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Title: Treadmill Desks at LANL - Pilot Study

Author(s): Fellows, Samara Kia

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Abstract

Introduction: It is well established that sedentariness is the largest, preventable contributor to premature death, eclipsing smoking in recent years. One approach to reduce sedentariness is by using a treadmill desk to perform office work while walking at a low speed.

Design and Methods: This longitudinal study was comprised of two groups; participants who are using the treadmill desk, and participants who are using a standard desk. Surveys and biometric data were collected from both groups 3 times at 1 month, 4 month, and 7 months. Additionally, a third group of users was identified: those not included in either group in the original study; these were individuals who had access to the treadmill desk, utilized it under their own initiative, and recorded their use without specific direction under the study.

Results: During the winter months of December 2014 through February 2015, 21 visits were officially recorded by 3 study participants. In the spring months of March through May 2015, 64 visits were officially recorded by 8 participants. In the summer and fall months of June through November 2015, no visits were recorded by any study participants. Through the months of December 2014 to May 2015, non-study users recorded a total of 49 visits or 42% of all visits; however, there were also no visits recorded by this group after May 2015.

Conclusions: We found an increased interest level when the treadmill desks were first introduced to LANL, but after a few months interest appeared to drop. It is possible that treadmill desk use was occurring, but subjects did not record their use. The treadmill desks will not be readily available for purchase by employees due to the study outcome. Additionally, conclusive changes in body measurements could not be performed due to lack of follow up by 58% of the participants.

Introduction

In the United States today about 1/3 of the population is considered obese [2]. The 2008 annual health care cost for obesity, in the United States, was estimated at \$147 billion a year. Annual health care costs for obese individuals are \$1,429 per person more when compared to healthy individuals [2]. Obesity increases risk for developing health issues such as hypertension, coronary heart disease, stroke, type 2 diabetes, and osteoarthritis.

Physical activity and eating habits are essential if an individual wants to prevent or decrease health concerns. Even simple exercise such as walking has been shown to reduce the risk of obesity-related health concerns. The CDC recommends 150 minutes a week of moderate exercise (i.e. walking) or 75 minutes a week of vigorous exercise (jogging, running) [4]. By fulfilling this recommendation an obese individual can lose weight and keep it off, reduce the risk of developing cardiovascular disease, strengthen their bones and muscles, improve mental health and mood, and improve the ability to do daily activities. In order to lose weight or keep off unwanted pounds, one needs to use more calories than one takes in. Since one pound equals about 3,500 calories, to achieve a healthy weight loss of 1-2 pounds per week, one will need to reduce their caloric intake by 500-700 calories/day or increase physical activity. A great way to help prevent obesity is by physical activity. Most working adults have sedentary jobs and do not take the opportunity to incorporate physical activity into their daily lives [3]. Treadmill desks are a great way to make sure an individual can get at least 30 minutes of movement throughout the workday.

Since treadmill desks are a fairly new invention not much research has been done on them. Some of the concerns with treadmill desks are (1) will individuals continue to use them without being reminded to on a daily basis and (2) will it improve an individual's overall health.

I hypothesized that the treadmill desks will be used without daily reminders and will decrease an individual's (1) diastolic blood pressure and (2) waist/hip circumference.

References

1. Canadian Society for Exercise Physiology, 2002
2. Finkelstein, E. A., Trogon, J. G., Cohen, J. W., & Dietz, W. (2009). *Health Affairs, At the Intersection of Health, Health Care and Policy*. Health Affairs. 28(5), 822-831.
3. McCrady, S. K. & Levine, J. A. (2009). Sedentariness at Work: How Much Do We Really Sit? *Obesity Journal*. 17(11), 2103-2105
4. USHHS. 2008 physical activity guidelines for Americans. USDHHS, Washington DC (2008)

Experimental Design

Participants

Participants were recruited through word of mouth and email. Participants who were involved with VirginPulse were offered 1,000 VirginPulse Health Points overall to participate in this study. Subjects were excluded if they were unable to walk at 2 mph, if they answered yes on any question in the Physical Activity Readiness Questionnaire (PAR Q), if they were pregnant, and/or had other health concerns.

Apparatus and/or Instruments

The instruments that were used in this study included: Steelcase Walkstation, medical scale, blood pressure/heart rate device, skinfold calipers, bio-impedance device, and VirginPulse pedometer.

The Walkstation is a treadmill desk in which individuals may walk at a maximum of 2 mph and complete tasks on a desk (i.e. walk and read emails). The Walkstation measures the distance and time walked and how many calories burned. This instrument was being used to see if it helps sedentary employees reduce their resting blood pressure, resting heart rate, body fat %, and waist/hip circumference.

Procedure

All participants are employees of Los Alamos National Laboratory (LANL). Employees were given a PAR Q to determine if they were physically able to participate in the study [1]. All eligible participants provided informed consent. Participants who had access to the treadmill desk were assigned to the treadmill desk group. On the 1st, 4th, and 7th month, biometrics were taken at the Wellness Center. Steps taken per day, minutes of physical activity, body fat percentage, height, weight, waist/hip circumference, resting blood pressure, and resting heart rate were the measurements. Before testing blood pressure, the participant sat for about 10 minutes.

At the end of each month, participants were instructed to submit a log of their physical activity for that month and complete an online survey. The survey took 10-15 minutes to fill out. Upon completing the survey and emailing a completed physical activity log, the participant received 100-200 Health Points if they are members of VirginPulse.

Participants who had access to a treadmill desk were asked to walk for at least 30 minutes every day during the work week.



Figure 1. Typical treadmill desk
Photo courtesy of Steelcase Inc.

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Results

Treadmill	Baseline	4 months	Non-treadmill	Baseline	4 months
# of Participants	13 (10F/3M)	3 (2F/1M)	# of Participants	11 (7M/4M)	7 (6F/1M)
Age (years)	41 ± 14.51	40 ± 12.17	Age (years)	42 ± 11	48 ± 13
Height (in)	65 ± 3.91	66 ± 4.13	Height (in)	67 ± 3.34	66 ± 2.64
Weight (lbs)	151 ± 36.07	129 ± 26.91	Weight (lbs)	172 ± 27.65	166 ± 15.27
BMI (lb/in)	25 ± 6.54	21 ± 2.09	BMI (lb/in)	27 ± 4.06	27 ± 3.68
Body Fat (%)	24 ± 9	17 ± 2.82	Body Fat (%)	28 ± 8.30	29 ± 9.71
Resting Systolic BP (mm HG)	115 ± 12.57	121 ± 5.69	Resting Systolic BP (mm HG)	119 ± 9.89	112 ± 9.96
Resting Diastolic BP (mm Hg)	73 ± 9.54	63 ± 5.57	Resting Diastolic BP (mm Hg)	75 ± 7.83	69 ± 7.71
Resting HR (bpm)	75 ± 13.86	62 ± 13	Resting HR (bpm)	72 ± 12.64	67 ± 10.39
Waist Circ. (in)	36 ± 5.84	31 ± 1.89	Waist Circ. (in)	34 ± 4.78	38 ± 4.26
Hip Circ. (in)	40 ± 5.19	36 ± 1.75	Hip Circ. (in)	42 ± 3.38	43 ± 4.69

Table 1. Anthropometric and body composition variables at baseline and after 4 months for subjects enrolled in the treadmill group
Data are shown as mean ± SD

Table 2. Anthropometric and body composition variables at baseline and after 4 months for subjects enrolled in the non-treadmill group
Data are shown as mean ± SD

Monthly treadmill desk usage

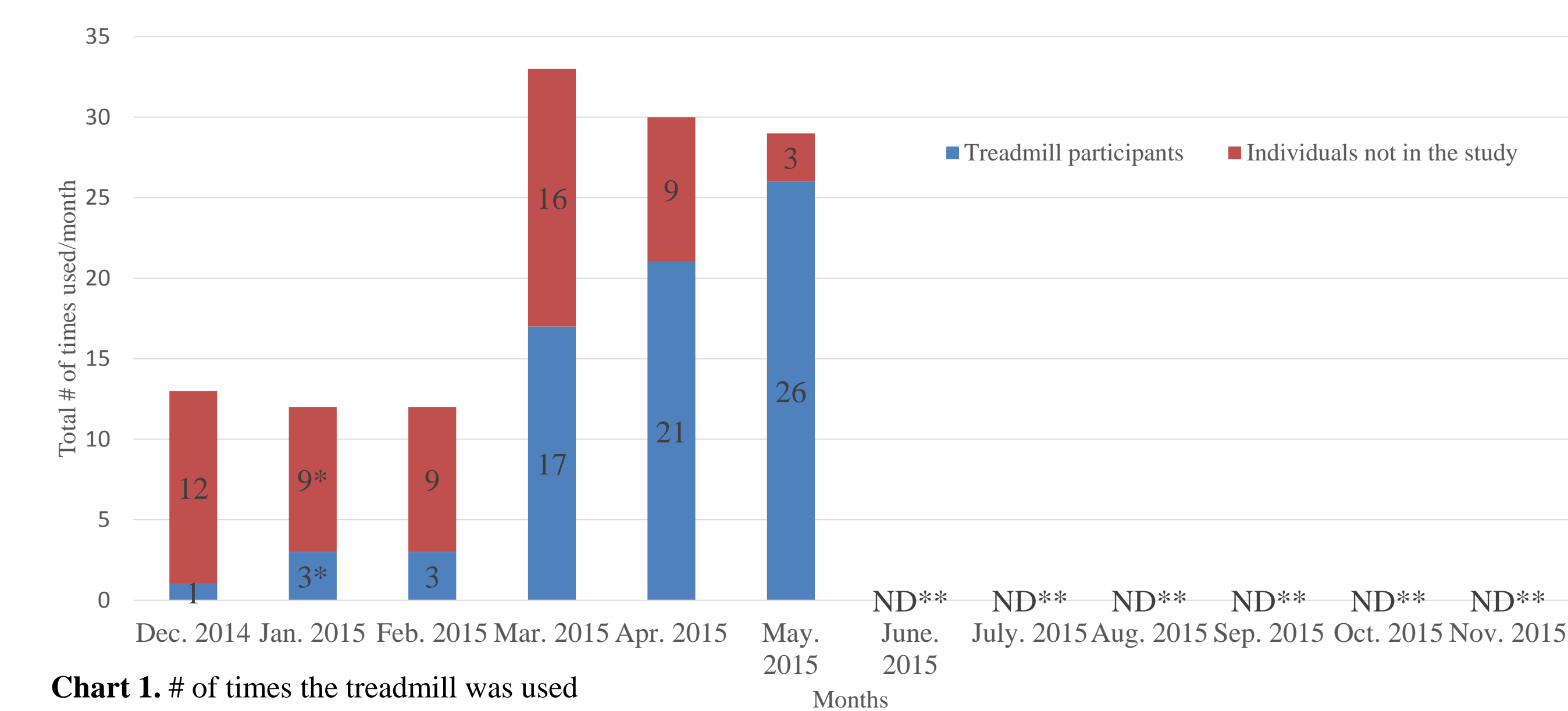


Chart 1. # of times the treadmill was used
* Extrapolated due to incomplete data
**ND indicates no data

In December 2014, one individual in the official study group recorded treadmill use one time. In February 2015, one individual recorded use 3 times. In March 2015, 3 individuals recorded use for a total of 17 sessions: 2, 12, and 3 uses each respectively. In April 2015, 6 individuals recorded use for a total of 21 sessions: 4, 4, 9, 2, 1, and 1 use each, respectively. In May 2015, 5 individuals recorded use for a total of 26 sessions: 3, 2, 7, 3, and 1 use each respectively. In the months June through November, 2015, no data was recorded by any individual so actual use could not be determined. In the month of January 2015, partial data was lost and so numbers were extrapolated based on surrounding data points. Through the months of December 2014 to May 2015, non-study users recorded a total of 49 visits or 42% of all visits.

Discussion

The goal of this study was to see if individuals would utilize the treadmill desk on a daily basis and if utilizing a treadmill daily would reduce diastolic blood pressure and hip/waist circumference. Unfortunately we did not have enough data to conclude any results. Some explanations for why this result occurred include a lack of convenience and flexibility for some users. The treadmill desks were installed as kiosks (shared workstations) wherein individuals reserved time and might have to travel to the kiosk if it was not located in their building. Here at LANL, employees may have felt that they did not have 10-15 minutes to travel to the treadmill desk. Better results may have been found if each of the treadmill participants were able to acquire their own desk.

We did, however, find that there was a peak in interest in the LANL population when the treadmill desk was first introduced. As time went on, interest fell and/or people were utilizing the desk but neglected to track their usage. In fact, 53% of all recorded visits were from 2 individuals.

As a result of apparent lack of interest or ability, treadmill desks will not be made readily available for purchase here at LANL. The shared workstations will still be available. Please check the ergonomic website (ergo.lanl.gov) for locations and the POC for the desk.