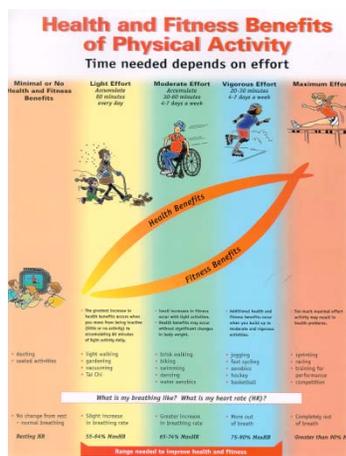


## Exercise Prescription for Health and Fitness: Pedometer Based Walking versus Fitness Programs

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Physical activity programs vary from *lifestyle programs* that are usually characterized by low intensity, daily activities (e.g. walking) to *fitness training programs* that are typically prescribed at a higher intensity, different frequencies and durations and include more traditional modes of exercise (e.g. aerobic, strength, etc.). Regardless of the type and goal of the physical activity program, they should adhere to established principles of training and be periodized, that is, organized into progressively overloaded programs until the desired level is obtained. In this way, the goals of the individual which may be to target health benefits, fitness gains or improvements in both, will be met in a safe and evidenced based manner. It has been established that regular physical activity can be effective for improving health and fitness and those participants that become physically fit have a reduced risk of all-cause mortality (Bauman, 2004). There is even some evidence to suggest that individuals that would be considered overweight can have acceptable levels of fitness and achieve some associated health benefits (Stevens et al., 2002).

The Canadian Physical Activity Guide (CPAG) illustrates these two types of programs in a continuum. At one end is the example of a minimum CPAG prescription which would be the accumulation of physical activities that total 60 minutes in duration at a low effort. At the other end, the CPAG includes a fitness prescription which involves vigorous intensity exercise, 20-30 minutes, 4-7 days a week. The CPAG also suggests that health benefits will be achieved at a light effort provided there is an accumulation of 60 minutes of physical activities each day but that few fitness benefits will occur with this type of prescription. However, as you progress to a more vigorous physical activity program, evidence suggests that this will maximize health and fitness gains (Iwasaki et al., 2003).



Health benefits consequent to physical activity programs include improvements in body composition, cardiovascular responses (lowered blood pressure and heart rate at rest and during submaximal exercise), blood fat and cholesterol levels, glycemic control, immune responses, various mental health indicators and an overall better lifestyle among others. Fitness benefits are usually thought of as more performance-based and include improvements in lean muscle mass, musculo-skeletal fitness (e.g.

strength, power, and endurance), anaerobic fitness, aerobic fitness and overall performance of personal, recreational and sport activities. Certainly, there is some overlap as the results of the same assessment can be applied to a health or a performance indicator (e.g. high  $VO_{2max}$  may be used to indicate the aerobic fitness of an athlete or a low  $VO_{2max}$  may indicate risk of cardiovascular disease for a sedentary individual). Lifestyle physical activity programs designed to favour health improvements may show some fitness benefits, however, the extent of these fitness benefits has been questioned. Conversely, physical fitness programs have been shown to be quite effective at improvements in health and fitness.

One particular program that gained popularity over the last 15 years and has facilitated an active lifestyle has been pedometer-based walking programs. Arguably, the most popular of these has been the 10,000 steps a day program which has been suggested as meeting the minimum recommendation for physical activity as advocated by the CPAG. Certainly, a previously sedentary individual that works up to and completes 10,000 steps a day has improved their physical activity levels and there is research that this type of program can improve aspects of cardiovascular health and may even promote some changes in fitness (Choi et al., 2007). However, the effectiveness of 10,000 steps a day walking programs and the long term success for sustained benefits has been questioned (Bravata et al., 2007). Conversely, the benefits from regular fitness training have been well established (Swain and Franklin, 2006).

The question of the effectiveness of a walking program in comparison to a fitness training program for changing health and/or fitness was of interest to our research team from the University of Alberta (Bell et al., 2010). Interestingly, little research has directly compared these two types of physical activity programs on the same health and fitness variables in a sedentary population. Furthermore, it is also important when comparing two different physical activity programs to equate the amount of energy (calories) expended between the two programs so that any observed differences were not because one program expended more energy (did more work) than the other. It was with these things in mind that we set out to investigate the health and fitness benefits of a periodized, pedometer based, 10,000 steps a day program in comparison to a fitness program that were equated in total energy cost in previously sedentary Albertans.

We studied 128 previously sedentary men and women (mean age ~50 yrs) that would be described as apparently healthy and randomly assigned them to one of three groups: a control group that we asked to carry on their usual activity, a pedometer based walking program and a fitness training program. We hypothesized that the fitness training program would result in greater health and fitness gain than the walking group even though energy expenditure was equated between the two physical activity groups.

Both programs were periodized. We started the walkers out with daily walking (~5600 steps a day) and progressively overloaded the number of steps per day every 3-4 weeks for 16 weeks until they were prescribed 10,000 steps a day followed by maintenance of this many steps for 2 more months. No intensity guidelines were provided to the walking group; they were just told to complete the prescribed number of steps as is usually the case for walking prescriptions. The walking program was done at home or work and was not supervised. However, each participant in this group had to report their actual steps each week by phone or email to a research assistant. The fitness program started at 20 minute sessions, 3 times a week at an intensity of 55 % of peak oxygen uptake (peak  $VO_2$ ) and were progressively

overloaded over the same time frame as the walking group until they were prescribed 43 minutes, 4 times a week at an intensity of 70% of peak  $\text{VO}_2$ . Intensity was monitored by heart rate. The fitness group came to a fitness and lifestyle centre and were supervised. Both groups completed 6 months of prescribed physical activity. The energy expenditure of total physical activity including baseline steps in kilojoules per week was calculated and made similar between the two physical activity groups.

As hypothesized, there were greater overall health and fitness gains with the fitness training group. These included greater decreases in systolic blood pressure and ratings of perceived exertion during submaximal exercise and greater increases in ventilatory threshold (VT) and peak  $\text{VO}_2$  for the fitness group in comparison to the walking group. The walking group showed some improvements in submaximal exercise responses but no changes in VT or peak  $\text{VO}_2$ . But all groups showed similar decreases in body mass, waist circumference, waist to hip ratio, resting heart rate, blood glucose and triglyceride levels. Thus, the pedometer based walking group was not without some benefits but overall, more improvements were gained with the fitness training prescription. More details of our study can be found in the article (Bell et al., 2010).

But it is of practical importance to note that a physical activity program is only as good as the willingness of the participants to keep interested and doing it! Interestingly, the walking group adhered better to their prescription and actually completed an average of 9221 out of the 10,000 steps a day prescribed (92% adherence) over the last 2 months of the 6 month program. The fitness training group averaged 3.1 days per week when they were actually prescribed 4 days a week (77% adherence). Thus, it seems that a lifestyle prescription walking that can be done on an individual's own time and at their convenience has some advantages to having to make a specific time of day to exercise, drive , park, exercise inside a centre and so on even if it is done less frequently. These can become barriers to attendance and ultimately the benefits of such programs.

A closer evaluation of the two different physical activity programs in our study reveals that the biggest difference between the two programs was the intensity of exercise. In fact, the fitness training program was less frequent (3.1 days per week versus daily) and shorter in duration (43 minutes versus > 1 hour to complete each day) than the walking program. This illustrates the point that the intensity of exercise is a critical determinate of optimizing gains in health and fitness. However, the convenience and adherence advantages of a pedometer based walking program cannot be ignored. So is there some way of increasing intensity of these types of programs? Of course there is. Add some hills or stairs to your walking program - just ensure that the hills or stairs are long enough to increase the intensity of effort for a decent period of time. Another way is to simply using a watch and determine how many steps on the pedometer you complete in 10 minutes while performing your normal pace. Say its 1000 steps in 10 minutes. Now at various times during the walk, pick up the pace to so that you complete 1200 steps in 10 minutes – then after a certain period of time, increase this to 1400 steps in 10 minutes. You will quickly find out that this increases walking speed and therefore elicits a higher intensity of effort – sort of like interval training! This idea was explored in another recent study by a group of our researchers at the University of Alberta and was shown to be effective for showing additional improvements in cardiovascular health in a group of individuals with type 2 diabetes (Johnson et al., 2009). The physical activity program in this latter study started with simply increasing daily steps using a

pedometer and progressed to targeting increasing walking speed. This is just another unique approach to periodizing physical activity programs to provide a progressive overload.

Other ideas include:

1. A 10,000 *Additional* Steps Program (10,000 ASP). Determine baseline steps over 7 days using a pedometer. For illustration purposes, say this number was 4,000 steps a day. Progress the number of steps over time until 10,000 additional steps are taken (total would be 14,000 steps a day).
2. A hybrid program that would include pedometer based walking program 3-4 days a week, plus 2 days a week of traditional fitness training.
3. Or any combination thereof – be creative and add variety.

Remember to assess your clients before, during and after your prescriptions to ensure and document success. Also monitor blood pressure and heart rate periodically to make sure your clients are exercising safely. Adhere to all the exercise guidelines provided in our CSEP certification programs. With current research support and with some creative programming, health and fitness gains can be optimized in our population. Making physical activity convenient while finding ways to incorporate an effective intensity is the key.

P.S. For further reading, check out our companion paper to Bell et al. (2010) that reports on various behavioural outcomes associated with the pedometer based walking program in comparison to the fitness program (Rodgers et al., 2009).

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