Pedometer-Measured Physical Activity and Health Behaviors in U.S. Adults

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ABSTRACT

BASSETT, D. R. JR., H. R. WYATT, H. THOMPSON, J. C. PETERS, and J. O. HILL. Pedometer-Measured Physical Activity and Health Behaviors in U.S. Adults. *Med. Sci. Sports Exerc.*, Vol. 42, No. 10, pp. 1819–1825, 2010. U.S. adults may have lower levels of ambulatory physical activity compared with adults living in other countries. **Purpose**: The purpose of this study was to provide descriptive, epidemiological data on the average number of steps per day estimated to be taken by U.S. adults and to identify predictors of pedometer-measured physical activity on the basis of demographic characteristics and self-reported behavioral characteristics. **Methods**: The America On the Move study was conducted in 2003. Individuals ($N = 2522$) aged 13 yr and older consented to fill out a survey, including 1921 adults aged 18 yr and older. Valid pedometer data were collected on 1136 adults with Accusplit AE120 pedometers. Data were weighted to reflect the general U.S. population according to several variables (age, gender, race/ethnicity, education, income, level of physical activity, and number of 5- to 17-yr-old children in the household). Differences in steps per day between subgroups were analyzed using unpaired *t*-tests when only two subgroups were involved or one-way ANOVA if multiple subgroups were involved. **Results**: Adults reported taking an average of 5117 steps per day. Male gender, younger age, higher education level, single marital status, and lower body mass index were all positively associated with steps per day. Steps per day were positively related to other self-reported measures of physical activity and negatively related to self-reported measures on physical inactivity. Living environment (urban, sub-urban, or rural) and eating habits were not associated with steps per day. **Conclusions**: In the current study, men and women living in the United States took fewer steps per day than those living in Switzerland, Australia, and Japan. We conclude that low levels of ambulatory physical activity are contributing to the high prevalence of adult obesity in the United States. **Key Words:** OBESITY, OVERWEIGHT, AMERICANS, WALKING, STEPS

Obesity is a major health concern in the United States, with 34% of American adults now classified as obese (body mass index (BMI) ≥ 30 kg·m^{-2}), as determined from measured height and weight (20). U.S. obesity rates have increased over the past 40 yr and are generally higher than that in other developed nations (21). Low levels of physical activity may be contributing to the obesity epidemic. Factors such as a built environment that restricts opportunities for walking and bicycling (10,11), heavy reliance on personal automobiles (23), declining occupational activity (6), and increased time allocated to sedentary leisure-time pursuits (24) are contributing to physical inactivity.

Electronic pedometers provide an accurate, objective, and low-cost method of measuring walking and other ambulatory activities (3). Pedometers do not rely on self-recall of physical activity or subjective assessment of exercise intensity in contrast to physical activity questionnaires. In addition, pedometers have been widely used to assess physical activity in longitudinal training studies, and they are increasingly being used in epidemiological studies of different populations, including Swiss adults (26), Japanese adults (15,33), Western Australian adults (18), and Canadian children (7). Another advantage of pedometers is that they allow results from research studies to be readily translated.

America On the Move is a national weight gain prevention program launched in 2003 that grew out of Colorado on the Move, which began in 2002. This initiative is based on data suggesting that small, simple changes to eating habits and activity choices can have a major impact in controlling body weight if sustained over time (13). The small changes advocated by Wyatt et al. (32) are (a) walking 2000 steps

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per day (about 1 mile·d^{-1}) more than usual and (b) choosing one behavior each day that removes approximately 100 kcal from the diet.

The primary purpose of this study was to provide descriptive data for ambulatory physical activity in a sample of U.S. adults. The study was an extension of a Colorado statewide survey of walking and its relation to excess weight, conducted in 2002 (32). The secondary purpose was to identify predictors of pedometer-measured physical activity on the basis of demographic characteristics and self-reported health behaviors.

METHODS

Harris Interactive, Inc., conducted the America On the Move study for the Partnership to Promote Healthy Eating and Active Living. The study examined the views and experiences of U.S. residents aged 13 yr and older concerning physical activity and health followed by a 2-d baseline assessment of physical activity using the pedometer. Only the adult data are reported in the current report.

Participants. A group of individuals aged 13 yr and older gave their consent to be interviewed and to wear a pedometer for 2 d. The participants were members of the Harris Interactive's online panel, which contains millions of members. The panel consists of potential respondents who have been recruited through online, telephone, mail, and in-person approaches to increase population coverage and to enhance representativeness. All panel members agreed to be invited to participate in online surveys through an opt-in procedure. The online interviews were about 10 min in length and were conducted between May 22 and May 29, 2003. A total of 2522 respondents agreed to be interviewed and to wear a pedometer. Of the respondents, 1921 were adults, and 1348 of them completed the step task and reported their step data in a brief follow-up survey conducted between June 2 and June 14, 2003. After cleaning the data, 1136 participants remained. All surveys were conducted in a manner consistent with the code and standards of the Council of American Survey Research Organizations and the code of the National Council of Public Polls. Approval to conduct secondary data analysis was granted by the University of Tennessee's institutional review board.

Online interview. After participants gave their consent, Harris Interactive, Inc., administered a brief online interview. A random sample of the online panel (stratified by age, sex, and location) was invited to participate in the study, through password-protected e-mails. Each respondent was required to enter a password before accessing the survey to ensure that a respondent only completed the survey one time. Respondents provided information on physical, behavioral, and attitudinal characteristics regarding physical activity, nutrition, and health.

To increase the number of respondents in the survey, one reminder invitation was mailed 2 d after the initial invitation to individuals who had not yet filled out the survey. Another measure used to increase the number of respondents was to award points that could be redeemed for merchandise or gift certificates. Respondents were also entered in monthly drawings.

Step measurement. After the initial interview, electronic pedometers (Accusplit AE120, Livermore, CA) were sent out to participants by 2-d priority mail. This pedometer model has the same internal mechanism as the Yamax SW series pedometer (25). A horizontal, spring-suspended lever arm moves up and down with each step, opening and closing an electric circuit that counts steps. Participants also received instructions describing proper pedometer placement (on the belt or waistband), and they were told to wear the pedometer from the time they woke up until they went to bed. They were instructed to wear the pedometer for 2 d, beginning the morning after receiving it in the mail, and to record the time they put it on, the time they took it off, and the number of steps on a diary form. A few days after their step counters were mailed to them, participants received a follow-up e-mail. This allowed them to submit their data to Harris Interactive by transcribing the results from the form onto the short online survey. At the end of the survey, respondents were allowed to keep their pedometers.

Table 1 shows descriptive characteristics for participants completing the online interview only as well as those who completed the online interview and returned step-count data. The subgroup that agreed to wear the step counter was leaner and contained a higher percentage of men (and a lower percentage of women) compared with those who refused the step counter.

Data analysis. The step data were cleaned and edited by the data processing staff. Further data cleaning involved eliminating outliers and unreasonable values. Specifically, individuals reporting fewer than 100 steps per day or greater than or equal to 50,000 steps per day were considered to

TABLE 1. Descriptive characteristics of participants aged 18 yr and older.

	Interview Only (n = 573)	Interview + Pedometer (n = 1348)	P*
Age (yr)	45.9	45.7	0.794
Gender			
% Male	42.4	47.7	0.033
% Female	57.6	52.3	
Height (cm)	170.2	170.9	0.269
Body mass (kg)	87.0	85.0	0.083
Body mass index (kg·m^{-2})	29.9	29.2	0.048
Race (%)			
White	87.3	88.1	0.803
Black	2.3	1.6	
Hispanic	2.3	2.1	
Other	8.2	8.2	
Hours of sitting per day	7.88	7.67	0.260
Hours of TV/videogames per day	3.67	3.87	0.163
Days of strenuous exercise per week	2.63	2.84	0.004
Hours of bicycling, swimming, and weight lifting per week	1.55	1.84	0.110

* P values represent differences between participants who only completed the interview and those who completed both parts of the study.

have data that were outliers. In addition, if the time that elapsed between the starting time and the ending time deviated markedly from what would normally be expected, the data were not used. (Specifically, the difference between the starting time and the ending time was required to be between 32 and 51 h for the 2-d measurement period.) After cleaning the pedometer and survey data, there were valid data on 1136 adults.

Data were weighted to reflect the general U.S. population according to the following demographic variables: age, gender, race/ethnicity, education, income, level of physical activity, and number of 5- to 17-yr-old children in the household. These variables were weighted to known parameters for the United States using the 2000 census bureau data.

All data were analyzed by the Statistical Package for the Social Sciences for Windows (version 15.0; SPSS Inc., Chicago, IL). Comparisons of the gender and race percentages in the group completing only the online interview and the group that completed the interview and wore the pedometer were compared using a chi-square test. Comparisons of steps per day between different subgroups were analyzed by *t*-tests when only two subgroups were involved or one-way ANOVA if multiple subgroups were involved. All analyses took into account the probability weights referred to earlier. The significance level was set at 0.05 for all comparisons.

RESULTS

The mean level of ambulatory activity was 5117 steps per day. Figure 1 illustrates the mean steps per day for men and women of different ages. We found that men take more steps than women ($P = 0.034$) and that there is an age-related decline in steps per day ($P < 0.001$), especially beyond 50 yr of age.

Table 2 shows the mean steps per day for various demographic subgroups. There was a marginal association of steps per day and education ($P = 0.059$), and single people accumulated significantly more steps than married and widowed people ($P < 0.001$). Residents of the mountain west region had higher values (6298 steps per day) than those living in the breadbasket ($P = 0.028$) and mid-Atlantic regions ($P = 0.04$) and marginally higher values than those living in the Pacific west ($P = 0.067$) and upper midwest regions ($P = 0.088$). There was a significant difference in steps per day among obese, overweight, and normal weight individuals ($P < 0.001$).

Table 3 shows how the mean steps per day varied with self-reported assessments of physical activity/inactivity, living environment, and dietary habits. Daily step counts varied according to the number of days exercised per week ($P < 0.001$), the self-rating of physical activity level ($P < 0.001$), and the number of hours of sitting per day ($P < 0.001$).

Persons who intended to become more active had lower step counts than those who intended to become less active or

TABLE 2. Steps per day on the basis of participant characteristics ($N = 1136$).

	Steps per Day			
Variables	***n***	**Mean**	**SE**	***P****
What is your sex?				
Male	526	5340	153	0.034
Female	610	4912	132	
What is your age?				
18–29 yr	220	5843	287	<0.001
30–39 yr	193	5127	204	
40–49 yr	233	5915	206	
50–59 yr	229	4742	256	
60+ yr	261	4027	169	
What is your education level?				
Less than high school	23	3920	582	0.059
High school graduate	180	4947	160	
Some college	480	5274	169	
College graduate	210	5241	297	
Some postgraduate studies	243	5385	274	
What is your marital status?				
Single	239	6076	225	<0.001
Married/partnered	735	4793	122	
Divorced	130	5463	313	
Widowed	32	3394	326	
What is your race?				
White	1012	5086	108	0.103
Hispanic	22	5617	582	
Black	12	3974	405	
Other	90	5651	386	
Region				
New England	47	5715	537	0.031
Mid-Atlantic	211	4908	248	
Southeast	259	5214	213	
Southcentral	118	5033	276	
Upper midwest	186	5020	246	
Breadbasket	78	4462	315	
Mountain west	84	6298	474	
Pacific west	153	4933	224	
BMI (calculated from self-reported height and weight)				
Nonoverweight/obese	329	5864	193	<0.001
Overweight	378	5200	166	
Obese	407	4330	163	

* *P* values represent tests among ordered categories (age, education level, and BMI); *P* values between all race categories were not significant; *P* values for marital status were significant for all categories except between single and divorced, between married/partnered and widowed, and between married/partnered and divorced; *P* values for region were different between mountain west and breadbasket. Data are weighted to reflect the general U.S. population.

Regions—New England: CT, ME, MA, NH, RI, VT; mid-Atlantic: MD, NJ, NY, PA, DC, WV, DE; southeast: AL, FL, GA, KY, MS, NC, SC, TN, VA; southcentral: AR, LA, OK, TX; upper midwest: IL, IN, MI, OH, WI; breadbasket: IA, KS, MN, MO, NE, ND, SD; mountain west: AZ, CO, ID, MT, NE, NM, UT, WY; Pacific west: CA, OR, WA, AK, HI.

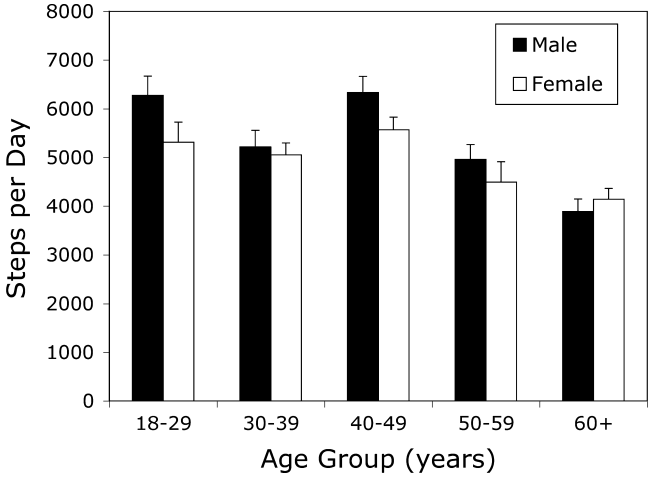

FIGURE 1—Pedometer-determined physical activity (steps per day) for men and women by age categories.

TABLE 3. Steps per day and self-reported assessments of activity/inactivity, living environment, and dietary habits (N = 1136).

Variables	Steps per Day			
	N	Mean	SE	*P**
During a typical week, how often do you exercise strenuously?				
Never	304	3683	142	<0.001
1 d·wk^{-1}	233	4479	218	
2 d·wk^{-1}	177	5376	308	
3 d·wk^{-1}	227	5486	231	
4–5 d·wk^{-1}	156	6200	220	
6–7 d·wk^{-1}	39	7891	540	
How physically active are you?				
Very active	78	6805	316	<0.001
Somewhat active	315	5306	132	
Somewhat inactive	611	4140	167	
Very inactive	132	3093	281	
Hours of sitting per day				
1–5	380	5858	167	<0.001
6–8	363	4891	176	
9+	393	4496	172	
Thinking about your current level of physical activity, would you like to…				
Become more active	949	4939	109	0.002
Become less active	5	5891	642	
Stay at same level	182	5811	263	
Are you currently trying to…				
Lose weight	849	4975	115	<0.001
Maintain current weight	260	5196	189	
Gain weight	27	7722	975	
Do you currently wear a "step counter" or pedometer?				
No	1100	5072	101	0.013
Yes	36	6497	679	
Which of the following describes the type of area where you live now?				
Urban or city area	308	5368	179	0.251
Suburban area next to a city	428	4972	180	
Small town or rural area	400	5048	163	
Do you try to eat food that are low in fat or calories?				
Do not try at all	121	5378	308	0.633
Try a little	552	5084	146	
Try a lot	463	5080	159	
Do you try to eat fruits and vegetables each day?				
Do not try at all	48	4681	377	0.592
Try a little	429	5172	182	
Try a lot	659	5113	124	

Data are weighted to reflect the general U.S. population.
* P values represent tests among ordered categories.

who intended to remain the same (P = 0.002). Those who were trying to lose weight and those who wanted their weight to remain the same had lower step counts than those who were trying to gain weight (P < 0.001). Those who were already wearing a step counter before being contacted had higher step counts than those who were not wearing one (P = 0.013). Finally, living environment (rural/urban), trying to eat a low-fat/low-calorie diet, and trying to eat five fruits and vegetables each day were not related to steps per day.

DISCUSSION

This study measured pedometer-assessed physical activity and health behaviors in a descriptive, epidemiological study of U.S. adults. We found that adults averaged 5117 steps per day. In general, men took more steps than women (5340 vs 4912 steps per day), and walking declined with age. It is interesting that these step counts are only about one-third of the values measured for men and women living in an Old Order Amish farming community in Ontario, Canada (2). Assuming that the labor-intensive farming lifestyle of the Amish reflects that of most North Americans in the mid-1800s, this suggests a marked decline in ambulatory activity over the last century and a half.

Other countries have started to conduct studies of step counting in their residents over time. Japan, for instance, has accumulated data indicating that steps per day in Japanese residents remained constant from 1995 to 2003 (S. Inoue, Tokyo Medical University, personal communication, June 5, 2008). The Canadian government has already used pedometers in a nationwide sample of children and adolescents (7), and they are planning to continue this in the future.

Recently, Tudor-Locke et al. (29) reported on accelerometer-measured step counts in U.S. adults. They analyzed data on 3744 individuals aged 20 yr or older who took part in the 2005–2006 National Health and Nutrition Examination Survey. The participants were instructed to wear an ActiGraph accelerometer with a step-count function for 7 d and had at least 1 d of data where they wore it for at least 10 h. U.S. adults took an average of 9676 ± 107 steps per day, which the authors deemed too high to be reasonable. Thus, they adjusted the step data to make the results more congruent with pedometer data from previous studies of adults living in Colorado and South Carolina. They used a procedure that involved censoring (i.e., eliminating) any steps accumulated during minutes where the accelerometer activity counts were less than 500 counts per minute. This had the effect of lowering the mean ± SE step counts to 6540 ± 106 steps per day. Although this value is higher than what we measured in the current study, both would fall into the "low-active" category (i.e., 5000–7500 steps per day) using the step index of Tudor-Locke and Bassett (31).

U.S. adults are inactive. This sample of adults was less active than those from other countries. Sequeira et al. (26) published a descriptive epidemiological study reporting in a representative population sample of 493 Swiss adults (25–74 yr of age). The pedometer study was conducted in conjunction with the World Health Organization Monitoring Trends and Determinants Cardiovascular Disease (MONICA) project in April to June 1989. Ped-o-boy pedometers (Barrigo GmbH, Schwenningen, Germany) were used and were individually calibrated to improve accuracy. The mean step counts recorded over 7 d were 10,400 steps per day in men and 8900 steps per day in women. An age-related decline in steps per day was observed, with the oldest group taking fewer steps per day than the younger groups.

McCormack et al. (18) studied physical activity levels of adults in Western Australia in November to December 2002. The study participants were a subsample of 3200 survey respondents taking part in a physical activity survey conducted under the auspices of the Premier's Physical Activity Task Force of Western Australia. After completing a telephone interview, 603 of 1326 individuals who were asked to wear a Yamax SW-700 pedometer for 7 d agreed to take part in a pedometer study (45% response rate). On average, adults in Western Australia took 9695 steps per day, with men taking more steps per day (10,221) than women (9178). An age-related decline in steps per day was observed.

Inoue et al. (15) reported the results of the Japanese National Health and Nutrition Survey (J-HANES), conducted in 2003. J-HANES is an annual survey conducted by the Ministry of Health, Labor, and Welfare since 1945, and the Yamax digi-walker pedometer has been used to monitor the number of steps since 1992 (33). In November 2003, J-HANES examined 1-d step counts in a nationally representative study of 8867 individuals. The mean ± SD steps per day taken by Japanese residents aged 15 yr and older was 7168 ± 4248 steps per day, with Japanese men taking 7575 ± 4580 steps per day and Japanese women taking 6821 ± 3909 step per day. As in other countries, there was an age-related decline in steps per day.

It is important to compare the methods used in pedometer studies conducted in different nations. Most studies used random sampling techniques, which involved selection of a random sample of telephone numbers for the initial contact. Beyond that, variation existed in how members of a household were selected. In Western Australia, for example, they interviewed the person in the house who had the most recent birthday and was at least 18 yr of age. In Japan, 5000 households were sampled, including 15,000 participants (thus, multiple individuals in some Japanese households were sampled). In the present study, the participants were members of an online panel who agreed to participate in a survey. Thus, it is possible that there was some selection bias in our study, but we attempted to control for this by weighting the data to reflect the entire U.S. population according to key demographic variables.

In all of the pedometer studies, participants were given a pedometer, an instruction sheet, and a step diary to record their data. They were given instructions on proper placement of the pedometer and told to wear the pedometer during all waking hours. In Australia and in the present study, pedometers and accompanying materials were sent out through the mail, whereas in the Swiss and Japanese studies, a physical examination was conducted, and the pedometer was handed out in person. The present study used a 2-d sampling period, whereas Australia and Switzerland used a 7-d sampling period and Japan used a 1-d sampling period. In cases where the primary intent is to measure steps per day of the population rather than of the individuals, we believe that 1–2 d is adequate. The time of year when data were collected also varied. In Australia, data were collected during November and December, whereas in Japan they were collected in November, and in Switzerland they were collected during May and June. The present study also collected pedometer data in May and June. Despite some inconsistencies, it is still possible to obtain a rough estimate of the walking behaviors in different countries by using data from pedometer surveys.

In the present study, the people we examined took fewer steps per day than those in other developed nations with similar, high levels of income and standards of living. This may partially explain why the prevalence of obesity in the United States is higher than that in other countries. On the basis of self-reported height and weight, the prevalence of obesity in U.S. adults was 23.9% in 2002 (1). By comparison, Australia had an obesity rate of 16% in 2001 (5), Switzerland had an obesity rate of 8% in 2002 (9), and Japan had an obesity rate of 3% in 2000 (33). (In all of these studies, obesity was defined as a body mass index (BMI) $\geq$ 30 $kg \cdot m^{-2}$, and BMI was computed from self-reported height and weight.) Both Switzerland and Japan have much higher rates of transportation-related walking compared with the United States (1), which contributes to the difference in daily step counts. In Australia, car use is almost as prevalent as in the United States (1), which might suggest that many of their steps are coming from leisure time, household, or occupational activity.

Obese individuals are particularly inactive. We found that pedometer-measured physical activity is lower in obese individuals. In this study, obese individuals accumulated about 1500 fewer steps per day than those who were neither overweight nor obese. This is consistent with previous studies reporting an inverse relation between steps per day and adiposity (12,14,27,30). Regardless of whether a low level of physical activity is a cause or a result of obesity, this is a real concern. Low levels of physical activity can contribute to the continuation of obesity, and decreased levels of physical activity are known to be associated with increased risk of obesity, hypertension, diabetes, heart disease, some cancers, and other chronic illnesses (22).

Walking to prevent weight gain in U.S. adults. Given the observed differences in physical activity between those who are obese and those who are at a healthy weight, promoting walking may be a reasonable strategy to prevent weight gain in the population. The median weight gain in U.S. adults is 1.8 lb (or 0.8 kg) per year (13), and this type of ''creeping weight gain'' is a serious problem. The accelerating rate of obesity will present a major challenge to the health care industry in the decades to come. Thus, immediate steps are needed to slow the rate of weight gain and ultimately to reverse it.

America On the Move advocates a simple approach for prevention of weight gain in individuals (32). The increase in physical activity advocated by America On the Move is 2000 steps per day or roughly 1 mile of walking. This could be easily achieved in about 20 $min \cdot d^{-1}$, and it would bring most Americans much closer to the average daily step counts seen in other developed nations (e.g., Switzerland, Australia, and Japan), although to close the gap entirely would require Americans to walk about 30–40 $min \cdot d^{-1}$. Another recommendation of America On the Move is to decrease caloric intake by 100 $kcal \cdot d^{-1}$. This two-pronged approach is consistent with the International Obesity Task Force's (16) view that the current obesity epidemic is due to physical inactivity and an abundance of inexpensive, calorie-dense food and beverages that promote weight gain.

To achieve 30 or more pounds of weight loss (≥13.6 kg) and to sustain it for at least 1 yr is likely to require considerably more effort than the initial, simple steps recommended by America On the Move to prevent weight gain, as

indicated by data from the National Weight Control Registry. Klem et al. (17) examined 784 individuals who met these criteria and found that they expended 400 kcal·d^{-1} through physical activity (equivalent to 60+ min of moderate-intensity physical activity) while consuming a low-fat, calorie-restricted diet. The National Weight Control Registry researchers studied a small subset of individuals enrolled in the registry, and they were found to be taking 10,900 steps per day (H. Wyatt, unpublished data).

Are pedometers useful in promoting physical activity? The present study provides supporting evidence that pedometers are helpful in promoting increased physical activity. Individuals who were already using a pedometer before enrolling in the current study were found to accumulate more steps than those who were not (6497 vs 5072 steps per day). This suggests that pedometers might motivate individuals to increase their physical activity, and it is consistent with longitudinal studies showing that pedometers are effective for increasing physical activity in previously sedentary adults. A recent review concluded that pedometer-based walking programs increased participants' activity levels by an average of 2183 steps per day (4). Programs that included a daily step goal and required participants to maintain a step diary were successful in increasing activity levels, whereas those that lacked these components were not (4).

Strengths and limitations. Pedometer studies are inexpensive, they require little data reduction, and the methodology is fairly uniform between studies. Thus, they can be used for epidemiological studies involving surveillance, tracking secular trends in physical activity, and comparing populations around the world. However, accelerometer-based activity monitors have certain advantages over pedometers in terms of being able to assess ''wear time'' and to detect minutes spent in light, moderate, and vigorous exercise. Furthermore, studies have shown that accelerometer-based devices are less impacted by adiposity than spring-levered pedometers (8,19). For example, Crouter et al. (8) found that the Yamax SW series pedometer undercounted steps in overweight and obese individuals, whereas an accelerometer-based step counter (New Lifestyles NL-2000) was more accurate. Thus, the high prevalence of obesity in the United States could be contributing to an underestimation of steps per day because of the use of this type of spring-levered pedometer.

Pedometers do not measure all types of physical activity, and it is acknowledged that they do not capture swimming, cycling, and weight lifting (3). Nevertheless, because pedometers can measure walking, running, many incidental activities, and sporting activities that involve walking/running (e.g., most team sports, golf, tennis, aerobics, etc.), they are usually seen as a valid measure of ambulatory physical activity (18). A further limitation is that participation in the study was voluntary, and it is possible that people who agreed to participate in the online survey could have different levels of activity than the general U.S. population. In addition, self-reported step counts cannot be considered a gold standard for objectively measured physical activity because reporting bias can occur.

In the present study, the step counts for the Rocky Mountain region (6298 steps per day) were approximately 500 steps per day less than those from a previous study of Colorado residents (6804 steps per day) conducted by Harris Interactive, Inc. (32). The step counts for the southeast region (5214 steps per day) were about 700 steps per day less than those from a previous telephone-based survey conducted in Fort Sumter, SC (5931 steps per day) (28). In part, these differences might have resulted from the fact that participants were recruited from Harris Interactive's online panel, as opposed to randomly selected telephone numbers of people in those regions. However, the effect of this difference in methodology appears to be relatively small, and it does not alter the overall conclusions of the present study.

CONCLUSIONS

In summary, in the present study, we found that adults average a little over 5100 steps per day. Similar to studies conducted in other countries, men accumulate more steps per day than women, and there is an age-related decline in steps per day. However, the average daily step counts that we measured in men and women are lower than those seen in studies from Switzerland, Western Australia, and Japan. The results suggest that policies to promote physical activity and healthy eating along with better education about making healthy lifestyle choices are needed to counteract the obesity epidemic.

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