State Examination Score (points)	1.36 (−0.26, 2.98)	2.18 (−0.94, 5.30)
Daily Walking (strides/day)	0.004 (0.00, 0.01)‡	0.002 (−0.00, 0.01)
Daily Walking Cadence (strides/min)	2.37 (1.39, 3.34)‡	2.21 (0.26, 4.16)*
ADL 1 – Walking Across a Small Room	−24.60 (−32.37, −16.83)‡	−19.40 (−35.46, −3.35)*
ADL 2 – Bathing	−21.95 (−28.75, −15.15)‡	−20.12 (−34.14, −6.10)†
ADL 3 – Transferring from a Bed to a Chair	−19.42 (−28.48, −10.37)‡	−52.21 (−68.96, −35.46)‡
ADL 4 – Toileting	−18.10 (−27.21, −9.00)‡	−31.22 (−48.78, −13.44)†
ADL 5 – Walk Up and Down Stairs Without Help	−20.10 (−25.84, −14.37)‡	−15.07 (−27.11, −3.04)†
ADL 6 – Walk a Half Mile Without Help	−16.89 (−24.41, −9.36)‡	−11.46 (−26.52, 3.61)
Sex=Men	9.62 (4.19, 15.05)†	2.69 (−8.07, 13.44)
Race=Caucasian	2.87 (−2.71, 8.44)	6.28 (−4.44, 17.01)
Current Smoking=yes	0.20 (−5.65, 6.041)	3.13 (−8.12, 14.39)
Hypertension=yes	−4.21 (−12.92, 4.50)	9.65 (−7.12, 26.41)
Dyslipidemia=yes	−8.01 (−17.37, 1.35)	2.98 (−15.17, 21.13)
Diabetes=yes	−9.94 (−15.41, −4.48)‡	−7.38 (−18.13, 3.46)
Metabolic Syndrome=yes	−6.94 (−14.21, 0.33)	−0.36 (−14.46, 13.79)
Abdominal Obesity=yes	−7.17 (−12.71, −1.62)*	−2.17 (−13.02, 8.67)
Obesity=yes	−1.62 (−7.21, 3.97)	−6.06 (−16.81, 4.69)
Lower Extremity Revascularization=yes	−1.89 (−7.79, 4.01)	−3.34 (−14.70, 8.02)
Coronary Artery Disease=yes	−3.61 (−9.53, 2.31)	−1.04 (−12.49, 10.41)
Cerebrovascular Disease=yes	−3.79 (−11.25, 3.70)	−8.15 (−22.54, 6.24)
Chronic Kidney Disease=yes	−4.51 (−11.01, 1.99)	−3.50 (−16.08, 9.07)

Variables	Physical Function	Role Limitations due to Emotional Problems
Chronic Obstructive Pulmonary Disease=yes	−9.57 (−15.77, −3.37)†	−9.56 (−21.69, 2.58)
Falling History=yes	−3.02 (−9.14, 3.11)	−11.27 (−23.00, 0.47)
Fear of Falling=yes	−5.53 (−11.30, 0.79)	−22.33 (−33.67, −10.99)‡
Stumbling While Walking=yes	−17.77 (−22.93, −12.61)‡	−35.4 (−45.33, −25.60)‡

*p > 0.05,

†p < 0.01,

‡p < 0.001.

Table IV

Regression coefficient summary for predictors included in a multivariate regression on the health-related quality of life subscale of physical function in 216 symptomatic patients with peripheral artery disease.

Predictors	Estimate (SE)	95% CI	Partial R^2	P Value
WIQ speed	0.32 (0.05)	0.21, 0.43	0.142	< 0.001
Stumbling While Walking	−8.88 (1.86)	−12.56, −5.20	0.098	< 0.001
WIQ stairs	0.15 (0.04)	0.07, 0.24	0.055	0.001
ADL2-Bathing	−8.37 (2.43)	−13.19, −3.56	0.054	0.001
6-Minute Walk Distance	0.03 (0.01)	0.01, 0.06	0.038	0.004
Daily Walking Cadence	0.68 (0.34)	0.02, 1.35	0.019	0.043
Intercept	13.57 (4.59)	4.48, 22.65		0.003

ADL = activity of daily living, WIQ = walking impairment questionnaire.

Overall model results: adjusted $R^2 = 0.648$, $p < 0.001$, Akaike Information Criterion = 1715.45

Table V

Regression coefficient summary for predictors included in a multivariate regression on the health-related quality of life subscale of role limitations due to emotional problems in 216 symptomatic patients with peripheral artery disease.

Predictors	Estimate (SE)	95% CI	Partial R^2	P Value
Stumbling While Walking	−26.68 (5.07)	−36.72, −16.65	0.116	< 0.001
ADL3 –Transferring from a Bed to a Chair	−36.89 (8.30)	−53.34, −20.45	0.085	< 0.001
WIQ Distance	0.17 (0.07)	0.03, 0.32	0.024	0.022
Intercept	80.82 (4.32)	72.28, 89.37		< 0.001

ADL = activity of daily living, WIQ = walking impairment questionnaire.

Overall model results: adjusted $R^2 = 0.278$, $p < 0.001$, Akaike Information Criterion = 2147.82