Health Hints

AgriLIFE EXTENSION
Texas A&M System

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September 2009
Vol. 13, No. 9

Pedometers
Motivating fitness

"Walking ranks among the most prevalent and beneficial forms of exercise."[1] "Walking is a gentle, low-impact exercise that can ease you into a higher level of fitness and health. Walking is one of your body's most natural forms of exercise. It's safe, simple, doesn't require practice, and the health benefits are many…. Walking, like other exercise, can help you achieve a number of important health benefits. Walking can help you:

- lower low-density lipoprotein (LDL) cholesterol (the "bad" cholesterol),
- raise high-density lipoprotein (HDL) cholesterol (the "good" cholesterol),
- lower your blood pressure,
- reduce your risk of or manage type 2 diabetes,

- manage your weight,
- improve your mood, and
- stay strong and fit."[2]

"Despite the documented health benefits of exercise, more than one half of U.S. adults do not meet the U.S. Department of Health and Human Services' recommendation of 30 minutes or more of exercise on most days of the week, and one fourth of adults do not exercise at all."[3]

Research shows that the pedometer – a small and typically inexpensive device that counts steps – is an excellent motivational tool for walking, as well as other physical activities. Pedometers are easy to use and can be used by almost anyone – young or old,[4, 5, 6] completely sedentary, or avid exerciser. Pedometers "offer a practical means to promote walking by raising awareness and serving as an environmental prompt."[1] Because pedometers are small devices, they can be worn throughout the day without being obtrusive. In fact, considering all of the beepers and cell phones you see hanging from people's waistbands, a pedometer might go completely unnoticed.

How Can a Pedometer Help?
Research highlights

A pedometer can be an excellent tool for motivation because you can wear it all day or just during a planned activity to see how many steps you are taking; then you can try to increase your number of steps, creating goals for the next day or week. "Many of us are motivated to exercise if we have a target to work towards, so [pedometers] can be a useful aid."[7] Research results of a systematic review of 26 studies on pedometer use showed that people who wore a pedometer increased their physical activity by 26.9 percent over baseline.[6] Those wearing pedometers took over 2,000 more steps (the equivalent of about 1 mile) per day than those who did not wear a pedometer.[6] Use of a pedometer was positively associated with physical activity as well as significant decreases in Body Mass Index (a measure of body fat) and decreases in systolic blood pressure an average of 4mm/HG.[6] This number is important because reducing systolic blood pressure by just 2mm/Hg has been shown to cut stroke mortality risk by 10 percent and risk of death by vascular causes by 7 percent.[6]

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How Many Steps?

Setting a step goal

It is recommended that people engage in 150 minutes per week of moderate intensity physical activity, the equivalent of 30 minutes each day five times a week. So, how do we reach this goal? Research suggests that having a "step goal" and keeping a "step diary" may be key motivational factors for increasing physical activity.[6] With the use of a pedometer as your data keeper and motivator:

- **Establish your baseline steps.** "Wear your pedometer throughout the day for three consecutive days."[8] "You may be surprised to learn how much walking you already do every day."[9] "Add the total number of steps for each of the three days together and divide by three. This gives you a baseline from which to start setting short- and long-term goals."[8]
- **Set short-term goals.** "Short-term goals might be to add a certain number of steps a day to your routine or to double your baseline steps"[8] (e.g., The National Diabetes Education Program's Game Plan suggests trying to increase the number of steps you take by 1,000 steps per week [about 250 steps per day], aiming for a goal of 10,000 steps per day).[9] "It might be easier than you think! Park farther from the door. Use the stairs rather than the elevator. Take short walking breaks during the day."[8]
- **Set long-term goals.** "Long-term goals might be to make 3,000 or more of your daily steps fast steps or to walk 10,000 steps a day."[8]
- **Log your progress.** Use the information on your pedometer to log how many steps you have taken each day or each workout to see your progress and keep you motivated. You can log your miles with a program like Walk Across Texas and boost your number of steps with a program like Mark Fenton's 20% Boost Program (see Fitness Walking with a Pedometer and Fit Walking into Your Life).

Although pedometers are widely used as a physical activity monitoring tool, they are unable to measure activity **intensity**. Researchers have determined that a rate of at least 100 steps per minute achieves moderate intensity activity. Therefore, based on a study published in the May 2009 issue of the *American Journal of Preventive Medicine*,[10] a simple pedometer-based recommendation of 3,000 steps in 30 minutes can get people started on a meaningful exercise program.[10, 11] According to the study, researchers believe that the data support a general recommendation of walking at more than 100 steps per minute on level terrain to meet the minimum of the moderate-intensity guideline. Because health benefits can be achieved with bouts of exercise lasting at least 10 minutes, a useful starting point is to try and accumulate 1,000 steps in 10 minutes before building up to 3,000 steps in 30 minutes.[10, 11]

Be sure to check with your physician before starting any physical activity program. "Your level of progress will depend upon your starting fitness level and health."[12] Most apparently healthy, but sedentary, adults can safely add about one additional mile (2,000 steps) the first week.[12] "Continue to add steps regularly. At least 10,000 steps per day is a good goal for currently sedentary people."[12] Promoting a single goal for everyone does not take into account age, health, or previous fitness level.[13] Work gradually at your own pace to increase your steps, your fitness level, and benefit your health.

Choosing a Pedometer

What to look for

When choosing a pedometer, there are a few points you may want to consider:

- accuracy,
- ease of use,
- comfort,
- cost, and
- additional features.

Accuracy. One of the most important considerations when buying a pedometer is accuracy. You want a pedometer that counts your steps as accurately as possible. The simplest pedometer that accurately counts steps is the only essential feature in a pedometer.[14] There are three mechanisms by which most pedometers work – some of which determine accuracy.

- Spring-levered pedometers are usually the least expensive type in which a horizontal spring-suspended lever arm (pendulum) moves up and down with normal walking movements. As the levered arm swings downward and closes, it counts a step. Then the spring returns to its original position.[15, 16] You will hear a click with each step, so this is something to consider if sounds bother you. "A **coiled spring** retains its accuracy longer than a **hairspring**, and they are more expensive. If you are paying more than $15 for a pedometer, do the research to find out whether it is a coiled-spring pedometer so you are getting value for your money."[16]

- Accelerometers – Piezo-electric pedometers are usually more accurate than spring-levered pedometers.[16] "An accelerometer uses a strain gauge, which measures how fast you are moving. This uses more battery power. So users need to replace the batteries more often – every 6 months or so. These pedometers also tolerate being tilted to one side, giving more accurate readings for a wider array of body shapes. They can also be carried in a pocket. They will usually cost over $25."[16]
- GPS pedometers use global positioning satellite (GPS) technology to measure distance and speed.[16] "These do not give you a step count but give very accurate speed and distance measurements outdoors. They work poorly indoors and won't work for treadmill walking or walking in place. You can download an application to use the GPS built into your cell phone as a GPS pedometer, or buy a stand-alone GPS pedometer."[16]

Ease of Use. Sometimes, simple is best. If all you really need to know is the number of steps counted, a basic model may be best. Added features can be hard to use and unreliable.[8, 17] Look for a display monitor you can read in different types of light[8] and one that can be easily read from angles when you are active. Be sure to get one with a sturdy clip and a security strap or "leash" that holds it in place so it does not fall off of your clothing.[8] Pedometers are notorious for falling off in the restroom.[18] Choose a model with a cover to prevent accidental bumps of the reset button.[17]

Comfort. For comfort, choose a lightweight model that fits the type of clothing you usually wear.[8] If you only plan to wear the pedometer during scheduled physical activity, comfort will not be as important; but if you plan to wear the pedometer all day, comfort will be an essential component.[19] (Note: If you are wearing a dress or other clothing that doesn't have a waistband, you can clip the pedometer to the waistband of your undergarmets.[20])

You can wear a pedometer in a variety of places, although some sites are more reliable than others, usually clipped to the waistband or belt, over the center of the leg (above the midline of the thigh). For standardized purposes, it is suggested that you always wear the pedometer over your dominant foot (i.e., the right foot for those who are right-handed and the left foot for those who are left-handed).[15, 21] It is important that the pedometer remain snug to keep it from bouncing around and recording non-step movements; this is why you should have an extra safety leash or string fastened to the pedometer's waist clip and pinned to or looped through a belt loop.[18] The pedometer needs to be worn as close to the hip bone as possible for the most accurate results.[19] It must also remain vertical for accurate readings. If the stomach protrudes and causes the pedometer to angle, it is best to wear the pedometer slightly below the waist,[21] or you may want to choose an accelerometer, which tolerates more tilt.[16]

Cost. "Avoid cheap or expensive brands, and look instead for simple step counters that have a cover and cost between $15 and $25."[22] Pedometers that are cheap tend to be less accurate. Studies have reported that low-cost pedometers in the $1-3 range tend to be inaccurate,[23, 24] sometimes miscounting steps by 50 percent or more,[24] while pedometers ranging in the $15-30 range tend to rate very good to excellent for accuracy.[17] If you are trying to keep costs down, choose a simple pedometer that accurately counts steps (you don't need all of the extra features) – check accuracy by walking 100 steps and seeing how accurately the pedometer counts the steps. An acceptable pedometer will have an error rate of 10 percent or less (i.e., 10 missed steps out of 100). Try to find a pedometer that does not exceed 5 percent error (i.e., misses 5 steps out of 100)[25] if possible. Note that most pedometers studied have been shown to be more accurate if you walk about 3.5 mph rather than more slowly at 2.5 mph.[21] "Some people with slow gaits may find any conventional pedometer works poorly for them…. And some obese people won't get pedometers to ride properly on their waistlines, resulting in low counts. A pricier version, an accelerometer, may work better for these groups…."[17] Important note: There's nothing wrong with a slow pace. In fact, according to a study published in the American Heart Association's journal, *Circulation* (May 2009), "Walking longer at a slower pace improved heart health much more effectively than standard cardiac rehabilitation of walking a shorter distance at a brisker pace in overweight patients with coronary heart disease."[26]

Additional Features. Some pedometers will have extra features that may help motivate you. These features may include calculations for calories burned,

The Wet Foot Walk

Some pedometers will ask you to input your step- or stride-length to give you an accurate count of your steps. The average person's stride length is 2.5 feet long, which means it takes just over 2,000 steps to walk 1 mile and about 10,000 steps to walk 5 miles.[27] For a fun way to get a more accurate stride-length, make a puddle of water on a stretch of sidewalk. Start walking your natural pace, walking through the water plus another 10 steps. Now measure the distance on your wet footprints from the heel of your left footprint to the heel of your right footprint on several of the footprints and average them. If your pedometer is set in feet, divide the inches by 12 to get feet. Step length in inches divided by 12 equals step length in feet.[28]

distance traveled, and connections to upload data from your pedometer to your computer. Note that some of these features, such as calories burned and distances covered are estimates (based on individual factors input into the device) and may have a larger margin of error than steps counted. Models with these extra features also may cost more. Still, they may be attractive options if these features help keep you motivated.

Want a little help choosing a specific model of pedometer based on current consumer ratings? See Which Model? for suggestions.

What Other Activities Can Be Counted?

Pedometers & other types of physical activity

Obviously, a pedometer won't work if your sport of choice is swimming since you can't immerse a pedometer in water. A pedometer, however, "can be used for most physical activities for which there is a stepping motion. These activities include not only walking but exercise that involves movement of the trunk, hip and legs, such as stair-climbing, cross-country skiing, dancing, household chores, running, and ball sports."[12] Cycling is another possibility, but some say pedometers don't work because they can't register impact from the foot.[19] Some recommend that if attaching the pedometer to the hip doesn't count your pedaling, attach the pedometer to your shoe. Wearing the pedometer on the shoe is also an option for those who find that it doesn't record steps consistently when worn on the waistband, perhaps because of a high waist.[29]

We recommend trying the pedometer with other activities to see how accurate it is at counting your movements. Then adjust the numbers as needed to represent your true amount of movement or number of steps. For example, if you want to play tennis, soccer, or basketball, put the pedometer on at the hip and play a short while, counting your actual steps; then look at the pedometer to see if it recorded the steps or movements that you counted. Try this several times to see if it is accurate, underestimating, or overestimating. Then adjust the numbers accordingly – if the pedometer seems to underestimate by about 10 percent, add the steps to your log book; if it overestimates, subtract steps. If it is within 5 percent, it is probably fairly accurate as many pedometers will be off by 5 percent even when counting steps walked. If the pedometer does not register movements for your chosen activity, try placing it on the shoe to see if this makes a difference.

Although the pedometer may not be completely accurate with activities other than walking and running, you may still be able to record enough information to know whether or not you are increasing your activity level.

Pick up a Pedometer

Cut the costs

"The costs associated with physical inactivity are high."[6] These are costs to our health and life quality as well as to our wallets. "If 10 percent of adults in the United States began a regular walking program, an estimated $5.6 billion in heart disease costs could be saved,"[6] and that's just one facet of health. Increased physical activity is associated with improvements in coronary artery disease, hypertension, stroke, insulin sensitivity, osteoporosis, and depression. Try starting a walking program today. Put on a pedometer for motivation, and try to add steps each day toward a healthier you.

To view the references used in this newsletter, go to: http://fcs.tamu.edu/health/healthhints/2009/sep/ref.php

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Which Model?
Consider the ratings

Pedometers can be found in most sporting goods stores or can be bought directly from the manufacturer online.[1] As pedometers become more popular in your area, you may find them in other local multi-purpose stores as well (check the sporting goods departments). Additionally, many health and physical activity promotion programs give pedometers as prizes, rewards, or motivators – just test them out to be sure they're accurate.

Where possible, consider objective evaluations by consumer organizations or sports magazines.[2] To get you started, here are some of the top-rated pedometers we found from such sources (listed alphabetically, with specific models in parentheses):

- Accusplit (AE 190XLG),[3]
- Freestyle (Pacer Pro),[4]
- Garmin Forerunner (205),[3]
- Kenz Liferecorder,[5]
- New Lifestyles (NL-2000),[3, 4]
- Omron (HJ-112; HJ-720ITC),[3, 4, 6]
- Sportline (Fitness 360, 330, Talking Safety Alarm),[4]
- Walk4Life (Elite – best for use on treadmill,[4] LS 2525[6]), and
- Yamax Digiwalker (CW-701; SW-701,SW-200).[5, 6]

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