Variability of Objectively Measured Sedentary Behavior

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ABSTRACT

DONALDSON, S. C., A. H. K. MONTOYE, M. S. TUTTLE, AND L. A. KAMINSKY. Variability of Objectively Measured Sedentary Behavior. *Med. Sci. Sports Exerc.*, Vol. 48, No. 4, pp. 755–761, 2016. **Introduction**: The primary purpose of this study was to evaluate variability of sedentary behavior (SB) throughout a 7-d measurement period and to determine if <7 d of SB measurement would be comparable with the typical 7-d measurement period. **Methods**: Retrospective data from Ball State University's Clinical Exercise Physiology Laboratory on 293 participants (99 men, 55 ± 14 yr, body mass index = 29 ± 5 kg·m^{-2}; 194 women, 51 ± 12 yr, body mass index = 27 ± 7 kg·m^{-2}) with seven consecutive days of data collected with ActiGraph accelerometers were analyzed (ActiGraph, Fort Walton Beach, FL). Time spent in SB (either <100 counts per minute or <150 counts per minute) and breaks in SB were compared between days and by sex using a two-way repeated-measures ANOVA. Stepwise regression was performed to determine if <7 d of SB measurement were comparable with the 7-d method, using an adjusted R^2 of ≥0.9 as a criterion for equivalence. **Results**: There were no differences in daily time spent in SB between the 7 d for all participants. However, there was a significant interaction between sex and days, with women spending less time in SB on both Saturdays and Sundays than men when using the 100 counts per minute cut-point. Stepwise regression showed using any 4 d would be comparable with a 7-d measurement (R^2 > 0.90). **Conclusions**: When assessed over a 7-d measurement period, SB appears to be very stable from day to day, although there may be some small differences in time spent in SB and breaks in SB between men and women, particularly on weekend days. The stepwise regression analysis suggests that a measurement period as short as 4 d could provide comparable data (91% of variance) with a 1-wk assessment. Shorter assessment periods would reduce both researcher and subject burden in data collection. **Key Words:** ACCELEROMETER, INACTIVITY, SEDENTARY BREAKS, SITTING

In the past decade, our understanding of the adverse physiological consequences of sedentary behavior (SB) has grown, and its association with poor health outcomes is becoming well established. Increased time spent in SB has been linked to an increased risk of weight gain and obesity, the metabolic syndrome, diabetes, cardiovascular disease, colon and rectal cancers, as well as premature mortality (5,8,12,13,17,21). Because SB is now recognized as important to health outcomes, interest in measuring SB is increasing.

SB is defined as "any waking behavior characterized by an energy expenditure ≤1.5 METs while in a seated or reclining posture" (8). Therefore, both posture and energy expenditure are important variables to consider when characterizing SB. The measurement of SB has often been obtained by subjective questionnaire methodology. These time use surveys inquire about various types of SB, including time spent sitting at work, commuting, and time spent watching television. These measures are easy to administer, and interpretation of results is relatively simple. However, recall bias and poor recollection of SB are concerns. Direct observation is often used as a criterion measure of SB, where researchers observe participants' behavior and record all activities (21). However, direct observation places burden on the researcher and subject, and with the technological advancement of physical activity (PA) monitors, they are now the preferred method to obtain objective measures of SB. These PA monitors detect motion in multiple planes and body position (i.e., sitting, lying, or standing) and can record periods of inactivity. Accelerometers are widely used and have been shown to provide reliable measures of PA, SB, as well as breaks in SB (22) Accelerometry and other objective measurement tools are often preferred because of the potential for gross underestimation associated with subjective measurements (14). Accelerometry has been shown to be a valid objective measure of SB in a free-living environment (16) and to agree 87%–99% with direct observation across measurement of different types of SB (2).

Accelerometers have become an established tool for objective PA measurement and can provide an indication of the intensity of various activities based on either posture or the number of activity counts per minute. Accelerometers worn on the thigh can be used to classify postures and use thigh angle to determine SB. Thresholds for counts per minute

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have also been developed for accelerometers worn on the hip; these thresholds, called cut-points, define ranges that represent different PA intensities and can also indicate periods of inactivity (i.e., SB). An early study of ActiGraph accelerometry cut-points for PA intensity suggested that a cut-point of <100 counts per minute could represent SB (6). This cut-point has been used in large-scale population studies, such as the National Health and Nutrition Examination Survey (20) and other SB studies (9,10,17). More recently, a study comparing ActiGraph accelerometry with direct observation suggested that <150 counts per minute may be a more appropriate cut-point to define SB (16). Currently, it is not universally accepted as to which cut-point is the most accurate measure of SB.

An important consideration for interpreting any physiological variable is knowledge of its variability. Additionally, understanding if differences between individual characteristics such as sex or if measurement factors such as day of the week influence variability is helpful. Presently, little is known about the daily variability in accelerometer-measured SB, including potential differences between weekdays and weekend days. Two studies examining SB using an ActiGraph accelerometer, both in older men and women (69 ± 7 and 83.5 ± 6.5 yr), found no differences in SB among individual days of the week when using a 7- or 21-d measurement period, respectively (7,15). Similar results were found when 46 middle-age (45 ± 16 yr) men and women's SB was assessed using an activPAL accelerometer for 7 d (11). Although these studies found no differences in SB among individual days of the week, a study of 170 office workers showed that significantly more time was spent in SB on working days when compared with nonworking days, as measured by an ActiGraph GT1M accelerometer (3). As there is no clear consensus whether SB varies, further investigation is needed regarding the variability of SB.

Accelerometry-measured PA and SB are typically obtained over a 7-d period. A 2005 review by Trost et al. (24) concluded that over 80% of variability in PA patterns can be determined with only 3–5 d of measurement. This was also shown for assessing PA with pedometers (24). These findings are important not only in terms of reducing the burden to study participants and researchers, but also for potentially improving compliance in participants wearing accelerometers. Understanding the variability of SB is necessary to determine if fewer than 7 d can be used to reasonably represent an individual's SB.

Therefore, the primary purpose of this study was to evaluate the variability of SB, and breaks in SB, over a 7-d measurement period and to determine if there were differences in SB between weekdays compared with weekends and between men and women. The secondary purpose was to determine the minimum number of days of SB measurement that is comparable with 7 d of measurement.

METHODS

Study population. Data from 956 adults, who participated in research studies at Ball State University's Clinical Exercise Physiology Laboratory between the years of 2006 and 2014, which included a 7-d accelerometer measurement, were accessed for this study. For studies with more than one assessment, only one assessment was used per research subject. Demographic information provided with the accelerometer file included height, weight, sex, and age; however, all individual identifiers were removed before creating the data set for this project. The Ball State University Institutional Review Board determined this study to be exempt because of the use of deidentified retrospective data. The participants in all studies were adult men and women who resided in or near Muncie, IN. Additionally, for all studies, participants came to the Clinical Exercise Physiology Laboratory to be fitted with the accelerometer and were instructed to wear it during all waking hours and to remove it while sleeping. Two hundred and ninety-three participants met the wear time criteria on seven consecutive days (described below), including files from 99 men and 194 women. Of the original 956 adults with data, only 708 had demographic information and usable accelerometer data (i.e., accelerometer did not malfunction); of these, only 293 met the 7-d wear time criteria. Demographic characteristics of these men and women meeting the 7-d wear time criteria, along with those with less than seven valid days of data, are presented in Table 1. Both men and women

TABLE 1. Characteristics of participants included and excluded from analysis.

	Included	Excluded	Total
Men	N = 99	N = 161	N = 260
Height (inches)	69.4 (3.3)	69.0 (2.6)	69.2 (2.8)
Weight (lb)	193.7 (35.3)*	204.5 (44.0)	200.3 (41.1)
BMI (kg·m^{-2})	28.5 (5.4)*	30.3 (6.2)	29.6 (6.0)
Age (yr)	55.9 (13.8)	58.5 (13.0)	57.5 (13.3)
Women	N = 194	N = 254	N = 448
Height (inches)	64.0 (2.9)	64.4 (3.2)	64.2 (3.1)
Weight (lb)	155.7 (37.9)*	175.4 (53.3)	167.0 (48.3)
BMI (kg·m^{-2})	26.9 (6.6)*	29.8 (8.7)	28.5 (8.0)
Age (yr)	52.0 (12.7)	51.1 (12.3)	51.5 (12.5)
Total	N = 293	N = 415	N = 708
Height (inches)	65.9 (3.9)	66.2 (3.7)	66.1 (3.8)
Weight (lb)	168.9 (41.2)*	186.7 (51.8)	179.4 (48.5)
BMI (kg·m^{-2})	27.5 (6.4)*	29.9 (7.8)	29.0 (7.3)
Age (yr)	53.3 (13.2)	53.9 (13.1)	53.7 (13.1)

Data are expressed as mean (SD).
*Denotes significant difference from participants with 4–6 d of data ($P < 0.05$).

included in analyses (7 d of data) weighed significantly less and had significantly lower body mass index (BMI) values than those excluded from analysis (<7 d of data); otherwise, there were no significant differences between those included and excluded from the analysis. The age range of participants was 19–81 yr for men and 19–90 yr for women.

SB measurement. Total daily time in SB was measured using three different models of ActiGraph accelerometers (GT1M, GT3X, and GT3X+). Because the GT1M is a uniaxial (vertical axis only) accelerometer, only the vertical axis from the GT3X and GT3X+ accelerometers was used. These three accelerometers have been shown to record acceleration data similarly when using the vertical axis only, whereas including more than one axis from triaxial accelerometers results in different estimates of time spent in each PA intensity when compared with uniaxial accelerometers (22). Accelerometer data were processed using the ActiLife 6.8.0 (ActiGraph) software. Accelerometers were initialized using the participants' height, weight, age, and sex. Participants were instructed to wear the accelerometer over the dominant hip on the midline of the thigh during all waking hours, except during water-based activities, for seven consecutive days. GT1M and GT3X accelerometers were set to record count data in 1-s epochs, and GT3X+ accelerometers were set to record raw (60 Hz) data. Data from all accelerometers were reintegrated into 60-s epochs for analysis. Nonwear time of the accelerometer was determined as ≥60 consecutive minutes of 0 counts, with a spike tolerance of up to two consecutive minutes of nonzero counts if the counts per minute were <10; data determined to be nonwear were removed from analysis. To have a valid day of data, participants had to have ≥600 min of wear time. For analyses, participants were only included if they met this wear time criteria on all seven measurement days.

For the main analysis, the 100 counts per minute cut-point was used to determine SB. Additionally, a previous study by Kozey-Keadle et al. (16) identified that 150 counts per minute may be a more appropriate cut-point for SB; therefore, a secondary analysis was conducted assessing variability in total time spent in SB across days of the week to determine if using the 150 counts per minute would affect variability in total SB detected with the accelerometer.

In addition to assessing total sedentary time, the variability in daily breaks in SB was assessed. A "break in SB" was defined as an interruption in a bout of SB consisting of at least 2 min of nonsedentary activity (i.e., at least two consecutive minutes with >100 counts per minute). These were presented as sedentary breaks per hour, calculated as the number of breaks in SB divided by the number of hours of wear time for that day, and sedentary breaks per sedentary hour, calculated as the number of breaks in SB divided by the number of hours of SB for that day (18).

Statistical analysis. All statistical analyses were conducted using IBM's Statistical Package for the Social Sciences (version 20.0; SPSS Inc., Chicago, IL). To examine the variability of SB throughout a 7-d measurement period, descriptive analyses were first conducted on the 293 accelerometer files. SB was evenly distributed around the mean. Because of violations in sphericity, Greenhouse–Geisser P values were used for statistical significance. A two-way ANOVA compared SB on individual days of the week and determined if differences existed among any of these 7 d. SB was compared between sexes across days of the week as well. Similar statistical tests were used for determining whether differences existed in breaks in SB per hour of wear time and breaks in SB per sedentary hour among days of the week. A paired sample t-test was used to compare SB when using the different cut-points of <100 counts per minute and <150 counts per minute on each day of the week.

To assess whether fewer measurement days were comparable with 7 d of SB measurement, a stepwise regression was performed. The dependent variable for this analysis was the 7-d mean for SB, with SB for each individual day as the independent variable. Regression analyses were performed for each individual day as well as for combinations of days. These combinations started as 1 d, and additional days were added in succession. The adjusted R^2 was evaluated to determine the amount of variance accounted for by each day or combination of days. Using the same criterion applied for PA measurement, combinations of days resulting in an adjusted R^2 value ≥0.90 were considered equivalent to the 7-d SB measurement (24). Statistical significance for all analyses was set at $P < 0.05$.

RESULTS

In this cohort of 293 adults, there were no significant differences in the daily time (% daily wear time) spent in SB between individual days of the week (mean: 64.0% ± 10.9%; $P = 0.32$). However, there was a significant interaction between sex and days for time spent in SB (Table 2). Men spent a greater percentage of their day being sedentary

TABLE 2. Percentage of time spent in SB by day of the week by sex.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Men							
Wear time (min·d^{-1})	856 (101)	862 (114)	880 (113)	841 (113)	872 (121)	847 (117)	810 (103)**
Percent SB·d^{-1}, 100 counts per minute	63.7 (11.0)	64.1 (10.8)	66.2 (9.9)	64.3 (11.3)	65.1 (10.7)	64.6 (10.1)*	67.0 (10.5)*
Percent SB·d^{-1}, 150 counts per minute	67.2 (10.8)*	68.1 (10.9)	69.4 (10.5)	68.6 (11.1)	68.7 (9.6)	68.1 (9.7)*	69.3 (9.9)*
Women							
Wear time (min·d^{-1})	858 (115)	853 (118)	868 (107)	878 (109)	870 (118)	829 (102)**	803 (101)**
Percent SB·d^{-1}, 100 counts per minute	64.2 (9.3)	65.6 (9.4)	64.9 (9.6)	65.5 (9.7)	65.3 (9.7)	61.7 (11.1)	62.8 (11.6)
Percent SB·d^{-1}, 150 counts per minute	68.6 (8.8)	69.2 (8.9)	69.2 (9.0)	69.2 (9.8)	69.4 (9.2)	66.3 (10.7)	67.7 (11.3)

Data are expressed as mean (SD).
*Denotes significant difference ($P < 0.05$) from women for a specific day of the week.
**Denotes significant difference ($P < 0.05$) from all other days of the week.

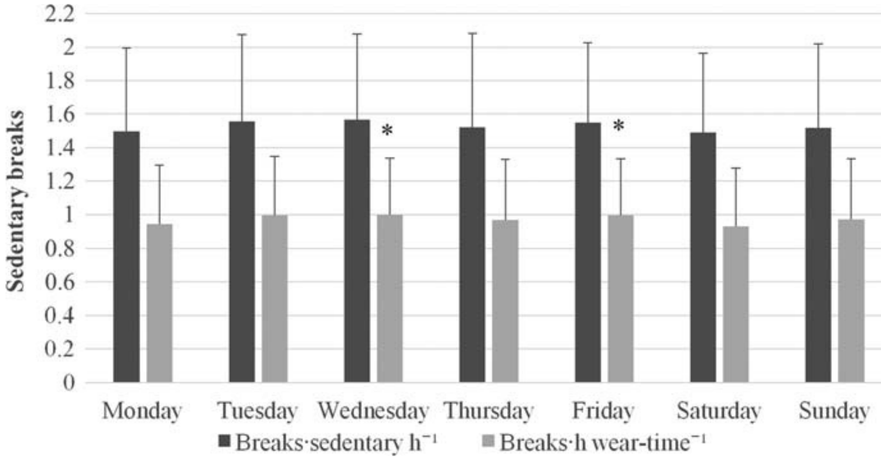

FIGURE 1—Breaks in SB among days of the week (100 counts per minute cut-point). *Indicates significant difference from Saturday.

on both Saturdays and Sundays than women when using 100 counts per minute as the cut-point for SB. In the secondary data analyses using the 150 counts per minute cut-point, men were found to spend a greater percentage of their day being sedentary on Saturdays, Sundays, and Mondays. When using the 150 counts per minute cut-point for SB, time spent in SB was significantly (ranging from 3.4% [2.3/67] to 7.8% [4.9/62.8]) higher than when using the 100 counts per minute cut-point for each individual day and when analyzing men and women separately. Wear time was lowest on Sundays for both sexes but was not different between men and women; wear time was also lower on Saturdays than weekdays but higher than on Sundays for women. The number of total breaks in SB per hour of wear time as well as the number of breaks in SB per sedentary hour is shown in the Figure 1. There was a slight but statistically significantly higher breaks per hour of wear time on Wednesdays and Fridays than on Saturdays. However, there were no significant differences in breaks per sedentary hour among individual days.

Breaks in SB, stratified by sex, are reported in Table 3. Men had significantly higher breaks per sedentary hour on Wednesdays and Fridays than Thursdays, but there were no other differences in breaks per sedentary hour among days of the week and there were no significant differences in SB breaks per hour of wear time among days of the week. Women had significantly lower breaks per hour of wear time on Saturdays than most weekdays and had significantly lower breaks per sedentary hour on Saturdays than on Fridays. In comparing SB breaks between sexes, minor and inconsistent differences were observed; men took significantly fewer breaks per sedentary hour on Thursdays but significantly more breaks per hour of wear time compared with women on Saturdays.

Because of differences in SB between men and women on weekends, stepwise regression analyses were performed both with and without sex as a covariate; inclusion of sex as a covariate did not change R^2 but lowered the adjusted R^2, and therefore, sex was not included as a covariate in these analyses. Stepwise regression analyses showed that any individual weekday provided an R^2 value of 0.56–0.58, whereas any single weekend day provided an R^2 of 0.40–0.45 in predicting SB for a 7-d measurement period (Table 4). The best individual day predictor was Friday, accounting for 58% of the variance, whereas Saturday provided the least valuable prediction of overall SB, accounting for only 40% of the variance. When combining two weekdays, the R^2 value increased to 0.73–0.76, and this value continued to increase with the addition of more days (weekend or weekday) to the regression equation. The combination of two weekdays and one weekend day further increased the R^2 to 0.84–0.87, and R^2 further increased to 0.91 when using three weekdays and one weekend day. Importantly, any combination of 4 d (weekend or weekdays) resulted in an adjusted R^2 of >0.90.

DISCUSSION

The main findings from this study are that there was no significant variability in accelerometer measures of SB over

TABLE 3. Breaks in SB by day of the week by sex.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Men							
Breaks per hour of wear time	0.93 (0.39)	0.98 (0.37)	1.04 (0.38)	0.93 (0.39)	1.01 (0.37)	0.99 (0.39)*	1.01 (0.40)
Breaks per sedentary hour	1.52 (0.49)	1.56 (0.47)	1.64 (0.52)**	1.45 (0.50)*	1.60 (0.52)**	1.56 (0.54)	1.57 (0.53)
Women							
Breaks per hour of wear time	0.94 (0.40)	0.99 (0.41)***	0.96 (0.41)	0.98 (0.41)***	0.97 (0.40)***	0.89 (0.39)	0.94 (0.41)
Breaks per sedentary hour	1.56 (0.67)	1.61 (0.72)	1.61 (0.70)	1.60 (0.65)	1.64 (0.72)***	1.48 (0.58)	1.53 (0.57)

Data are expressed as mean (SD).
*Denotes significant difference ($P < 0.05$) from women for the specific day of the week.
**Denotes significant difference ($P < 0.05$) from Thursday.
***Denotes significant difference ($P < 0.05$) from Saturday.

TABLE 4. Stepwise regression for determining the number of measurement days equivalent to 7 d of measurement.

Model	R	R^2	Adjusted R^2	SE of the Estimate
Wed	0.75	0.56	0.56	0.05
Wed, Thurs	0.85	0.73	0.73	0.04
Wed, Thurs, Fri	0.91	0.82	0.82	0.03
Wed, Thurs, Sat	0.93	0.86	0.86	0.03
Wed, Thurs, Sat, Sun	0.95	0.91	0.91	0.02
Wed, Thurs, Fri, Mon	0.96	0.92	0.92	0.02
Wed, Thurs, Fri, Sat*	0.96	0.92	0.92	0.02
Wed, Thurs, Fri, Sat, Sun	0.98	0.96	0.95	0.02
Wed, Thurs, Fri, Sat, Sun, Mon	0.99	0.98	0.98	0.01
Wed, Thurs, Sat, Sun, Fri, Mon, Tues	1.00	1.00	1.00	0.00

*All other possible combinations of 4 d yielded R^2 and adjusted R^2 > 0.90.

seven consecutive days for a group of 293 men and women who ranged in age from 19 to 90 yr. This is consistent with three previous studies that showed little day-to-day variability in total time spent in SB throughout a week (7,11,19).

Interestingly though, when examining the individual characteristics of the subject (i.e., sex) or measurement factors (i.e., days of the week or cut-point classification), there were some small, yet significant, differences in SB observed. Men had a significantly higher percentage of their day spent in SB than women on weekend days for both cut-point classifications (<100 counts per minute and <150 counts per minute). This difference appears to be due to women being less sedentary on the weekends compared with weekdays versus men that showed little difference across the 7 d. When using the 150 counts per minute cut-point, women were more sedentary than men on Monday as well as the weekend days. Although the reasons for these differences are not known, a recent report showed that women performed more household activities than men during the week (1). The 2014 American Time Use Survey found that more of these household activities, including housework, food preparation, and lawn and garden care, are done on weekends (2.11 $h \cdot d^{-1}$) compared with weekdays (only 1.63 $h \cdot d^{-1}$).

Furthermore, differences were found between men and women when analyzing breaks in SB. In this cohort, women had fewer breaks in SB than men on Saturdays; however, on Thursdays, men were found to take fewer breaks in SB than women. A previous study found no differences in breaks in SB between men and women on average but failed to investigate day-to-day variability (4). Our study found small, inconsistent differences in breaks in SB among days of the week, but overall, there was very little variability in breaks in SB. No other studies to our knowledge have investigated the variability in breaks in SB throughout the week or between sexes. Thus, more research is needed to determine if there are any specific days of the week that exhibit worse SB profiles and if these may differ based on individual characteristics such as sex. Applying two different cut-point criteria for determining SB did not show any notable differences in the variability of SB measures. The only finding that was different between the two cut-points was on Mondays, where women spent less time in SB than men with the <150 counts per minute cut-point. This consistency is important as both cut-points may be used in research. Although the <100 counts per minute cut-point has been used more often in previous studies, recent research suggests that the <150 counts per minute cut-point may be a more dependable measure for free-living SB assessment (16). It should also be noted that the differences between cut-points for total time spent in SB in this study was small (the highest daily difference was 7.8%).

The amount of SB change necessary to reduce the risk of unfavorable health outcomes has yet to be established; therefore, interpretation of these small daily differences is difficult. One study has shown that reducing SB by 1 $h \cdot d^{-1}$ correlates with a decrease in waist circumference and an increase in HDL cholesterol and other metabolic markers (4). However, more studies are needed to establish clear recommendations for reductions in SB to produce health benefits. The stability of objectively measured SB found in this study, as well as previous studies, would suggest that small changes in SB observed from interventions would reflect real behavior differences as opposed to measurement variability.

The present cohort was found to be more sedentary than nationally representative estimates of SB. The National Health and Nutrition Examination Study in the United States and the Australian Diabetes, Obesity and Lifestyle Study found 55% and 57% (no SD data provided) of waking time was spent in SB, respectively (9,20). Both of these studies used ActiGraph accelerometers with a cut-point of <100 counts per minute as the criterion for SB. In the present study, participants spent 65% ± 7% of waking time in SB with the same <100 counts per minute cut-point. The amount of time spent in SB would be even greater (69% ± 10%) if the <150 counts per minute cut-point were used. One recent report showed that those who spent more time in SB (>50th percentile) had lower coefficients of variation than those below the <50th percentile (11). Thus, the relatively higher percentage of time spent in SB of the present cohort may be an important factor related to the stability of SB found in the present study.

Given the stability of SB measures shown in the present and recent studies, it is of interest to understand how many days of measurement are needed to provide a reasonable measure of an individuals' SB. A recent study of SB for a 21-d period with 50 adults >55 yr old found no differences among any days of the week (7). They determined that any five weekdays or weekend days could be used to accurately represent SB for a 21-d measurement period. Similarly, the present study found any combination of 4 d to be comparable ($R^2 > 0.90$) to the 7-d measurement period. Weekdays were shown to be stronger predictors than weekend days, potentially because of the stability of SB in both men and women throughout the weekdays. Even though weekdays were found to be stronger predictors, differences between men and women's SB on weekend days suggest that inclusion of weekend days in measurement of SB is important. Additionally, using any 4 d of measurement in place of the typical 7 d would reduce the burden placed on participants and researchers, as well as potentially improve compliance in participants wearing accelerometers. The 4-d minimal wear time recommendations would also provide the added advantage of including more participants' data being eligible for inclusion in study data sets applying minimal wear time recommendations for measurement. This can be seen with the present data set that of the 956 participants who completed a 7-d accelerometer assessment, only 293 met the wear time criteria on all 7 d.

This finding is similar to the recommendations of using three weekdays and 1 weekend day for adequate measurement of PA that is often used (25). This methodology used in PA assessment is supported by the conclusion of Trost et al. (24) that over 80% of PA variability can be determined from only 3–5 d of measurement. Applying the three-weekday and one-weekend day wear time criteria to our data set, 708 participants would have acceptable data, highlighting the potential for increased sample sizes when requiring fewer days of wear to characterize PA and SB.

Strengths and limitations. The major strength of this study was the robust sample size with 293 adults who ranged in age from 19 to 90 yr. Additionally, the data set was composed of seven consecutive days of measurement with 2051 person-days of SB measurement. This data set allowed for analyses of differences between sex across days of the week and weekdays versus weekends.

A limitation of the present study was the absence of available information for other demographic variables associated with differences in SB, such as occupation, employment status, and race. The present population was recruited from a community that is 84% Caucasian, making it likely that the present cohort was predominantly Caucasian. The design of the present study required a 7-d measurement period. As both men and women who met this criterion had significantly lower BMI and body weight than those excluded from analysis (<7 d of data), further research is warranted to evaluate SB variability in overweight and obese populations. Additionally, it is not well-known how representative one 7-d period is of a person's SB. More research is needed on how much SB varies throughout different circumstances, such as the season of the year or during periods living at home versus time away from home.

CONCLUSIONS

When assessed over a 7-d measurement period, SB appears to be very stable from day to day, although there may be some small differences in time spent in SB and breaks in SB between men and women, particularly on weekend days. Further study of the influence of these and other characteristics such as occupation, employment status, and race on SB is needed. Given the stability of objectively measured SB measurement over a 7-d period, it appears reasonable to perform assessments in <7 d. The findings from the current study support that 4 d can provide a reasonable measure, thereby reducing participant burden and making it easier for researchers to collect data sufficient for the formation of recommendations related to general health guidelines.

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