Use of a Pedometer to Monitor Physical Activity in Older Adults: A Pilot Study

Chul-Gyu Kim, MS, RN
Health Insurance Review & Assessment Service
1586-7 Seocho3-dong Seocho-gu
Seoul, 137-706, Korea
chgkim@hiramail.net
Tel: 82-2-2182-2209
Fax: 82-2-585-4257

Young-Shin Lee, PhD, RN
San Diego State University
School of Nursing
5500 Campanile Drive
San Diego, CA 92182
ylee@mail.sdsu.edu
Tel: (619) 594-5385
Fax: (619) 594-2765

Abstract

Objective: To conduct a preliminary test of the reliability of pedometer use to determine physical activity (PA) by older adults living independently.
Design: Descriptive cross-sectional study.
Sample: Thirty-two older adults (mean age = 71.5 years), living independently, participated.
Measurement: Step counts along a 10 m line were determined by observation and pedometer. Each individual then completed a 7-day step count using a pedometer, a 7-day PA log, and a self-reported PA questionnaire.
Results: There was no significant difference in steps measured by observational count and pedometer. Average step length was 56 cm, and average walking speed was 0.88 m/s. Pedometer counts were significantly correlated with self-reported walking distance and amount of leisure PA, but not with walking energy expenditure. Cronbach's alpha coefficient of 7-day pedometer records ranged from .77 to .90. Pedometer counts were somewhat, but not significantly, higher for individuals who were younger than 70 years old, female, Caucasian, had

normal blood pressure, normal body mass index, or no medical problems, than counts for participants in opposing categories.

Conclusions: The use of pedometer to monitor PA in older adults appears to be reliable and valid. A future study using a larger sample and evaluating the association of PA with health outcomes is recommended.

Keywords: Walking, pedometer, physical activity, elderly, reliability

Use of a Pedometer to Monitor Physical Activity in Older Adults: A Pilot Study

Introduction

Regular walking is the most common mode of physical activity (PA) and an important way to improve the health condition of older adults.[1,2] Seventy percent of older adults, regardless of gender, ethnicity/race, income status, and environment, engaged in walking as exercise.[2,3] Even light PA, such as walking a dog, provides health benefits and helps to control chronic diseases, such as hypertension, diabetes, and depression, especially in sedentary older adults.[4,5] The American College of Sports Medicine and the American Heart Association recommends that people walk 30 minutes almost every day to get health benefits.[6] However, there are no specific guidelines as to how many steps a day or how far older adults should walk.

Several tools, including pedometers, accelerometers, and self-report questionnaires, are used to measure PA and walking activity, and each has pros and cons. Pedometers, the tools most commonly used by older adults, are easy to use, cost-effective, provide an objective measurement, and increase individual interest in engaging in PA because they are worn on the body.[7-11] However, only a few studies have examined the accuracy, reliability, and validity of using pedometers as PA measurement tools by older adults. The accuracy of pedometer use, particularly by seniors who are frail and walk slowly, has been debated.[12-14] Cyarto et al.[12] compared pedometer counts with observed steps walked over a 13 m distance in two groups of older adults in a nursing home (mean age = 79.4) and a senior center (mean age = 70.6), and concluded that pedometer counts underestimated steps in both groups and had a higher error in nursing home residents than in the senior center visitors. Melanson et al.[13] studied 78 healthy adults over 60 years old, walking on a treadmill for 10 minutes at two different walking speeds (normal and brisk), and found that pedometer accuracy decreased with increasing age and body mass index (BMI). In a study of community dwelling Caucasian men and women (mean age = 79.2), pedometer counts were compared with observed steps while the person was walking 100 steps on a level surface in a straight trajectory. The results showed that pedometer counts underestimated observed steps by an average of 16% (range = 11-31%), and that pedometer accuracy decreased in individuals whose gate speed was less than .8 m/s.[14] All of these studies were conducted under

laboratory conditions and may not represent pedometer accuracy under real-life conditions. In these studies, furthermore, the site on the body where the pedometer was worn varied from the left hip, on clothing at the waist,[13] centered over the dominant foot,[12] or on the dominant hip,[14] and there are no specific guidelines for selecting a wearing site, which might influence the accuracy of pedometer use.

Reliability of pedometer counts has also been measured in several studies. A study of adults (mean age = 49.1) showed reliability coefficients between .71 and .91,[15] and another study of postmenopausal women with type 2 diabetes found that reliability coefficients were between .84 and .87.[9] Although the pedometer counts were reliable, the study populations were adults in middle age, not the elderly. Therefore, these results may not be applicable to older populations.

A few studies have examined the validity of pedometer use by identifying the association with self-reported PA. Strycker et al.[9] reported that correlations between pedometer data and self-reported PA in post-menopausal women were .31 to .36, and a study of older adults (aged 69~92 years) showed correlation coefficients of .43 to .56 between pedometer data and self-reported PA.[16] Bassett, Cureton, and Ainsworth[17] found a correlation coefficient of .35 between daily walking distances and pedometer for adults (aged 25~70 years). Other studies tested the validity of pedometer use by examining the association between the pedometer steps and factors reflecting the amount of PA, such as age, body weight, and health conditions.[8,9,17,18] Although previous studies provided important information about the accuracy, reliability, and validity of pedometer, use of pedometers by older adults is still subject to debate. There is still insufficient evidence to support pedometers as a good measurement tool for older adults under real-life conditions.

In the current study, a theoretical background of pedometer use was derived from the PA model for older adults, adopted from Cox's Interaction Model of Client Health Behavior[19] and developed by Lee.[20] The PA model is composed of four constructs: personal, interpersonal, and environment factors and physical activity. Personal factors consist of specific background variables, cognitive appraisal, and motivational variables (health self-determinism and motives for fitness). In the PA model, a variable, motivation for fitness indicated a strong and direct effect for older adults to engage in PA among psychosocial and environmental factors. Therefore, the present study hypothesized that use of pedometer can be applied to older adults as a means of motivation for fitness and health. The overall goal of the current study was to examine the accuracy, reliability and validity of pedometer use by older adults living in a community. The specific goals were to 1) compare pedometer and observed step counts; 2) examine reliability among 7-day pedometer counts; 3) determine relationships between 7-day pedometer counts and self-reported PA; and 4) examine differences in pedometer counts by age, gender, race, BMI, blood pressure, and medical problems.

Methods

Sample and study setting

The cross-sectional descriptive study was conducted on 32 older adults living independently in a senior center, senior apartments, and a retirement community in the west coastal region of the U.S. Inclusion criteria were age 60 years or older, ability to read English and walk without a walking device (e.g. cane, walker, or wheelchair), and living independently. Individuals with visual problems, limited writing ability, and cognitive impairment assessed by the Orientation-Memory-Concentration test were excluded. After approval of the Institutional Review Board of the University, the research team visited a senior center, senior apartments, and a retirement community, and invited participation by potential subjects. Those who showed interest in the study were questioned to determine if they met the study criteria, had their blood pressure checked, and were screened using the cognitive impairment test. Those who met all inclusion criteria were provided with materials for the study package (questionnaire and a pedometer), received a blood pressure reading, and given an appointment one week later to return the questionnaire and pedometer, and have another blood pressure reading taken. After completing the questionnaire, two blood pressure measurements, and pedometer logs, each participant was received a cash incentive.

Instruments

Pedometer and PA log. The Yamax SW-200 pedometer was selected to measure daily steps, based on its accuracy and convenience for older adults who walk slowly.[21] To find an accurate position for the pedometer, participants walked a round trip along a 5m straight line wearing two pedometers on the waistline - one halfway between the center and side (iliac crest) of the body, and the other three-quarters around to the side of the body. A researcher counted the steps and measured the time with a stopwatch. Step length was calculated as 10m divided by the observed steps. The pedometer position that gave a count closer to the observed count was selected as the position for the longer study. Participants were instructed to wear the pedometer in the designated position at home, from morning to night, for the following 7 days. They were also instructed to read the pedometer and write down the number of steps at bedtime, each day. Participants practiced opening and closing the cover of the pedometers and using the restart button.

A PA log was used to record daily pedometer counts. It consisted of separate columns for the day, starting and ending times, step count, and daily activities, with examples. Each participant was given a PA log and requested to write down starting and ending times wearing the pedometer, step count, and daily activities, every day for 7 days.

Self-reported physical activity and walking. A Habitual Physical Activity Questionnaire (HPAQ), which was developed and validated to measure PA for older people,[22] with additional questions on walking, was used to measure self-reported PA. The HPAQ consists of three subscales - household, sports, and leisure physical activities – with 22 items that assess the frequency and duration of household, sports, and leisure time physical activities during the past 12 months. The household activity score is the mean of 10 household item responses. The sports/leisure PA/walking score is obtained by summing subscores reported for various physical activities, with average intensity code*s* multiplied by frequency and duration to give themetabolic equivalent of task(MET). Higher HPAQ scores indicate greater physical activity. Previous studies showed that HPAQ results had a correlation coefficient of .78 with average 3-day activity recall, and a correlation coefficient of .72 with activity measured by pedometer.[22] In this study, the HPAQ was used as a total sum of household and sports/leisure PA score and a score of each subscale of HPAQ: household activity, walking (MET), and leisure PA/sports (MET).

Personal characteristics. Personal data included age, gender, ethnicity, education, medical problems, blood pressure, and BMI. Education level was divided into seven levels from no school to graduate school. Eleven items indicating medical problems were measured with a dichotomized score, so that the sum ranged from 0 to 11, with lower scores reflecting better health conditions. Blood pressure was measured for each participant at least two times over 7-14 days, and the readings were averaged. To confirm the validity and reliability of the measurements, trained research assistants measured blood pressures with a calibrated aneroid sphygmomanometer (American Diagnostic Corp ®), following the procedure guidelines of the National High Blood Pressure Education Program.[23] Blood pressure was categorized as *high* (systolic or diastolic BP over 140/90 mmHg, regardless of anti-hypertension medication) or *normal*. Each participant was weighed on a dial floor scale and asked their height. BMI was calculated as weight (kg) divided by the square of height (m2). BMI was categorized as *normal* (below 25) or *high* (25 or over, considered overweight or obese).

Cognitive impairment: Because the study used self-administered questionnaire and pedometer applications, which require individual management, individual cognitive impairment was screened with the revised Orientation-Memory-Concentration (OMC) Test at the beginning of the study. The revised OMC test was initially developed as a 26-item test by Blessed, Tomlinson, and Roth,[24] and was later modified and shortened to 6 items by Katzman, Brow, Fuld, Peck, Schechter, and Schimmel.[25] The OMC score represents a sum of the 6 items, which ranges from 0 to 28; higher scores reflect greater cognitive impairment. Those who had a score of 8 or less were eligible to participate in the study.

Statistical Analysis

Means and standard deviations were computed for all variables. Student's t-test was used to compare pedometer counts with observed steps, and to evaluate differences in daily pedometer counts among participants with different personal characteristics. Pearson's correlation coefficients were used to determine relationships between pedometer counts and HPAQ measures of physical activity. Reliability coefficients (Cronbach's α) were computed from 2-7 day of pedometer data. Because this study was a pilot study, the statistical power was calculated at the post-study and considered adequate to demonstrate the relationship with the following reasons. First, reliability coefficient of pedometer counts over 7 days was high and acceptable. Second, the pedometer counts averaged over 7 days showed strong correlations with self-reported walking distance, amount of leisure time PA, and total PA (r = .49, .66, and .64 respectively) which mean a large effect. Even though the sample size was relatively small, the findings were reflected no power issues in this study.

Results

Sample characteristics. Mean age of the participants was 71.5 years (SD = 8.13)*.* Of the 32 participants, 17 (53.1%) were women, 27 (84.4%) were Caucasian, and 96.9% had a degree higher than high school graduate. Eight (25.0%) had systolic BP above 140 mmHg; only one (3.1%) had diastolic BP above 90 mmHg. Mean BMI was 26.6 (SD = 4.96) and 21 (67.8%) of the participants were overweight or obese. Twenty four participants (75.0%) had medical problems, such as cardiovascular disease (25.0%), sleeping disorder*s* (21.9%), osteoarthritis/rheumatoid arthritis (21.9%), dental problems (18.8%), or osteoporosis (15.6%). Thirty of the participants completed a 7-day record of pedometer counts, one completed a 6-day record, and one completed a 4-day record.

Pedometer vs. observed step counts. The mean of difference between pedometer count and observed count over a 10 m distance was .88 (t (31) = 1.738, p = .09), and this was not statistically significant (Table 1). Step length measured in the 10 m walk averaged 56.03 cm and walking speed averaged .88 m/s. .

Reliability of pedometer counts. On average, participants wore a pedometer 12.44 hours per day, and daily step counts were 6,103 (SD = 4,086, N = 30) (Table 2). The internal consistency of 7 day pedometer counts for the sample was .96, ranging from .77 to .90 among days. Mean step counts were lowest on Day 1 of the study. Mean time wearing a pedometer was highest on Days 4 and 5, and mean step count was highest on Day 5 (6,772 steps).

Pedometer count vs. HPAQ scores. Pedometer counts averaged over 7 days showed strong correlations with HPAQ subscales - walking distance, amount of leisure PA (MET), and total PA (r = .49 ~ .66, p < .01) (Table 3). However,

pedometer counts were not significantly correlated with HPAQ walking (MET) or household activities.

Relationships between personal characteristics and pedometer counts.
Participants who were under 70 years old, women, Caucasian, had normal BMI, normal BP, or no reported medical problems had higher pedometer counts than participants in the opposing categories (Table 4). However, the differences were not statistically significant.

Discussion

The present study demonstrated the feasibility of pedometer use by older adults living in a community, by comparing pedometer counts with observed step counts and self-reported PA, determining reliability of pedometer counts among 7 days, and relating differences in pedometer counts to differences in demographic characteristics and health status. The finding that there was no difference between pedometer counts and observed steps over a short distance indicates that pedometers are valid to use for older adults living independently. The findings differ from those of previous studies, which found that pedometer counts were significantly lower than observed steps.[12,21] The different results might be due to the choice and position of the pedometer, since previous studies used different sites for wearing the pedometer.[12-14] The SW-200 pedometer detects only unidirectional movement and, therefore, can be influenced body alignment, posture, gait motion, and position on the body. The current study considered the characteristics of the SW-200 and individual figures, and developed strategies in the study design to 1) find a pedometer position that reflected the most accurate count for each individual, and 2) instruct the user to place the pedometer in the same position for each use. The results indicate that such precautions make pedometer use more reliable for measuring steps of older adults.

For the participants in the present study, mean step length[8,18,26] was shorter, and gait speed was slower[12,13] than those in previous studies with the similar age groups that fell into a category of fragile and high risk of falls. As the current study participants were living independently and had good health conditions, further study is needed to more accurately determine gate speed and step length of older adults living independently.

The internal consistency of 7-day pedometer counts was .96 (Cronbach α coefficient), which is excellent, and the range of daily pedometer counts ranged from .77 to .90. The study findings also showed that 5 days or more of pedometer data are enough to obtain valid information (Cronbach α coefficients > .80), which is consistent with results of previous studies.[9,15]

In the current study, validity of pedometer counts was tested by comparison with a total PA score of HPAQ and subscales of HPAQ - walking MET and distance, household activity, and leisure PA MET. Pedometer counts showed strong

correlations with HPAQ scores - total PA, leisure PA including sports, and walking distance - but not with household activity or walking MET. The values of correlation coefficients between pedometer and total PA were similar to[22] or stronger[8,9,27] than those found in previous studies comparing pedometer counts with various self-report PA. Thus, the current findings support the validity of both the HPAQ as a self-report of PA, and of pedometer counts.

Results of the present study showed that the HPAQ subscores - leisure PA and walking distance - were significantly and moderately associated with pedometer counts, further supporting the validity of pedometer use. This result makes sense, as leisure PA, such as sports, gardening, treadmills, walking, and aerobics, involve a lot of leg movement. On the other hand, household activity was not related to daily pedometer counts; household activities, such as washing dishes and clothes, cleaning the kitchen and bathroom, and preparing meals, entail less leg movement. Walking MET was also not related to pedometer count, probably because it measures frequency of and time spent per walking session, and many older adults are slow walkers.

The average walking steps per day observed in the current study was close to the results of meta-analysis for adults >65 years,[28] which further confirms pedometers as a valid tool. In the current study, the mean daily step count was higher for participants who were <70 years old, women, healthy, or had low BMI than participants in opposing categories, even though the differences were not statistically significant, probably due to the small sample size. This result is similar to that of previous studies comparing differences with age, gender, BMI, and health status.[8,9,18,29]

Results of the present study suggest that pedometers can provide a reliable and valid measure of PA for older adults under free-living conditions. Pedometers are easy to use, efficient, and affordable, but proper positioning is a key to successful use. Using a pedometer may actually increase motivation to engage in physical activity and, therefore, help maintain the health of older individuals.

Validity of the results of the present study was limited by the small sample size. Differences in pedometer counts by age, gender, race, BMI, blood pressure, and medical problems were not statistically significant, even though they were fairly large and consistent with differences reported in the literature. Further studies with a larger sample are needed to clarify the reliability and validity issues of pedometer use. Another limitation of the present study was due to the methods, specifically to the need for participants to read and write a pedometer count in the PA log each day. Some participants had difficulty reading and writing the numbers on the PA log for various reasons, such as limited dexterity, decreased vision, and low education. A PA log needs to be developed for easy recording.

References

1. Ham, S.A., Yore, M.M., Kruger, J, Heath, G.W., Moeti, R. (2007). Physical activity patterns among Latinos in the United States: putting the pieces together. *Preventive Chronic Disease, 4*(4), A92.
2. Lee, Y. S. (2005). Gender differences in physical activity and walking among older adults. *Journal of Women Aging*, 17(1-2), 55-70.
3. Centers for Disease Control and Prevention (2000, June). Compliance with physical activity recommendations by walking for exercise – Michigan, 1996 and 1998. MMWR, 49(25), 560-565.
4. Bravata, D.M., Smith-Spangler, C., Sundaram, V., Gienger, A.L., Lin, N., Lewis, R., et al. (2007). Using pedometers to increase physical activity and improve health: a systematic review. *Journal of the American Medical Association*, 298(19), 2296-304.
5. Dasgupta, K., Chan, C., Da Costa, D., Pilote, L., De Civita, M., Ross, N., et al. (2007). Walking behaviour and glycemic control in type 2 diabetes: seasonal and gender differences--study design and methods. *Cardiovascular Diabetology*, 6, 1.
6. Nelson, M.E., Rejeski, W.J., Blair, S.N., Duncan, P.W., Judge, J.O., King, A.C., Macera, C.A., Castaneda-Sceppa, C. (2007). Physical activity and public health in older adults: recommendation from the American College of Sports Medicine and the American Heart Association. *Medicine & Science in Sports & Exercise*, *39*(8), 1435-45.
7. Croteau, K.A., Richeson, N.E., Farmer, B.C., & Jones, D.B. (2007). Effect of a pedometer-based intervention on daily step counts of community-dwelling older adults*. Research Quarterly for Exercise & Sport,* 78(5), 401-406.
8. Ewald, B., McEvoy, M., & Attia, J. (2008). Step counts superior to physical activity scale for identifying health markers in older adults. *British Journal of Sports Medicine*.
9. Strycker, L.A., Duncan, S.C., Chaumeton, N.R., Duncan, T.E., & Toobert, D.J. (2007). Reliability of pedometer data in samples of youth and older women. *International Journal of Behavioral Nutritionand Physical Activity*, 4, 4.
10. Sugden, J.A., Sniehotta, F.F., Donnan, P.T., Boyle, P., Johnston, D.W., & McMurdo, ME. (2008). The feasibility of using pedometers and brief advice to increase activity in sedentary older women--a pilot study. *BMC Health Services Research*, 8, 169.
11. Talbot, L.A., Gaines, J.M., Huynh, T.N., & Metter, E.J. (2003). A home-based pedometer-driven walking program to increase physical activity in older adults with osteoarthritis of the knee: a preliminary study*. Journal of the American Geriatrics Society*, 51(3), 387-392
12. Cyarto, E.V., Myers, A.M., & Tudor-Locke, C. (2004). Pedometer accuracy in nursing home and community-dwelling older adults. *Medicine & Science in Sports & Exercise*, 36(2), 205-209.
13. Melanson, E.L., Knoll, J.R., Bell, M.L., Donahoo, W.T., Hill, J.O., Nysse, L.J., et al. (2004). Commercially available pedometers: considerations for accurate step counting. *Preventive Medicine*, 39(2), 361-368.

14. Storti, K.L., Pettee, K.K., Brach, J.S., Talkowski, J.B., Richardson, C.R., & Kriska, A.M. (2008). Gait speed and step-count monitor accuracy in community-dwelling older adults. *Medicine & Science in Sports & Exercise*, 40(1), 59-64.
15. Tudor-Locke, C., Burkett, L., Reis, J.P., Ainsworth, B.E., Macera, C.A., & Wilson, D.K. (2005). How many days of pedometer monitoring predict weekly physical activity in adults? *Preventive Medicine*, 40(3), 293-8.
16. Stel, V.S., Smit, J.H., Pluijm, S.M., Visser, M., Deeg, D.J., & Lips, P. (2004). Comparison of the LASA Physical Activity Questionnaire with a 7-day diary and pedometer. *Journal of Clinical Epidemiology, 57*(3), 252-8.
17. Bassett, D.R. Jr., Cureton, A.L., & Ainsworth, B.E. (2000). Measurement of daily walking distance-questionnaire versus pedometer. *Medicine and Science in Sports and Exercise, 32* (5), 1018-1023.
18. Yamakawa, K, Tsai, C.K., Haig, A.J., Miner, J.A., & Harris, M.J. (2004). Relationship between ambulation and obesity in older persons with and without low back pain. *International Journal of Obesity*, 28(1), 137-143.
19. Cox, C. L. (1982). An interaction model of client health behavior: theoretical prescription for nursing. *Advances in Nursing Science, 5,* 41-56.
20. Lee, Y-S, & Laffrey, S.C. (2006). Physical activity in older adults: Testing a model. *Nursing Research*, 55(2) 110-120.
21. Le Masurier, G.C., Lee, S.M., & Tudor-Locke, C. (2004). Motion sensor accuracy under controlled and free-living conditions. *Medicine & Science in Sports & Exercise*, 36(5), 905-910.
22. Voorrips, L.E., Ravelli, A.C., Dongelmans, PC, Deurenberg, P, & Van, Staveren WA. (1991). A physical activity questionnaire for the elderly. *Medicine & Science in Sports & Exercise*, 23(8), 974-979.
23. National High Blood Pressure Education Program. (2003). *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure* (NIH Publication No. 03-5233). U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, & Blood Institute, Bethesda, MD.
24. Blessed, G., Tomlinson, B. E., & Roth, M. (1963). The association between quantitative measures of dementia and of senile change in the cerebral grey matter of elderly subjects. *British Journal of Psychiatry, 114,* 797-811.
25. Katzman, R., Brown, T., Fuld, P., Peck, A., Schechter, R., & Schimmel, H. (1983). Validation of a short Orientation-Memory-Concentration Test of cognitive impairment. *American Journal of Psychiatry, 140*(6), 734-739.
26. Lockhart, T.E., Woldstad, J.C., & Smith, J.L. (2003). Effects of age-related gait changes on the biomechanics of slips and falls. *Ergonomics*, 46(12), 1136-1160.
27. Ono, R., Hirata, S., Yamada, M., Nishiyama, T., Kurosaka, M., & Tamura, Y. (2007). Reliability and validity of the Baecke physical activity

questionnaire in adult women with hip disorders. *BMC Musculoskeletal Disorders,* 8, 61.

28. Bohannon, R.W. (2007). Number of pedometer-assessed steps taken per day by adults: a descriptive meta-analysis. *Physical Therapy, 87*(12), 1642-1650.

29. Ashe, M.C., Eng, J.J., Miller, W.C., & Soon, J.A. (2007). Disparity between physical capacity and participation in seniors with chronic disease. *Medicine & Science in Sports & Exercise*, 39(7), 1139-1146.

Table 1. *Comparison of Step Counts Measured by Pedometer and Observation Over a 10m Distance (N = 32)*

Variable	*Mean*	*SD*	Minimum	Maximum	*t*	*p*
Pedometer count	19.281	3.89	12	28	1.738	.092
Manual count	18.406	3.22	12	26		
Step length (cm)	56.03	10.27	38.46	83.33		
Speed (m/s)	0.88	0.21	0.43	1.25		

Table 2. *Reliability Coefficients for Daily Pedometer Counts (N = 30)*

Variable	Hours		Steps		Reliability coefficients (Cronbach's α)
	Mean	*SD*	*Mean*	*SD*	
Daily mean	12.45	2.26	6103.1	4086.0	0.95
1 Day	9.38	3.20	4362.8	4605.5	
2 Day	13.03	2.50	6642.3	4447.9	0.84
3 Day	12.98	2.45	6375.0	3767.0	0.77
4 Day	13.10	2.36	6086.5	4142.0	0.77
5 Day	13.09	2.64	6772.8	5698.3	0.89
6 Day	12.89	2.56	6300.5	5239.0	0.90
7 Day	12.66	3.18	6181.8	4637.8	0.89

Table 3. *Correlation Coefficients for Pedometer Counts vs. PA Self-report (N = 30)*

Variables		r	p
7-day step average with:			
PA subscores	Walking activity (MET)	0.14	0.47
by HPAQ	Walking distance	0.49	<0.01
	Household activities	0.02	0.91
	Leisure activities (MET)	0.66	<0.01
PA total		0.64	<0.01

r: Pearson correlation coefficient; MET = metabolic equivalent task

Table 4. *Comparison of Pedometer Step Count for Participants with Personal Characteristics*

Personal characteristic		n	Mean	SD	t	p
Age	< 70	14	6800.1	4928.2	1.05	0.302
	≥ 70	18	5300.2	3120.0		
Gender	Male	15	5582.9	3305.7	-0.49	0.629
	Female	17	6285.9	4623.3		
Race	Caucasian	27	6200.7	4284.4	0.80	0.432
	Other	5	4637.1	1685.7		
BMI	< 25	18	6289.6	5092.1	0.58	0.569
	≥ 25	14	5528.0	2029.9		
Blood pressure (mmHg)	< 140/90	24	6284.0	4549.9	1.26	0.218
	≥ 140/90	8	4973.6	1335.9		
No. of medical problem	0	8	6959.8	6220.0	0.59	0.574
	≥ 1	24	5621.9	3074.2		