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Walking to meet physical activity guidelines in knee osteoarthritis: Is 10,000 steps enough?

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Abstract

Objective—To study if step goals (e.g. walking 10,000 steps/day) approximate meeting 2008 Physical Activity Guidelines for Americans among adults with or at high risk of knee OA.

Design—Cross-sectional observational cohort

Setting—Community

Participants—People with or at high risk of knee OA

Interventions—None

Main Outcome Measures—Objective physical activity data were collected over 7 consecutive days from people with or at high risk of knee (OA) participating in the Multicenter Osteoarthritis Study. Using activity monitor data, we determined the proportion that 1) walked 10,000 steps/day, 2) met the 2008 Physical Activity Guidelines, and 3) achieved both recommendations.

Results—Of 1788 subjects studied (age 67 ± 8 yrs, BMI 31 ± 6 kg/m², 60% women), 16.7% of men and 12.6% of women walked 10,000 steps/day, while 6% of men and 5% of women met the 2008 Physical Activity Guidelines for Americans. Of those walking 10,000 steps/day, 16.7% and 26.7% of men and women also met the 2008 Physical Activity Guidelines.

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Conclusions—Among this sample of older adults with or at high risk of knee OA, walking 10,000 steps/day did not translate into meeting public health guidelines. These findings highlight the disparity between number of steps/day believed to be needed and recommended time-intensity guidelines to achieve positive health benefits.

Keywords

Physical Activity; knee osteoarthritis; pedometer; Public Health Guidelines; Walking

More than one in ten adults over the age of 60 in the United States have knee osteoarthritis (OA), a painful form of arthritis and the most common cause of functional limitation in older adults.^{1, 2} Knee OA is an important public health problem in the United States given its increased prevalence with aging and links to disability and all-cause death.³⁻⁵ At present, there are no curative or disease-modifying agents for OA. Rather, the goals of treatment are to reduce pain and functional limitation through pharmacologic, non-pharmacologic, or surgical (e.g., joint replacement) means.

Walking is the most common form of exercise employed by older adults,⁶⁻⁸ and walking-based exercise programs improve pain and functional limitation in people with symptomatic knee OA.^{9, 10} A pedometer is a simple tool to objectively quantify walking (as steps/day) and when used in conjunction with a step goal, e.g., walking 10,000 steps/day, has been found to be effective in increasing physical activity and improving health outcomes such as body mass index (BMI) and blood pressure.¹¹ In the most recent guidelines for prescribing exercise, the American College of Sports Medicine (ACSM) recommends walking least 7,000 steps/day for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness.¹² Moreover, the popular press promote a goal of at least 10,000 steps/day in order to meet physical activity guidelines.^{13, 14}

On the one hand, the recommendation for attaining health benefits from physical activity specifies both a time and intensity of activity. In particular, the 2008 Physical Activity Guidelines for Americans from the Department of Health and Human Services (DHHS) recommends all adults attain at least 150 minutes/week of moderate intensity physical activity in at least 10 minute increments.¹⁵ The DHHS views this as a public health recommendation given that it incorporates the most up-to-date data on health benefits associated with physical activity.¹⁶ Furthermore, other national^{12, 17, 18} and international organizations¹⁹ have adopted similar guidelines. It is noteworthy that the DHHS specifies this same recommendation applies to older adults as well those with disabilities, hence the recommendation applies to people with knee OA.¹⁵ On the other hand, a goal of walking 10,000 steps/day specifies the overall amount of physical activity without any intensity requirement and has been found to more effectively promote physical activity than the DHHS recommendation.^{20, 21} Nevertheless, it is not known if steps/day goals can serve as a reasonable proxy to meet the DHHS time-intensity guidelines. For example, it is unclear if rehabilitation professionals can expect the DHHS time-intensity guidelines to be achieved by recommending a step count goal of 7,000 or 10,000 steps/day. This is important to understand since there is a clinical need to encourage physical activity in a manner tied to positive health outcomes for people with knee OA.²²

Thus, the purpose of this study was to determine if people who walk at least 7,000 or 10,000 steps/day also meet the DHHS time-intensity guidelines. We also estimated the number of steps/day which best discriminates meeting the time-intensity guidelines.

METHODS

The Multicenter Osteoarthritis (MOST) Study

The MOST Study is a large multicenter longitudinal cohort study of community-dwelling participants who have or are at high risk of knee OA.²³ The MOST study cohort at baseline included adults aged 50 to 79 years who were recruited from communities in and surrounding Birmingham, Alabama and Iowa City, Iowa. Study criteria, based on risk for knee OA, included the presence of known risk factors, such as being ≥ 50 years of age, female, reporting a previous knee injury or operation, and having a body weight in excess of the median weight for each age- and sex-specific group based on data from the Framingham OA Study.²⁴ The MOST study protocol was approved by the institutional review boards at the University of Iowa, University of Alabama at Birmingham, and the University of California San Francisco. All participants in the MOST study provided informed consent.

Analysis Subsample

This particular analysis focused on a subset of the MOST study cohort, restricted to the 1,788 individuals who provided objectively monitored physical activity data (see below for method of measurement) collected at the 60-month follow-up exam between May of 2009 and January of 2011. This was the first study visit in the MOST study in which objective physical activity data were collected.

Physical Activity Monitor

Steps/day and time and intensity variables used to assess achievement of the 2008 Physical Activity Guidelines for Americans were simultaneously assessed using a Physical activity monitor^a. We used a small (70 × 50 × 20 mm; 38 g), waterproof, self-contained device that attaches to the ankle and records the number of strides taken every minute while providing no feedback to the user. To calculate steps, strides are doubled. The physical activity monitor has high concurrent validity in comparison with several reference standard measures of step frequency in older adults, high convergent validity in comparison with SF-36 scores among participants with OA, and high test-retest reliability in adults.^{25, 26} Furthermore, the physical activity monitor accurately measures moderate walking speeds with a cadence greater than 100 steps/minute.²⁷

Each study participant was fitted with the physical activity monitor and given written and verbal instructions for attaching the monitor each morning and removing it at bedtime for 7 consecutive days (plus part of the day that the participant received the device and the day it was returned). To determine whether participants wore the monitor long enough to be counted as a full day, we adopted a published method for processing accelerometry data.²⁸ We defined 10 hours of monitoring as the minimum amount of time needed to identify a valid day. The 10-hour requirement represents more than 66% of waking hours and has been utilized as a threshold in studies of physical activity in the general adult population²⁹ and people with knee OA.²⁸ Time worn was determined from the first step recorded in the morning to the last step recorded in the evening. To exclude times participants may have taken the activity monitor off during the day, we omitted times where the monitor registered no steps for 180 consecutive minutes during the day, which is consistent with previous literature in knee OA populations.^{28, 30} Finally, we restricted our sample to those participants who had a minimum of 3 valid days of data since previous studies have found this to be the minimum number of days needed to establish a reliable estimate of physical activity.^{25, 31}

^aStepWatch activity monitor: Orthocare Innovations, 840 Research Parkway Suite 200 Oklahoma City, OK 73104

Steps/day

Steps/day benchmarks (e.g. walking 10,000 steps/day) are based on waist-mounted pedometers and are known to count fewer steps when compared to an ankle-mounted activity monitor.³² Since pedometers, which are less expensive and more readily accessible, are more likely to be used in clinical and public health applications, we converted steps/day from activity monitor data to what would be expected from a waist-mounted piezoelectric pedometer using methods in the literature.³² In particular, we reduced the number of steps from activity monitor data by 17.3%, 17.5%, and 23.9% for participants with a BMI < 25, 25 to 30, and ≥ 30, respectively.³² We also performed a secondary conversion reducing activity monitor steps from all subjects by 26%. These conversions were based upon a recent validation study that found BMI did not significantly affect the step counting accuracy of the activity monitor.³³ We calculated average steps/day by totaling the number of steps taken each valid day of monitoring divided by the number of valid days. We then identified participants who met the 7,000 and 10,000 steps/day cut-points from converted activity monitor data.

Time-intensity recommendations

We classified each participant according to their achievement (yes/no) of the time-intensity recommendations published in the 2008 Physical Activity Guidelines for Americans from the DHHS from activity monitor data.¹⁵ As stated above, these guidelines recommend that all adults perform at least 150 minutes/week of moderate intensity physical activity in bouts lasting at least 10 continuous minutes. We classified walking at ≥ 100 steps/minute (steps/min) as a threshold for moderate intensity physical activity,^{34–39}. This threshold is a minimal recommended intensity and is not intended to be a precise measure of moderate intensity, but rather a general physical activity promotion benchmark.³⁴ We defined a bout as walking ≥ 10 minutes at a moderate intensity allowing for interruptions of less than 100 step/min for 1 or 2 minutes, but not 3 minutes. The definition is consistent with the 2003–2004 National Health and Nutritional Examination Survey definition of meeting physical activity guidelines.²⁹ Participants accumulating at least 150 minutes/week at these recommended intensity and bout durations were classified as achieving the time-intensity recommendations. For instance, participants walking at a rate of 100 steps/minute would need a minimum of 3000 steps/day in bouts lasting at least continuous 10 minutes for five days in order to meet the 2008 Physical Activity Guidelines. Nevertheless, many steps realistically occur at intensities and durations that do not meet recommended values. We acknowledge that the 2008 Physical Activity Guidelines also specifies a separate recommendation for 75 minutes/week of vigorous physical activity. However, conservatively estimating that a vigorous intensity corresponds to 130 steps/min,³⁶ less than 1% of study participants walked at this intensity for at least one minute, and none walked at this intensity for a single bout of ≥ 10 continuous minutes. Hence, we did not define meeting guidelines by vigorous intensity physical activity. For participants with less than 7 days of Activity monitor data, we included those with at least 3 days of usable data and standardized the available data to 7 day (one week) estimates, as has been advocated in the literature.^{25, 31}

Participants Characteristics

The following participant characteristics were ascertained at the 60-month clinic visit by interview, questionnaire, and/or direct measurement as appropriate: age, sex, race (Non-White vs White), education (<some college vs. college), body mass index (BMI) computed from standardized weight and height assessments classified into World Health Organization categories⁴¹, radiographic OA (ROA) of either knee to be present based on radiographic findings in the tibiofemoral or patellofemoral joints⁴², knee pain measured as the average pain in the past 30 days on a Visual Analogue Scale (VAS) ranging from 0 to 100, self-reported comorbidities based on the modified Charlson comorbidity index⁴³ (≥ 1 vs none),

depressive symptoms (≥ 16 vs. < 16) measured with the Center for Epidemiologic Studies Depression Scale (CES-D)⁴⁴, and widespread pain (present vs. absent) defined by the American College of Rheumatology as pain above and below the waist, pain on the right and left sides of the body, and back pain based upon a standard homunculus.⁴⁵

Statistical Analysis

Given the recognized differences in physical activity patterns by sex, data for men and women were analyzed separately.²⁹ We computed means and standard deviations for continuous variables (e.g., steps/day) and computed proportions for categorical variables (e.g., proportions meeting the time-intensity guidelines). We calculated the sensitivity, specificity, and positive predictive value (PPV) of using the 7,000 and 10,000 steps/day cut-points to identify those who met the time-intensity guidelines. We performed a sensitivity analysis using a secondary method of reducing Activity monitor steps/day by 26% to estimate what may be expected to be recorded by a pedometer.³³ Lastly, we explored the possibility of an optimal steps/day cut-point to differentiate those meeting the time-intensity guidelines. Specifically, we identified the point on a receiver operating characteristic (ROC) curve that was closest to perfect discrimination (balanced sensitivity and specificity) and estimated the area under the curve (AUC) to describe the overall ability to steps/day to discriminate meeting physical activity guidelines (c-statistic). We also calculated steps/day on the ROC curve corresponding to high specificity values of 75%, 85%, 90%, and 95% in order to explore steps/day targets, which may be worthwhile steps/day goals.

RESULTS

The 2330 MOST Study participants attending the 60-month follow-up visit have been described previously.⁴⁶ In brief, 16% (377) did not agree to wear the activity monitor, and 2% (58) had monitor malfunctions. Of the remaining 1,895 participants, 94% (1,788/1,895) wore the monitor for at least 3 valid days and thus represent the present analysis sample. The monitor was worn for 7 valid days by 74% of the sample (n=1,331). The mean (sd) age of the study sample was 67.2 (7.7) years and the mean BMI was 30.7 (6.0) kg/m². A majority of the participants were women (60%) and white (90%). Table 1 presents additional participant characteristics of the analysis sample.

We found that 51.3% (95% CI 47.6, 54.9) of men and 44.5% (95% CI 41.5, 47.5) of women averaged $\geq 7,000$ steps/day from converted activity monitor data. For $\geq 10,000$ steps/day, 16.7% (95% CI 13.9, 19.4) of men and 12.6% (95% CI 10.6, 14.6) of women met this threshold again using converted activity monitor data. In contrast, only 6% (95% CI 4.3, 7.7) of men and 5% (95% CI 3.7, 6.3) of women met the time-intensity guidelines. Men and women who met time-intensity guidelines walked 10,936 (3,776) and 11,542 (2,999) steps/day, respectively; those not meeting guidelines walked 7,136 (2,818) and 6,635 (2,595), respectively.

Of those who accumulated $\geq 7,000$ steps/day, 10.9% of both men and women also met time-intensity guidelines, [95% CI 8.0, 14.6 for men, 95% CI 8.3, 14.2 for women]. Of those who accumulated $\geq 10,000$ steps/day, 16.7% (men) and 26.7% (women) also met time-intensity guidelines [95% CI 10.7, 24.8 for men, 95% CI 19.6, 35.1 for women] (Table 2). We found similar results using a secondary conversion of activity monitor steps/day (Table 3). We also found similar results stratifying by the presence/absence of radiographic knee OA.

The ROC analysis supported 7,910 steps/day (for men) and 9,040 steps/day (for women) as optimal steps/day cut-points associated with meeting the time-intensity guidelines (Figure 1). The AUC for men was 0.81 and for women was 0.91, which suggests moderate accuracy⁴⁷ for steps/day to discriminate meeting time-intensity guidelines. For men, 32.2%

(95% CI 29.4, 35.0) accumulated 7,910 steps/day and for women, 19.4% (95% CI 17.1, 21.8) accumulated 9,040 steps/day. However, even with this 'optimal' cut-point, only 13.3% of men and 23.7% of women who met these specific steps/day cut-points also met the time-intensity guidelines, respectively [95% CI 9.6, 18.1 for men, 95% CI 17.1, 31.8 for women] (Table 2). Using a high specificity approach, steps/day associated with meeting time-intensity guidelines ranged from 9,000 to 11,800 for men and 8,200 to 11,200 for women (Figure 2).

DISCUSSION

We did not find application of existing steps/day cut-points a useful approach for identifying people with or at high risk of knee OA who met the clinical recommendation DHHS time-intensity guidelines. In particular, using a 7,000 or 10,000 steps/day recommendation did not discriminate between those who did and did not walk at least 150 minutes/week of moderate intensity physical activity in bouts lasting at least 10 continuous minutes. Further, we found that a data-driven optimal steps/day translation poorly predicted those who met this time-intensity guideline.

Although it is tempting to conclude that no value of steps/day can be used to translate achievement of public health time-intensity guidelines for this population, the limiting factor in this study was that so very few people with or at high risk of knee OA actually met the time-intensity guidelines. To be clear, 6% and 5% of men and women, respectively, with or at risk of OA actually met objectively determined and literally translated time-intensity guidelines. Given that the positive predictive value is dependent on the prevalence of the outcome of interest, which was particularly low in our sample, the resultant positive predictive value was also low.⁴⁸ This finding is not an anomaly nor is it unique to OA samples. For instance, Troiano et al. reported 2.5% of men and 2.3% of women over the age of 60 years met time-intensity guidelines in a large and nationally representative sample.²⁹ Hence, the limited achievement of time-intensity guidelines may be less an issue of particular disease-related issues, but rather other non-disease factors.

We find it noteworthy that much of the literature cited to create the time-intensity guidelines is based on self-reported physical activity.¹⁵ We defined meeting such guidelines from an objective monitor in this study. Previous literature has reported that self-reported physical activity places 62% of the general population as meeting time-intensity guidelines, but only 9.6% meet these same guidelines when defined from objective monitoring.⁴⁹ In a similar fashion, self-reported physical activity data from the 2000–1 Behaviors Risk Factor Surveillance Surveys (BRFSS) indicated that 22 to 40% of US adults over the age of 45 with doctor-diagnosed met physical activity guidelines,⁸ however objective physical activity data from the Osteoarthritis Initiative (OAI) indicates 12.9% of men and 7.7% of women meet these guidelines.^{22, 50} Hence, literal translation of time-intensity guidelines using an objective monitor may be too stringent and not reflective of true levels of physical activity associated with health benefits. While the present time-intensity guidelines are realistic and reasonable for self-reported physical activity, future study is needed to clarify what levels of objectively-monitored physical activity are associated with health benefits. For instance, previous randomized controlled trials have demonstrated that walking for 30 to 40 minutes a day three times a week, *i.e.*, less than what is recommended, still results in a decrease in knee pain and improved physical function for people with symptomatic knee OA.^{9, 10} A more detailed study of health benefits from a broader continuum of exercise dose would help inform rehabilitation specialists and health providers of what incremental health gains may occur following increasing dosing of exercise.

Study Limitations

Limitations of our study should be acknowledged. First, we employed 100 steps/min as an indication of moderate intensity activity recommended by the DHHS guidelines needed to achieve health benefits. Previous research has recommended this cadence as a general physical activity promotion benchmark, with the acknowledgement that it is not intended to be a precise measure of moderate intensity.³⁴ Second, we employed the same monitor to measure both pedometer step counts and the time-intensity recommendations. Ideally, these estimates would have been generated from distinct instruments. Third, steps recorded by a physical activity monitor are not the same as steps recorded by a pedometer. We therefore converted step counts based on previously published methods.³² Fourth, we acknowledge that the 2008 physical activity guidelines alternatively recommends older adults who are unable to meet the 150 minutes/week of moderate intensity physical activity due to chronic conditions participate in as much activity as tolerated. Nevertheless, we are unable to determine which study participants may qualify for this alternative recommendation. We find it noteworthy that radiographic disease and knee pain are not likely reasons why individuals with or at risk of knee OA do not meet time-intensity guidelines.⁵² Furthermore, the low prevalence of meeting time-intensity guidelines is not unique to OA samples, as mentioned previously. Thus, it may not be the presence of chronic conditions in terms of disease and pain that limit older adults from meeting guidelines. Rather, other factors common to the population in general, such as a lack of time, activity preferences, reliance on cars for transportation, and urban design are likely important for meeting time-intensity guidelines.^{53, 54} Fifth, step counts were employed as a surrogate marker of overall physical activity, however it is possible that participants engaged in non-stepping physical activity (such as cycling or swimming) or activity that produced relatively few steps (such as gardening and other chores). Hence, physical activities with few steps or no steps may be missed in our estimate of physical activity. Sixth, we acknowledge that we did not include muscle-strengthening activities in the definition of meeting DHHS guidelines.

Despite these limitations, our study has several strengths. First, our study included a large cohort of people with or at risk of knee OA from two centers in the United States. This sample represents one of the largest cohorts with objectively recorded physical activity. Second, the converted mean steps/day for men and women in our study were similar to values reported in other pedometer-based studies.⁵⁷ Such findings support the validity of the physical activity monitor adjusted estimates of steps/day as generally approximating what would be recorded by a pedometer. Similarly, the prevalence of walking 7,000 and 10,000 steps/day are similar to previously published research.^{57, 58}

Our study implies that encouraging people with or at risk of knee OA to accumulate 7,000 or 10,000 steps/day may not equate to also meeting time-intensity physical activity guidelines, at least when they are literally and rigidly translated from objectively-determined movement data. The best evidence for improved health outcomes supports the need to achieve at least a moderate intensity for a sustained period of time. However, the DHHS also supports the position that “some is good, more is better”¹⁵, meaning that risk reductions begin in a dose-response fashion with even small increases in physical activity, even those well below meeting time-intensity guidelines. Therefore, while setting step count goals may not result in meeting time-intensity goals, some benefit in health is likely to occur through walking an increasing number of steps/day. We presented steps/day with high specificity for meeting time-intensity guidelines, which ranged from 8,200 to 11,800 steps/day. Such targets may be more worthwhile as daily activity goals, as they may still provide health benefits for those who are unable to meet time-intensity guidelines. For instance, some people with knee OA may not be able to sustain walking at a moderate intensity, i.e., 100 steps/minute, due to knee pain. Hence, a more individualized pedometer-based step index as shown in figure 2

may ultimately better promote health benefits and encourage walking behaviors in this population.^{59, 60}

CONCLUSIONS

To conclude, in this sample of individuals with or at risk of knee OA we found that the previously promoted candidate values of steps/day do not predict a literal and objectively-monitored translation of meeting time-intensity recommendations as published in the 2008 Physical Activity Guidelines for Americans. In fact, there appears to be no ideal number of steps/day that can adequately discriminate those meeting these guidelines, attributed to the low proportion of people who actually meet these time-intensity recommendations based upon objective measurement. Public health messages emphasizing the evidence-based dose-response nature of increasing individual physical activity (i.e., “some is good, more is better” no matter where one begins) associated with increasing health benefits may be better received since so few people meet the time-intensity guidelines, at least when they are literally translated from an objectively-monitored physical activity instruments.

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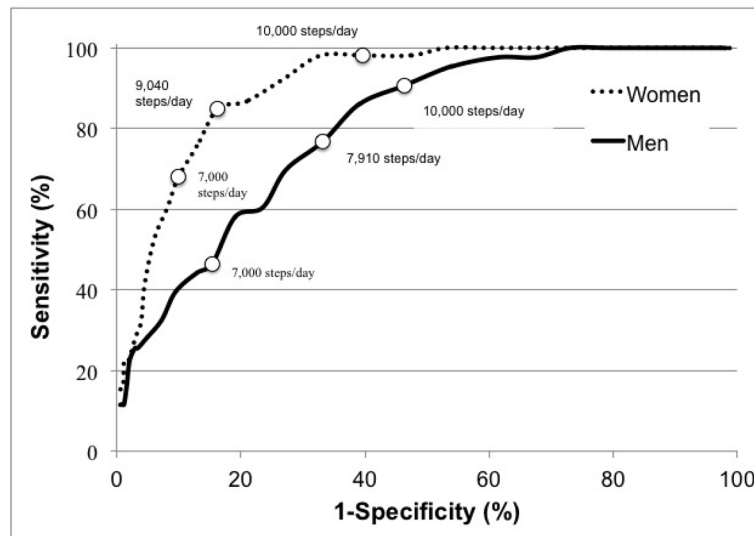


FIGURE 1. Receiver operating characteristic (ROC) curve of steps/day discriminating men (n= 718) and women (n=1,070) meeting the 2008 Physical Activity Guidelines for Americans

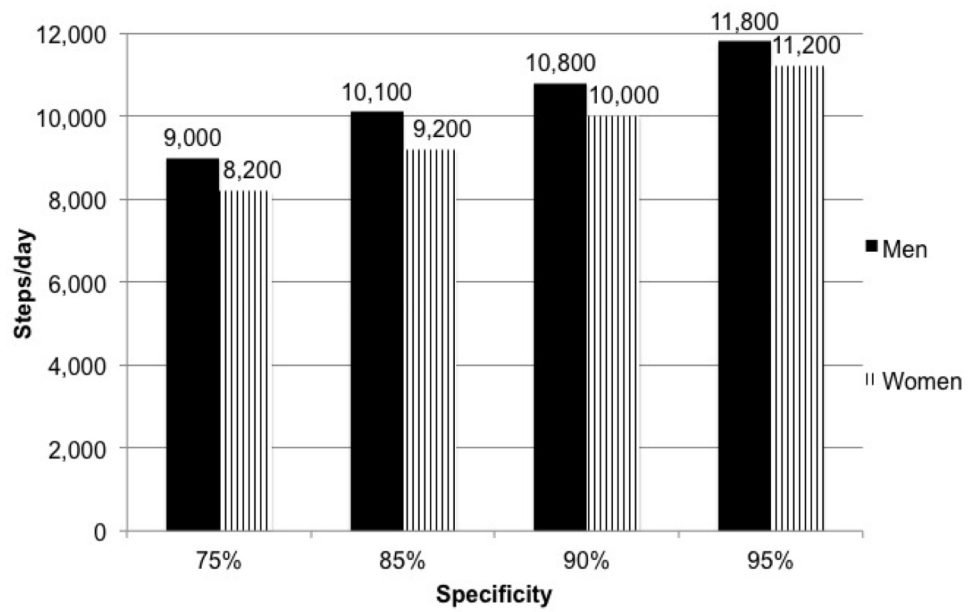


FIGURE 2. Steps/day for high specificity values for meeting the 2008 Physical Activity Guidelines for Americans calculated from ROC curves for men (n= 718) and women (n=1,070).

Table 1

Descriptive characteristics of study participants stratified by sex.

	Men	Women
n	718	1070
Age [Mean (sd)]	66.8 (7.9)	67.4 (7.6)
BMI [kg/m] [Mean (sd)]	30.8 (5.5)	30.7 (6.3)
Education [% College]	52	43
Race [% White]	91	90
Knee pain (VAS: 0–100) [Mean (sd)]	15.3 (18.2)	21.2 (22.1)
None (VAS: 0–9) [%]	47	37
Mild (VAS: 10–39) [%]	42	42
Moderate/Severe (VAS: 40) [%]	11	21
ROA [%]	53	55
No Comorbidity [%]	59	59
Study Site [% Alabama]	39	37
Depressive Symptoms [% CES-D 16]	7	11
Steps/day [Mean (sd)]	7,364.1 (3,019.0)	6,879.0 (2,823.6)

Abbreviations: MOST=Multicenter Osteoarthritis Study; BMI = Body Mass Index; VAS= Visual Analogue Scale; ROA= Radiographic Knee Osteoarthritis; CES-D= Center for Epidemiologic Studies Depression Scale

Table 2

Ability of 10,000 steps/day, 7,000 steps/day, and ideal step/day to discriminate meeting time intensity guidelines

	Sensitivity	Specificity	Positive Predictive Value
10,000 steps/day			
Men	46.5 [31.5, 62.2]	85.2 [82.2, 87.7]	16.7 [10.7, 24.8]
Women	67.9 [53.6, 79.7]	90.3 [88.2, 92.0]	26.7 [19.6, 35.1]
7,000 steps/day			
Men	93.0 [79.9, 98.1]	51.4 [47.6, 55.2]	10.9 [8.0, 14.6]
Women	98.1 [88.6, 99.9]	58.3 [55.2, 61.4]	10.9 [8.3, 14.2]
Ideal steps/day			
Men (7,910 steps/day)	83.7 [68.7, 92.7]	65.3 [61.6, 68.9]	13.3 [9.6, 18.1]
Women (9,040 steps/day)	62.3 [47.9, 74.9]	89.6 [87.5, 91.4]	23.7 [17.1, 31.8]

Ideal steps/day = steps/day on the ROC curve that was closest to perfect discrimination of meeting time-intensity guidelines

Time-intensity guidelines = 150 minutes/week of moderate intensity physical activity in bouts lasting at least 10 continuous minutes

Table 3

Secondary analysis of the ability of 10,000 steps/day and 7,000 steps/day to discriminate meeting time intensity guidelines. Steps/day were calculated by reducing StepWatch steps by 26% across all subjects to approximate pedometer steps.

	Sensitivity	Specificity	Positive Predictive Value
10,000 steps/day			
Men	37.2 [23.3, 53.2]	90.7 [88.2, 92.7]	20.3 [12.4, 31.1]
Women	41.5 [28.4, 55.8]	95.0 [93.4, 96.2]	30.1 [20.2, 42.1]
7,000 steps/day			
Men	86.0 [71.3, 94.2]	61.0 [57.2, 64.7]	12.3 [8.9, 16.7]
Women	98.1 [88.6, 99.9]	67.5 [64.5, 70.3]	13.6 [10.4, 17.5]

Time-intensity guidelines = 150 minutes/week of moderate intensity physical activity in bouts lasting at least 10 continuous minutes