

SEDENTARY TIME IN MIDLIFE WOMEN

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ABSTRACT

Physical inactivity contributes to chronic illness and is an important factor in chronic illness prevention. Minimal consideration has been given to sedentary time independent of physical activity (PA) levels in reducing health risks. The purpose of this study was to assess sedentary time independently of light, moderate and vigorous PA levels in midlife women. A small convenience sample of 24 midlife women ages 47-55 consisting of faculty, staff, and students at a large Mid-western university wore an accelerometer for seven consecutive days to assess physical activity levels. Findings indicated that the sample was sedentary for more than eight hours a day (μ 720 min/day; SD 93). With this small convenience sample of women, the results must be analyzed carefully and may not be generalizable beyond this sample. Assessing sedentary time along with other metabolic factors that increase the risk for cardiovascular disease and Type 2 diabetes will lead to more effective interventions to improve health outcomes.

INTRODUCTION

Considerable information has been published about the health and wellness benefits of physical activity. The United States Department of Health and Human Services distributed physical activity recommendations detailing the frequency, duration and intensity of physical activity for individuals. Recommendations for adults include, 150 minutes per week of moderate or greater intensity or 75 minutes of vigorous-intensity physical activity most days of the week (U.S. Department of Health, 2008, p. vii) to prevent chronic conditions. The physical activity guidelines are endorsed by the American Heart Association, the American College of Cardiology, and the American Diabetes Association. These recommendations apply to midlife women (ages 47-55), the focus of the current study, who have increasing cardiovascular disease risk during the transition to menopause (American Heart Association, 2013).

It is important to note that there are no guidelines regarding the duration of sedentary time each day. Research is underway in this area; however the

information and knowledge has not reached the level of being incorporated into national or international guidelines. The daily lives of the majority of individuals in modern society involve sitting rather than moving around. Means of transportation, work, and home life include low energy activities for most individuals. Sedentary behaviors such as watching television, computer use, or sitting in an automobile typically are in the energy expenditure range of 1.0-1.5 metabolic equivalents (METs). For comparison, vigorous activity is typically >6 METs (Tudor-Locke C, Washington TL, Ainsworth BE, Troiano RP., 2009). The purpose of this study was to assess sedentary time independently of light, moderate and vigorous PA levels in midlife women.

LITERATURE REVIEW

Sedentary behavior has been a recent topic of interest for researchers. “Too much sitting – a health hazard” (Dunstan, Howard, Healy, & Owen, 2012) represents this concept and state that sedentary behavior is not a recent phenomenon. Physicians as early as the 17th century noted that there was a relationship between sedentary time and deleterious health consequences (Dunstan et al., 2012, p. 370). M.T. Hamilton, D. G. Hamilton, and Zderic (2007) indicated that little has been determined about the cellular signals, physiological responses, and disease outcomes caused by prolonged sitting and other sedentary behaviors (p. 2655). Some studies have shown specific relationships between sedentary time and weight gain, increases in plasma glucose and abnormal glucose tolerance, cardiovascular disease, as well as cancer (Thorp et. al. 2011). Many of these adverse health consequences can potentially be prevented with physical activity and a reduction in sedentary time throughout the lifespan.

Several studies have researched the correlation between television viewing (sedentary activity) and cardiometabolic health. In the Australian Diabetes, Obesity and Lifestyle Study (AusDiab) conducted in 1999-2000, findings suggested that among adults without known diabetes, self-reported TV time was positively associated with undiagnosed abnormal glucose metabolism (Dunstan, Salmon, & Owen, 2004). AusDiab (2004) also reported that high TV viewing time was associated with overweight and obesity than lack of leisure time physical activity (Cameron et al. 2003).

Dunstan et al., (2012) calls attention to prolonged unbroken sitting as a contributor to poor health. In the AusDiab study, it was discovered that there were significant beneficial associations observed with frequent breaks in sedentary time (Dustan et al., 2012). Physiologically, it has been suggested that the loss of local contractile stimulation induced through sitting leads to both the suppression of skeletal muscle lipoprotein lipase (LPL) activity, which is necessary for triglyceride uptake and high-density lipoprotein (HDL) cholesterol production, and reduced glucose uptake (Bey & Hamilton, 2003). However, when an individual takes breaks between long periods of sitting, the suppression of skeletal LPL decreases and there are improved mechanisms for glucose uptake.

To reduce time spent sedentary, some literature recommends increasing time spent in non-exercise activity thermogenesis (NEAT). NEAT is described as an activity that is not sleeping, eating, or structured sports-like physical activity (Levine, 2002). NEAT ranges from daily walking into work to agricultural tasks, like gardening, as well as standing, stretching, turning, bending, or fidgeting. A deficiency in NEAT will result in less movement and consequently less daily caloric expenditure. "Neat is the most

variable component of the total energy expenditure, typically ranging from approximately 300 to 2,000 kilocalories per day when comparing the average of the estimate for the lowest and highest quartiles in total energy expenditure” (Brooks, Butte, Rand, Flatt, & Caballero, 2004). By increasing NEAT, time spent sedentary can be interrupted by different types of caloric expenditure. It is important to note that meeting physical activity recommendations may not affect NEAT deficiency, since nonexercise activity takes place over a far greater time span every day and continually interrupts sedentary time.

METHODS

SAMPLE AND SETTING

In this descriptive study, a convenience sample ($n=23$) was recruited via email broadcast. This sample included metabolically healthy (no diagnosed diabetes) midlife women, ages 47-55 years, from faculty, staff and students at a large academic medical center in the Midwest. This sample also reported that they did not engage in regular physical activity.

Demographics were assessed and are reported in Table 1. This sample was on average 50 (SD 2.4) years old and had a mean body mass index of 25 (SD 4.4). The majority of the sample was caucasian and married with all of them having at least some college education.

TABLE 1 DEMOGRAPHIC INFORMATION

Demographic Variables	Participant Responses (N=25)
Age	M=48 (47-50) years
Race	
	Caucasian 24 (96%)
	African American 1 (4%)
Ethnicity	
	Not Hispanic or Latino 25 (100%)
Marital Status	
	Single 6 (24%)
	Married 18 (72%)
	No Response 1 (4%)
Education	
	Some College 5 (20%)
	College Graduate 10 (40%)
	Graduate School 10 (40%)

PROCEDURES

Each woman was given an RT3 triaxial accelerometer (Stay-Healthy, Monrovia, CA) to wear for seven consecutive days (five week days and two weekend days) with instructions to wear the monitor during waking hours except during bathing or swimming.

MEASUREMENT

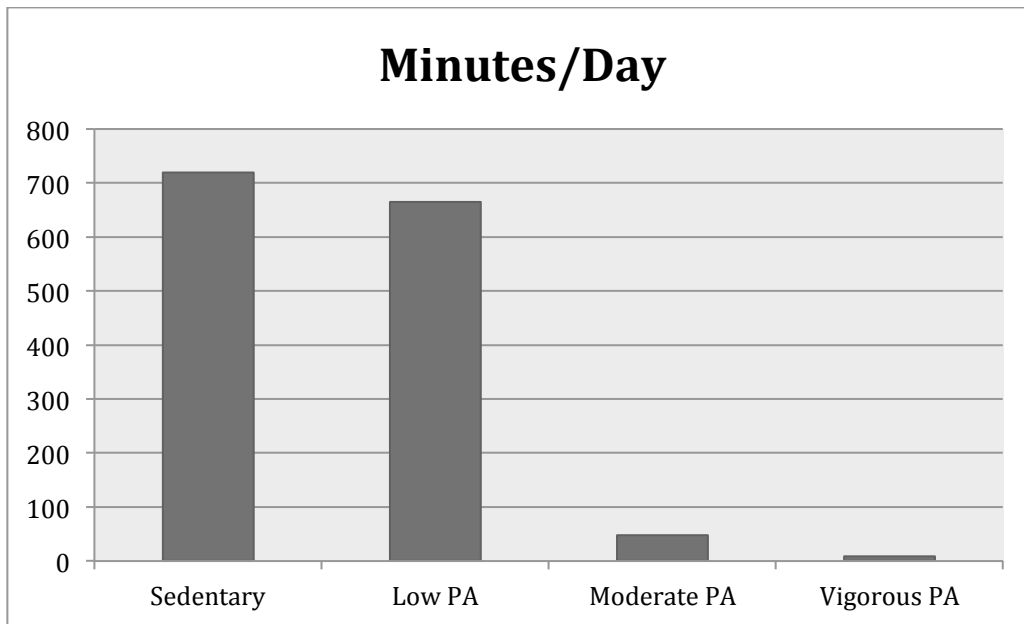
Total minutes per day for each intensity level were calculated. Intensity levels were measured based on metabolic equivalents (METS). One metabolic equivalent is the “amount of oxygen consumed while sitting at rest and is equal to 3.5 ml O₂ per kilogram body weight x minutes” (Jetté M, Sidney K, & Blümchen G., 1990, p. 1).

The accelerometer measurements included sedentary: METS=1, low intensity activity: $3 > \text{METS} > 1$, moderate activity: $6 > \text{METS} > 3$, and vigorous activity: $\text{METS} > 6$.

RESULTS

This sample of women was overweight with a mean BMI of 25 kg/m^2 . These women's body mass indices ranged from $20.7 - 38.7 \text{ kg/m}^2$. This information about the sample indicates that the risks for adverse health conditions were increased due to high BMI. The sample, on average, was sedentary for more than eight hours a day ($M=720 \text{ min/day}$; $SD 93$). Results of the samples average PA levels are demonstrated in Figure 1 in minutes per day.

FIGURE 1 RESULTS



DISCUSSION AND STUDY LIMITATIONS

Although this group of women, on average was meeting the daily recommendations for physical activity; some participants were below the recommended level, based on the research evidence to date, these women had a greater risk of morbidity and mortality than women who were sedentary for fewer hours a day. The knowledge gained from this study and future larger investigations holds promise for promoting the development of national guidelines for sedentary behavior and to allow clinicians to individualize recommendations to reduce sedentary time in midlife women. In addition, this small sample was mainly Caucasian, college-educated females, thus, the results may not be generalizable to the larger population. A larger study with greater socioeconomic, racial and ethnic diversity is needed. New and innovative technology will provide more accurate data measurement for physical activity as well.

CONCLUSIONS AND FUTURE STUDY

There are currently no recommendations addressing sedentary time. There is insufficient information about inactivity physiology to prompt new public health policies limiting sitting time and supporting prescription of nonexercise activity to reduce risk factors related to metabolic diseases (Hamilton, Hamilton, & Zedyric, 2007). Determining the mechanisms through which sedentary behavior negatively affects health will help determine which features (e.g., environment, energy expenditure, type of activity) should be prioritized in measurement (Marshall and Merchant, 2013).

Future research will add to experimental evidence underlying the negative health effects of sedentary time. There is currently insufficient information about inactivity physiology to prompt new public health policies limiting sitting time and supporting prescription of nonexercise activity to reduce risk factors related to metabolic diseases (Hamilton, Hamilton, Zedyric, 2007).

Replacing sedentary time with light or non-exercise activity throughout the day, while continuing to meet the National PA guidelines is a consideration for healthcare providers when counseling midlife women. Updating the current guidelines with recommendations to address the time spent sedentary each day will be beneficial to decrease morbidity and mortality. The ultimate goal of this research is to create healthier, more active individuals and prevent chronic illness.

DISCLOSURES:

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