ABSTRACT

THE IMPACT OF A WORKPLACE INTERVENTION ON SITTING TIME AMONG OFFICE EMPLOYEES: *STANDPOINTS!*

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Excessive sitting time is a risk factor for type 2 diabetes, cardiovascular disease, metabolic syndrome, obesity, and premature mortality and is prevalent in office-based workplace settings. Researchers have designed a wide variety of interventions designed to increase physical activity in the workplace, but only within the last decade has decreasing sedentary activity explicitly been targeted. The objective of this pre/post quasi-experimental study (*Standpoints!*) was to evaluate the impact of a multicomponent workplace intervention on office employees' percentage of sitting time. The 6-week intervention was comprised of web-based, in-person, and point-tracker components. Changes in the percentage of sitting time at the workplace, in minutes per 8-hour work day (primary outcome), were measured by self-reported data through the Occupational Sitting and Physical Activity Questionnaire (OSPAQ). The control group was not exposed to this intervention; these participants were encouraged to continue normal daily routines and not to drastically change their nutrition habits or physical activity during the 6-week period.

Relative to the controls, the intervention group significantly reduced workplace sitting time (mean change −45 min/8-h work day). Workplace sitting was replaced primarily by incorporating standing (+39 min 22 sec/8h work day) and walking (+5 min and 46 sec/8-h work day) with no change in heavy labor/physically demanding tasks. The control group alternately had an increase in their percentage of sitting time during the span

of the 6-week period (+8 min 38 sec/8h work day) and reduced the amount of standing (-6 min and 14 sec/8-h work day), walking (-4min and 19 sec/8-h work day), and heavy labor/physically demanding tasks (-58 sec/8h work day).

This 6-week multicomponent workplace intervention showed significant reductions in sitting time in the intervention group. Studies to assess the sustainability of this program and the potential for other health-related benefits of reducing sitting time are needed.

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THE IMPACT OF A WORKPLACE INTERVENTION ON SITTING TIME AMONG OFFICE EMPLOYEES: *STANDPOINTS!*

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CHAPTER 1

INTRODUCTION

Over the last few decades, the United States has seen substantial advancements in modernized technology, an increased work week, and a decrease in physically demanding jobs which have led to an increase in inactive lifestyles. Sedentary behavior is defined as activities that require low levels of energy expenditure,[1] ≤1.5 METs, while in a sitting or reclining position[2] and include activities such as lying down, watching TV, sleeping, and other forms of screen-based entertainment that does not increase energy expenditure above the resting level (1.0-1.5 METs).[3] The National Health and Nutrition Examination Survey (NHANES) waves from 2003-2004 and 2005-2006 reported that the average American adult spent 8 hours of one's waking hours in sedentary behaviors.[4,5]

Several cohort studies have linked sedentary behavior to adverse health outcomes in adults and have included common leisure sedentary behaviors in their analysis: TV viewing, screen time, reading, and playing view games. Dunstan et al. found that prolonged TV viewing time was associated with an increased risk of cardiovascular disease and all-cause mortality.[6] Independent of leisure-time exercise activities, each hour increment of screen time was associated with 11% of all-cause mortality and 18% of cardiovascular disease mortality in individuals who watched greater than 4 hours of TV per day. Independent of physical activity, Patel et al. found that those who reported sitting for greater than 6 hours during leisure time, compared to less than 3 hours, had an increased risk of all-cause death rate of 40% in women and 20% in men.[7] The combination of both sitting more and being less physically active was associated with an increase of all-cause death rates of 94% in

women and 48% in men.[7] Kim et al. concluded that the risk of mortality increased with longer durations of sedentary behaviors.[8] More specifically, the researchers found a strong correlation between adverse effects of prolonged sitting while doing leisure activities and at meal times but found a weak correlation between sitting during transportation or at work with all-cause mortality.[8]

A positive relationship between sedentary behavior and type 2 diabetes, cardiovascular disease, and all-cause mortality was found in several reviews.[1,3,9] Additionally, a direct influence on metabolism, bone mineral content, and vascular health,[10] independent of physical activity, was associated with prolonged sedentary behavior. Although not the main focus of the review, Rezende et al. noted that despite the positive relationship between sedentary activities in older adults (>60 years old) and risk of all-cause mortality, some common activities in this population such as playing board games, crafting, reading, and computer use were associated with decreased risk of dementia.[9]

In 2008, the release of the *Physical Activity Guidelines*, called for public action to increase physical activity levels. The recommendations encouraged adults to participate in 150 minutes of moderate-intensity aerobic physical activity or at least spread out physical activity in bouts of 10 minutes throughout the week.[11] In that same year, the World Health Organization met for the 61st World Health Assembly to discuss workers' health and a global plan of action.[12] The assembly highlighted the importance of protecting and promoting health in the workplace and released the WHO Global Plan of Action on Workers' Health (2008-2017): Baseline for Implementation in 2013.[13] Since the release of these two guidelines, there have been a plethora of studies and government actions promoting physical activity in the community, workplace, schools, health care facilities, and other locations and several review articles have addressed interventions aimed at increasing

physical activity in adult populations.[14-16] Only recently has the literature addressed the need for a focus on reducing sedentary activity explicitly.

The impact of sedentary behavior, in the face of prolonged sitting time, is associated with premature mortality;[17,18] chronic diseases including cardiovascular disease,[19] diabetes,[20,21] metabolic syndrome, obesity; and cancer.[3,22,23] In spite of meeting weekly guidelines for physical activity, sitting for prolonged periods of time compromises metabolic health.[1] While the exact definition of prolonged sitting time still remains unclear, studies have looked at periods ranging from >20 minutes,[21] >3 hours,[19] >4 hours,[24] to >6 hours/day[25] to define sitting for prolonged periods.

A large majority of working adults sit during their commute to work, at work, and during leisure time. The average employee in the US spends about 8.9 hours at work or doing work-related activities.[26] Work days have been associated with 2 hours more of sitting and less standing and walking time in comparison to leisure and non-work days.[27] With the workplace being a setting where sedentary behavior is highly prevalent,[28] employees are at greater risk, especially office employees, for compromised health.

Problem Statement

In 2010, Chau et al. reported that there were no workplace studies that attempted to reduce sitting time specifically as a primary outcome of research.[29] Proper et al. confirmed the results from Chau et al. by stating that studies that only focus on promoting physical activity won't have as great of an impact on reducing sitting time specifically.[3] In response to these studies, several researchers designed interventions for the workplace that included: 1. changing the work environment by introducing sit-stand, treadmill, cycling and stepping workstations; 2. prompts at the point of choice via computer programs; or 3. a

multicomponent intervention program involving several of the previously mentioned strategies and additionally workplace organizational elements. The issue for interventions designed to break up prolonged sitting is how to increase the odds of people performing an alternative behavior—standing, walking, or exercising—while at work.[24]

Several studies also looked at dietary intake in addition to sitting time at work. Most studies used dietary analysis to control for the primary intervention outcome. Participants were asked to maintain usual dietary habits from baseline and throughout the intervention period[23] or to record everything they ate 24 hours before the first assessment and to repeat the same dietary intake before the follow-up assessment.[30] Thorp et al. even went as far as providing prepared meals (i.e. breakfast, lunch, and snacks) by a nutritionist to provide 70% of each individual's estimated energy needs in order to control dietary intake during the study.[31]

Purpose Statement

The purpose of this study is to examine the impact of a 6-week multicomponent intervention on employee sitting time at the workplace. The study will also evaluate the impact of the intervention on participants' indicators of health and dietary practices.

Hypotheses and Research Questions

Hypothesis 1: Office employees participating in the 6-week multicomponent intervention program titled *Standpoints!* will reduce their percentage of sitting time at work.

Research Question 1: Will the intervention impact employees' sitting time percentage?

Hypothesis 2: Office employees participating in the 6-week multicomponent intervention program will reduce their BMI and waist circumference.

Research Question 2: Will the intervention have an impact on employees' biomarkers for health?

CHAPTER 2

REVIEW OF THE LITERATURE

Hazards of Prolonged Sitting

Sitting for long periods of time, as seen in the workplace, has been associated with musculoskeletal discomfort in the upper extremities and neck as well as lower back pain.[32,33] One study also looked at sitting time and endothelial function. Impaired endothelial function has been used as a predictor of cardiovascular disease.[19] Thosar et al. incorporated two trials, one with uninterrupted sitting and the other with breaks in sitting time.[19] The effects of the 3-hour uninterrupted sitting time trial resulted in decreased endothelial function while the second trial, incorporating breaks in sitting time with low-intensity physical activity, did not observe a decline in endothelial function.[19] Yates et al. found that independent of physical activity, chronic low-grade inflammation and poor metabolic health in women were positively associated with self-reported weekday sitting time.[34] In a recent review, Dunstan et al. 2012, noted prominent evidence to support the relationship between sedentary time with biomarkers of obesity, diabetes, and cancer.[6]

Benefits to Breaking Up Prolonged Sitting Time

Breaking up prolonged sitting time has positive effects on health. Researchers have seen the impacts of reducing sitting time across different age groups and varying health states. One of the first studies to objectively assess breaks in prolonged sedentary activity

and biomarkers for metabolic risk found that the total number of breaks in sedentary time, independent of total sedentary time, was associated with significantly smaller waist circumference, a reduced BMI, lower triglycerides, and a normal-range 2-h plasma glucose in middle-aged adults.[35] More specifically, Larsen et al. found that interrupting 7 hours of sitting time with 2-minute bouts of either light-intensity or moderate-intensity walking every 20 minutes was shown to significantly lower systolic blood pressure in overweight and obese adults ages 45-65.[36]

The effects of breaking up sitting on insulin were found to reduce endogenous insulin secretion, as a reflection of lower levels of postprandial C-peptide, in young (18-24 years) healthy adults who participated in hourly 8-min, moderate-intensity cycling exercise bouts over an 8-hour period.[37] In adults ages 18-40 years, Peddie et al. found similar results in postprandial insulin levels when participants broke up sitting time with 1 minute and 40 seconds of brisk walking every 30 minutes.[30] In overweight or obese adults, ages 45-65, Dunstan et al. found that 2-minute bouts of light-intensity and moderate intensity walking every 20 minutes lowered postprandial insulin and glucose levels.[21] A decrease in postprandial insulin levels is indicative of a reduced need for insulin as the short bouts of physical activity helped to improve the body's response to transfer glucose from the blood into the cells of active muscles.

To reduce musculoskeletal discomfort and lower back pain, Husemann et al. reported that alternating between entering data while sitting for 30 minutes at work, then standing for 15 minutes doing non-data-entry office work (such as photocopying, shredding, and sending faxes) resulted in a decrease in physical complaints after one week of the intervention.[38] Several years later, Thorp et al. observed a reduction in musculoskeletal discomfort in the lower back and a reduction in levels of fatigue when participants reduced

sitting time with alternating standing and sitting bouts of 30 minutes, without affecting work productivity.[39]

Interventions to Reduce Sedentary Activity in the Workplace

The current body of research on intervention programs in the workplace promoting a decrease in sedentary behavior and ultimately prolonged sitting time covers an array of intervention designs. Installation of active workstations,[40-42] such as sit-stand or treadmill desks, use of computer program prompting software downloaded onto work computers[24,43,44] and multicomponent interventions[45] have been used as methods for reducing sitting time in the workplace.

Environmental and Workstation Modifications

The impact of individual workspace modifications on sitting time for office employees has shown a reduction in sitting time and influenced health-risk biomarkers for disease. Modifications included installation of sit-stand desks, treadmill desks, cycling stations, and stepping devices.[40] Through the use of active workstations, Alkhajah et al. assessed changes in objectively measured sitting time, activity levels, and disease risk factors in office-based employees ages 20-65 over a 3-month period.[41] After a baseline fasting blood test (total cholesterol, high-density lipoprotein (HDL) cholesterol, triglycerides, and glucose levels) and anthropometric measurements (height, weight, BMI, waist and hip circumference) were taken, commercially available sit-stand workstations were installed in the employee offices of the intervention group. Participants wore an activePAL activity monitor, worn 24 hours/day across a 7-day observation period, to objectively assess sitting, standing, and stepping time and sit-to-stand transitions. The intervention group significantly reduced their sitting time at work, primarily replacing sitting with standing, by

more than 2 hours and significantly increased HDL cholesterol levels by an average of 0.26 mmol/L. There were no other significant changes in blood or anthropometric analysis.[41]

In the same year, the results from the Take a Stand Project, 2011, were released. Pronk et al. analyzed the effect of a sit-stand device on time spent sitting at work and assessed the effect of reduced sitting time on selected health-related outcomes, mood states, and indices of work over a 7-week period.[42] Sitting, standing, and walking behaviors were monitored by using experience-sampling methodology (ESM) via text message using a cellular telephone. Text messages were sent at three random times over the course of the work day asking participants to describe what state of activity he/she was in—sitting, standing, or walking. Participants also had access to physical activity resources, were offered incentives to participate in physical activity, and were supported by managerial and supervisory policies and protocols that promoted employee health in the workplace. Financial incentives were offered to those who actively engaged in the organization's health and well-being program as a whole. Survey questions were utilized to assess the effect of a decrease in sitting on certain health-related outcomes, mood states, and office behaviors. During the intervention period, participants significantly decreased sitting behavior by 66 minutes per day which resulted in a decrease in upper back and neck pain and improved mood and energy levels.[42]

Two recent reviews concluded that active workstations (analysis included standing desks, walking desks, and cycling stations) resulted in an influential decrease in sitting time, an increase in energy expenditure, a positive effect on several biomarkers of health, no negative effect on work performance, and no critical effect on cognitive function.[40] Although there appears to be a significant benefit with the addition of sit-stand workstations, there is a lack of concrete recommendations for how often and how long a change in position needs to occur to achieve health benefits.

Point of Choice

Another design for workplace interventions that attempt to counteract the effects of prolonged sitting in office workers includes point-of-choice prompting software downloaded on employee personal work computers. This design is typically more cost effective than changing the workplace environment with personal workstation modifications. In 2012, Evans et al. investigated the effects of point-of-choice (PoC) prompting software (MyRestBreak) in addition to education, to reduce long, uninterrupted sedentary periods and total sedentary time during the work day.[43] This short intervention study (5 work days) used an assessor-blind, parallel-group, active-controlled randomized design to compare two groups of office workers. One group received an education-only session on the adverse health effects of sitting for long periods while the other group received both the education and point-of-choice (PoC) prompting software on their PCs reminding them to stand every 30 minutes. Participants wore a thigh-mounted activPAL™ at work for 5 work days that measured time-stamped acceleration classified into sitting/lying, standing, and walking.

The prompting software, MyRestBreak, reminded participants to take a break every 30 minutes for 1 minute. The window could not be minimized or moved, but the employees could work in any opened windows around it. Participants at baseline were primarily female and had a normal BMI. The result of the study indicated that there was no difference on total time spent sitting between groups but both the number of and the time spent sitting in prolonged sitting periods (>30 minutes' duration) were decreased in the PoC-plus-education group. The insignificant results of this study could be due to the small number of participants and the short length of the intervention itself and the fact that there was no long-term follow-up.[43] In that same year, Healy published a review on reducing prolonged

sitting in the workplace, identified gaps in research, and concluded that there is a need for cluster-randomized controlled trials that objectively measure and target workplace sitting time and additionally assess health, economic, and social outcomes.[46]

In 2013, Cooley and Pedersen designed a pilot study to increase nonpurposeful movement breaks at work to determine if an e-health delivery of passive and active prompts (via a downloaded computer software program called *Exertime*) would motivate desk-based employees to reduce their prolonged sitting time over two 13-week intervention stages.[24] The study included passive and active stages of prompting. During the passive prompting condition, the software program exposed participants to a prompt they could not ignore every 45 minutes. The prompt included a list of movement activities to break up the act of sitting that could be performed and logged. The second stage, beginning right after the first, was a 13-week active stage that disabled the timed occurrence of the prompting software but still allowed participants to engage in the software program. The study results indicated that the compliance rate was higher during the passive condition which increased the adherence to a change in health behavior. The researchers indicated that future studies should investigate a multiple strategy approach for changing workplace health behaviors to include changes in the built environment, paired with passive prompts to foster a reduction in sedentary behaviors while at work.[24]

A study using a similar design as the Cooley and Pedersen looked at additional variables in office workers and more closely addressed the needs identified by the Healy et al. 2012 review. A randomized controlled trial incorporating an e-health intervention designed to reduce prolonged sitting time and mean arterial pressure (MAP) was effective in incorporating non-exercise physical activity (NEPA) throughout the work day.[44] The prompting software *Exertime* was used during this 13-week intervention to prompt the experimental group to break up a sedentary position every 45 minutes with 30 seconds of

NEPA; the control group did not have *Exertime* downloaded onto their personal work computers. Systolic and diastolic blood pressure measurements were collected before and after the intervention in both the control and experimental groups. The researchers did not implement an objective measurement of sedentary activity through use of accelerometers but did verify the NEPA reports by contacting participants by telephone throughout the experimental period. Participants were asked to verify their self-report of occupational physical activity for the given day through each telephone call. The control group was also contacted by phone on several occasions throughout the study. The calls were used to verify that their workplace behavior continued as normal and that no new forms of physical activity during or outside of the workplace had taken place. The results of the study indicated that passively prompting desk-based employees to break up sitting time, by engaging in voluntary movement, significantly decreased MAP and ultimately blood pressure over the 13-week period.[44]

In 2014, Pedersen et al. aimed to test the effectiveness of a randomized-controlled, field-based workplace health and wellness intervention (WHWI).[47] The purpose of the WHWI was to increase daily energy expenditure by interrupting prolonged periods of sitting with short-bursts of physical activity during the work day. The researchers in this study also used the program *Exertime* to passively introduce reminders to break up prolonged sitting time with a physical activity. The intervention group, who were introduced to *Exertime* over a 13-week period, significantly increased their energy expenditure between pre-test and post-test.[47] Also, the researchers concluded that the use of a passive e-health approach is a cost-effective method for changing health habits and has the potential to improve participant adherence.[47]

Multicomponent Interventions

A study aimed to assess the short-term efficacy of a two-armed non-randomized control trial included organizational, environmental, and individual changes to reduce workplace sitting.[45] The multicomponent intervention was used to determine if objectively measured workplace sitting time, standing time, and moving time in addition to health-related biomarkers and work-related outcomes would differ in the experimental and control groups. At the organization level, the researchers conducted a meeting with management and unit representatives from the intervention group to emphasize the importance of organizational support and to brainstorm strategies to decrease employees' workplace sitting time. The researchers then held a workshop for the participants in the intervention group and provided information on the health consequences of excessive sitting and the details of the intervention design. Environmental changes included installation of dual-display sit–stand workstations (ErgotronWorkFit-S) in the intervention group during the 4-week duration of the study. On an individual level, each intervention participant received a 30-minute in-person consultation with their health coach during the first week and additionally three weekly telephone calls during the remainder of the intervention. The control group was asked to maintain normal work behaviors. The objective measurements in this study included physical activity using an activPAL3 activity monitor; weight, fat mass, and fat-free mass; seated blood pressure; waist and hip circumference; and a fasting blood sample measuring plasma glucose, cholesterol, and triglycerides. The measurements were all assessed on-site and blood samples were sent immediately to an accredited testing laboratory (Melbourne Pathology). Socio-demographic characteristics were also collected at the start of the study and general health, eye strain headaches, digestion and sleep

problems, musculoskeletal health, and work-related performance outcomes were measured pre- and post-intervention.[45] At baseline, there were no significant differences between the control and intervention groups. In relation to the control group, the results of the study showed significant differences in the intervention group of increased standing and decreased sitting and one less hour of prolonged sitting while at work. There were no significant benefits of anthropometric or cardio-metabolic biomarkers or adverse effects on work performance which may be due to the short-term duration of the study (4 weeks) and small sample size (n=44).

Conclusion

The underlying issue presented in interventions aimed at breaking up prolonged sitting is how to increase the chance of performing an alternative behavior in place of pre-existing habits and social norms.[43] According to a recent review, workplace sedentary behavior interventions may have a greater effect and sustainability if multilevel interventions are used. Combining individual smartphone monitoring and feedback about sedentary behavior levels, in addition to social and competitive activities in the workplace, can greatly influence social norms.[48] All computer-based employees should remove themselves from a sedentary position for a short period every hour.[24,44] Although several researchers have indicated the importance of breaking up prolonged sitting time every 30 minutes for a brief period (1-2 minutes),[24,43,44] this intervention program will focus on breaking up each hour with 5 minutes of activity. Additionally, sending the employees prompts every 30 minutes was not accepted by the employee wellness coordinator because of a concern that too many reminders would affect productivity.

According to a recent review by Benatti and Ried-Larsen, epidemiological and experimental studies provide a great amount of evidence of the positive effects of breaking up prolonged sitting time on metabolic outcomes.[49] Based on the research, type, intensity, and frequency of physical activity needed to effectively counteract the adverse effects of prolonged sitting may differ according to subjects' characteristics, especially in accordance to participants' habitual physical activity level. There is a need for well-designed experimental studies to explain more efficient and feasible physical activity levels (type, volume, frequency, and intensity) to break up prolonged sitting time in various populations and settings.[49] Also, interventions in the workplace should target not only the individual but also the organization and the work environment.[42,46]

This research intervention aimed to use a multilevel approach that incorporated web-based, in-person, and point-tracking components. Through the web, Microsoft Outlook software was used to remind employees to break up sitting time every hour and a weekly email—with information on the weekly wellness topic and a stretching/desk exercise e-video—was sent to each participant's inbox. The in-person component included inviting participants to standing in-person weekly lunch-time meetings on wellness topics in the work environment. A points system for healthy competition between co-workers was incorporated. In addition, baseline and post-intervention objective assessments of cardio-metabolic biomarkers were assessed to contribute to the existing lack of research with validated and repeatable interventions. Due to the low cost of utilizing an existing software program (Microsoft Outlook) that employees already used during a typical work day and the help of funding from the School of Health Studies at Northern Illinois University, the intervention itself was at no cost burden to city management.

CHAPTER 3

METHODS

Study Design

A pre-/post-quasi-experimental design was implemented to test the hypotheses for this study. To determine the impact of an intervention program on sitting time and indices of health, anthropometric measurements (height, weight, waist circumference, and BMI) and self-reported data (sedentary and physical activity at work) were collected at baseline and immediately after exposure to a 6-week experimental period and compared between the intervention and the control groups. The intervention group received the program outlined in the Intervention Design section, whereas the control group received no intervention. Data for this study was collected between February and June 2016 and analyzed May–September 2016. Research staff and participants were not blinded to group allocation. Approval from the Institutional Review Board (IRB) of Northern Illinois University was obtained before recruitment of participants and data collection (Appendix D) and all subjects signed an informed consent prior to participating in this study (Appendix C).

Sample Population

A convenience sample of desk-based office employees from two separate towns in the metropolitan area of Chicago was recruited to participate in this study. The intervention

group was recruited from a group of municipal city office employees that included 90 employees housed over ten departments. The control group was recruited from 891 office personnel employed by a local university across all departments. Eligibility criteria for inclusion in the study were: an office employee, aged 18-65, working ≥20 hours per week, ambulatory, not planning an absence of greater than 1 week during the study, and access to Microsoft Outlook email.

Procedures

Intervention Group

In March of 2015, wellness coordinators of several office-based companies in the Chicago area were contacted by email and/or phone call by the researcher to introduce the study and to obtain permission to incorporate the intervention program *Standpoints!* at their site of employment and to ask permission to recruit their office personnel to participate in the study. One office-based site of employment for a city municipal building accepted the proposal. The researcher set up several meetings with the wellness coordinator and the company management to develop the logistics of incorporating the study's wellness program into their employee's activities without affecting their job responsibilities. After several weeks of meetings, a multicomponent (web based, in person, and point tracker) program design was agreed upon and included the use of an existing software program used by the city (Microsoft Outlook) to incorporate hourly reminders to encourage employees to break up their sitting time while at work.

In January of 2016, an information flyer (Appendix A) about the study was sent by management at the city building to all potential intervention participants (n = 90) and in

February a recruitment email asking all employees to attend one of two 30-minute information sessions was delivered by the researcher. The flyer informed employees about the study, the benefits and requirements of participating, and how to find out more information about the program design. The information meetings provided education on the effects of prolonged sitting, the purpose of the study, the program structure, what was required of the participants, how they would be reminded to fulfill the requirements of the study, how often, and ways to accumulate participation points. The points system was used as an incentive to participate, as the employee who accumulated the most points would enter a drawing for a $50 gift card. Employees were also asked at the meetings if they currently had the technology to track their daily step counts or if they needed a pedometer. Employees who indicated that they did not have a means for tracking their steps were provided with a pedometer. Those who agreed to participate signed a consent form at this meeting.

Employees unable to attend the information meeting but who were still interested in learning more about the study were sent an email link to a video of the meeting, a points tracker handout (Appendix J), information on the risks of prolonged sitting, and the informed consent form (Appendix C). The email also asked participants if they had or wanted a pedometer for use during the study and as incentive to accumulate participation points to win a $50 gift card at the end of the intervention. Participants who met the eligibility requirements were reminded that their involvement in the study was voluntary, provided written informed consent (Appendix C), and attended their employee wellness fair for a baseline assessment of height, weight, BMI, and waist circumference measured by a medical assistant.

Control Group

Due to the small number of participants in the intervention group, a control group was later added to the study with IRB amendment approval. In April, university faculty and staff were sent an information flyer (Appendix A) via the University Official Announcements to recruit office employees from the university. The flyer contained information about the purpose and requirements of the study and invited university office-based employees to participate. The flyer also indicated that those who participated in the study would receive a package of wellness information that would include information on the benefits of decreasing prolonged sitting time at work, how to build and pack a healthy lunch for work, innovative ways to be more active at the workplace, how to acquire information on mindful eating, how to build a strong support system within your workplace; and how to create SMART Goals to improve personal healthy habits. The details of the wellness information is outlined in the Intervention Design section. Those who agreed to participate were screened for eligibility, provided signed informed consent (Appendix C), and scheduled a time with the study's lead researcher for the baseline assessment measurements of height, weight, BMI, and waist circumference. Figure 1 displays the order of enrollment, participation, and analyses of participants.

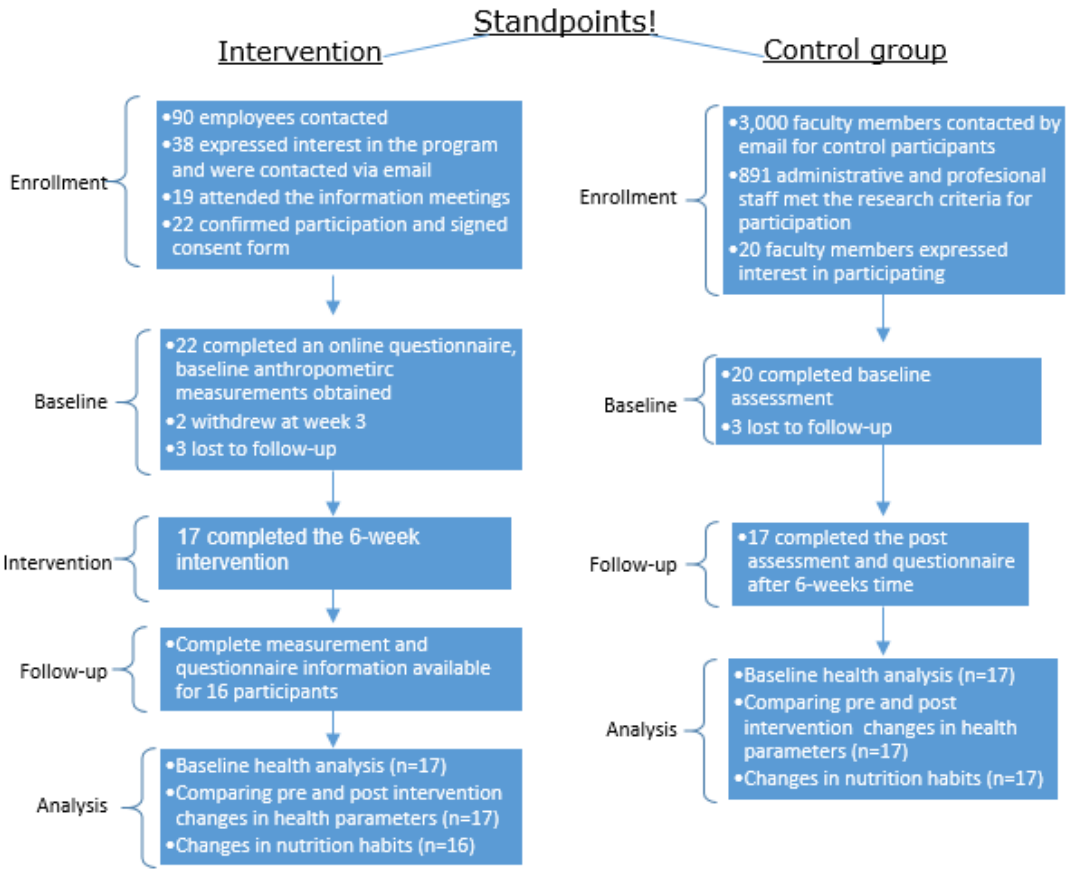


Figure 1. Flow diagram of enrollment, participation, and analyses of participants.

Intervention Design

Each participant in the intervention group was provided with an outline of the 6-week intervention (March-April 2016; Appendix G), sent a weekly information email (Appendix I), invited to in-person wellness meetings, and provided with a points tracker form for daily/weekly activity tracking (Appendix J). In combination with feedback from management and the wellness coordinator for the city employees, the design of the

intervention itself was based on the concepts from the *Essential Elements of Effective Workplace Programs and Policies for Improving Worker Health and Wellbeing*. This resource document was developed by the National Institute for Occupational Safety and Health (NIOSH)[50] and is divided into four categories: Organizational Culture and Leadership, Program Design, Program Implementation and Resources, and Program Evaluation. Each of the four categories included a different number of sub-categories to break down the demonstration of effective program design into a total of 20 sub-categories.

Under Organizational Culture, there are three subcategories: 1. develop a "human-centered culture," 2. demonstrate leadership, and 3. engage mid-level management. The intervention group already had an existing wellness program and coordinator who promoted organizational respect and encouraged worker participation, input, and involvement in short voluntary programs. During the introduction of this research at the city, it was emphasized that the city is committed to providing employees with opportunities to improve their health and wellness and was allowing this research study to take place at their workplace. Mid-level management was involved, including the wellness coordinator for the city, in promoting and communicating with city employee participants to help the program succeed in its endeavors.

The second category, Program Design, included 11 subcategories: 4. establish clear principles, 5. integrate relevant systems, 6. eliminate recognized occupational hazard, 7. be consistent, 8. promote employee participation, 9. tailor programs to the specific workplace and the diverse needs of workers, 10. consider incentives and rewards, 11. find and use the right tools, 12. adjust the program as needed, 13. make sure the program lasts, and 14. ensure confidentiality. The purpose of this study was clearly explained to participants; an initial review of previous literature was conducted; the consistency of the program was kept through same day/time weekly email announcements and same day/time weekly in-person

meetings; an incentive was used to encourage participation and awarded at the end of the intervention; validated instruments were used to assess change from baseline to post-analysis; and all employees signed an informed consent protecting their confidentiality.

The third category, Program Implementation and Resources, had four sub-categories: 15. be willing to start small and scale up, 16. provide adequate resources, 17. communicate strategically, and 18. build accountability into program implementation. This study used self-reported data to assess sitting time percentage as a starting place because the use of direct measures, like accelerometers, was not accepted by city management. It is possible that future studies at this site could strengthen the current program design by using a more direct way of measuring sitting, standing, and moving time while at work. This study provided participants with information of the importance of breaking up prolonged sitting time at work and provided handouts to encourage movement at work. Communication during the program was incorporated multiple times a week and through hourly reminders via Microsoft Outlook, and a point tracker form was included to promote accountability and to reward participation.

The final category, Program Evaluation, was incorporated in this study to measure and analyze the results of the intervention, and Chapter 6 of this paper includes what was learned from this study and what future research should include. The individual details of this study's intervention components are highlighted below:

A. Web-Based

At the start of the intervention program and on the Monday of each week, an email (Appendix I) was sent to each participant that included a weekly theme, a 5-minute stretching and exercise-at-your-desk video, a corresponding handout with images of the

stretches/exercises (Appendix K), an article on the weekly topic, and information on each week's information meeting. The weekly themes were titled: Stand-Up Wellness; Take a Stand at Lunch; The Daily Stand; Move, Food and Mood; Never Stand Alone; and Stand-Up for Life! Additionally, participants were sent hourly reminders via Microsoft Outlook prompting them to change from a sitting position to either stand or move for 5 minutes (Appendix H). The selected prompting frequency was utilized based on the research that all computer-based employees should alter from a sitting position for a short period every 60 minutes.[47] At the point of prompting, employees were encouraged to utilize the weekly email information (the 5-minute stretching/exercise video and the stretching/exercise handout; Appendix K) or the list of ideas for activities to break up sitting time on the provided points tracker form (Appendix J) to spend 5 minutes every hour doing an activity besides sitting while at work. Once the prompt was initiated, it was up to the employee to decide how to shift his/her position from a sitting to active position. At the very least, employees were instructed to stand during the 5-minute break times and could continue working from that position.

B. In-Person

In addition to the web-based component of the intervention program, there was an in-person component to promote behavior change. Employees were invited to attend a lunch-time information meeting to discuss the themed wellness topic of the week guided by the researcher. In total there were four in-person meetings. Discussion at the first meeting included how to build and pack a healthy lunch for work and how to prepare meals in advance and also provided information on fluid intake and the importance of staying hydrated. The second meeting informed participants of the details and benefits to

incorporate standing meetings in the workplace and how to conduct them. The third meeting provided participants with information on the benefits of listening to body cues for hunger and satiety, how mood affects eating habits, and ways to manage stressful eating. The final meeting topic was included in the design to help employees develop long-term goals to improve personal healthy habits. The goals discussed were SMART Goals and were specific, measureable, attainable, realistic, and timely in nature.

C. Point Tracker

The third element of the program involved a points tracker form (Appendix J.) for employees to fill out on a daily/weekly basis. The form included multiple boxes to tally the number of times each employee performed an activity listed. A few examples of possible activities that counted towards earning points were stretching during the work day, standing to greet a visitor to a workspace, having a standing or walking meeting, standing during phone calls, walking to a coworker's desk instead of contacting them by phone or email, taking breaks from sitting during long meetings, using the stairs instead of an elevator, packing a healthy lunch for work, taking a break at the hourly "prompting times," and recording daily step counts. Participants were also provided with a pedometer if they did not previously have the technology to track steps. The participant who earned the highest number of points by the end of the 6-week program received a $50 visa gift card.

Data Collection

Anthropometric measurements for the intervention group were collected at baseline and at the employee wellness fair by a medical assistant. Post-intervention measurements

were taken at the scheduled re-assessment time slot, again by a medical assistant. The control group measurements were collected at baseline as well as at follow-up at the university during scheduled appointments with the researcher. A link to the online survey—a combined questionnaire created using the program Qualtrics—was sent to each participant by email at two occasions during the study, directly following each pre- and post-anthroprometric assessment.

Anthropometrics

At each assessment, all participants had their height, weight, BMI, and waist circumference measured in the same attire. For both groups, height and waist circumference were measured using a DRITZ brand tape measure. For the intervention group, a WEIGHT WATCHERS brand digital scale was used to assess body weight at the employee wellness fair and for the control group an analog scale was used for body weight. A WEIGHT WATCHERS scale was not available for use while assessing the control group and a variance in measures is noted in the limitations section of this study. Body weight was measured after voiding for shoes or heavy clothing (with 2 lbs. reduction for clothing) and to the nearest whole number for both groups. Waist circumference (to the nearest 0.1 in) measures were obtained in duplicate and averaged for both groups.

Questionnaire

Three previously validated questionnaires were used during data analysis for this study. The Occupational Sitting and Physical Activity Questionnaire (OSPAQ) was used to assess sitting, standing, walking, and heavy labor/physically demanding task time while at work. The Global Physical Activity Questionnaire (GPAQ) collects information on physical activity while at work, traveling to and from places, and during recreational activities. For the purposes of this study, this questionaire was used to collect participants' physical

activity outside of work. Dietary information of participants was collected through the use of a 26-item Dietary Screener Questionnaire (DSQ). The DSQ assesses consumption of fruits and vegetables, dairy/calcium, added sugars, whole grains/fiber, red meat, and processed meat within the last 30 days. Participants responded to 16 questions pertaining to how often and how much (based on an assumed serving size) they consumed fruits, vegetables, added sugar, and processed foods in the past month. The DSQ was utilized in this study because an assessment of the total dietary intake was not required and a screener could be used to characterize a population's median intake as well as examine the interrelationship between diet and other variables.[51]

Statistical Analysis

Descriptive statistics were used to describe socio-demographic, work, and health characteristics of office-based employees in intervention and control groups at baseline. This study used the non-parametric related-samples Wilcoxon signed rank test to determine critical differences between the intervention group and control group. All data were analyzed using IBM SPSS Statistics for Windows, Version 22.0. (Armonk, NY: IBM Corp.)[52] Statistical significance for all data analysis was accepted at the $p<0.05$ level of confidence.

CHAPTER 4

RESULTS

Participant Characteristics

Table 1 shows the participant characteristics. Participants ranged in age from 18-65 years old with the greatest percentage of individuals in the intervention group falling between 41-50 years old and in the control group 51 and 60 years old respectively. There were 16 females and one male participant in each group. About 88% of the intervention group participants were Caucasion while 94% of the control group participants were of this ethnicity. Highest level of educational degrees ranged from high school diploma to doctorate degree. The majority of the highest level of education was a bachelor's degree for both the intervention group (41.2%, n=7) and the control group (52.9%, n=9). The majority number of hours that participants worked during the week was 41 to 50 hours (41.2%, n=7) in the intervention group and 31-40 hours (58.8%, n=10) in the control group.

The mean BMI for the intervention group was 27 ± 7.9 and in the control group the mean BMI was 31.4 ± 9.4. The mean waist circumference for the intervention group was 35.4 ± 4.78 while the control group averaged 38.9 ± 9.19 for waist circumference. Participants in the intervention group and control group were similar with respect to demographic characteristics, BMI, and waist circumference. Both groups were similar in physical activity characteristics as well.

Table 1 Participant Characteristics by Group at Baseline

Characteristics	Intervention %(N=17)	Control % (N=17)	% (N=34)
Gender % (n)			
Women	94 (16)	94 (16)	94.1 (32)
Men	5.9 (1)	5.9 (1)	5.9 (2)
Age, years % (n)			
18-30 years of age	5.9 (1)	11.8 (2)	8.8 (3)
31-40 years of age	0	17.6 (3)	8.8 (3)
41-50 years of age	41.2 (7)	5.9 (1)	23.5 (8)
51-60 years of age	35.3 (6)	52.9 (9)	44.1 (15)
60 + years of age	17.6 (3)	11.8 (2)	14.7 (5)
Ethnicity % (n)			
Caucasian	88.2 (15)	94 (16)	91 (31)
African American	0	5.9 (1)	2.9 (1)
Asian Indian	5.9 (1)	0	2.9 (1)
Latino	5.9 (1)	0	2.9 (1)
Education % (n)			
High school diploma	29.4 (5)	11.8 (2)	21 (7)
Associate degree	5.9 (1)	5.9 (1)	5.9 (2)
Bachelor's degree	41.2 (7)	52.9 (9)	47 (16)
Master's degree	23.5 (4)	23.5 (4)	23.5 (8)
Doctorate degree	0	5.9 (1)	2.9 (1)
Hours per week worked % (n)			
20-30 hours	35.3 (6)	0	17.6 (6)
31-40 hours	5.9 (1)	58.8 (10)	32.4 (11)
41-50 hours	41.2 (7)	23.5 (4)	32.4 (11)
51-60 hours	17.6 (3)	11.8 (2)	14.7 (5)
61-70 hours	0	5.9 (1)	2.9 (1)
Days at work per week % (n)			
3 or 4 days	17.6 (3)	0	8.8 (3)
5 or 6 days	82.4 (14)	94 (16)	88.2 (30)
7 days	0	5.9 (1)	2.9 (1)
Body Mass Index, (kg/m^2) mean ± SD	27 ± 7.9	31.4 ± 9.4	*Male 27.65 ± 4.31* *Female 29.3 ± 9.09*
Waist Circumference (Inches) mean ± SD	35.4 ± 4.78	38.9 ± 9.19	*Male* 40.37 ± 0.9 *Female* 36.94 ± 7.61

Physical Activity

About 15% of the participants reported no structured physical activity outside of work (n=5) while 85% of participants reported moderate-vigorous activity outside of work hours (n=29). In the intervention group, 52.9% (n=9) of individuals participated in vigorous activity and 100% (n=17) participated in moderate physical activity. In the control group, 58.8% (n=10) of individuals participated in vigorous activity while 41.2% (n=7) participated in moderate activity. It is noted that the five individuals who did not participate in any outside of work physical activity were all from the control group while all 100% (n=17) of individuals from the intervention group participated in some sort of structured activity outside of work hours. See Table 2 for a group comparison of physical activity frequencies.

Table 2. Physical Activity Characteristics of Participants by Group at Baseline

Activity	Intervention (N=17)	Control (N=17)	(N=34)
Physical Activity Outside of Work Hours % (n)			
Yes	100 (17)	70.6 (12)	85.3 (29)
No	0	29.4 (5)	14.7 (5)
Vigorous Physical Activity			
Yes	52.9 (9)	58.8 (10)	56 (19)
No	47.1 (8)	41.2 (7)	44 (15)
Moderate Physical Activity			
Yes	100 (17)	52.9 (9)	76 (26)
No	0	47.1 (8)	24 (8)

Dietary Intake

Questions used from the dietary screener for analysis included the ones pertaining to whole fruit, non-starchy vegetable, and added-sugar intake and reported as a mean (M) percentage (%) of consumption (Table 3). It was assumed

that each instance of food intake was representative of a single serving size. The Dietary Guidelines recommend that adults over the age of 18 consume two servings of fruit per day[53] and three servings of vegetables per day.[54] At baseline, 52.9% of participants in the intervention group did not adequately meet the minimum two servings per day recommendation while 47.1% did meet the guidelines. In the control group at baseline, 76.5% of participants consumed less than two servings per day while 23.5% consumed two of more servings of fruit per day. In the intervention group, there was a greater initial consumption of fruit than the control group.

Non-starchy vegetable intake was measured from two questions on the questionnaire and averaged by percentage of participants who replied in each category. In the intervention group at baseline, 88.3% of participants did not meet the daily recommended intake while 11.7% of participants consumed three servings or more daily. In the control group at baseline, 94.1% of participants did not meet the recommended daily intake of three non-starchy vegetable servings per day while 5.9% of participants consumed at least three servings daily.

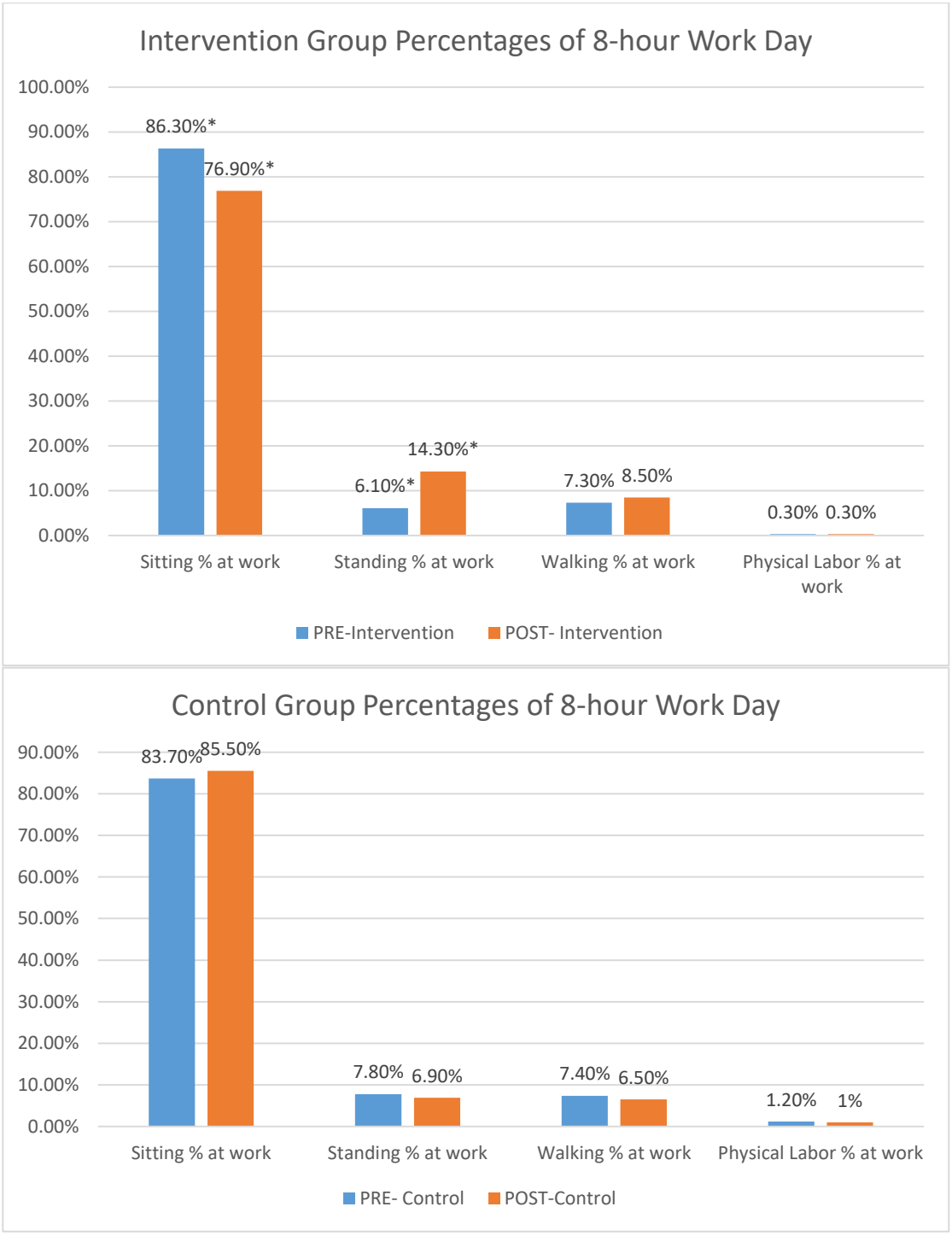
Frequency of added-sugar intake is found in Table 3. At baseline, added-sugar intake was measured from five questions asking participants about their regular soda pop, coffee or tea with added sugar, sweetened fruit/sports drinks, chocolate or candy, and bakery item intake (.ie. donuts, sweet rolls, danish, muffins, and pop tarts). Participants were asked to specify how often an added-sugar item was consumed and was selected from the following options: never, 1-3 times last month, 1-4 times per week, 5-6 times per week, or 1 or more times per day.

Table 3. Dietary Intake Characteristics of Participants by Group at Baseline

Dietary Intake	Intervention (N=17)	Control (N=17)	(N=34)
Whole Fruit Intake %: *< 2 servings per day*	52.9	76.5	64.7
≥ 2 servings per day	47.1	23.5	35.3
Non-Starchy Vegetable Intake: %			
< 3 servings per day	88.3	94.1	91.2
≥ 3 servings per day	11.7	5.9	8.8
Added Sugar Intake % (n)			
Regular soda or pop with sugar:			
Never	47.1 (8)	23.5 (4)	35.3 (12)
1-3 times last month	35.3 (6)	58.8 (10)	47.1 (16)
1-4 times per week	17.6 (3)	5.9 (1)	11.8 (4)
5-6 times per week	0	0	0
≥ 1 time per day	0	11.8 (2)	5.9 (2)
Coffee or tea with added sugar:			
Never	35.3 (6)	47.1 (8)	41.2 (14)
1-3 times last month	23.5 (4)	5.9 (1)	14.7 (5)
1-4 times per week	17.6 (3)	11.8 (2)	14.7 (5)
5-6 times per week	0	17.6 (3)	8.8 (3)
≥ 1 time per day	23.5 (4)	17.6 (3)	20.6 (7)
Sweetened fruit drinks, sports or energy drinks:			
Never	82.4 (14)	58.8 (10)	70.5 (24)
1-3 times last month	5.9 (1)	29.4 (5)	17.6 (6)
1-4 times per week	11.8 (2)	5.9 (1)	8.8 (3)
5-6 times per week	0	5.9 (1)	2.9 (1)
≥ 1 time per day	0	0	0
Chocolate or candy			
Never	0	5.9 (1)	2.9 (1)
1-3 times last month	5.9 (1)	23.5 (4)	14.7 (5)
1-4 times per week	47.1 (8)	47.1 (8)	47.1 (16)
5-6 times per week	11.8 (2)	17.6 (3)	14.7 (5)
≥ 1 time per day	29.4 (5)	5.9 (1)	17.6 (6)
Donuts, sweet rolls, Danish, muffins, pop tarts, etc.			
Never	11.8 (2)	0	5.9 (2)
1-3 times last month	17.6 (3)	52.9 (9)	35.3 (12)
1-4 times per week	52.9 (9)	47.1 (8)	50 (17)
5-6 times per week	5.9 (1)	0	2.9 (1)
≥ 1 time per day	11.8 (2)	0	5.9 (2)

Sitting, Standing, and Moving

Percentages of sitting, standing, and moving time from baseline and follow-up are displayed in Figure 2. In an 8-hour work day, at baseline the intervention group sat an average of 6 hours 54 minutes (86.3%) of work time and the control group sat an average of 6 hours 42 minutes (83.8%) of work time. The percentage of standing time during a typical work day was 6.1% (29 minutes) for the intervention group and 7.7% (37 minutes) for the control group. For both groups, an average of 7.3% (35 minutes) was spent walking at work while percentage of physical labor at work was negligable.



*Indicates statistically significant differences between mean percentage values *p<0.05*

Figure 2. Change in sedentary behavior and activity from baseline to follow-up.

Equivalency of Groups

Physical Characteristics

The intervention group and control group were tested for equivalency at baseline using independent-samples Wilcoxon signed rank test. Participants in the intervention group and participants in the control group were not significantly different regarding BMI (p=0.09) nor did participants difffer significantly in regards to waist circumference (p=0.30). There was also no significant difference in age (p=*0.83*), gender (p=1), race (p=0.51), or highest level of education (p=0.29). Both groups were similar in physical and basic demographic characteristics and did not differ significantly.

Sitting, Standing, and Moving

Data was not available for one post-intervention participant; therefore, the data presented for the study's primary outcome reflects the related-samples Wilcoxon signed rank test using 33 pairs. The results indicated a significant difference between the percentage of sitting time (*p=0.02)* and standing time *(p=0.04)* from pre- to post-assessment for the intervention group. There were no significant differences in the percent of time spent walking or percent time spent performing physical labor for either group. The mean (M) percent times engaged in sitting, standing, and moving for all participants in each group are represented in Table 4. See Figure 2 for the bar graph display of these results.

Table 4. Changes in Sitting, Standing, and Moving at Follow-up

Group: Intervention	**Baseline**	**Follow-up**	**p-value**
Sitting % (M) ± Std Dev	86.3 ± 6.5	76.9 ± 11.4	**0.02***
Standing % (M)	6.1± 2.6	14.3 ± 12.3	**0.04***
Walking % (M)	7.3 ± 4.5	8.5 ± 5.5	0.60
Physical Labor % (M)	0.3 ± 1.2	0.3 ± 1.3	1.00
Group: Control	Baseline	Follow-up	p-value
Sitting % (M)	83.7 ± 7.9	85.5 ± 6.7	0.38
Standing %(M)	7.8 ± 6.3	6.9 ± 3.4	0.798
Walking % (M)	7.4 ± 2.9	6.5 ± 3.9	0.50
Physical Labor % (M)	1.2 ± 2.1	1.0 ± 1.9	0.59

*Indicates statistically significant differences between mean percentage values *p<0.05*

Indices of Health

Similar to the data analysis for sitting time percentage at work, a related-samples Wilcoxon signed rank test was used to assess changes in health biomarkers (34 pairs) and dietary intake from baseline to post-intervention (33 pairs). There were no significant changes in BMI or waist circumference in either group. See Table 5 for each group's biomarkers for health and significance value.

Table 5. Changes in BMI and Waist Circumference

Group: Intervention	**Baseline**	**Follow-up**	**p-value**
BMI (M±SD)	27 ± 7.9	27.14±7.8	0.61
WC (M±SD)	35.4 ± 4.78	35.56±4.13	0.84
Group: Control	Baseline	Follow-up	p-value
BMI (M±SD)	31.4 ± 9.4	31.65±9.57	0.147
WC (M±SD)	38.9 ± 9.19	38.47±9.18	0.69

Dietary Intake

The dietary intake screener was part of the online questionnaire in this study and asked participants about their fruit, vegetable, added-sugar, and processed-foods intake before and after the intervention period. Only one question in the questionaire was used to assess whole-fruit intake. At baseline, 23.5% participants in the intervention group consumed whole fruit 1-4 times per week, 17.6% consumed whole fruit 5-6 times per week, 11.8% consumed whole fruit 1 time per day, and 47.1% consumed whole fruit two or more times per day. At follow-up, there was negligable difference in consumption from baseline, with 25% at 1-4 times per week, 12.5% at 5-6 times per week, 18.7% at 1 time per day, and 43.8% at 2 or more times per day at post-intervention.

At baseline, 29.4% the control group consumed whole fruit 1-3 times a month, 29.4% of participants consumed whole fruit 1-4 times per week, 17.6% of employees consumed whole fruit 5-6 times per week, and 23.5% achieved the recommended daily servings of 2 or more per day. After 6 weeks, the control group's whole-fruit intake was as follows: 23.5% at 1-3 times per month, 41.2% at 1-4 times per week, 5.9% at 5-6 times per week, 5.9% at 1 time per day, and 23.5% consuming whole fruit 2 or more times per day. At baseline and follow-up, the total number of participants meeting the USDA recommended dietary intake of fruits was greater in the intervention group than the control group. Table 6 shows the average (M) percentage (%) of whole-fruit intake at intial and follow-up assessments for both the intervention and control groups.

Table 6. Percentage of Whole-Fruit Intake at Baseline and Post-Intervention

Group: Intervention	**Baseline**	**Follow-up**
Never (M %)	0	0
1-3 times per month (M %)	0	0
1-4 times per week (M %)	23.5	25
5-6 times per week (M %)	17.6	12.5
1 time per day (M %)	11.8	18.7
≥2 times per day (M %)	47.1	43.8
Group: Control	Baseline	Follow-up
Never (M %)	0	0
1-3 times per month (M %)	29.4	23.5
1-4 times per week (M %)	29.4	41.2
5-6 times per week (M %)	17.6	5.9
1 time per day (M %)	0	5.9
≥2 times per day (M %)	23.5	23.5

Overall there were four questions that asked participants about their vegetable intake. The questions on the questionnaire categorized vegetable intake by starchy, green-leafy, and non-starchy-based vegetables. The two questions chosen for purposes of analysis in this study were the ones pertaining to non-starchy vegetable intake in the past 30 days. Participants were asked to rate their servings by the following categories: never, 1-3 times per month, 1-4 times per week, 5-6 times per week, 1 time per day, and 2 or more times per day. Table 7 shows the average (M) percent (%) of participants' servings of non-starchy vegetables in the last 30 days.

Table 7. Percentage of Non-Starchy Vegetable Intake Baseline and Post-Intervention

Group: Intervention	**Baseline**	**Follow-up**
Never (M %)	2.9	3.2
1-3 times per month (M %)	0	3.2
1-4 times per week (M %)	50	46.9
5-6 times per week (M %)	11.8	12.5
1 time per day (M %)	23.5	25
≥2 times per day (M %)	11.8	9.4
Group: Control	Baseline	Follow-up
Never (M %)	5.9	5.9
1-3 times per month (M %)	23.5	20.6
1-4 times per week (M %)	44.1	52.9
5-6 times per week (M %)	0	2.95
1 time per day (M %)	20.6	11.8
≥2 times per day (M %)	5.9	5.9

Five questions pertaining to added-sugar intake were analyzed. The estimated servings of added-sugar intake was obtained from the questions pertaining to regular pop, added sugar to tea or coffee, sweetened drinks, chocolate or candy, and bakery sweets consumed within the last 30 days. A combined analysis of added-sugar intake consisted of an average of the mean frequencies of each category to transform consumption into one variable. Although there was a decrease in added-sugar intake for all frequency categories in the intervention group, the difference was not significant. The control group also had a decrease in the average frequency of added-sugar intake from baseline to follow-up, but again the difference was insignificant. Participants were asked to rate their servings by the following categories: never, 1-3 times per month, 1-4 times per week, 5-6 times per week, and ≥1 time per day. See Table 8 for the average percentage of intake by group.

Table 8. Percentage of Added-Sugar Intake at Baseline and Post-Intervention

Group: Intervention	**Baseline**	**Follow-up**
Never (M %)	35.3	40.0
1-3 times per month (M %)	18.8	21.3
1-4 times per week (M %)	29.4	23.8
5-6 times per week (M %)	3.6	5.0
≥1 time per day (M %)	12.9	10.0
Group: Control	Baseline	Follow-up
Never (M %)	27.0	34.1
1-3 times per month (M %)	34.0	34.1
1-4 times per week (M %)	23.5	23.5
5-6 times per week (M %)	8.2	0
1 time per day (M %)	7.1	8.3

CHAPTER 5

DISCUSSION

This study demonstrated that a multicomponent workplace intervention, using web-based, in-person, and points-tracker features, was accepted and achieved statistically measureable outcomes. Participation resulted in significant differences in sitting (-45 minutes) and standing (+39 minutes) time in those who participated in the 6-week intervention program compared to baseline measurements. Pronk et al. incorporated a similar study length (7 weeks total with 4 weeks of intervention) and found similar results in sitting time reduction (66 minutes per day).[42] Even though Pronk et al. incorporated an environmental change design not used in this current research, the similar time frame is congruent for effective change comparison. Evans et al. used an even shorter assessment period (3-5 work days) and did not find significant differences in the amount of time spent sitting but did see a significant change in the length of prolonged sitting periods.[43]

Cooley and Pedersen conducted a 26-week pilot study to test the feasibility of a workplace e-health intervention based on a passive approach to increase non-purposeful movement to reduce sitting time.[24] Incorporating 13 weeks of passive prompts (forced engagement) and 13 weeks of active prompts (voluntary engagement) to increase non-purposeful work-day movement, the outcomes showed greater attrition for the passive phase.[24] Two follow-up studies incorporating 13 weeks of passive prompts found significant differences in sitting time as well as an increase in calories expended[47] and a decrease in blood pressure.[44] It is possible that due to the shorter duration of this intervention, 6

weeks, and use of active prompts instead of passive, there was a negligible change in health outcomes of the study despite the significant reduction in sitting time.

Results of this study are similar to the findings reported by Healy et al., with respect to BMI and waist circumference.[45] This is plausible due to the short duration of the study and the fact that participants were not asked to add moderate-vigorous exercise to their daily routine or to change their eating habits during the intervention program. In the 4-week intervention by Healy et al., the researchers reported no statistically significant intervention affects (beneficial or adverse) for any of the anthropometric or cardio-metabolic health outcomes.[45]

By request of city management, who surveyed employees during a previous wellness program, topics of nutrition were discussed with participants at the Friday information meetings. Although the intervention program did not directly incorporate a primary nutrition component, pre- and post-intervention nutrition self-assessment questions were still collected. Previous studies have incorporated dietary components in addition to physical activity at work[23,30,31] but used the information to control for the primary outcome of research—sitting time. Future studies designed to decrease sedentary activity should additionally incorporate nutrition education and dietary components to add to the existing gap in the literature.

An email reminder to get up at least every 55 minutes was incorporated based on the previous research that computer-based employees should remove themselves from a sedentary position for a short period every hour.[44] The significant decrease in sitting time suggests that incorporating hourly reminders may be a feasible method for other office-based employees who are required to use their computers during work hours. There was not a significant difference in walking time percentage outcomes, possibly due to the study's

emphasis on sitting itself or the limited distance to incorporate walking (i.e. walk to a co-worker's desk).

The relevance of each individual component of the intervention program was not assessed for contribution in relation to the primary outcome of the study. It is likely that during the short time period of this intervention that the hourly reminders, sent through Microsoft Outlook, were attributed to the significant change. In one such study, Bardus et al. looked at the reasons for participating and not participating in e-health workplace physical activity interventions and found that focusing on employees' needs and motivators to behavior change provided the greatest influence.[55] Future studies could explore the effect of each part of the intervention by adding a survey to the post-analysis assessment to ask participants about which part of the program was most beneficial in encouraging workplace habit change. According to Lally et al., who investigated habit formation in a real-world setting, it takes an average 66 days to form a habit.[56] Although it would have been interesting to use this time frame to determine if there was a greater effect on sitting time percentage if the duration of the study was doubled, a longer intervention design was unsupported by city management.

A recent review by Garner et al. concluded that interventions aimed at reducing workplace sitting time as a primary outcome should incorporate an educational piece to raise awareness of adverse health outcomes of prolonged sitting time, use behavior change theory techniques to instruct on how to break up sitting time, and include a behavior substitution like sit-to-stand desks and/or physical activity programs while at work.[57] A systematic review and meta-analysis examining the impact of theoretical use to promote health behavior change in web-based interventions found that the effectiveness was associated with more extensive use of theory, inclusion of more behavior change

techniques, and the use of additional methods of interacting with participants.[58] The most commonly used theories to develop the internet-based interventions were social cognitive theory (SCT), the trans-theoretical model (TTM), and the theory of reasoned action/planned behavior (TPB). According to Webb et al., the effect size of the TPB had a larger effect on behavior outcomes. The theory of reasoned action/theory of planned behavior suggests that an individual's behavior is determined by his or her intention to engage in the behavior, which is a result of the individual's attitudes, subjective norms, and perceived behavioral control.[59] For the current research to have the greatest effect, an office-based employee's attitude or belief about breaking up sitting time would have to be primarily positive, incorporating organizational involvement and approval for sitting less at work, and each individual's control over reducing sitting time would have to outweigh the perceived barriers. In general, according to the TPB, the more positive the attitude and the subjective norms are (towards reducing sedentary time at work), and the greater the perceived control is, the stronger the individual's intention will be to incorporate breaks in sitting time at work.[59] It has also been suggested that health researchers revise their research interventions to move away from voluntary activity-based programs and incorporate a "forced" (or passive) activity-based design. Incorporating all of these components in an intervention designed to decrease sitting time in the workplace would result in improved compliance, a reduced attrition rate, and stronger results to contribute to the literature.

Conclusion

Results of this study found that office employees who participated in this 6-week multicomponent workplace intervention, incorporating hourly reminders to get up and move, reduced their sitting time percentage by 9.4% and increased their standing time percentage by 8.2% from initial to follow-up. A 9.4% average decrease equates to about

45 minutes and 7 seconds of an 8-hour work day while an 8.2% average increase is equal to 39 minutes and 22 seconds respectively. The participants in this study were similarly matched in gender, age, ethnicity, and education with no significant differences in BMI or waist circumference at baseline. Future studies should recruit a larger sample size, incorporate multiple components to reduce office employees' sitting time while at work, and consider using direct measures of compliance for greater accuracy.

CHAPTER 6
STRENGTHS, LIMITATIONS, AND FUTURE RESEARCH

Strengths

A strength of this study was that there were no significant differences between the groups and adjustment for equivalency was not needed during data analysis. Second, the program design was cost efficient and did not require a software download or equipment purchase for the intervention group participants. Last, the study design included a comparison group and used a consistent interrupted time series to improve the likelihood that the results were not due to chance.

Limitations

The current research was limited by a small sample size (N=34) and the inability to randomize the control (n=17) and intervention (n=17) groups. Additionally, majority of the study's participants were females, thus limiting the generalizability of the study results. Another major limitation of the study was the variance in assessment tools and self-reported data. It was not possible to test both the intervention and control groups using the same scales for body weight and there was a lack of consistency between the medical assistant who measured the intervention group and the graduate researcher who measured the control group. The nature and location of the measurements for waist circumference were discussed but it is still necessary to mention the results obtained are imperfect. Finally, the lack of consistency for time of day for assessments and variance in assessment

dates between the intervention and control groups also limit the validity of the results of this research. The data for the intervention group was collected in March and end of April while the control group's data was collected in April and June.

Future Research

Future trials should use a larger sample size, increase the duration of the study, and incorporate the use of direct measures of compliance—for example, use accelerometers—to more accurately determine sitting time and physical activity percentage in addition to self-reported data. Also, research would benefit from assessing participants at the same time of day at initial and follow-up assessments and during the same time frame/season. Additionally, a more consistent method for measurements and same assessment tools for consistency should be utilized. Finally, a more explicit behavior-theory-based design and inclusion of a dietary education component, in addition to the risks of sedentary activity, would bridge the gap in existing literature.

REFERENCES

1. Thorp AA, Owen N, Neuhaus M, Dunstan DW. Sedentary behaviors and subsequent health outcomes in adults. *American Journal of Preventive Medicine*. 2011;41(2):207–215.

2. Sedentary Behaviour Research Network, Tremblay M. Letter to the editor: Standardized use of the terms 'sedentary' and 'sedentary behaviours'. *Appl. Physiol. Nutr. Metab*. 2012;37. Available at: http://dx.doi.org/10.1139/H2012-024 [Accessed December 6, 2015].

3. Proper KI, Singh AS, van Mechelen W, Chinapaw MJM. Sedentary Behaviors and Health Outcomes Among Adults. *American Journal of Preventive Medicine*. 2011;40(2):174–182.

4. Matthews CE, Chen KY, Freedson PS, Buchowski MS, Beech BM, Pate RR, Troiano RP. Amount of time spent in sedentary behaviors in the United States, 2003-2004. *American Journal of Epidemiology*. 2008;167(7):875–881.

5. Schuna JM, Johnson WD, Tudor-Locke C. Adult self-reported and objectively monitored physical activity and sedentary behavior: NHANES 2005–2006. *International Journal of Behavioral Nutrition and Physical Activity*. 2013;10(1):126.

6. Dunstan DW, Howard B, Healy GN, Owen N. Too much sitting – A health hazard. *Diabetes Research and Clinical Practice*. 2012;97(3):368–376.

7. Patel AV, Bernstein L, Deka A, Feigelson HS, Campbell PT, Gapstur SM, Colditz GA, Thun MJ. Leisure time spent sitting in relation to total mortality in a prospective cohort of US adults. *American Journal of Epidemiology*. 2010;172(4):419–429.

8. Kim Y, Wilkens LR, Park S-Y, Goodman MT, Monroe KR, Kolonel LN. Association between various sedentary behaviours and all-cause, cardiovascular disease and cancer mortality: The Multiethnic cohort study. *International Journal of Epidemiology*. 2013;42(4):1040–1056.

9. Rezende LF, Rey-López J, Matsudo VK, Luiz O. Sedentary behavior and health outcomes among older adults: A systematic review. *BMC Public Health*. 2014;14(1):333.

10. Tremblay MS, Colley RC, Saunders TJ, Healy GN, Owen N. Physiological and health implications of a sedentary lifestyle. *Applied Physiology, Nutrition, and Metabolism*. 2010;35(6):725–740.

11. Office of Disease Prevention and Health Promotion. Adults - 2008 physical activity guidelines. 2015. Available at: http://health.gov/paguidelines/guidelines/adults.aspx [Accessed November 12, 2015].

12. WHO. Sixty-first world health assembly. *World Health Organization*. 2010. Available at: http://www.who.int/mediacentre/events/2008/wha61/en/ [Accessed January 30, 2016].

13. WHO. *WHO global plan of action on workers' health (2008-2017): Baseline for implementation*. 2013. Available at: http://www.who.int/occupational_health/who_workers_health_web.pdf [Accessed January 16, 2016].

14. Bock C, Jarczok MN, Litaker D. Community-based efforts to promote physical activity: A systematic review of interventions considering mode of delivery, study quality and population subgroups. *Journal of Science and Medicine in Sport*. 2014;17(3):276–282.

15. Bottorff JL, Seaton CL, Johnson ST, Caperchione CM, Oliffe JL, More K, Jaffer-Hirji H, Tillotson SM. An updated review of interventions that include promotion of physical activity for adult men. *Sports Medicine*. 2014;45(6):775–800.

16. Malik SH, Blake H, Suggs LS. A systematic review of workplace health promotion interventions for increasing physical activity. *British Journal of Health Psychology*. 2013;19(1):149–180.

17. Katzmarzyk PT, Church TS, Craig CL, Bouchard C. Sitting Time and Mortality from All Causes, Cardiovascular Disease, and Cancer. *Medicine & Science in Sports & Exercise*. 2009;41(5):998–1005.

18. Van der Ploeg HP. Sitting time and all-cause mortality risk in 222 497 Australian adults. *Archives of Internal Medicine*. 2012;172(6):494.

19. Thosar SS, Bielko SL, Mather KJ, Johnston JD, Wallace JP. Effect of Prolonged Sitting and Breaks in Sitting Time on Endothelial Function. *Medicine & Science in Sports & Exercise*. 2015;47(4):843–849.

20. Lyden K, Keadle SK, Staudenmayer J, Braun B, Freedson PS. Discrete Features of Sedentary Behavior Impact Cardiometabolic Risk Factors. *Medicine & Science in Sports & Exercise*. 2015;47(5):1079–1086.

21. Dunstan DW, Kingwell BA, Larsen R, Healy GN, Cerin E, Hamilton MT, Shaw JE, Bertovic DA, Zimmet PZ, Salmon J, Owen N. Breaking up prolonged sitting reduces Postprandial glucose and insulin responses. *Diabetes Care*. 2012;35(5):976–983.

22. CDC. Reducing Occupational Sitting Time and Improving Worker Health: The Take-a-Stand Project, 2011. *Preventing Chronic Disease*. 2012;9. Available at: http://www.cdc.gov/pcd/issues/2012/11_0323.htm [Accessed October 1, 2015].

23. Owen N, Healy GN, Matthews CE, Dunstan DW. Too Much Sitting. *Exercise and Sport Sciences Reviews*. 2010;38(3):105–113.

24. Cooley D, Pedersen S. A pilot study of increasing Nonpurposeful movement breaks at work as a means of reducing prolonged sitting. *Journal of Environmental and Public Health*. 2013;2013:1–8.

25. Robertson MM, Huang Y, Larson N. The relationship among computer work, environmental design, and musculoskeletal and visual discomfort: Examining the moderating role of supervisory relations and co-worker support. *International Archives of Occupational and Environmental Health*. 2015;89(1):7–22.

26. United States Department of Labor. Charts from the American Time Use Survey. *Bureau of Labor Statistics*. 2004. Available at: http://www.bls.gov/tus/charts/ [Accessed October 1, 2015].

27. McCrady SK, Levine JA. Sedentariness at work: How much do we really sit? *Obesity*. 2009;17(11):2103–2105.

28. Ryan CG, Dall PM, Granat MH, Grant MP, Plotnikoff R, al et, Straker L, Tissot F, Gallagher KM, Messing K. Sitting patterns at work: objective measurement of adherence to current recommendations. *Ergonomics*. 2011. Available at: http://dx.doi.org/10.1080/00140139.2011.570458 [Accessed October 1, 2015].

29. Chau JY, van der Ploeg HP, van Uffelen JGZ, Wong J, Riphagen I, Healy GN, Gilson ND, Dunstan DW, Bauman AE, Owen N, Brown WJ. Are workplace interventions to reduce sitting effective? A systematic review. *Preventive Medicine*. 2010;51(5):352–356.

30. Peddie MC, Bone JL, Rehrer NJ, Skeaff CM, Gray AR, Perry TL. Breaking prolonged sitting reduces postprandial glycemia in healthy, normal-weight adults: A randomized crossover trial. *American Journal of Clinical Nutrition*. 2013;98(2):358–366.

31. Thorp AA, Kingwell BA, Sethi P, Hammond L, Owen N, Dunstan DW. Alternating bouts of sitting and standing Attenuate Postprandial glucose responses. *Medicine & Science in Sports & Exercise*. 2014;46(11):2053–2061.

32. Spyropoulos P, Papathanasiou G, Georgoudis G, Chronopoulos E, Koutis H, Koumoutsou F. Prevalence of Low Back Pain in Greek Public Office Workers. 2007.

33. Robertson MM, Ciriello VM, Garabet AM. Office ergonomics training and a sit-stand workstation: Effects on musculoskeletal and visual symptoms and performance of office workers. *Applied Ergonomics*. 2013;44(1):73–85.

34. Yates T, Khunti K, Wilmot EG, Brady E, Webb D, Srinivasan B, Henson J, Talbot D, Davies MJ. Self-reported sitting time and markers of inflammation, insulin resistance, and Adiposity. *American Journal of Preventive Medicine*. 2012;42(1):1–7.

35. Healy GN, Dunstan DW, Salmon J, Cerin E, Shaw JE, Zimmet PZ, Owen N. Breaks in sedentary time: Beneficial associations with metabolic risk. *Diabetes Care*. 2008;31(4):661–666.

36. Larsen RN, Kingwell BA, Sethi P, Cerin E, Owen N, Dunstan DW. Breaking up prolonged sitting reduces resting blood pressure in overweight/obese adults. *Nutrition, Metabolism and Cardiovascular Diseases*. 2014;24(9):976–982.

37. Altenburg TM, Rotteveel J, Dunstan DW, Salmon J, Chinapaw MJM. The effect of interrupting prolonged sitting time with short, hourly, moderate-intensity cycling bouts on cardiometabolic risk factors in healthy, young adults. *Journal of Applied Physiology*. 2013;115(12):1751–1756.

38. Husemann B, Mach CY Von, Borsotto D, Zepf KI, Scharnbacher J. Comparisons of Musculoskeletal complaints and data entry between a sitting and a sit-stand workstation paradigm. *Human Factors: The Journal of the Human Factors and Ergonomics Society*. 2009;51(3):310–320.

39. Thorp AA, Kingwell BA, Owen N, Dunstan DW. Breaking up workplace sitting time with intermittent standing bouts improves fatigue and musculoskeletal discomfort in overweight/obese office workers. *Occupational and Environmental Medicine*. 2014;71(11):765–771.

40. Torbeyns T, Bailey S, Bos I, Meeusen R. Active workstations to fight sedentary behaviour. *Sports Medicine*. 2014;44(9):1261–1273.

41. Alkhajah TA, Reeves MM, Eakin EG, Winkler EAH, Owen N, Healy GN. Sit–Stand workstations. *American Journal of Preventive Medicine*. 2012;43(3):298–303.

42. Pronk NP, Katz AS, Lowry M, Payfer JR. Reducing occupational sitting time and improving worker health: The take-a-stand project, 2011. *Preventing Chronic Disease*. 2012;9.

43. Evans RE, Fawole HO, Sheriff SA, Dall PM, Grant PM, Ryan CG. Point-of-choice prompts to reduce sitting time at work. *American Journal of Preventive Medicine*. 2012;43(3):293–297.

44. Mainsbridge CP, Cooley PD, Fraser SP, Pedersen SJ. The effect of an e-health intervention designed to reduce prolonged occupational sitting on mean arterial pressure. *Journal of Occupational and Environmental Medicine*. 2014;56(11):1189–1194.

45. Healy GN, Eakin EG, LaMontagne AD, Owen N, Winkler EAH, Wiesner G, Gunning L, Neuhaus M, Lawler S, Fjeldsoe BS, Dunstan DW. Reducing sitting time in office workers: Short-term efficacy of a multicomponent intervention. *Preventive Medicine*. 2013;57(1):43–48.

46. Healy G. *Reducing prolonged sitting in the workplace an evidence review: Full report*. Melbourne: Victorian Health Promotion Foundation; 2012.

47. Pedersen SJ, Cooley PD, Mainsbridge C. An e-health intervention designed to increase work day energy expenditure by reducing prolonged occupational sitting habits. *Work*. 2014;49(2):289–295. Available at: http://dx.doi.org/10.3233/WOR-131644 [Accessed January 30, 2016].

48. Manini TM, Carr LJ, King AC, Marshall S, Robinson TN, Rejeski WJ. Interventions to reduce sedentary behavior. *Medicine & Science in Sports & Exercise*. 2015;47(6):1306–1310.

49. Benatti RB, Ried-Larsen M. The effects of breaking up prolonged sitting time. *Medicine & Science in Sports & Exercise*. 2015;47(10):2053–2061.

50. NIOSH. *WorkLife A national institute for occupational safety and health initiative essential elements of effective workplace programs and policies for improving worker health and wellbeing*. 2009. Available at: http://www.cdc.gov/niosh/docs/2010-140/pdfs/2010-140.pdf [Accessed January 23, 2016].

51. National Cancer Institute. 2016) Dietary Screener questionnaire in the NHANES 2009-10: Background.National Cancer Institute'sDivision of Cancer Control and Population Sciences. 2016. Available at: http://epi.grants.cancer.gov/nhanes/dietscreen/ [Accessed October 7, 2016].)

52. IBM. IBM how to cite IBM SPSS statistics or earlier versions of SPSS - United States. *IBM Support*. 2016. Available at: http://www-01.ibm.com/support/docview.wss?uid=swg21476197 [Accessed September 17, 2016].

53. United States Department of Agriculture. All about the fruit group. *ChooseMyPlate.gov*. 2016. Available at: https://www.choosemyplate.gov/fruit [Accessed October 22, 2016].

54. United States Department of Agriculture. All about the vegetable group. *ChooseMyPlate.gov*. 2016. Available at: https://www.choosemyplate.gov/vegetables [Accessed October 22, 2016].

55. Bardus M, Blake H, Lloyd S, Suzanne Suggs L. Reasons for participating and not participating in a e-health workplace physical activity intervention. *International Journal of Workplace Health Management*. 2014;7(4):229–246.

56. Lally P, van Jaarsveld CHM, Potts HWW, Wardle J. How are habits formed: Modelling habit formation in the real world. *European Journal of Social Psychology*. 2009;40(6):998–1009.

57. Gardner B, Smith L, Lorencatto F, Hamer M, Biddle SJ. How to reduce sitting time? A review of behaviour change strategies used in sedentary behaviour reduction interventions among adults. *Health Psychology Review*. 2015:1–24.

58. Webb TL, Joseph J, Yardley L, Michie S. Using the Internet to promote health behavior change: A systematic review and Meta-analysis of the impact of theoretical basis, use of behavior change techniques, and mode of delivery on efficacy. *Journal of Medical Internet Research*. 2010;12(1):e4.

59. Maryland's Tobacco Resource Center. Theory of reasoned action/theory of planned behavior.*MDQuit.org*. 2011. Available at: http://mdquit.org/health-behavior-models/theory-reasoned-actiontheory-planned-behavior [Accessed October 25, 2016]

APPENDIX A

RECRUITMENT FLYERS

Are you interested in learning simple ways to improve your health while at work?

Volunteers wanted for research study conducted by Northern Illinois University:
The impact of a workplace intervention on sitting time among office employees: Standpoints!

Who Can Participate?
--Office employees for the City of St. Charles, IL

What is Involved?
--Attend the employee Wellness Fair February 18, 24, or 25 to have your height, weight, BMI, and waist circumference measured.
--Complete a questionnaire (approx. 15 min total) electronically.
--Participate in a 6-week intervention designed to decrease total sitting time while at work starting **March 14th.**

Benefits to Participants:
--Assessment of your current health status and information on the benefits of breaking up prolonged sitting.
--Participate in free stretching/ movement classes as well as nutrition education meetings!
--Receive a **free** pedometer and earn points to win a $50 gift card!

Interested in Learning More?
Attend an information meeting February 11 @ 1:00pm in the Council Chambers or @ 2:30pm in the Public Works training room to learn about the intervention program! Meeting approx. 45 min.

To sign up, please contact the Human Resources Office at hr@stcharlesil.gov, or by phone 630-377-4446.

If you would like to learn more about this study, contact Ashley Ehnik at

Ashley Ehnik is the Principal Investigator for this study.
She is a Graduate Student, Dietetic Intern, and Certified Personal Trainer.

IRB Approval: APPROVED

Are you a UNIVERSITY employee who spends the majority of your work day at your desk or computer?

We are looking for individuals to be part of a study examining sedentary activity in the workplace. You will be asked to come to the nutrition assessment lab in Wirtz 308A for measurement of your height, weight, and waist circumference. In addition to this you will complete a short online survey that will take 10-15 minutes inquiring about your diet and physical activity habits. After 6 weeks, you will be asked to return for re-assessment of your weight and waist circumference. Also, you will retake the online survey. In between the 6-week period, you will be asked to - continue with your daily routines as normal and not drastically change your physical activity habits or dietary patterns.

For your time and participation, you will receive a package of information on various wellness topics. The package will include information on the benefits of decreasing prolonged sitting time at work; how to build and pack a healthy lunch for work; innovative ways to be more active at the workplace; acquire information on mindful eating; how to build a strong support system within your workplace; and how to create SMART Goals to improve personal healthy habits!

Please contact Ashley Ejnik at [redacted] or by email at [redacted] to participate in this research project. Thank you!

APPENDIX B

RECRUITMENT SCRIPT

Recruiting Script

Information meeting in early February:

Good afternoon everyone, my name is Ashley Ejnik. I am pursuing my masters in the Nutrition and Dietetics program at Northern Illinois University and conducting research on the impact of prolonged sitting time in the workplace. Because the City of [ ] is committed to providing you with opportunities to improve your health and wellness, I am inviting you to participate in this study.

Participation in this research includes: attending your employee Wellness Fair on February 18th, 24th or 25th to have your height, weight, BMI and waist circumference measured; taking a questionnaire, which will take approximately 15 minutes, and inquiries about your demographic information, sedentary and physical behavior at work, physical activity outside of work, quality of life in regards to your mental and physical health, and dietary patterns. You will also be asked to participate in a 6 week intervention program titled *Standpoints!,* starting March 14th, to break up your time spent sitting at work. Information emails will be sent to you weekly and hourly reminders to stand up and move around will be sent to your computer via Outlook. You will also be invited to, but not required to, attend weekly information meetings held every Friday during the lunch hour. These sessions will include a movement/stretching class, nutrition information, and/or information related to overall wellness. You will receive a free pedometer and asked to use it during the study. The baseline requirements of this study are fairly minimal and do not ask you do anything outside the realm of your everyday living activities. You will be given an outline of the program and dates for activities and information. There is also an opportunity for you to earn points to create healthy competition between you and the other participants; a $50 gift card will be awarded to the winner at the end of the 6 week program!

Does anyone have any questions? If you would like to participate in this study, there is a consent form for you to sign indicating that you understand the premise of the research and intervention program.

If you are unsure at this time whether you would like to participate, you can still sign up at the employee Wellness Fair and by the last day on the 25th of February. If you have any further questions, I can be reached at [ ]

Thank you for your time and attention.

APPENDIX C

CONSENT FORMS

Northern Illinois University

The study titled *The impact of a workplace intervention on sitting time among office employees: Standpoints!* is being conducted by Northern Illinois University in collaboration with the City of St. Charles, Illinois.

I understand that by agreeing to participate in this study, my involvement lasts for 8 weeks and I will be asked to do the following: have my height, weight, and waist circumference assessed at the employee Wellness Fair and additionally after the intervention program; complete a computer generated questionnaire before and after the intervention; and participate to the best of my ability in the six-week intervention program called *Standpoints!*

During the program: I will be asked to check my employee email at the start of each week for information on how to participate and will receive non-invasive hourly reminders to promote a break in sedentary activity while at my desk. I will be asked to wear the pedometer given to me, only while at work, to record what my daily workplace step count is. I will also be invited to optional Friday meetings providing information on nutrition and stretching/movement classes. Each week will focus on a different topic on ways to incorporate healthy behaviors: Week 1: Program Kickoff, *Stand-Up Wellness,* learn about the benefits of breaking up prolonged sitting, calorie expenditure from physical activities, and information on equipment to promote movement at work; Week 2: *Take a Stand at Lunch,* become familiar with walking paths around the office and learn how to build and pack a healthy lunch for work; Week 3: *The Daily Stand,* discover a new way to incorporate meetings into the workplace; Week 4: *Move, Food, and Mood!,* acquire information about the benefits of activity and stress reduction and the importance of listening to your body cues for hunger and satiety; Week 5: *Never Stand Alone,* build a strong support system within your workplace; and Week 6: *Stand-Up for Life,* become skilled in the art of creating SMART Goals to improve personal healthy habits.

I agree to participate in this research project conducted by Graduate Student, Dietetic Intern, and Certified Personal Trainer, Ashley Ejnik, and Assistant Professor, Dr. Priyanka Chakraborty PhD, RDN at Northern Illinois University. I have been informed that the purpose of the study is to determine baseline risks for chronic diseases and if the proposed intervention program has an influence on reducing office employee's sitting time.

I am aware that my participation is voluntary and may be withdrawn at any time without penalty or prejudice. If I have any additional questions concerning this study, I may contact Ashley Ejnik at (847) 975-7528 or Dr. Chakraborty at (815) 753-6346. I understand that if I wish further information regarding my rights as a research subject, I may contact the Office of Research Compliance at Northern Illinois University at (815) 753-8588.

I understand that the intended benefits of this study include: assessment of my current health risk factors; education on risk factors associated with prolonged sitting; learning exercises/stretches to break up prolonged sitting time; free stretching/movement classes and nutrition education by Ashley Ejnik; a free pedometer; and a chance to earn points during the intervention to win a $50 gift card!

I understand that all information gathered during this study will be kept confidential. No personally identifiable information will be reported in publications, presentations, or to the City of St. Charles. I understand that my consent to participate in this project **does not affect my employment status or my relationship with Northern Illinois University,** and I acknowledge that I have received a copy of this consent form.

Printed Name:

_____

Signature:

X_____ Date: _____

Northern Illinois University

The study titled *The impact of a workplace intervention on sitting time among office employees: Standpoints*! is being conducted by in collaboration with the City of St. Charles, Illinois.

I understand that by agreeing to participate in this study, my involvement lasts for 6 weeks and I will be asked to do the following: have my height, weight, and waist circumference measured and complete a computer generated questionnaire at week 1 and again six weeks later.

During the 6-week time span: I will be asked to continue with my daily routines as normal and not drastically change my physical activity habits or dietary patterns. As incentive for being a participant in the control group, at the end of the 6 week time period I will receive information on various wellness topics.

I will receive information about the benefits of breaking up prolonged sitting, calorie expenditure from physical activities; learn how to build and pack a healthy lunch for work; discover a new way to incorporate meetings into the workplace; acquire information about the benefits of listening to my body cues for hunger and satiety; how to build a strong support system within my workplace; and become skilled in the art of creating SMART Goals to improve my personal healthy habits.

I agree to participate in this research project conducted by Graduate Student, Dietetic Intern, and Certified Personal Trainer, Ashley Ejnik, and Associate Professor, Dr. Umoren PhD, RDN at Northern Illinois University. I have been informed that the purpose of the study is to determine baseline risks for chronic diseases and if the intervention program conducted in St. Charles, IL has an influence on reducing office employee's sitting time.

I am aware that my participation is voluntary and may be withdrawn at any time without penalty or prejudice. If I have any additional questions concerning this study, I may contact [redacted] I understand that if I wish further information regarding my rights as a research subject, I may contact the Office of Research Compliance at Northern Illinois University at (815) 753-8588.

I understand that the intended benefits of this study include: assessment of my current health risk factors and post analysis (after 6 weeks) education on risk factors associated with prolonged sitting; learning exercises/stretches to break up prolonged sitting time; and video classes on wellness topics by Ashley Ejnik. I understand that all information gathered during this study will be kept confidential. No personally identifiable information will be reported in publications, presentations. I acknowledge that I have received a copy of this consent form.

Printed Name: _____

Signature:

X_____Date: _____

APPENDIX D

IRB APPROVAL LETTER

NORTHERN ILLINOIS UNIVERSITY
Office of Research Compliance and Integri
Lowden Hall 301 · DeKalb, IL 60115-2584
815-753-8588 · Fax 815-753-1631 · www.niu.edu/orci

Approval Notice

Initial Review

11-Jan-2016

TO: Ashley Ejnik

RE: Protocol # HS15-0367 "**The impact of a workplace intervention on sitting time among office employees: Standpoints!**"

Your **Initial Review** submission was reviewed and approved under **Expedited** procedures by Institutional Review Board #2 on **10-Jan-2016**. Please note the following information about your approved research protocol:

Protocol Approval period: **10-Jan-2016 - 09-Jan-2017**

If your project will continue beyond that date, or if you intend to make modifications to the study, you will need additional approval and should contact the Office of Research Compliance and Integrity for assistance. Continuing review of the project, conducted at least annually, will be necessary until you no longer retain any identifiers that could link the subjects to the data collected. Please remember to use your **protocol number** (**HS15-0367**) on any documents or correspondence with the IRB concerning your research protocol.

Please note that the IRB has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

Unless you have been approved for a waiver of the written signature of informed consent, this notice includes a date-stamped copy of the approved consent form for your use. NIU policy requires that informed consent documents given to subjects participating in non-exempt research bear the approval stamp of the NIU IRB. This stamped document is the only consent form that may be photocopied for distribution to study participants.

It is important for you to note that as a research investigator involved with human subjects, you are responsible for ensuring that this project has current IRB approval at all times, and for retaining the signed consent forms obtained from your subjects for a minimum of three years after the study is concluded. If consent for the study is being given by proxy (guardian, etc.), it is your responsibility to document the authority of that person to consent for the subject. Also, the committee recommends that you include an acknowledgment by the subject, or the subject's representative, that he or she has received a copy of the consent form. In addition, you are required to promptly report to the IRB any injuries or other unanticipated problems or risks to subjects and others. The IRB extends best wishes for success in your research endeavors.

APPENDIX E

IRB AMENDMENT APPROVAL LETTER

NORTHERN ILLINOIS UNIVERSITY
Office of Research Compliance and Integrity
Lowden Hall 301 · DeKalb, IL 60115-2584
815-753-8588 · Fax 815-753-1631 · www.niu.edu/orci

Approval Notice

Protocol Amendment

13-Apr-2016

Ashley Ejnik

Family, Consumer and Nutrition Sciences

RE: Protocol # **HS15-0367** "**The impact of a workplace intervention on sitting time among office employees: Standpoints!**"

Dear Ashley Ejnik,

Your **Protocol Amendment** submission was reviewed and approved under **Expedited** procedures by Institutional Review Board #2 on **13-Apr-2016**.

Please note the following information about your approved research protocol:

Protocol Approval period: **10-Jan-2016** - **09-Jan-2017**

If your project will continue beyond that date, or if you intend to make modifications to the study, you will need additional approval and should contact the Office of Research Compliance and Integrity for assistance. Annual review of the project will be necessary until you no longer retain any identifiers that could link the subjects to the data collected.

It is important for you to note that as a research investigator involved with human subjects, you are responsible for ensuring that the project has current IRB approval at all times, and for retaining any signed consent forms obtained from your subjects in a secure place for a minimum of three years after the study is concluded. The committee also recommends that the informed consent include an acknowledgement that the subject, or the subject's representative, that he or she has received a copy of the consent form. In addition, you are required to promptly report to the IRB any injuries or other unanticipated problems involving risks to subjects or others.

Please remember to use your **protocol number** (**HS15-0367**) on any documents or correspondence with the IRB concerning your research protocol.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact the Office of Research Compliance and Integrity at (815) 753-8588.

APPENDIX F

QUESTIONNAIRE

Standpoints! Study Questionnaire

This questionnaire is designed for the research study: The impact of a workplace intervention on sitting time among office employees: Standpoints! There are a total of 40 questions. You will be asked about your sedentary and physical behavior at work, physical activity that you do outside of work, your quality of life in regards to your mental and physical health, your dietary patterns, and your basic demographic information. The total time to complete the questions should take approximately 10-15 minutes; there is a percentage bar at the top of the screen indicating your status of progression.

The first 4 questions ask you about your work activity behavior and include questions about time spent sitting and standing at work. Please answer these questions with thought.

How many hours did you work in the last 7 days?

- ❍ Less than 20
- ❍ 20-30 hours
- ❍ 31-40 hours
- ❍ 41-50 hours
- ❍ 51-60 hours
- ❍ 61-70 hours
- ❍ 71-80 hours
- ❍ 81-90 hours
- ❍ 91-100 hours
- ❍ More than 100 hours

During the last 7 days, how many days were you at work?

- ❍ 1 or 2 days
- ❍ 3 or 4 days
- ❍ 5 or 6 days
- ❍ 7 days

For the following question, please use this example to guide you in how to fill out your own typical work day percentages: Example: Jane is an administrative officer. Her work day involves working on the computer at her desk, answering the phone, filing documents, photocopying, and some walking around the office. Jane would describe a typical work day in the last 7 days like this:

Sitting (including driving)	90 %		
Standing	5 %		
Walking	5 %		
Heavy labor or physically demanding tasks	0 %	Total	100 %

Did you read this?

- ❍ Yes
- ❍ No

How would you describe your typical work day in the last 7 days? (This involves only your work day, and does not include travel to and from work, or what you did in your leisure time) *It can be helpful to break this down by minutes and convert to percentages. For example: if you work for 8.5 hours a day, that is 510 minutes. If you sit for 5 hours of the 8.5 that is 300 minutes and roughly ~60%. (Make sure this adds up to 100%)

_____ Sitting (including driving at work) _____%
_____ b. Standing _____%
_____ c. Walking _____%
_____ d. Heavy labor or physically demanding tasks _____%

The following 6 questions exclude the physical activities you do at work that you have already accounted for and relate to OUTSIDE of work physical activity.

Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate (e.g. running, football, circuit training) for at least 10 minutes continuously (OUTSIDE of work)?

- ❍ Yes
- ❍ No

In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (leisure) activities (OUTSIDE of work)?

- ❍ none
- ❍ 1-2 days
- ❍ 3-4 days
- ❍ 5-6 days
- ❍ 7 days a week

How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day (OUTSIDE of work)?

- ❍ none
- ❍ less than 10 minutes per day
- ❍ 15-20 minutes per day
- ❍ 30 minutes per day
- ❍ 45-60 minutes per day
- ❍ greater than one hour per day

Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate (e.g. brisk walking, cycling, swimming, volleyball) for at least 10 minutes continuously (OUTSIDE of work)?

- ❍ Yes
- ❍ No

In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (leisure) activities (OUTSIDE of work)?

- ❍ none
- ❍ 1-2 days
- ❍ 3-4 days
- ❍ 5-6 days
- ❍ 7 days a week

How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?

- ❍ none
- ❍ less than 10 minutes per day
- ❍ 15-20 minutes per day
- ❍ 30 minutes per day
- ❍ 45-60 minutes per day
- ❍ greater than an hour a day

The next 10 questions are in place to measure your quality of life in regards to your mental and physical health.

Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health NOT good?

- ❍ was NOT good for 0 days
- ❍ was NOT good for 1-5 days
- ❍ was NOT good for 6-10 days
- ❍ was NOT good for 11-15 days
- ❍ was NOT good for 16-20 days
- ❍ was NOT good for 21-25 days
- ❍ was NOT good for 26-30 days

During the past 30 days, for about how many days did poor PHYSICAL or MENTAL health keep you from doing your usual activities, such as self-care, work, or recreation?

- ❍ 0 days
- ❍ 1-5 days
- ❍ 6-10 days
- ❍ 11-15 days
- ❍ 16-20 days
- ❍ 21-25 days
- ❍ 26-30 days

Are you LIMITED in any way in any activities because of any impairment or health problem?

- ❍ yes
- ❍ no

What is the MAJOR impairment or health problem that limits your activities?

- ❍ Arthritis/rheumatism
- ❍ back or neck problem
- ❍ fractures, bone/joint injury
- ❍ walking problem
- ❍ hearing problem
- ❍ eye/vision problem
- ❍ heart problem
- ❍ stroke problem
- ❍ Hypertension/high blood pressure
- ❍ Diabetes
- ❍ Cancer
- ❍ depression/anxiety/emotional problem
- ❍ other impairment/problem _____
- ❍ NOT APPLICABLE

During the past 30 days, for about how many days have you felt SAD, BLUE, or DEPRESSED?

- ❍ 0 days
- ❍ 1-5 days
- ❍ 6-10 days
- ❍ 11-15 days
- ❍ 16-20 days
- ❍ 21-25 days
- ❍ 26-30 days

During the past 30 days, for about how many days have you felt WORRIED, TENSE, or ANXIOUS?

- ❍ 0 days
- ❍ 1-5 days
- ❍ 6-10 days
- ❍ 11-15 days
- ❍ 16-20 days
- ❍ 21-25 days
- ❍ 26-30 days

During the past 30 days, for about how many days have you felt you did NOT get ENOUGH REST or SLEEP?

- ❍ 0 days
- ❍ 1-5 days
- ❍ 6-10 days
- ❍ 11-15 days
- ❍ 16-20 days
- ❍ 21-25 days
- ❍ 26-30 days

During the past 30 days, for about how many days have you felt VERY HEALTHY AND FULL OF ENERGY?

- ❍ 0 days
- ❍ 1-5 days
- ❍ 6-10 days
- ❍ 11-15 days
- ❍ 16-20 days
- ❍ 21-25 days
- ❍ 26-30 days

How would you say that in general your health is?

- ❍ Excellent
- ❍ Very good
- ❍ Good
- ❍ Fair
- ❍ Poor

Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health NOT good?

- ❍ was NOT good for 0 days
- ❍ was NOT good for 1-5 days
- ❍ was NOT good for 6-10 days
- ❍ was NOT good for 11-15 days
- ❍ was NOT good for 16-20 days
- ❍ was NOT good for 21-25 days
- ❍ was NOT good for 26-30 days

The following 16 questions ask you about the foods you ate or drank during the past month, that is, the past 30 days. When answering, please include meals and snacks at home, at work, in restaurants, and anyplace else.

During the past month, what kind of milk did you usually drink?

- ❍ NONE
- ❍ Whole or regular milk
- ❍ 2% fat or reduced-fat milk
- ❍ 1%, 1/2% or low-fat milk
- ❍ Fat-free, skim or nonfat milk
- ❍ Soy milk
- ❍ other _____

During the past month, how often did you drink regular soda or pop that contains sugar? Do NOT include diet soda.

- ❍ Never
- ❍ 1 time last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 time per day
- ❍ 2-3 times per day
- ❍ 4-5 times per day
- ❍ 6 or more times per day

During the past month, how often did you drink 100% pure fruit juices such as orange, mango, apple, grape and pineapple juices? Do NOT include fruit-flavored drinks with added sugar or fruit juice you made at home and added sugar to.

- ❍ Never
- ❍ 1 time last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 time per day
- ❍ 2-3 times per day
- ❍ 4-5 times per day
- ❍ 6 or more times per day

During the past month, how often did you drink coffee or tea that had sugar or honey added to it? Include coffee and tea you sweetened yourself and presweetened tea and coffee drinks such as Arizona Ice Tea and Frappuccino. Do NOT include artificially sweetened or diet tea.

- ❍ Never
- ❍ 1 times last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 time per day
- ❍ 2-3 times per day
- ❍ 4-5 times per day
- ❍ 6 or more times per day

During the past month, how often did you drink sweetened fruit drinks, sports or energy drinks, such as Koolaid, lemonade, Hi-C, cranberry drink, Gatorade, Red Bull, or vitamin water? Include fruit juices you made at home and added sugar to. Do NOT include diet drinks or artificially sweetened drinks.

- ❍ Never
- ❍ 1 time last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 time per day
- ❍ 2-3 times per day
- ❍ 4-5 times per day
- ❍ 6 or more times per day

During the past month, how often did you eat fruit? Include fresh, frozen or canned fruit. Do NOT include juices.

- ❍ Never
- ❍ 1 time last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 time per day
- ❍ 2 or more times per day

During the past month, how often did you eat a green leafy or lettuce salad, with or without other vegetables?

- ❍ Never
- ❍ 1 time last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 time per day
- ❍ 2 or more times per day

During the past month, how often did you eat any kind of fried potatoes, including french fries, home fries or hash brown potatoes?

- ❍ Never
- ❍ 1 time last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 time per day
- ❍ 2 or more times per day

During the past month, how often did you eat any other kind of potatoes, such as baked, boiled, mashed potatoes, sweet potatoes or potato salad?

- ❍ Never
- ❍ 1 time last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 time per day
- ❍ 2 or more times per day

During the past month, how often did you eat re-fried beans, baked beans, beans in soup, pork and beans, or any other type of cooked dried beans? Do NOT include green beans.

- ❍ Never
- ❍ 1 time last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 time per day
- ❍ 2 or more times per day

During the past month, how often did you eat brown rice or other cooked whole grains, such as bulgur, cracked wheat or millet? Do NOT include white rice.

- ❍ Never
- ❍ 1 time last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 time per day
- ❍ 2 or more times per day

During the past month, NOT including what you just told me (green salads, potatoes, cooked dried beans), how often did you eat OTHER vegetables?

- ❍ Never
- ❍ 1 time last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 time per day
- ❍ 2 or more times per day

During the past month, how often did you eat red meat such as beef, pork, ham or sausage? Do NOT include chicken, turkey, or sea food. INCLUDE red meat you had in sandwiches, lasagna, stew and other mixtures. Red meats may also include veal, lamb and any lunch meats made with these meats.

- ❍ Never

- ❍ 1 time last month
- ❍ 2-3 time last month
- ❍ 1 time per week
- ❍ 2 time per week
- ❍ 3-4 time per week
- ❍ 5-6 times per week
- ❍ 1 time per week
- ❍ 2 or more times per week

During the past month, how often did you eat whole grain bread, including toast, rolls and in sandwiches? Whole grain breads include whole-wheat, rye, oatmeal and pumpernickel, Do NOT include white bread.

- ❍ Never
- ❍ 1 time last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 time per day
- ❍ 2 or more times per day

During the past month, how often did you eat chocolate or any other types of candy? Do NOT include sugar-free candy.

- ❍ Never
- ❍ 1 time last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 time per day
- ❍ 2 or more times per day

During the past month, how often did you eat donuts, sweet rolls, Danish, muffins, pop tarts, cookies, cake, pie or brownies, ice cream or other frozen desserts? Do NOT include sugar-free items.

- ❍ Never
- ❍ 1 time last month
- ❍ 2-3 times last month
- ❍ 1 time per week
- ❍ 2 times per week
- ❍ 3-4 times per week
- ❍ 5-6 times per week
- ❍ 1 times per day
- ❍ 2 or more times per day

The last 5 questions ask you basic demographic information.

To which age group do you belong to?

- ❍ 18-30 years of age
- ❍ 31-40 years of age
- ❍ 41-50 years of age
- ❍ 51-60 years of age
- ❍ 60 + years of age

What is your gender?

- ❍ Male
- ❍ Female
- ❍ Transgender

What is your race?

- ❍ White, non-Latino
- ❍ Black or African American
- ❍ American Indian or Alaska Native--Print name of enrolled or principal tribe _____
- ❍ Asian Indian
- ❍ Chinese
- ❍ Filipino
- ❍ Japanese
- ❍ Korean
- ❍ Vietnamese
- ❍ Other Asian --Print race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on _____
- ❍ Native Hawaiian
- ❍ Guamanian or Chamorro
- ❍ Samoan
- ❍ Other Pacific Islander -- Print race, for example, Fijian, Tongan, and so on.
- ❍ Other, please specify _____
- ❍

What is your highest educational degree achieved to date?

- ❍ Did not graduate from high school
- ❍ High school diploma or equivalent
- ❍ Associate degree
- ❍ Bachelor's degree
- ❍ Master's degree
- ❍ Doctorate degree
- ❍

What department do you work in?

- ❍ City Administration
- ❍ Community Development
- ❍ Finance
- ❍ Fire Department Administration
- ❍ Human Resources
- ❍ Information Systems
- ❍ Inventory Control
- ❍ Police Department Records
- ❍ Public Works
- ❍ Utility Billing
- ❍ other (please specify) _____

APPENDIX G

INTERVENTION PROGRAM OUTLINE

STANDPOINTS!

Participant Program Outline

*Welcome to the employee wellness intervention program!
The City of St. Charles is committed to providing you with opportunities to improve your health and wellness and your participation in this program will benefit you for life!
This **3-page** outline is meant to guide you through the 6-week intervention and includes information on weeks 0 and week 7 for assessment and questionnaire participant requirements.

Weeks 0: At February 11th Information Meeting & February Employee Wellness Fair 18th, 19th, or 25th	• Researcher provides education on the effects of prolonged sitting and will explain: ○ the purpose of the study ○ program structure ○ how reminder prompts will be sent and how often ○ ways to accumulate points: *Standpoints!* ***Please mark off each item as you complete them***
Scan and attach results: and send a copy to Ashley [redacted] **of your results:** _____☐	• At the February Wellness Fair (February 18, 19, or 25) ○ have biomarkers for disease physically assessed and RECORD: ○ **Waist circumference _____cm** ○ **Weight _____lbs** ○ **Height _____inches** ○ **BMI _____** • Interpretation of results from data collection (weight, height, BMI, WC) at health fair shared with participants
Fill out informed consent: _____☐	• Informed consent
Take Questionnaire: _____☐	• *Participants take study questionnaire*: demographic information, sedentary activity at work, nutrition screener, physical activity outside work, quality of life. (link to questionnaire will be provided through email) • Distribution of pedometers: *Standpoints!* for logging daily steps

Week 1:
3/14/16-3/18/16
	Program Kick off! *Stand-Up Wellness*
	
	• Monday Email--Topics to be covered:
	  ○ Information on the difference in calories expended during time sitting, time standing, time walking, and benefits of exercising!
	  ○ Stretching Videos
	• NO FRIDAY INFORMATION MEETING

Week 2:
3/21/16-3/25/16
	Take a *Stand* at lunch
	
	• Monday email: stretching video
	• Friday Information Meeting
	  ○ How to build a healthy lunch and how to prepare meals in advance
	  ○ Also, information on fluid intake and the importance of staying hydrated—also promotes you to get up and go to the bathroom more often, more movement and breaks in prolonged sitting!

Week 3: 3/28/16-4/1/16	The Daily *Stand* • Monday email: stretching video • Friday Information Meeting: Information on Stand-up meetings (15 minute team building meeting) and how to incorporate them into the workplace. • Also, more information on how to break up prolonged sitting times with stretching and movement exercises

Week 4:
4/4/16-4/8/16
	Move, Food and Mood!
	
	• Monday email: stretching video
	• Friday Information Meeting:
	  ○ Information on the benefits of listening to your body cues for hunger and satiety
	  ○ Information on how mood effects eating habits and ways to change behavior into a positive activity

Week 5:
4/11/16-4/15/16
	Never Stand Alone
	
	• Monday email:
	  ○ Building a support system within your workplace
	  ○ Finding an "Accountabilibuddy"
	
	• NO FRIDAY INFORMATION MEETING

Week 6: 4/18/16-4/22/16	*Stand-Up for Life!* • Monday email: stretching video • Friday Information Meeting: ○ Developing *SMART Goals* to improve personal healthy habits • After our information meeting:

	○ Measurements assessed: waist circumference, weight, height, BMI (by Tyler Medical Services) ○ @ 1:30pm in the Council Chambers
Conclusion Week 7: 4/25/16-4/29/16 **Scan and attach results: send to Ashley through email** [redacted] **of your results** _____☐ **Take Questionnaire:** _____☐ **Send Ashley points tracker:** _____☐	○ **Waist circumference _____cm** ○ **Weight _____lbs** ○ **Height _____inches** ○ **BMI _____** • *Participants take study questionnaire*: demographic information, sedentary activity at work, nutrition screener, physical activity outside work, quality of life • **Send *Standpoints!* Points Tracker to** [redacted] **by April 26th**

THANK YOU FOR YOUR PARTICIPATION!

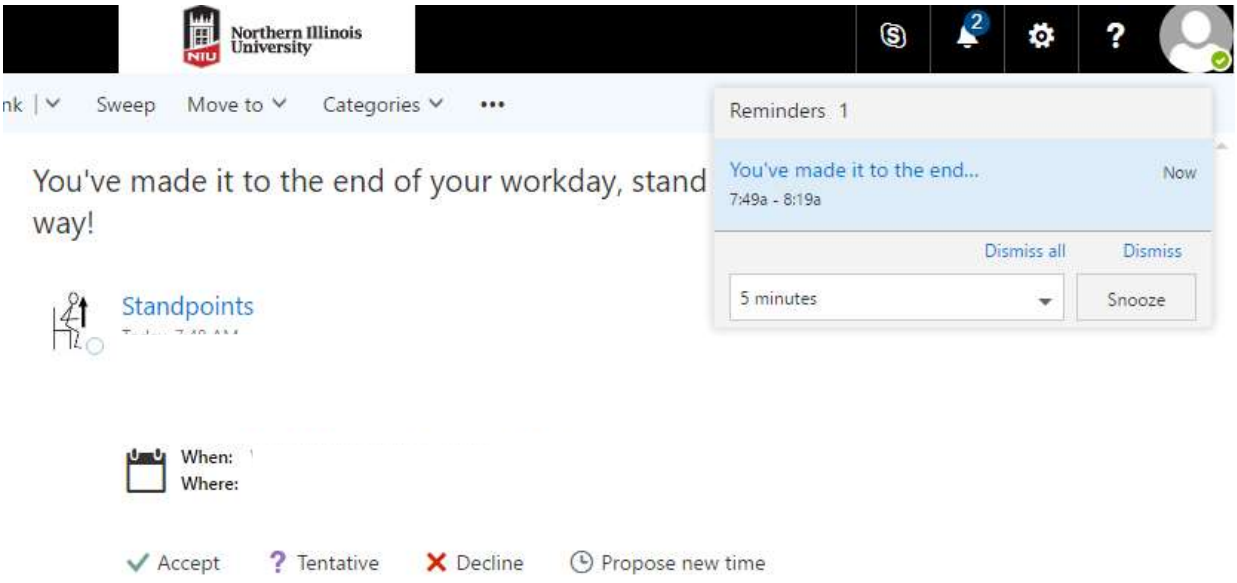
APPENDIX H

INTERVENTION PROGRAM HOURLY REMINDERS

Hourly Reminders via Microsoft Outlook – Intervention Group

Time Reminder Sent Daily	Reminder Text
8:55am-9:00am	Good Morning! Rise with the sun :-)
9:55am-10:00am	Stand up for your health!
10:55am-11:00am	Stand up to live longer and be here for your family :-)
12:00pm-1:00pm	It's a beautiful day! Take a break from your screen and get your body moving!
1:55pm-2:00pm	Help your body utilize your food, get up, stand up, it will put you in a better mood!
2:55pm-3:00pm	Find yourself in a mid-day slump? Get up quick and get your body pumped!
3:55pm-4:00pm	You've made it to the end of your work day, stand up to live the rest in a healthy way!

Reminder on Participant's Computer Screen Example:



APPENDIX I

INTERVENTION PROGRAM OUTLINE OF WEEKLY EMAILS

Outline of Weekly Emails – Standpoints!

Week 1: Program Kickoff! *Stand-Up Wellness*

5 min stretching video: https://vimeo.com/154351960/cd23e870ad

Check out this website for a quick read on sitting, standing, and calorie expenditure!

http://www.bizspace.co.uk/blog/stand-or-sit-question

Now calculate your personal total calorie burn to see the difference standing and moving can make on your caloric expenditure while at work!

http://www.juststand.org/tabid/637/default.aspx

Week 2: *Take a Stand at Lunch*

5 min stretching video - https://vimeo.com/154352535/b61ae5975f

(30 min) How to Pack a Healthy Lunch for Work presentation: https://vimeo.com/160804852/3bc3322f39

Week 3: *The Daily Stand*

5 min stretching video - https://vimeo.com/154352534/45667318f6

(30 min) How to Conduct a Productive Standing Meeting at Work presentation: https://vimeo.com/161664920/c9ffe34579

Week 4: *Move, Food, and Mood*

5 min stretching video https://vimeo.com/154352539/c72838dc7a

(30 min) Mindful Eating Presentation: https://vimeo.com/162418314/9ab84253e0

Week 5: *Never Stand Alone*

5 min stretching video https://vimeo.com/154352536/533ff83685

What is an accountabilibuddy? (45 sec video)

https://www.youtube.com/watch?v=FR9vZgQQOD0

How to find an accountabilibuddy (short read)

http://blog.myfitnesspal.com/how-to-find-an-accountabilibuddy/

Week 6: *Stand-Up for Life!*

5 min stretching video https://vimeo.com/154352538/e715ed3f5e

(30 min) Garden Wellness-How to Plant the Seeds for a Healthier you! presentation https://vimeo.com/164314198/985e7db57f

APPENDIX J

INTERVENTION PROGRAM POINTS TRACKER PAGE 1 OF 6

Weekly ***Standpoints!*** Point Tracker NAME: _____

PLEASE KEEP THIS LOG FOR THE DURATION OF THE STUDY
You will be emailing this to STANDPOINTS@niu.edu during week 7

Week of: March 14th-18th

*This tracking handout is intended for daily and weekly employee use to easily keep track of points accumulated during the *Standpoints!* intervention program.

The following tables include ways to reduce your sitting time while at work and include a blank space to keep track of your efforts during the work day.

Each time you do one of the activities you receive a point! If you do an activity several times over the course of the work day, every instance counts for a point.

*Keep in mind, the winner that accumulates the most points per work hours, over the course of 6 weeks, will receive a $50 gift card!

MONDAY	3/14/16
Take a break from sitting at your desk at the prompted reminders via Outlook (*includes: standing and continuing to do work tasks, walking down the hall, going to the bathroom, etc. any activity that breaks the act of sitting)	@8:55am___ @9:55am___ @10:55am___ @12-1pm ___ @1:55pm___ @2:55pm___ @3:55pm___
Stand during phone calls	
Walk to your coworkers desk instead of phoning or emailing	
Have a standing or walking meeting	
Stand at the back of the room during presentations	
Take breaks in sitting time in long meetings	
Use the stairs	
Pack a healthy lunch for work	
Exercising during the work day (going to the gym, attending an exercise class, body weight workout)	
Stretching during the workday	
Stand to greet a visitor to your workspace	
Track your daily step count _____	
Day TOTAL:	

TUESDAY	3/15/16
Take a break from sitting at your desk at the prompted reminders via Outlook (*includes: standing and continuing to do work tasks, walking down the hall, going to the bathroom, etc. any activity that breaks the act of sitting)	@8:55am___ @9:55am___ @10:55am___ @12-1pm ___ @1:55pm___ @2:55pm___ @3:55pm___
Stand during phone calls	
Walk to your coworkers desk instead of phoning or emailing	
Have a standing or walking meeting	
Stand at the back of the room during presentations	
Take breaks in sitting time in long meetings	
Use the stairs	
Pack a healthy lunch for work	
Exercising during the work day (going to the gym, attending an exercise class, body weight workout)	
Stretching during the workday	
Stand to greet a visitor to your workspace	
Track your daily step count _____	
Day TOTAL:	

WEDNESDAY	3/16/16
Take a break from sitting at your desk at the prompted reminders via Outlook (*includes: standing and continuing to do work tasks, walking down the hall, going to the bathroom, etc. any activity that breaks the act of sitting)	@8:55am___ @9:55am___ @10:55am___ @12-1pm ___ @1:55pm___ @2:55pm___ @3:55pm___
Stand during phone calls	
Walk to your coworkers desk instead of phoning or emailing	
Have a standing or walking meeting	
Stand at the back of the room during presentations	
Take breaks in sitting time in long meetings	
Use the stairs	
Pack a healthy lunch for work	
Exercising during the work day (going to the gym, attending an exercise class, body weight workout)	
Stretching during the workday	
Stand to greet a visitor to your workspace	
Track your daily step count _____	
Day TOTAL:	

THURSDAY	3/17/16
Take a break from sitting at your desk at the prompted reminders via Outlook (*includes: standing and continuing to do work tasks, walking down the hall, going to the bathroom, etc. any activity that breaks the act of sitting)	@8:55am___ @9:55am___ @10:55am___ @12-1pm ___ @1:55pm___ @2:55pm___ @3:55pm___
Stand during phone calls	
Walk to your coworkers desk instead of phoning or emailing	
Have a standing or walking meeting	
Stand at the back of the room during presentations	
Take breaks in sitting time in long meetings	
Use the stairs	
Pack a healthy lunch for work	
Exercising during the work day (going to the gym, attending an exercise class, body weight workout)	
Stretching during the workday	
Stand to greet a visitor to your workspace	
Track your daily step count _____	
Day TOTAL:	

FRIDAY	3/18/16
Take a break from sitting at your desk at the prompted reminders via Outlook (*includes: standing and continuing to do work tasks, walking down the hall, going to the bathroom, etc. any activity that breaks the act of sitting)	@8:55am___ @9:55am___ @10:55am___ @12-1pm ___ @1:55pm___ @2:55pm___ @3:55pm___
Stand during phone calls	
Walk to your coworkers desk instead of phoning or emailing	
Have a standing or walking meeting	
Stand at the back of the room during presentations	
Take breaks in sitting time in long meetings	
Use the stairs	
Pack a healthy lunch for work	
Exercising during the work day (going to the gym, attending an exercise class, body weight workout)	
Stretching during the workday	
Stand to greet a visitor to your workspace	
Track your daily step count _____	
Day TOTAL:	

Weekly Total Points: _____

Total hours worked this week: _____

APPENDIX K

STRETCHING/DESK EXERCISE HANDOUTS

To reduce your musculoskeletal discomfort while at work, it is important not only to break up prolonged sitting but also to stretch various body parts. Stretching your neck and shoulders will reduce pressure and stiffness in your upper back, giving your shoulders an opportunity to lengthen will help you improve your posture; stretching your hands and wrists can help you avoid symptoms of carpel tunnel; stretching your lower back reduces lower lumbar pressure on the vertebras in your lower back; and getting blood flowing to your legs reduces your chances of developing deep vein thrombosis and blood clots. There are so many benefits to getting up and moving, even for just 5 minutes every hour and more so 2 minutes every half hour!

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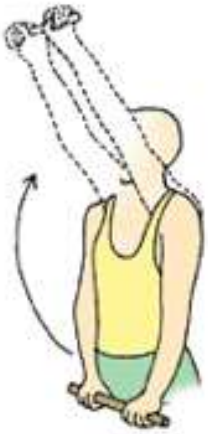
This week we are focusing on stretching the shoulders. Shoulder stretches are necessary to maintain a balance among the muscles around the shoulders and upper back. As gravity pulls us forward and our shoulders become rounded while sitting at our desks, the muscles on the front of our chest and shoulders shorten. These forces cause disc degeneration, head and neck pain, rotator cuff impingement, amongst other problems. For a lot of us stress in our lives is manifested by tightness and hyperactivity of our shoulder muscles. Regular shoulder stretches can improve posture, improve function, and make us feel better!

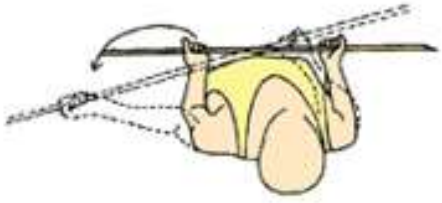
Frozen Shoulder Exercises



Shoulder flexion

Shoulder extension

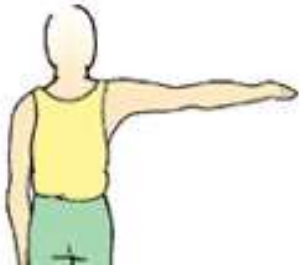
Shoulder abduction



External rotation

Internal rotation

Scapular range of motion



Sitting for prolonged periods of time shortens and tightens our hip flexors. This is a group of muscles that connects your hip joint to your femur and allows you to lift your knees and bend at the waist. They are found deep in the abdominal cavity and are some of the strongest muscles in the body. This muscle group is an integral part of most physical activities, including walking, running, jumping and even pivoting. The hip flexor is also an important stabilizer, as it keeps your hips steady and even helps to keep your spine straight. This week's stretches focuses on stretching your tight, shortened, and typically underused hip flexors!


15 EXERCISES
YOU CAN DO AT
YOUR DESK
We all say that we are too busy to exercise but with these great moves you can do at your desk you have no excuse. Try out some of these desk and office exercises and start feeling better today, beware, some are more discreet than others!
1. USE YOUR CHAIR
2. TRICEP DIP
3. WRISTS
4. LOWER BODY STRETCH
5. SPINAL STRETCH
6. SHOULDER STRETCH
7. HAMSTRING STRETCH
8. SIDE STRETCH
9. BUNS OF STEEL
10. HAMSTRING CURL
11. ARM STRETCH
12. SHOULDER BLADES
13. NECK MUSCLES
14. CORE STRENGTHENER
15. ANKLE ROLL
DesirableBody
Look Good