Speed and Exercise Intensity of Recreational Walkers

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Background. **Brisk walking has been identified as an activity suited to meet American College of Sport Medicine/Centers for Disease Control and Prevention recommendations for moderate intensity exercise (55–69% HR_{max}, 40–59% VO_2R). However, little is known about whether recreational walkers self-select a pace which elicits this intensity and how they interpret the term "brisk walking."**

Methods. **The walking speed of 82 adults was covertly observed in a public park. Fifty-nine of these participants demonstrated their interpretation of "brisk walking" and the speed was noted. Eleven of these subjects subsequently walked on a treadmill at their observed and "brisk walk" speeds. Heart rate (HR), respiratory gases, and ratings of perceived exertion (RPE) were measured.**

Results. **Mean observed and "brisk" walking speeds were 1.56 ± 0.17 $m \cdot s^{-1}$ and 1.79 ± 0.19 $m \cdot s^{-1}$ respectively ($P \leq 0.001$). Mean exercise intensities during the treadmill test (n = 11) were 59.0 ± 13.4% VO_{2max} and 67.3 ± 11.6% HR_{max} for the observed speed (1.60 + 0.24 $m \cdot s^{-1}$). The brisk speed (1.86 ± 0.12 $m \cdot s^{-1}$) equated to 68.6 ± 14.9% VO_{2max} and 78.5 ± 15.5% HR_{max}.**

Conclusion. **The speed and intensity selected by this group of walkers meets current recommendations for moderate intensity exercise. Instructing individuals to "walk briskly" prompts more vigorous activity.**

Key Words: **walking speed; exercise intensity; brisk walking; health.**

INTRODUCTION

Physical activity guidelines recommend that adults should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week [*1*]. In fulfilling this exercise prescription, brisk walking has been identified by public health agencies as a suitable activity [*2*]. Walking is currently the most frequently reported form of physical activity in the European Union [*3*] and has been found to promote better adherence than more intensive exercise [*4*]. Its widespread application lies in the fact that it requires no special skills or facilities and is achievable by virtually all age groups with little risk of injury [*5*]. Furthermore, the beneficial effects of regular walking are well documented: walking programs have been shown to favorably alter aerobic capacity [*6–9*], improve lipid profiles [*9,10*], decrease adiposity [*9,11*] and blood pressure [*12–15*], and enhance psychological well-being [*16*].

Despite the popularity of walking and its well-documented health and fitness benefits, few studies have considered whether people habitually walk at a pace and relative effort which meets the public health recommendations for moderate intensity exercise. Only in the work of Spelman and colleagues [*17*] was walking speed and intensity covertly examined. However, their study involved relatively young (34.9 ± 8.6 yr), "exercise" walkers who may not accurately represent the general population. Additionally, while guidelines advocate "brisk walking," there is a dearth of literature considering how the general public interprets this term. Were it available, such information would help those recommending physical activity to accurately prescribe walking as a means of meeting current active living recommendations [*1*] and be confident of the intensity it may evoke.

The purpose of the present study was twofold. Firstly, to determine the speed and relative exercise intensity self-selected by walkers during an outdoor walking session. Secondly, to assess the publics' interpretation of "brisk walking" in terms of pace and intensity.

METHODS

Subjects

Eighty-two subjects aged between 21 and 74 years (28 men, 54 women) were observed in a public access

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park in Northern Ireland. To minimize external effects on walking speed, individuals walking with children, a dog on a lead, pushing a pram, or carrying a bag were excluded from the study. Fifty-nine of these subjects (mean age 47.9 ± 13.6 years; 16 men, 43 women) volunteered to demonstrate their interpretation of brisk walking over the same course. There was no significant difference in the observed walking speed of the subjects who volunteered or declined to walk briskly ($P > 0.05$). After the brisk walking speed was recorded, subjects were invited to attend the Human Performance Laboratory of the University of Ulster in order to determine the relative intensity of the walking speeds. Eleven female subjects (mean age 40.2 ± 13.3 years) volunteered to take part. Exclusion criteria for the treadmill test were body mass index > 30 kg/m^2; any history of coronary heart disease; musculoskeletal injury; resting blood pressure > 140/90 mm Hg; and acute illnesses. Ethical approval was granted from the Research Ethical Committee of the University of Ulster at Jordanstown. Subjects provided written Informed Consent prior to the treadmill test.

Outdoor Walking Session

Prior to the observation session, an area of level, unobstructed pathway was identified and the distance between two distinct points was established with a measuring tape. Subjects meeting the set criteria were observed by a trained investigator. Speed was determined by using a stopwatch (Fastime, Hong Kong) to record the time taken to walk the pre-measured distance (18.56 m). The observer then intercepted the subject and asked questions regarding their age and walking habits. All subjects were asked to "walk briskly" over the same course while being timed. Eleven subjects agreed to take part in a laboratory based treadmill test following an explanation of its purpose.

Treadmill Walking Test

Subjects were instructed to refrain from exercise for 24 h, and not to eat or drink caffeine-containing products for 3 h prior to visiting the laboratory. Height, weight, and body mass index were determined by using standard methods. Time was allowed for familiarization with the treadmill and gas analysis equipment. The participants "observed" and "brisk" walking paces were replicated on the treadmill. Subjects walked for 3 min at each speed. Respiratory gases were measured by using a gas analysis system (Quinton Metabolic Cart, Seattle, WA), and heart rate (HR) was measured by short-range telemetry (PE4000 Sport-tester, Polar Electro, Kempele, Finland). Oxygen consumption and HR measured during the last minute at both intensities were averaged to determine mean values for the walking test. Rating of Perceived Exertion (RPE) using the Borg 15-grade scale [*18*] was obtained during the last 15 s of each minute at both speeds.

TABLE 1

Descriptive Characteristics for Subjects Who Performed the Treadmill Test (n = 11, female)

Variable	Mean	SD	Range
Age (yr)	40.2	13.3	22–58
Height (cm)	161.9	5.2	156–175
Weight (kg)	64.0	9.5	49.2–78.1
BMI (kg/m^2)	24.4	3.5	19.8–29.9
VO_{2max} (ml · kg^{-1} · min^{-1})	31.6	7.3	19.1–41.7
HR_{max} (beats · min^{-1})	179.8	13.3	162–198

Prediction of VO_{2max}

In order to predict VO_{2max}, if the subject's HR did not reach 85% of predicted maximal HR reserve (i.e., [maximal HR − resting HR) (0.85)] + resting HR) during the brisk walk, the gradient was then increased by 2.5% every 3 min until 85% HR reserve was attained [*19*]. Linear regression was used to extrapolate HR and oxygen consumption to the age predicted maximal HR (220 − age) [*20*].

Statistical Analysis

Descriptive statistics were computed for the self-selected and brisk walking intensities. The walking speeds and exercise intensities during the observed and "brisk" walks were compared by using t-tests. Observed walking speeds for the three groups were compared by using a one-way ANOVA. Statistical significance was established at $P < 0.05$.

RESULTS

The mean observed walking speed for the 82 walkers was 1.56 ± 0.17 m · s^{-1}. The mean "brisk" walking velocity in 59 of these subjects was 1.79 ± 0.19 m · s^{-1} (the mean observed speed of this sub-sample was 1.57 ± 0.18 m · s^{-1}). The subjects who performed the treadmill test had a mean observed and brisk speed of 1.60 ± 0.24 m · s^{-1} and 1.86 ± 0.12 m · s^{-1}, respectively. The difference between mean observed and brisk speeds were statistically significant ($P \leq 0.001$). There was no significant difference between the observed walking speeds of the three groups ($P > 0.05$).

Subjects (n = 82) reported walking 4.82 ± 2.62 times per week, for approximately 54.46 ± 24.6 min.

Descriptive characteristics for the subjects who performed the treadmill test are shown in Table 1. The scores for aerobic fitness, height, and weight are similar to population reference values [*21*]. Values for RPE and exercise intensities during the observed and brisk walks are presented in Table 2. The measures for percentage VO_{2max} and HR_{max} were significantly different

TABLE 2

Measures of Exercise Intensity during Observed and Brisk Walking Speeds ($n = 11$)

	Observed		Brisk	
	Mean	SD	Mean	SD
RPE	11.5	1.7	13.6	1.7
% VO_{2max}	59.0	13.4	68.6*	14.9
% HR_{max}	67.3	11.6	78.5*	15.5

*, Significant difference between observed and brisk walking speeds ($P < 0.01$).

between the observed and brisk walking velocities ($P < 0.01$).

DISCUSSION

The central finding of this study is that the pace and relative intensity selected by this group of recreational walkers is of moderate intensity, and instructing them to walk "briskly" prompts more vigorous activity. The observed speed (1.56 ± 0.17 m · s^{-1}) is slower than reported in a similar study by Spelman *et al.* [*17*] (1.78 ± 0.19 m · s^{-1}). However, their study involved "exercise walkers" whose mean VO_{2max} was approximately 4 ml · kg^{-1} · min^{-1} higher than the recreational walkers of the present study. Because an individual's physiological stress related to walking speed is a function of VO_{2max} [*22*], Spelman's group of walkers were capable of sustaining a higher pace. In keeping with our results, a study investigating the effects of commuting to work by sedentary adults recorded a pre-intervention walking speed of 1.61 m · s^{-1} [*23*]. When asked to walk briskly, our subjects significantly increased their walking speed to 1.79 ± 0.19 m · s^{-1}. Our results were similar to studies of walking programs which assessed "brisk" pace at baseline and reported speeds between 1.72 ± 0.26 and 1.76 ± 0.02 m · s^{-1} [*10*,*24*,*25*].

Public health guidelines advocate that adults should accumulate 30 min or more of moderate-intensity physical activity on most, preferably all, days of the week [*1*]. Moderate physical activity was described as activity performed at an intensity of 3 to 6 METS—the equivalent of walking briskly at 3–4 mph (1.34–1.79 m · s^{-1}) for most healthy adults. The mean speed of both the habitual and brisk walks meets these recommendations, with the chosen brisk speed being at the very upper end of the range. Interestingly, the mean rating of perceived exertion during observed habitual walking speed was 11.5 (11 = fairly light), indicating that individuals do not perceive their usual walking pace to be overexerting. Approximately half of the participants walked at speeds greater than 1.79 m · s^{-1} during the brisk walk, suggesting that instructing people to "walk briskly" elicits a speed which is greater than moderate-intensity activity. This suggestion is supported by the fact that the mean percentage HR_{max} measured during the brisk walk (78.5%) exceeds the definition of moderate intensity exercise of 55–69% HR_{max} [*26*]. Crucially then, when walking for exercise, adults intuitively walk at speeds and intensities which meet definitions of moderate-intensity activity, and instructing them to walk briskly encourages vigorous exercise.

Few studies have examined walking at intensities similar to that of the brisk walking velocity in the present study (68.6% VO_{2max}, 78.5% HR_{max}). However, a study by Duncan *et al.* [*9*] investigating the training effects of walking at 1.33 m · s^{-1}, 1.78 m · s^{-1}, and 2.22 m · s^{-1} corresponding to 56, 67, and 86% HR_{max}, respectively, found that, while similar improvements in HDL cholesterol were seen in all groups, aerobic power increased in a dose-response manner according to walking speed. These findings suggest that walking pace has a profound effect on aerobic fitness [*27*]. Aerobic fitness is independently associated with CVD and all-cause mortality to the same order as traditional risk factors, such as smoking, and greater than hypertension and hypercholesterolemia [*28*]. Accordingly, walking "briskly" has the potential to evoke greater improvements in VO_{2max}, thereby favorably altering CVD risk profile.

The findings of this study have important implications for public health guidelines. Firstly, it appears that when prescribing walking to meet recommendations for moderate-intensity exercise, people intuitively self-select an appropriate pace and may therefore procure the associated physiological and psychological benefits. Secondly, walking has traditionally been viewed as a moderate-intensity activity. However the present study clearly indicates that using the adjective "brisk" when prescribing walking evokes a more vigorous intensity of exercise. Lastly, approximately 40 min of walking at 1.56 m · s^{-1}, expends the same calories as 30 min of walking at 1.79 m · s^{-1} [*29*]. Since the "brisk" speed expends as much energy as a moderate activity but with less investment of time, for individuals affected by the constraints of a busy lifestyle, this may make exercise more attractive and accessible.

The present study is not without limitations. Firstly, exercise intensity measured on the treadmill may not truly reflect walking on an outdoor surface. Available literature is conflicting [*30*–*32*]; however, any reported difference is likely to have had negligible effects on the findings [*17*]. Secondly, as the chosen brisk walking pace was performed on a treadmill for up to 3 min, it is unknown whether our subjects could have maintained their brisk speed for a longer duration. The third limitation is the small and female-biased nature of the laboratory sample. This reflects other observations

that walking is more popular in women than men [*3*], but also highlights the need for research to be replicated with free-living male subjects.

In summary, the present study indicates that the speed self-selected by a sample of recreational walkers is of a sufficient intensity to meet current physical activity recommendations [*1*]. Furthermore, the use of the adjective "brisk" is sufficient to elicit a vigorous exercise response which may provide additional physiological benefits beyond those associated with a moderate walking pace. Therefore, while walking may be a sensible starting point for individuals overcoming inactivity, for moderately active adults without contraindications to exercise, "brisk" walking may be prescribed as a more intense activity for optimal health and fitness benefit.

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