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Short title: Physical activity in late effects of polio

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Key words: Gait performance; Muscle strength; Physical activity; Post poliomyelitis syndrome; Rehabilitation

ABSTRACT

Objective: To examine the relationship between physical activity (assessed subjectively and objectively), knee muscle strength, gait performance, age, gender and body mass index (BMI) in persons with late effects of polio.

Design: Cross-sectional.

Setting: A university hospital outpatient clinic.

Participants: Seventy-seven community-dwelling ambulant individuals with late effects of polio (42 men and 35 women; mean age 67 years [SD 6, range 54-80]).

Main outcome measures: Physical activity was described by the Physical Activity and Disability Survey (PADS), and by a pedometer (number of steps/day). Isokinetic concentric knee extensor and flexor muscle strength was measured at 60°/s. Gait performance was assessed by the Timed "Up and Go" (TUG) test, the Comfortable Gait Speed (CGS) and Fast Gait Speed (FGS) tests, and the 6-Minute Walk Test (6MWT).

Results: The PADS leisure subscale was significantly correlated with all knee muscle strength measurements ($P < .01$), CGS ($P < .05$) and the 6MWT ($P < .05$), and the number of steps per day was significantly correlated with all knee muscle strength measurements and all gait performance tests ($P < .01$). In the linear regression analyses, knee muscle strength and gait performance explained 1% to 8% of the variance in the leisure subscale, and when the personal attributes (age, gender and BMI) were added they explained up to 14% of the variance. Knee muscle strength explained 16% and gait performance explained 15% to 31% of the variance in the number of steps per day and when personal attributes (age, gender and BMI) were added they contributed at most an additional 3% of the variance.

Conclusions: In ambulatory persons with late effects of polio, knee muscle strength and gait performance explain only a small portion of physical activity. Further studies are needed to increase our understanding of how other impairments, activity limitations, environmental factors, and personal factors are associated with physical activity in persons with late effects of polio.

INTRODUCTION

Physical activity (PA) is equally beneficialfor people with or without disability (1). Regular PA promotes overall health, can be used to prevent and treat various diseases, contributes to maintenance of functional independence, general well-being and life satisfaction (2-4). Despite this knowledge, about one third of the adult population does not attain public health guidelines of at least 150 minutes per week (4), and activity levels are even lower in older adults and in persons with disabilities (5). Adults with disabilities are twice as likely to be physically inactive than are those with no disability (6). Health status and personal factors, such as self-efficacy, mood and motivational readiness, as well as age, gender, income, education, cost of and access to facilitites, are associated with PA in both disabled and non-disabled persons (3, 7), but the evidence on determinants of PA participation is inconclusive for persons with disabilities (1, 8). One key to an effective health promotion program for persons with disabilities is to understand the diversity of factors that are associated with successful participation in PA (3, 9).

A neurological condition leading to a life-long disability is late effects of polio. It can occur several decades after an acute poliomyelitis infection and is characterized by new symptoms or impairments such as muscle weakness and muscle fatigue (10, 11). These impairments can lead to activity limitations (12), many of which are related to gait performance (13). This, in turn, can impact on perceived participation (14), as defined by the International Classification of Functioning, Disability and Health (ICF) (15), and also life satisfaction (16). Late effects of polio has a slowly progressive course (11). The management comprises an interdisciplinary goal-oriented approach to reduce disability and to encourage a healthy and active lifestyle (11, 17). Many persons with late effects of polio are having difficulty or are unable to increase the amount of exercise to achieve desired levels of moderate PA because of their impairments and activity limitations. This may affect their overall physical and psychological health and life satisfaction, their bone and muscle mass, and increase the risk for falls and fractures, and chronic disesases such as cardiovascular and metabolic, many of which are common among middle-aged and older people. Therefore, it is necessary to adapt and individualize health promotion programmes for this population, which requires an understanding of how their impairments and activity limitations affect their rates of PA participation.

Late effects of polio is characterized by different impairments and activity limitations. Among them, muscle weakness is one very common complaint (18) and activities related to the ability to ambulate are those that persons with late effects of polio most often report as difficult to perform (13). Thus, both muscle strength and gait performance could be related to PA participation in persons with late effects of polio, as is the case in stroke, multiple sclerosis and spinal cord injury (8, 19, 20). In persons with late effects of polio, muscle weakness in the lower limbs is one of the most common impairments and knee muscle strength, in particular, is a predictor for gait performance in this population (21). However, only two studies have assessed the associations between PA and muscle strength in this population (22, 23); greater muscle strength was associated with higher activity levels (22) and daily step counts (23). To the best of our knowledge, no study has assessed the relationship between PA and gait performance in persons with late effects of polio. In persons with disabilities, age, gender and Body Mass Index (BMI) are associated with rates of PA (7) and therefore should also be included in any research model examining variables associated with PA participation.

The aim of this study was to assess the relationship between PA (assessed subjectively and objectively), knee muscle strength, gait performance, age, gender and BMI in persons with late effects of polio.

METHODS

Participants

Community dwelling ambulatory persons with mild to moderate late effects of polio were selected from the database at a post-polio rehabilitation clinic in a university hospital. The database has existed since 2003 and at the time of recruitment (January 2012) included 300 persons (130 men and 170 women) with a confirmed history of acute poliomyelitis meeting the following inclusion criteria: 50 to 80 years of age; new symptoms after a period of functional stability; an electromyogram in the upper and lower limbs as verification of prior polio; ambulatory with or without mobility devices; living in ordinary housing; able to understand verbal and written instructions in Swedish; being able to walk at least 300 m with or without mobility devices and/or orthotics. Exclusion criteria were: no other conditions such as severe joint problems, cardiovascular or pulmonary diseases, or respiratory insuffiency due to late effects of polio, that could affect mobility and PA; not using a wheelchair as the main mode of transportation. A total of 300 persons matched these inclusion and exclusion criteria. Based on our own previous studies in this population, we anticipated a response rate of at least 70%. We then randomly selected and invited 102 to participate in the present study and 77 persons (42 men, 35 women) accepted the invitation (response rate 76%). This sample size would allow a sufficient number of independent variables, consistent with the recommendations of 10 individuals per variable (24). There was no significant difference regarding age between the 77 participants, and the 25 non-participants and the 198 eligible persons, respectively.

Following the National Rehabilitation Hospital Post-Polio Limb Classification (25) and the individuals' own perception of their post-polio, one lower limb was defined as the "more affected" and the other as the "less affected". Prior to testing, all participants were medically checked by the responsible physician.

Before inclusion, oral and written information about the purpose of the study was provided and each participant gave their written informed consent. The Regional Ethical Review Board in Lund, Sweden approved the study (Dnr 2013/427).

Assessments

Physical activity

PA was measured with the Swedish version of The Physical Activity and Disability Survey (PADS-S) (26) and a pedometer (Yamax SW 200, Tokyo, Japan).

The PADS is a 31-item self-report questionnaire developed to provide a measure of the day-to-day level of PA in people with disabilities (27). The original PADS has shown good psychometric properties (27, 28), and has been used in populations with disabilities, such as multiple sclerosis, arthritis and stroke (28-30). In the present study, the participants were asked about their PA behavior in the following four subscales: (1) structured exercise (exercising at a specific time of day on a regular basis with an emphasis on improving fitness); (2) leisure time physical activity (unstructured physical activity performed on an infrequent basis, such as bowling, going for an occasional walk, but not focused on fitness); (3) indoor and outdoor household activity (indoor activities, such as dusting, mopping floor, doing laundry, and outdoor activities, such as gardening and maintenance); and (4) work-related activity (activities during work). The participants were asked to report the amount of time spent performing PA within each area during the last year. Data were then converted into minutes per day for each subscale and used to calculate the sum of PADS.

The pedometer was used to observe and measure the number of steps during three ordinary days (weekdays as well as weekends), representing a numerical count of the participants' daily PA. The Yamax pedometer is considered to have good validity and reliability (31) and has been used in persons with late effects of polio (22, 23). The participants were carefully instructed on how to wear the pedometer, clipped to their clothing (either side) and close to the anterior iliac spine, from the time they woke up in the morning to the time they went to bed at night. The participants recorded their daily counts and then reset the pedometer each morning. The pedometers were returned by post in a prepaid envelope, together with the records of participants' daily counts. From these counts, the mean number of steps per day was calculated.

Knee muscle strength

Isokinetic concentric knee extensor and flexor muscle strength was measured with a Biodex® Multi-Joint System 3 PRO dynamometer using a standard protocol applied in our research group. These strength measurements have been shown to be reliable in persons with late effects of polio, with high test-retest agreement, intra class correlation coefficient (ICC; 0.93-0.99) and low standard error of measurement (SEM %; 4%-14%) (32). The participants were seated in the adjustable chair of the dynamometer, without shoes or orthotics. They were firmly stabilized with straps across the shoulders, waist and thigh, and sat with folded arms throughout the test. The ankle cuff of the lever arm was strapped 3 cm proximal to the malleoli of the tested leg. After a structured warm-up, each participant performed, in successions, three maximal concentric knee extensor and flexor contractions at 60°/s and the highest peak torques were recorded (Newton meter; Nm). Before each measurement the range of motion was set and the Biodex software applied the gravity correction. Consistent verbal encouragement was given throughout. All measurements started with the less affected lower limb followed by the more affected lower limb.

Gait performance

Four gait performance tests were performed in the following order: the Timed "Up & Go" test (TUG) (33), the 10 meter Comfortable Gait Speed and the 10 meter Fast Gait Speed tests (CGS and FGS) (34), and the 6-Minute Walk Test (6MWT) (35). These four tests are commonly used in patients with neurological conditions (36), cover aspects of walking related to both physical strength (TUG, CGS and FGS) and fatigue (6MWT), and have been found to be reliable in persons with late effects of polio with high test-retest agreement (ICC 0.82-0,97) and low SEM% (4%-7%) (37).

For the TUG each participant sat in an armchair placed at the end of a marked 3-m walkway. Participants were instructed to sit with their back against the chair and on the word “go”, stand up, walk at a comfortable speed past the 3-m mark, turn around, walk back and sit down in the chair. They were allowed to use the armrests for support if needed. The TUG was carried out twice, with a 1-minute rest between each trial, and the mean of the two tests were recorded (seconds).

For the CGS and FGS, a 14-m walkway was marked on the floor, and the participants were timed over the middle 10 meters. For the CGS, the participants were told to walk at a self-selected comfortable pace, whereas for the FGS, the participants were told to walk as fast and safely as possible without running. The CGS and FGS were performed 3 times with 30 seconds between each trial. The time (in seconds) taken to walk 10 meters was recorded for each trial and the mean value for CGS and FGS were calculated and converted to gait speed (m/s).

For the 6MWT, the participants were instructed to walk 30 m between two marks on the floor. After passing either mark, they were told to turn and walk back. They were instructed to cover as much ground as possible and to walk as far as possible during six minutes. The 6MWT was performed once and the number of 30 m-lengths was counted. On the wall every meter was marked so the distance could be measured to the nearest meter. The participants were informed when 3 minutes of the test remained. They were allowed to rest and then continue walking, but no participant had to rest during the test.

No verbal encouragement was given during the gait performance tests. A digital stopwatch with an accuracy of one decimal figure in units of 1 second was used to measure time. All participants were independent walkers but were allowed to use, if needed, their mobility device and/or orthotic. Fifteen (19%) participants used mobility devices (a cane, crutch or rollator), 15 (19%) participants used an ankle-foot orthotic, AFO, and 4 (5%) used a knee-ankle-foot orthotic, KAFO (which was locked during the gait performance tests).

Data analysis

PADS provided 5 quantitative variables: the sum of PADS and the four subscales (exercise, leisure, household and work, expressed in minutes per day). The pedometer provided one quantitative variable: the mean number of steps per day. Knee muscle strength and gait performance provided 8 quantitative variables for the analyses: 4 strength measurements and 4 gait performance tests. Due to weakness, 5 participants were unable to perform the knee flexion measurements in their more affected lower limb; muscle strength for these measurements was therefore scored as “0” in the statistical analyses. All 77 participants completed the 4 gait performance tests.

Descriptive statistics (mean ± SD) were calculated for the characteristics of the participants. Differences in the mean between men and women for the PADS, the number of steps, knee muscle strength and gait performance were determined using independent sample t-tests. Relationships between the PADS, the number of steps, knee muscle strength measurements and gait performance tests were analyzed with the Pearson’s correlation coefficient (r).

Linear regression analyses were performed to examine the relationship between PA and knee muscle strength, gait performance, and personal attributes. Only the PADS leisure subscale and the number of steps were significantly (r = .25 to .57, $P < .05$) correlated to knee muscle strength and gait performance, and so they were used in the linear regression model.

In the first step of the analyses, the leisure subscale and the number of steps were the dependent variables and the strength measurements and the gait performance tests were the independent variables. In the second step of the analyses, the other independent variables (age, gender and BMI) were added. As there were significant correlations between the knee extensor and flexor muscle strength measurements (r = .42 to .77, $P < .001$) as well as between the different gait performance tests (r = .72 to .86; $P < .001$), they were analyzed separately in the regression analyses.

The R^2 value represents the proportionate contribution of the independent variables to the variance of the dependent variable and the adjusted R^2 value was used here to correct for multiple variables. The suitability of this approach – the aptness of the linear model and the normality of the residuals – was addressed in scatterplots of the residuals and predicted values, in normal probability plots and in Q-Q plots. The aptness of this model and the suitability was not rejected, confirming that the linear model could be applied to this sample. All calculations were performed using IBM SPSS Statistics version 20 (IBM Corporation, Armonk, New York, United States). Significance levels less than .05 represented statistical significance.

RESULTS

The mean age of the 77 participants was 67 years (SD ± 6), the mean time since onset of new symptoms was 16 years (SD ± 8), and a majority (n =51) was retired. The mean BMI was 27 (SD ± 4, range 19 to 38).

In table 1, PA as assessed by the PADS and the mean number of steps per day, together with the summary statistics of the knee muscle strength measurements and the gait performance tests are presented. There were significant differences between the men and the women for the leisure ($P < .05$) and household ($P < .05$) subscales; the men spent significantly more time in leisure activities and the women spent significantly more time in household activities. However, there were no significant differences between the men and women for the sum of PADS or in the mean number of steps per day. Knee muscle strength was significantly lower for the women ($P < .01$) in both lower limbs, but there were no significant differences between the men and the women in the gait performance tests.

Insert Table 1 about here

All correlations between the PADS and number of steps, and knee muscle strength and gait performance are presented in Table 2. For the PADS, there were no significant correlations between the sum of PADS and muscle strength or gait performance, respectively. For the different subscales, only leisure was significantly correlated with all the knee muscle strength measurements (r = .25 to .31, $P < .05$) and with two of the four gait performance tests: CGS and 6MWT (r = –.25 to .30, $P < .05$). The number of steps was significantly correlated with all knee muscle strength measurements and all gait performance tests (r = .29 to .57, $P < .05$). In Figure 1 and 2, the relationship between the PADS leisure subscale and the number of steps, and knee muscle extension strength and 6MWT, respectively, are presented graphically.

Insert Table 2 about here

Insert Figures 1 and Figure 2 about here

The results of the multiple linear regression analyses for the PADS and the number of steps are presented for knee muscle strength and gait performance in Table 3. Knee muscle strength and gait performance explained 1% to 9% of the variance in the leisure subscale, and when the personal attributes (age, gender and BMI) were added they explained up to 14% of the variance. The knee muscle strength measurements explained 16% and the gait performance tests explained 15% to 31% of the variance in the number of steps. When the personal attributes were added to the model the variance explained at most an additional 3% for knee muscle strength and about the same for gait performance (2% to 3%).

Insert Table 3 about here

DISCUSSION

As a group, people with disabilities have one of the highest rates of physical inactivity, which predisposes them to a number of potential health issues including increased risk of falls, fractures, and cardiovascular and metabolic comorbidity (38). Encouraging higher levels of PA in people with late effects of polio and other physical disabilities requires a thorough understanding of the factors associated with higher or lower levels of PA participation. In this study, the relationship between PA, knee muscle strength, gait performance and personal attributes were assessed in persons with late effects of polio. The leisure subscale in PADS and the pedometer were significantly associated with muscle strength and gait performance. However, knee muscle strength and gait performance, as well as personal attributes could only explain a small part of the ability to be physically active in this group of people. Thus, even though PA in persons with late effects of polio was associated with muscle strength, gait performance and personal attributes, the strength of the relationships was only moderate which imply that other factors are also of importance.

Persons with late effects of polio are a heterogeneous group and studies of PA in this population have shown a large variability in both self-reported PA and observed PA (23, 26, 39). The most common impairments in persons with late effects of polio – muscle weakness and muscle fatigue – often affect the lower limbs. Many of these persons therefore experience increasing mobility difficulties (12, 40), which may impact their participation in society and their possibility to be physically active (12, 41). Two studies have shown a relationship between isometric knee muscle strength and levels of PA in persons with late effects of polio (22, 23). However, the results from these studies are not quite comparable to the results in the present study since the tools used to assess strength and PA were different.

PA is considered a multidimensional behavior since it may be performed in multiple ways, with different intensities and in different settings, and there is no method that provides fully valid and reliable data for all dimensions (42). Thus, PA is recommended to be measured in more than one way to obtain a more complete picture (42). In this study, PA was measured by the

PADS and by a pedometer. PADS is a self-report measure specifically developed for persons with chronic conditions and with the ability to capture low levels of PA whereas the pedometer is a more objective measure. The knee muscle strength measurements were performed using an isokinetic dynamometer which provides reliable results and are used for scientific purposes (32). The four gait performance tests used in this study are recommended for clinical practice as well as for research, and assess various aspects of gait performance in a reliable way (37).

When examining the data by each subscale in the PADS (exercise, leisure, household and work) and the total number of steps per day, we found that only the leisure subscale was significantly associated with knee muscle strength and gait performance, whereas the number of steps per day was significantly associated with knee muscle strength and all gait performance tests. The leisure subscale cover activities such as walking and biking performed for leisure or recreation. These activities must be viewed differently whether they are performed as a leisure activity or as exercise. Walking leisurely, e.g., walking the dog or walking to the store, is entirely different from walking for moderate to vigorous exercise which is more planned and structured. Due to the nature of the type of activities that participants may have engaged in under the exercise, household and work activity subscales, it is possible that we did not detect a relationship between PA and muscle strength and gait performance because of the low exercise participation rates (45 participants exercised regularly but only 9 minutes per day). In addition, the possibility that the participants were able to perform their household subscale activities either standing or sitting down and the low number of persons working (15 persons reported being physically active at work) may also have influenced the strength of relationships. The PADS describes activities in many areas of life and it is possible that other impairments, such as pain and fatigue, affected the ability to perform these activities (43).

Knee muscle strength was significantly associated with the leisure subscale in the PADS and with the number of steps. Our findings also indicate that activities performed within the leisure subscale are more dependent on knee muscle strength than activities performed in the other subscales. The relationship between PA and muscle strength has also been established in various physical conditions, for example in disabled women above 65 years of age (44) and in persons with spinal cord injury (19), but similar studies in other neurological conditions are scarce. Taken together, this reiterates the importance of knee muscle strength for PA and that strength can be an important predictor of PA.

This is the first study that has assessed the relationships between PA and gait performance in persons with late effects of polio. Two of the gait performance tests were significantly related to the leisure subscale in the PADS but had no relationship to the total PADS score. This was not surprising since most PA in the PADS was performed within the household subscale, which only includes short walking distances. Gait performance had a stronger relationship with the number of steps compared to PADS, consistent with previous research (45). Gait and muscle endurance, as assessed by the 6MWT, explained the highest percentage of variance in number of steps. Gait endurance has been found to be useful in elucidating the relationship between muscle strength and fatigue, and walking ability in persons with late effects of polio (21, 46). The relationship between gait performance and PA has also been seen in other neurological conditions, for example stroke and multiple sclerosis (8, 20), and confirms that the ability to ambulate is a predictor of PA.

To be able to assess how much knee muscle strength and gait performance influenced PA, a linear regression model was used in the present study. The PADS (sum of PADS and subscales) and the number of steps were used as continuous variables, similar to previous studies (29, 30). Since other factors besides muscle strength and gait performance can influence PA, different independent variables were used in the linear regression model. However, the personal attributes (age, gender and BMI) only added 9% to the explanation of the variance in PA. Age has previously been found to be positively associated with PA in persons with late effects of polio but no association has been found between gender, BMI and PA (26).

Since the variability was explained only to a moderate degree, there are other impairments and activity limitations likely to be associated with PA that needs to be considered in future research. Impairments such as decreased muscle strength in other muscle groups, and pain, fatigue, and mood, and activity limitations such as walking outdoors may be associated with PA. Environmental factors such as accessibility (47), as well as other personal factors, such as motivation and self-efficacy (7), have been found to be associated with PA in persons with disabilities. There are reasons to believe that they may be associated with PA also in persons with late effects of polio and should therefore be explored in future studies. Future studies should also consider using outcome measures that assess the participants own experiences or perceptions in order to increase the understanding of the impact of a life-long disability on PA.

There were a few limitations in present study. One is that only the knee extensors, and knee flexors muscle strength were measured. These muscle groups were chosen as they are important for gait performance and measurements of these muscles are reliable in persons with late effect of polio (32). Weakness in hip and ankle muscles can also influence gait performance in persons with late effects of polio, and should be considered in future studies. The use of orthoses and mobility devices during ambulation may partly compensate for muscle weakness and could therefore influence the strength of the relationships. This should therefore be accommodated in future studies when the number of participants using a KAFO is much higher than in the present study. Another limitation is that we did not consider any self-reported impairments, such as fatigue, pain, and mood, and any self-reported activity limitations related to walking as well as other daily activities. The participants represented a broad range of functioning. Some participants had very weak muscles and five participants were not able to perform knee flexion strength measurements, but were still able to walk at least 300 m. Thus, the results should be restricted to ambulant persons with a mild to moderate disability due to late effects of polio.

Conclusions

Knee muscle strength and gait performance are weak to moderate predictors of PA in persons with late effects of polio, and the strength of the relationships indicates that there are other factors that could be of importance for PA. As PA is likely to be associated with a diversity of factors, there is a need to complement objective measurements with patient-reported outcome measures as they may deepen our understanding of the person's own perception of impairments and activity limitations on the ability to engage in PA. Further studies are also needed to increase our understanding of how environmental and personal factors are associated with PA in persons with late effects of polio.

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Table 1. Data on the PADS, number of steps, knee muscle strength and gait performance for the 77 persons with late effects of polio.

	Mean (SD)
PADS, minutes per day	
Exercise	9 (16)
Leisure	26 (35)
Household	117 (73)
Work	9 (32)
Sum of PADS	161 (88)
Pedometer, number per day	
Steps	6270 (3120)
Knee muscle strength; Nm	
Extension 60°/s	
More affected lower limb	69 (43)
Less affected lower limb	104 (43)
Flexion 60°/s	
More affected lower limb	36 (24)
Less affected lower limb	59 (25)
Gait performance	
TUG; s	10 (3)
CGS; m/s	1.2 (0.2)
FGS; m/s	1.6 (0.3)
6MWT; m	436 (99)

NM, Newton meter; TUG, Timed "Up and Go"; CGS, Comfortable Gait Speed; FGS, Fast Gait Speed; 6MWT, 6-Minute Walk Test

Table 2. Correlations between the PADS, number of steps, knee muscle strength and gait performance for the 77 persons with late effects of polio.

	PADS					Pedometer
	Exercise	**Leisure**	**Household**	**Work**	**Sum of PADS**	
Isokinetic knee muscle strength						
Knee extension						
More affected	0.04	0.26*	– 0.02	– 0.01	0.09	0.42**
Less affected	0.16	0.27*	– 0.11	– 0.04	0.04	0.29*
Knee flexion						
More affected	– 0.06	0.31**	0.05	– 0.02	0.14	0.41**
Less affected	0.10	0.25*	– 0.10	– 0.03	0.02	0.32**
Gait performance						
TUG	0.04	– 0.15	– 0.06	– 0.18	– 0.17	– 0.46**
CGS	0.03	– 0.25*	– 0.08	– 0.06	– 0.18	– 0.40**
FGS	0.02	– 0.21	– 0.08	– 0.10	– 0.18	– 0.43**
6MWT	0.01	0.30**	0.06	– 0.10	0.21	0.57**

TUG, Timed Up & Go; CGS, Comfortable Gait Speed; FGS, Fast Gait Speed; 6MWT, 6-Minute Walk Test

Relationships between the PADS, the number of steps, knee muscle strength and gait performance were analyzed with the Pearson's correlation coefficient (r).

** $P < .01$, * $P < .05$, otherwise not significant.

Table 3. The results of the linear regression analyses examining the relationship between PA and knee muscle strength, gait performance, and personal attributes for the 77 persons with late effects of polio.

	PADS Leisure subscale		**Number of steps**	
Independent variables	Beta	Adjusted R^2	Beta	Adjusted R^2
Knee Extension				
More affected/less affected	.21*/.22*	.05/.06	30**/21*	.16/.07
More and less affected, Age, Gender and BMI	.11*	.13	19**	.18
Knee Flexion				
More affected/less affected	.46**/.36*	.08/.05	54**/43**	.16/.09
More and less affected, Age, Gender and BMI	.21*	.13	39**	.19
Gait performance				
TUG	-2.1	.01	-553**	.20
TUG, Age, Gender and BMI	-2.2	.10	-529**	.17
CGS	-4.4*	.05	-631**	.15
CGS, Age, Gender and BMI	-3.6	.12	-599**	.13
FGS	-4.7	.03	-838**	.17
FGS, Age, Gender and BMI	-3.7	.11	-806**	.15
6MWT	.1*	.08	18**	.31
6MWT, Age, Gender and BMI	.9*	.14	18**	.29

Beta= unstandardized coefficient, Adjusted R^2 , determination coefficient

BMI, Body mass Index, TUG, Timed Up & Go; CGS, Comfortable Gait Speed; FGS, Fast Gait Speed; 6MWT, 6-Minute Walk Test

** *P* < .01, * *P* < .05, otherwise not significant.

LEGENDS

Figure 1. The relationship between isokinetic knee extensor muscle strength in the more affected lower limb (filled circles) and the less affected lower limb (open circles), and the PADS leisure subscale and the number of steps.

Figure 2. The relationship between the 6-Minute Walk Test (6MWT) and the PADS leisure subscale and the number of steps.

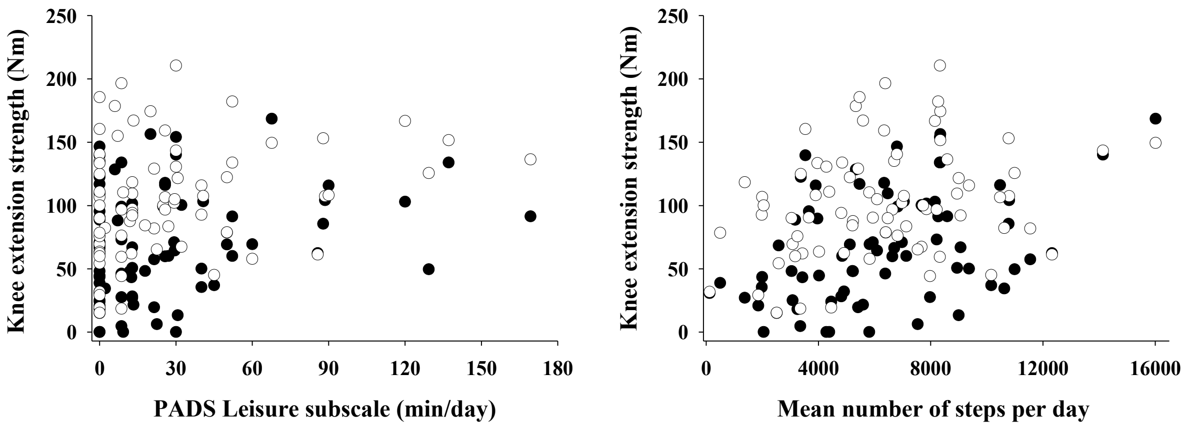
Knee extension strength (Nm)
250
200
150
100
50
0
0
30
60
90
120
150
180
PADS Leisure subscale (min/day)
Knee extension strength (Nm)
250
200
150
100
50
0
0
4000
8000
12000
16000
Mean number of steps per day

Figure 1

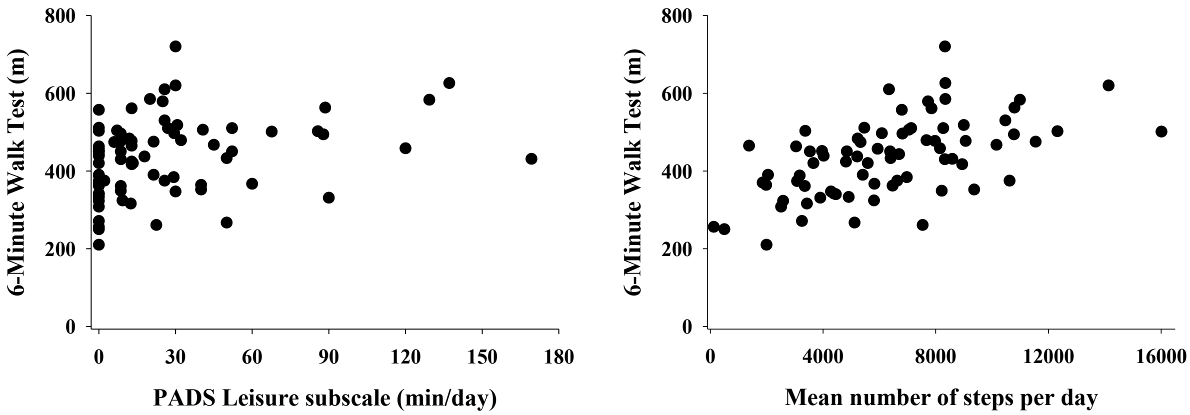
800
600
400
200
0
6-Minute Walk Test (m)
0
30
60
90
120
150
180
PADS Leisure subscale (min/day)
800
600
400
200
0
6-Minute Walk Test (m)
0
4000
8000
12000
16000
Mean number of steps per day

Figure 2