

Accelerometer assessment of physical activity in active, healthy older adults

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Abstract

Despite widespread use of accelerometers to objectively monitor physical activity among adults and youth, little attention has been given to older populations. The purpose of this study was to define an accelerometer count cutpoint for a group of older adults and to then assess the group's physical activity for 7 days. Participants (N=38; 69.7 ± 3.5 years) completed a laboratory-based calibration with an Actigraph 7164 accelerometer. The cutpoint defining moderate to vigorous physical activity (MVPA) was 1041 counts per minute. On average, participants obtained 68 minutes of MVPA per day, although more than 65% occurred as sporadic activity. Longer bouts of activity occurred in the morning (06:00-12:00) more frequently than other times of the day. Almost 14 hours per day were spent in light intensity activity. This study demonstrates the rich information accelerometers provide about older adult activity patterns- information that may further our understanding of the relationship between physical activity and healthy aging.

Introduction

The beneficial effects of physical activity on the health and quality of life of older adults are well-established and yet 62% of Canadians 65 years or older are inactive (National Advisory Council on Aging (NACA), 2006) compared to 40% of individuals between 20 and 24 years (Canadian Fitness and Lifestyle Research Institute (CFLRI), 2006). Unlike other age groups where there appear to have been improvements in activity levels over the past few years, the proportion of inactive senior men actually increased from 53% in 2001 to 55% in 2005. The rate of inactivity in senior women was stable but still exceptionally high at 67% in 2005 (NACA, 2006). These disturbing trends have resulted in the development of physical activity interventions and promotion tools targeted at older populations. One example is Canada's Physical Activity Guide for Older Adults, which recommends adults over 55 years of age achieve 30-60 minutes of moderate activity on most days of the week (Health Canada, ALCOA, & CSEP, 1999).

Appropriate measurement tools are necessary in order to properly study physical activity in older adults and to evaluate the success of interventions. There are issues with the use of questionnaires in an older population, including vision and hearing impairments or disturbances to cognition and short- or long-term memory (Shephard, 2003). There may also be problems with accurately reporting the intensity of exercise, as perceptions of what is "hard" activity or "light" activity depends on the tolerance and fitness level of the individual, both of which are affected by age (Shephard, 2003).

Accelerometers are an effective way to obtain objective and detailed information about physical activity behaviour (Esliger, Copeland, Barnes, & Tremblay, 2005) and they may overcome many of the issues with self-report in older adults. As accelerometers

are generally more sensitive they may be ideal for use with populations who typically engage in very light or very brief activity, such as the elderly (Shephard, 2003). However, despite the widespread use of these devices among adults and youth, there has been very little work using accelerometers to measure physical activity in older populations.

There are recognized limitations to the use of accelerometers, such as an inability to detect non-ambulatory activity like resistance training or cycling (Montoye, Kemper, Saris, & Washburn, 1996). There may also be other issues that pertain specifically to the use of accelerometers with older populations. For example, the quality of accelerometer data is affected significantly by the degree of subject compliance, such as remembering to wear the device, which could pose a problem to older adults facing memory loss or lacking the visual and manual dexterity to properly attach the device in the recommended position (Wilcox, Tudor-Locke, & Ainsworth, 2001). Finally, although there are many studies which have assessed the relationship between the raw accelerometer output and criterion levels of activity or energy expenditure, none of these “calibration” studies have been performed specifically on older adults (Welk, 2005). This is becoming an increasingly important issue as several large population-based studies such as the National Health and Nutrition Examination Survey (NHANES) (Troiano, 2005) and the Canadian Health Measures Survey (Tremblay & Connor-Gorber, 2007) are currently collecting objective measures of physical activity using accelerometers. The present study begins to address this need.

Therefore, the purpose of this study was to assess the relationship between accelerometer counts and walking in a group of older adults and establish a threshold

count value that could be defined as moderate physical activity. The second objective was to employ this cutpoint to assess free-living physical activity for one week.

Methods

Participants. Volunteer participants for this study included 38 people (18 men, 20 women) ranging in age from 64-77 years with a mean age of 69.7 ± 3.5 years. The mean BMI of the subjects was $26.6 \pm 3.7 \text{ kg}\cdot\text{m}^{-2}$. Participants were recruited from newspaper advertisements, flyers and word of mouth. The inclusion criterion was the ability to walk briskly on a treadmill without assistance. All participants were healthy and free from medications that would influence energy expenditure or their ability to perform walking exercise. When necessary, clearance for unrestricted physical activity was obtained from a physician. All subjects provided written, informed consent.

Procedures. A preliminary laboratory-based assessment was conducted to establish the relationship between activity intensity and accelerometer counts in the sample population. Walking was chosen as the activity for the calibration because accelerometers are ideally suited for measuring locomotor activity (Welk, 2005) and walking is the most popular physical activity among older Canadians (CFLRI, 2006).

Participants first attended a familiarization session where they were introduced to the laboratory procedures and practiced walking on the treadmill. Participants were then asked to walk until they felt comfortable walking without the continuous use of handrails. On the day of the experimental session participants were asked to refrain from caffeine or exercise prior to their scheduled session. Similar to the procedures of Freedson, Melanson, & Sirard (1998), the experimental session consisted of three, 6-minute conditions of walking on a motorized treadmill. The three speeds were 2.4, 3.2, and 4.8

km•h⁻¹. Initially higher speeds were chosen, however, during pilot testing it was determined not all of the participants could walk at speeds greater than 4.8 km•h⁻¹. Five minutes of rest were given between each 6-minute condition and the 3 conditions were performed in random order.

Oxygen consumption was determined using the Vista Mini CPX open-circuit spirometry system (VacuMed, Ventura, CA). Oxygen consumption was calculated every 30 seconds using the TurboFit v.5.4 software (VacuMed, Ventura, CA). Resting oxygen consumption data was collected for at least two minutes prior to the start of exercise with participants in a seated position. Steady-state oxygen consumption was calculated by averaging the final 3 minutes of each treadmill walking condition.

During the laboratory assessment, each participant wore 2 Actigraph model 7164 accelerometers positioned side-by-side over their right hip using an adjustable nylon belt. The Actigraph is a uniaxial accelerometer that measures accelerations in the vertical plane ranging from 0.05 to 2.0 G with frequencies between 0.25 to 2.5 Hz (Tryon & Williams, 1996). Actigraph counts can be summed over user-defined epochs, which for the present study were set at 1 minute. The average counts per minute were calculated for each 6-minute walking condition. Twenty accelerometers were used for this study. All 20 devices were calibrated prior to use, using a mechanical shaker as outlined in Esliger and Tremblay (2007).

Following the laboratory assessment, 34 of the 38 participants agreed to wear an accelerometer for 7 consecutive days. Participants were asked to record the times the monitor was attached and removed each day (e.g., on at wake-up and off at bedtime) for the purpose of distinguishing between device wear time and non-wear time. In order for

the data to be included in the analyses, participants were required to wear the accelerometer for at least 10 hours a day for at least 5 of the 7 days. In total, data from 33 participants (15 men, 18 women) were included in the analysis (i.e., 31 files with 7 valid days, two files with six valid days, and one corrupt file).

Following the 7 days of monitoring participants completed the self-report Physical Activity recall (SR-PAR). The SR-PAR is a modified version of the interviewer-administered Physical Activity Recall. The SR-PAR is used to estimate recent physical activity participation in occupational, leisure, and home activities over the previous 7 day period (Miller, Freedson, & Kline, 1994). With adults, the SR-PAR has been significantly related to Caltrac accelerometer scores ($r = .79$) and other self-report tools ($r = .37$) (Miller et al., 1994).

Data Analysis. For the laboratory assessment, the average counts per minute were calculated for each 6-minute treadmill walking condition and steady-state oxygen consumption was calculated by averaging the final 3 minutes of each condition. The mean accelerometer counts and oxygen uptake for each walking speed were established. An intraclass correlation coefficient (ICC) was calculated for the counts from the two accelerometers worn by each participant.

Upon completion of the 7 day monitoring period, data were downloaded using the manufacturer's software producing a file containing minute-by-minute movement counts for each participant. The activity data were cleaned according to comprehensive procedures reported elsewhere (Esliger et al., 2005). The raw accelerometer counts were categorized as moderate to vigorous physical activity (MVPA) based on the results from

the laboratory assessment (MVPA 1). For comparison purposes, the data were also analysed using the count cutoffs for younger adults (MVPA 2) established by Freedson et al. (1998). Two indices of inactivity were generated 1) light activity time (all counts per minute less than the MVPA cutpoint), and 2) sedentary time (a subdivision of light activity time equal to all counts per minute ≤ 50).

Total minutes of MVPA were further examined to determine how and when active minutes were accumulated. Minutes of MVPA were broken down by days of the week and by time of day, with morning defined as 06:00 to 11:59, afternoon defined as 12:00 to 17:59, and evening defined as 18:00 to 23:59. Long bouts of activity were defined as 20 or more consecutive minutes, short bouts were 10-19 minutes, and all remaining minutes of MVPA were labeled sporadic.

The SR-PAR scores were compared to the average minutes of MVPA per day using Pearson product moment correlations. All analyses were performed using SPSS v. 15.0 and statistical significance was set at $p < 0.05$.

Results

Laboratory Assessment

The results of the laboratory assessment are shown in Table 1. The ICC between the activity counts from the two accelerometers worn by the participants was 0.956 ($p < .001$). For all subsequent analyses an average of the count values from the two devices was used. There was no significant difference between men and women for either activity counts or oxygen consumption, therefore, the pooled data were used to establish an activity count cutpoint for moderate to vigorous physical activity (MVPA). There was a

strong relationship between walking speed and accelerometer counts ($r=0.878$) with a standard error of $0.48 \text{ km}\cdot\text{hr}^{-1}$. Figure 1 shows that accelerometer counts were also significantly related to oxygen consumption ($r=0.60$, $\text{SEE} = 2.48 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$).

Profile of Physical Activity

The 7 days of direct monitoring were used to profile the activity patterns of the participants. On average, participants wore the accelerometer for 15.0 ± 1.3 hours per day.

The data from the laboratory assessment were used to create a count “cutpoint” for defining physical activity. Unlike many previous studies using accelerometers we did not develop a series of cutpoints to define various intensity categories; one count cutpoint was identified based on the counts associated with a reference activity, which was walking at $3.2 \text{ km}\cdot\text{hr}^{-1}$. The cut point was set at counts per minute ≥ 1041 (MVPA 1) which corresponded to a mean VO_2 of $13 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$. For comparison we also used the Freedson et al. (1998) young adult criteria for MVPA of counts per minute ≥ 1964 (MVPA 2). Table 2 shows the average counts per minute for the 7 day period and the minutes of MVPA per day using the two different count cutoffs for defining physical activity. There was a significant difference in minutes of MVPA per day using the two different cutpoints (MVPA 1 and MVPA 2; $p=.000$). All subsequent outcome variables were determined using the MVPA 1 criteria.

The detailed nature of time-stamped accelerometer data enables a closer examination of physical activity patterns including when and how activity is accumulated. Figure 2 shows the minutes of physical activity per day across the days of

the week, while Figure 3 shows when during the day activity occurred. On average, significantly less activity was accumulated in the evening hours compared to the morning or afternoon ($p < 0.001$). The majority of physical activity (66%) was accumulated as sporadic activity (bouts less than 10 minutes in length), as shown in Figure 4. The remaining 34% of MVPA was consistent with physical activity recommendations to accumulate activity in bouts of 10 or more minutes. Men accumulated 4.3 ± 4.0 long bouts of activity during the 7 days while women accumulated 3.0 ± 2.4 long bouts. Panel B in Figure 4 demonstrates that the majority of MVPA accumulated in long bouts of activity occurred during the morning hours (06:00 – 11:59).

Accelerometers can also provide information about physical inactivity. Table 3 shows the time spent in light activity (counts per minute < 1041). We then further subdivided light activity into sedentary time (counts per minute ≤ 50). 50 counts per minute have been used previously as the threshold to classify sedentary time (Esliger et al., 2005), however, it should be noted there is no consensus in the literature at this time on the appropriate cutpoint for sedentary activity.

A total of 31 participants completed the self-report 7 day physical activity recall (SR-PAR) at the end of the monitoring period. The mean scores on the SR-PAR are shown in Table 2. Scores on the SR-PAR were significantly related to minutes per day of MVPA 1 with a Pearson's coefficient of 0.484 ($p = 0.006$) and also to minutes of MVPA 2 per day with a Pearson's correlation coefficient of 0.363 ($p = 0.045$). SR-PAR scores were significantly correlated to the average accelerometer counts per minute (Pearson's correlation = 0.489, $p = 0.005$).

Discussion.

To date there has been little work using accelerometry to examine activity profiles in older Canadians. This study provides accelerometer data from a group of active, healthy, individuals between 64 and 77 years of age that can be used for comparison in future studies. These results demonstrate the valuable information that can be obtained from objective monitoring of physical activity in older adults.

Accelerometers are ideally suited for measuring ambulatory activity, although Welk (2005) points out there are many challenges to converting counts to meaningful outcome data. Typically regression equations are used to define different intensity classifications including light (<3METS), moderate (3-6 METS) and hard activity (6 METS) (Freedson et al., 1998; Troiano, 2006). However, the narrow range of walking speeds that was possible with these participants is an issue for the development of a regression equation. With no vigorous activity included in the calibration protocol the resulting regression equation would have a large intercept term, in this case greater than $10 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$. An equation with an elevated intercept term would generally overestimate the time spent in moderate activity (Matthews, 2005). Unfortunately, including vigorous activity in calibration protocols is a significant challenge when working with older adults; while some older individuals can and do participate in high-intensity activities, they are not likely to be a representative sample of the population. For these reasons, we chose to use a simplified approach to define physical activity from accelerometer counts by using a reference activity to establish a single threshold count value above which all time is labeled as active. This is consistent with the methods of Anderson et al. (2006) who used a single count threshold (2000 counts per minute) for

subjects in the European Youth Heart Study. A similar strategy has also been proposed by Schutz, Weinsier, and Hunter (2001) where accelerometer –based activity time would be calculated based on a subject’s steady-state accelerometer counts during a reference activity task, such as walking or running at a given speed. We chose walking as our reference activity because walking is reported as the most popular physical activity among older Canadians 65 years of age or greater (CFLRI, 2006). 65% of older adults report participating in walking during their leisure time compared to only 34 % who report participating in organized sport, 7% who participate in bicycling and less than 10% who participate in swimming or weight training (CFLRI, 2006).

The accelerometer counts per minute associated with walking at $3.2 \text{ km}\cdot\text{hr}^{-1}$ was used as the cutpoint for defining moderate-intensity activity. Although this walking speed is less than the $4.0 \text{ km}\cdot\text{hr}^{-1}$ that is defined as moderately intense physical activity in the compendium of physical activities, Ainsworth et al. (2000) point out that individual differences in fitness and age can alter the energy cost of activity. Although we can only estimate the relative intensity of this walking speed, we believe this reference activity is a reasonable marker of moderate intensity activity for this age group. For these older adults, walking at $3.2 \text{ km}\cdot\text{hr}^{-1}$ resulted in a mean VO_2 of $13 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$, equivalent to 3.7 METS, assuming a standard oxygen consumption of $3.5 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ equals 1 MET. This is consistent with the 4 MET intensity of activity that is associated with reduced risk of morbidity and mortality in older adults (Paterson, Jones, & Rice, 2007). It should be noted that there are limitations to assuming a fixed value of $3.5 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ for one MET, for example Kwan et al. (2004) found that in men and women over the age of 65, 1 MET was actually $2.8 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$. If we were to use this value then walking at 3.2

$\text{km}\cdot\text{hr}^{-1}$ would equate to 4.6 METS for the older adults in the present study. In this case the 1041 count cutpoint we used would be a conservative delineation of MVPA for these older adults. (i.e., there is little chance that a light minute of activity will be inappropriately labeled as MVPA).

Oxygen consumption and Actigraph counts were only moderately related in this sample of older adults ($r = 0.600$). In young adults the relationship between counts per minute and VO_2 has been shown to be stronger with r values greater than 0.8 (Freedson et al., 1998; Nichols, Morgan, Chabot, Sallis, & Calfas, 2000), however the errors of estimates are smaller. Our results are similar to those of Swartz et al. (2000) who used subjects across a wide age range (19-74 years) to assess the relationship between energy expenditure and Actigraph counts and reported an r value of 0.563. Caution is needed when using accelerometer counts to predict energy expenditure in older adults as the relationship between VO_2 and accelerometer counts tends to be weaker in older adults compared to younger adults with several different devices and device placements (Brandon, Ross, Sanford, & Lloyd, 2004; Fehling, Smith, Warner & Dalsky, 1999; Nichols, Patterson & Early, 1992). To avoid this issue we did not attempt to define count cutpoints for varying levels of exercise intensity, we simply chose a threshold count value that was associated with a reference activity (walking at $3.2 \text{ km}\cdot\text{hr}^{-1}$) for our subjects. This approach is reinforced by the fact that the relationship we observed between walking speed and counts was strong ($r = 0.878$).

The counts associated with walking at $3.2 \text{ km}\cdot\text{hr}^{-1}$ was 1041 counts per minute which was similar to the results of Nichols et al. (2000) who reported a mean of 920 cpm for young adults walking at $3.2 \text{ km}\cdot\text{hr}^{-1}$. However, this is substantially lower than the

cutpoint of 1952 counts per minute that is typically used for moderate activity in younger adults (Freedson et al., 1998). It is known that age influences the relationship between accelerometer counts and activity and, as a result, different cutpoints are used for children than for adults. This variability highlights the need to develop cutpoints which are specific to the population being assessed, which was the approach taken in the present study. To our knowledge this is the first study that has attempted to define an Actigraph cutpoint for MVPA in older adults.

Profile of Physical Activity

We found that over 7 days of monitoring the mean counts per minute was 302. There is a large variation in mean counts per minute values reported in the literature which may be partially explained by differences in data reduction procedures and, in particular, different methods of dealing with sleep time which can dilute counts per minute values (Esliger et al., 2005). Previous studies using the same data reduction procedures as the present study found an average of 394 counts per minute in adults (mean age 38 years) (Copeland, Kowalski, Donen, & Tremblay, 2005) and 561 counts per minute in contemporary children (mean age 11 years) (Tremblay, Barnes, Copeland, & Esliger, 2005). Dinger, Oman, Taylor, Vesely, & Able (2004) reported an average of 168 counts per minute for 56 older adults (mean age: 75 years), however, they do not specify their data reduction procedures or how they controlled sleep time or accelerometer “off time”. Washburn and Ficker (1999) reported an average of 206 cpm for 20 older adults (mean age 72 years). The 2003-2004 NHANES results showed that 769 white adults 60 years and older achieved an average of 215 counts per minute (Troiano et al., 2008).

Using our cutpoint to classify counts, the participants obtained on average 68 minutes of MVPA per day and this number was significantly related to the self-report measure of activity over the same 7 days (SR-PAR). Using the Freedson et al. (1998) cutpoint (MVPA 2) the average minutes of MVPA per day was 29 and the relationship to self-reported activity was not as strong ($p=.363$ vs. $p=.484$ for MVPA 1). We found the SR-PAR scores and average accelerometer counts per minute were moderately related, with a correlation of 0.489. This is consistent with the results of Washburn and Ficker (1999) who reported a correlation of 0.49 between Actigraph counts and scores on the Physical Activity Scale for the Elderly in 20 older adults. In general, both the mean counts per minute and the minutes of MVPA suggest this group of older adults were active. This is supported by the mean SR-PAR score of 39.3 which is comparable to the SR-PAR score of 42.3 we obtained from 247 undergraduate Kinesiology students (Copeland et al., 2005).

If one were to include all minutes of MVPA in the analysis, the vast majority of subjects (30 out of 33) would easily meet Canada's Physical Activity Guide recommendations for older adults to obtain at least 30 minutes of moderate intensity activity on most days of the week (Health Canada et al., 1999). However, it is important to note these guidelines recommend that physical activity be accumulated in bouts of at least 10 minutes and the majority (66%) of MVPA occurred as "sporadic activity" in bouts of less than 10 minutes. If we only include minutes of MVPA that were accumulated in bouts of at least 10 minutes, as per the guidelines, then only 8 of the 33 subjects meet the physical activity recommendations. This suggests not many older adults are complying with the recommendation of accumulating activity in 10 minute bouts,

which may indicate a need for better education on the guidelines. The possible health benefits associated with sporadic activity of less than 10 minutes in duration are unknown (Hardman, 2001), but should be explored, as this type of activity may make a substantial contribution to total daily energy expenditure.

The activity profile obtained from direct monitoring can provide valuable information for developing targeted activity interventions. In this group of older adults, significantly more minutes of activity occurred in the morning and afternoon hours compared to the evening hours. Furthermore, more long bouts of activity were observed in the morning compared to the afternoon. This may suggest that older adults in this community are more likely to participate in purposeful, continuous, activities in the morning hours which would be useful to know when scheduling activity programs to appeal to as many people as possible. The majority of the participants were retired, so it was not surprising there were no significant differences in activity levels across the days of the week or on weekdays versus weekends.

The overall “light” activity (which includes sedentary time) was approximately 14 hours per day which means more than 90% of the time monitored was spent in low intensity activities. Meijer, Goris, Wouters, & Westerterp (2001) examined a group of European older adults and found they spent 82% of their time engaging in low intensity activity (<3 METS). Interestingly, Meijer et al. found that more time spent in low intensity activities was significantly related to a lower overall daily physical activity level because older adults appear to compensate for an exercise training program by reducing non-training physical activity. It also appears that percentage of time spent in low intensity activities increases with age (Meijer et al., 2001). This suggests that

interventions targeted at older adults may need to emphasize engaging in activities of at least moderate intensity and on reducing inactive time. Furthermore, our results show there may also need to be a greater emphasis on accumulating activity in bouts of at least 10 minutes in length.

There are limitations to this study. This was a small sample of older adults therefore, the accelerometer count cut point or physical activity profile may not be generalizable to all older adults. Activity levels may have been underestimated as accelerometers cannot detect resistance exercise, cycling, or upper-body work. In addition, 2 of the subjects reported swimming during the 7-day period and this activity was not captured. Despite these limitations, this study demonstrates the potential of using accelerometers to provide a detailed physical activity profile of active older adults. The compliance rates were very high for subjects in this study and more than 90% of subjects wore the accelerometer for a complete 7 days and kept an accurate log sheet. Accelerometers can provide valuable information about the activity patterns of older adults. This information is useful in guiding program development and assessing the impact of physical activity interventions, and will allow us to further our understanding of the relationship between physical activity and healthy aging.

Figure Captions

Figure 1: The relationship between between activity counts and oxygen consumption (N=38).

Figure 2: Average minutes of MVPA per day across days of the week. (Mean \pm SE, N = 33).

Figure 3: Weekly minutes of MVPA by time of day. (Mean \pm SE, N=33). * = evening minutes of MVPA significantly less than morning or afternoon, $p < 0.001$.

Figure 4: Panel A, Minutes of MVPA per day that occurred in long bouts (>20 minutes), short bouts (10-19 minutes) and as sporadic activity (< 10 minutes); Panel B, percent of active minutes during the morning, afternoon and evening that occurred in long bouts, short bouts and as sporadic activity. (N=33).

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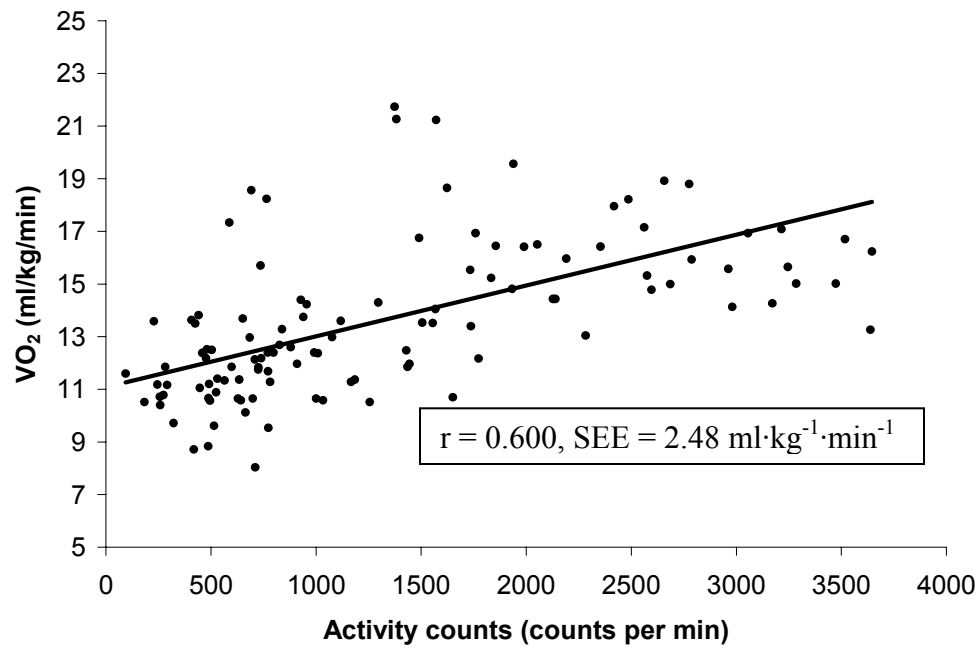


Figure 1

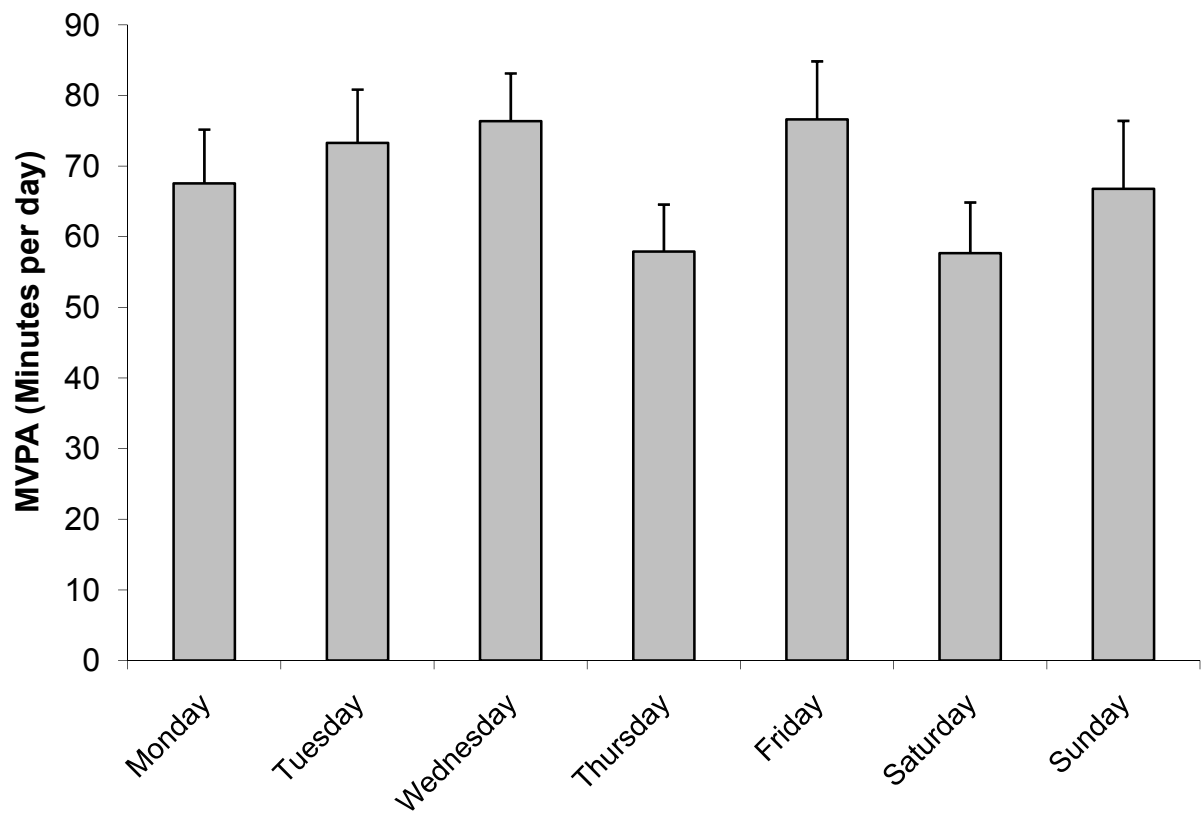


Figure 2

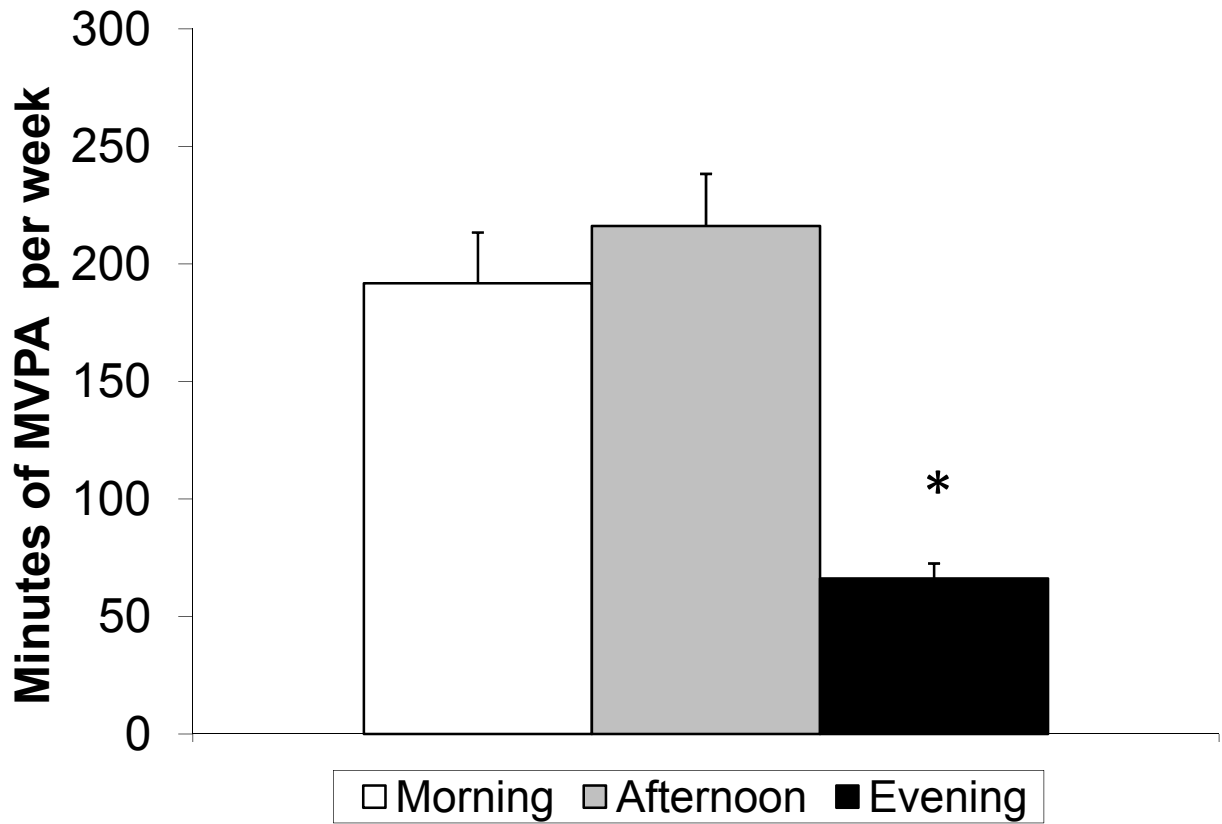
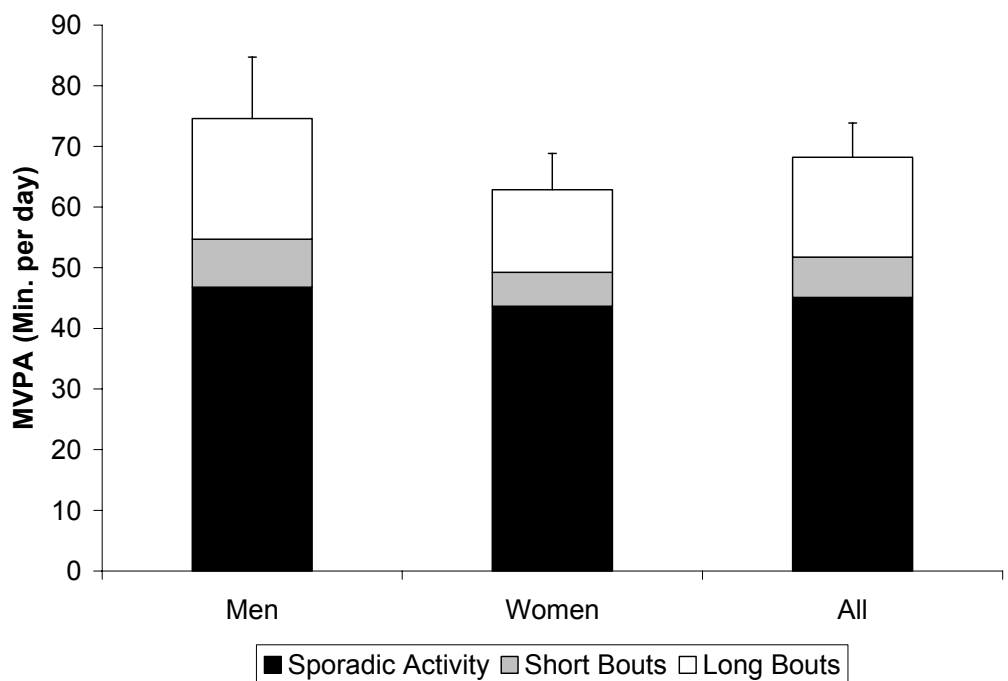
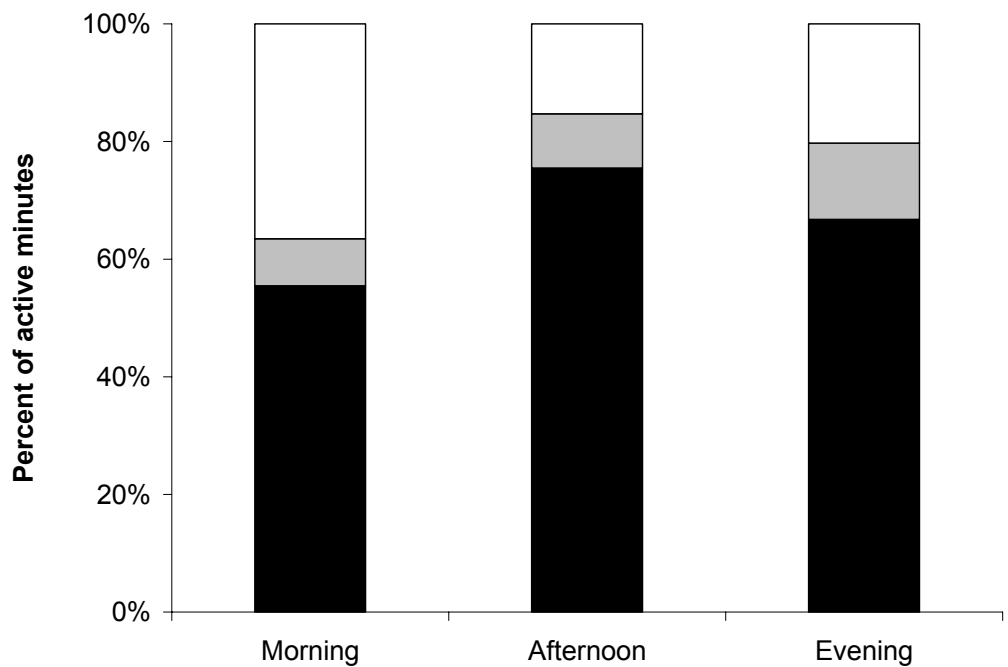


Figure 3



A



B

Figure 4.

Table 1: Activity counts from 2 accelerometers and VO₂ at 3 walking speeds. (Mean (SD))

Speed (km·hr ⁻¹)	Activity counts 1 (counts·min ⁻¹)	Activity Counts 2 (counts·min ⁻¹)	Mean Counts (counts·min ⁻¹)	VO ₂ (ml·kg ⁻¹ ·min ⁻¹)
2.4	517 (242)	514 (217)	515 (218)	11.4 (1.8)
3.2	1050 (446)	1032 (363)	1041 (62)	13.0 (2.1)
4.8	2481 (740)	2527 (639)	2504 (108)	16.6 (2.5)

Table 2. Objective and self-reported physical activity data for one week.

	MVPA ¹ (minutes per day)	MVPA ² (minutes per day)	Avg. counts per minute	SR-PAR score
men	74.6 (39.2)	33.3 (28)	313 (153)	39.6 (8.0)
women	62.9 (25.5)	25.3 (13.7)	294 (88)	39.0 (4.8)
Mean	68.2 (32.5)	29.0 (21.5)	302 (120)	39.3 (6.3)

Note: MVPA = moderate to vigorous physical activity, SR-PAR = self-report physical activity recall.

MVPA¹ = cutpoint developed in preliminary assessment, counts per minute >1041

MVPA² = previously published cutpoints for younger adults, counts per minute >1952

Table 3: Light activity and sedentary time by gender (Mean (SD))

	Men (n=15)	Women (n=18)
Light activity (hours per day)	13.8 (1.4)	13.9 (1.0)
Sedentary time (hours per day)	8.9 (1.5)	7.4 (1.2)

Note: light activity = all activity < MVPA cut point of 1041 counts per minute; sedentary time (a subset of light activity) = all activity < 50 counts per minute.