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# The Effects Of An Active Study Break Intervention In College Students: An Observational Study

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# THE EFFECTS OF AN ACTIVE STUDY BREAK INTERVENTION IN COLLEGE STUDENTS: AN OBSERVATIONAL STUDY

by

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This thesis, submitted by Kathryn Joann Southard in partial fulfillment of the requirements for the Degree of Master of Science from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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Date

PERMISSION

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Kathryn Joann Southard
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ABSTRACT

**Background:** Sedentary lifestyles are a major public health concern. Research has shown that frequent active breaks are beneficial to productivity, mental and physical health, and may prevent obesity.

**Purpose:** This study examined the effectiveness of a signage intervention in a university library to promote the use of physically active (AB) compared to inactive (IB) study breaks.

**Methods:** College students were observed over three weeks: pre-intervention (PRE); signage intervention (SIGN); and post-intervention (POST). Each week of observation consisted of 12 hours, (6, 2-hour segments) on Sunday, Monday, and Tuesday (36 hours total). SIGN consisted of table tents and signs posted in the library encouraging students to take active breaks while studying. Observation was conducted using our Systematic Observation of Breaks (SOBREAK) method, developed based on similar observational methods, such as SOFIT and SOPARK. Two trained researchers systematically observed two different types of study rooms, one silent and one social, scanning every 30 seconds and recording the number of AB and IB observed by gender. Types of breaks were operationalized based on the literature, where AB included: stretching, getting out of chair, walking, and IB: socializing, cellphone use, snacking. Data was analyzed using a repeated measures ANOVA (SPSS v21).

**Results:** A total of 4,320 scans observed 465 students. AB was significantly higher in SIGN compared to PRE and POST (5.5% vs. 4.3% vs 2.3%; $p \leq 0.001$). IB SIGN was lower than PRE and POST (7.9% vs. 9.0% vs. 6.7%; $p \leq 0.001$). Female AB SIGN was higher compared to PRE (3.7% vs 3.0%; $p \leq 0.001$), but not POST. Female IB SIGN was lower than PRE (8.6% vs 7.3%; $p \leq 0.001$), but not POST. Male AB SIGN was higher than male PRE and POST (7.3% vs. 5.6% vs. 2.6%; $p \leq 0.001$). Male IB SIGN was lower than PRE (7.2% vs 10.8%; $p \leq 0.001$), but higher than POST (6.0%; $p \leq 0.001$).

**Conclusions:** This study provides preliminary evidence that a visual reminder to take an AB while studying can positively influence physical activity. However, a visual reminder may be necessary for continued AB, and that a one-time signage intervention is not enough to encourage long-term AB. Future studies could examine AB vs IB in different ethnic groups and overweight compared to normal weight individuals.

# CHAPTER I

## INTRODUCTION

Obesity has become a major public health concern effecting approximately 475 million humans globally, and the excessive accumulation of adipose tissue is increasing due to decreased physical activity levels (Pedram, et al., 2013). Research has shown that 60% of the world population does not perform sufficient physical activity to obtain the benefits of reducing the development of chronic diseases through body-weight control and other mechanisms (Dilek, Aysegul, Ozden & Fatma, 22013). Increased physical activity is associated with decreased risk of coronary heart disease, adult-onset diabetes, hypertension, colon cancer, osteoporosis, anxiety, and depression (Randall, Han, Heesch, Fields & Knehans, 2007).

In many parts of the world, lifestyles have become increasingly sedentary in the home, at work and during leisure time, given the increasing popularity of computer usage, video game playing and television viewing (Barwais, Cuddihy & Tomson, 2013). Growing more increasingly common is adults engaging in sedentary behaviors, and spending most of their waking hours either in sedentary or in light-intensity physical activities (Barwais, Cuddihy & Tomson, 2013).

Inactive adults accumulate health risks such as hypertension, obesity, and adult-onset diabetes with the lack of exercise. Decreased time spent engaged in physical activity is a result of many factors, such as a full time job (Taylor, et al., 2013), school (Randall, Han, Heesch, Fields & Knehans, 2007),or cold winter climates (Lee & Li, 2014). These prolonged hours of sedentary

activities come from many inactive activities such as watching television, using social media, and playing video games. Examination of these sedentary behaviors is important because with these prolonged hours of sedentary behavior comes a much higher risk of developing chronic diseases at an earlier age that could otherwise have been prevented.

Recent research has shown that short rest breaks at work including physical activity (30 seconds to 3 minutes) every 15 minutes, can have a major impact on well-being and work productivity (Henning, Jacques, Kissel, Sullivan & As-Webb, 2014). Stretching exercises can show improvement in productivity, eye, leg, and foot comfort, reduce stress and promote enjoyment, increase health awareness and facilitate behavior change after short active breaks in a work environment. Also, decreased sedentary time at work is associated with decreased cardiovascular and metabolic health risks, premature mortality, and enhancing work place social interaction (Taylor, et al., 2013).

Increasing physical activity levels in order to reduce health risk should be promoted to everyone at a young age to improve health awareness and implement permanent healthy lifestyle changes. There is a lot of sedentary time during school days and this situation continues into college years when students are unaware or ignorant of the health risks (Randall, Han, Heesch, Fields & Knehans, 2007). The common phrase "Freshman 15" is the scenario used to describe many students that gain fifteen pounds, or any amount of weight, within their first year of college (Smith-Jackson & Reel, 2012). This new phase in life, typically the first year of college, has been shown to add more sedentary time to students' lifestyles with the addition of poor nutrition, more strenuous studies, and school work. An idea has emerged through data that freshman weight gain

is inevitable, (Smith-Jackson & Reel, 2012) but perhaps there just is not enough knowledge about how to live a healthy lifestyle being presented to this age population.

Recent research has examined the effects of using active breaks in work environments to promote health, well-being, and productivity through increased physical activity levels (Taylor, et al., 2013; Burkland, 2013; Henning, Jacques, Kissel, Sullivan & As-Webb, 2014). However, few studies have addressed the importance of utilizing an active study break to reap the benefits of increased physical activity levels, health promotion, decreased stress, and overall well-being in a college environment. College students forego a major transition when leaving high school where most of them are in sports or extra-curricular activities, and become much more sedentary in college (Randall, Han, Heesch, Fields & Knehans, 2007). Students need to become aware of the health risks related to low physical activity levels, and increased sedentary time to prevent future obesity, hypertension, diabetes, and many other chronic diseases. The importance of reaching out to college students is to teach them, as young adults, how to stay active during long periods of sedentary time. This will begin to show them how to implement healthy physical activity habits into their future career, such as taking frequent active breaks while sitting at a computer during an 8 hour work shift.

Increased physical activity has obvious health benefits, and one possible mechanism to increase physical activity in college-aged students may be via active study breaks. Currently it is unknown whether students engage in active study breaks, and whether active study breaks are a viable option for college students. Through the use of an intervention in the main campus library at the University of North Dakota as means to promote active study breaks in college, there is potential for significantly increased physical activity levels, energy expenditure, improved mood,

increased retention rate, increased productivity rate, and therefore improved grades. Active study breaks may be the one strategy to counter the "Freshman 15" and for students to not gain weight, or not gain as much weight, while having to study for college exams, or do homework for extended periods of time.

## Purpose

The primary aim of this study is to increase active study breaks in college students. The intervention will be used to promote the use of active study breaks during studying and inform the students of the specific benefits from exercise to help fight against health risks and raise awareness.

## Hypothesis

It is hypothesized that students will engage in more active study breaks during the signage intervention compared to before the intervention. Students will be more likely to use active study breaks when studying for a prolonged period of time, and will be more willing to participate in an active break when studying in a non-silent area.

## Limitations

Possible limitations arise in this study with the unknown number of students that will be observable during these set times and if they attempt to utilize an active study break by seeing the fliers, posters, and table tents identifying the overall benefits of physical activity. If they are not aware of their surroundings they may not take the time to read the facts on the intervention materials, thus not implementing active study breaks into their studying routine. Also, some

students may already use an active study break before the intervention, so the intervention will not pertain to them or they just don't feel like putting forth the effort to increase their physical activity levels. Students may also feel too awkward or shy to stand up and do exercises in a public environment.

Further limitations also arise with categorizing the actual contents of an active study break to an inactive study break. Getting up and going to the bathroom, getting a drink of water, and snacking all consist of actual physical activity, but it is different than stretching, squatting, or other exercise activities. Making sure students acknowledge the contents of an active study break will be an important aspect of the intervention to categorize actual physical activity that is performed during study breaks.

Observation of only college students is a limitation that will need to be addressed. There are adults in college, so it will be important to make sure observations are being taken from actual students studying within a certain age range and not professors, workers, or visitors. The choosing of whom to observe can also be a limitation if they do not look like a college student but in fact they very well could be. The age range is of importance to target college-aged students and promote healthy decisions at a younger age, and not older adults. Another limitation is not specifying ethnicity of the population sample being observed since North Dakota schools are predominantly white.

Active study breaks have been shown to be of significant value in work related environments, such as increased work productivity, socialization, increased physical activity levels, and increased mood (Taylor, et al., 2013). Therefore, understanding how implementing

active study breaks into college students' daily lives is of great importance. College students are often under a lot of time constraints and stress, and regular exercise can be implemented into their daily routines without having to set aside time to go to the gym.

Of major significance in this study is whether college students will attempt to implement active study breaks into their study routines to harvest the benefits. The high prevalence of weight gain in the first year of college could possibly be decreased if students learn how to engage in regular physical activity even at stressful times (Randall, Han, Heesch, Fields & Knehans, 2007). Movement while studying may also relieve stress and increase retention rates, therefore improving grades over time. The intervention will potentially raise the awareness of how easy it is to achieve overall health benefits from simple exercises and give students the necessary knowledge to have an overall healthier lifestyle.

# CHAPTER II

# LITERATURE REVIEW

Exercise awareness has grown tremendously throughout the last few years, and workplaces are starting to implement active study breaks into their daily work schedules, (Henning, Jacques, Kissel, Sullivan & As-Webb, 2014; Taylor, et al., 2013) but there isn't a significant amount of colleges implementing or promoting an active lifestyle into study routines. Past workplace interventions have concentrated on getting the employees to be more active during a sedentary desk job, even if it is for only 15 seconds at a time, with many workplaces seeing positive results. The purpose of this study is to get more college students involved in active study breaks during long sedentary periods of studying to decrease risks of future obesity, hypertension, and diabetes. Therefore, we will examine recommended physical activity levels to reap health benefits, why physical activity levels are decreasing, benefits of being active while studying, and how to stay active when put in sedentary environments.

## Physical Activity Levels

A recent study has shown that physical activity levels start to decrease when students begin their first year of college. Randall and colleagues (2007) examined changes in women's physical activity levels over their freshman year of college in south central United States. Results showed that women started walking less as the academic year progressed. (Randall, Han,

Heesch, Fields & Knehans, 2007). However, vigorous, moderate, and total physical activity minutes per week did not change significantly. Students were assessed within the first and last six weeks of the year and completed a demographic questionnaire and several body composition measures. This finding of decreased walking time was not anticipated given that most students walk across campus to attend classes, but if the walks took less than 10 minutes it was not reported on the International Physical Activity Questionnaire (IPAQ). Students' motivation to regularly attend class could have decreased as the year progressed as well, thus skewing the data. Another limitation is that this study sample consisted of mostly Caucasian women who were of healthy weight and highly active, thus a diverse sample may show different results. The decline in walking found in this study could be seen as the beginning of a gradual decrease in physical activity that may continue throughout college and into adulthood, revealing the importance of stressing health habits at a young age. The sample was a relatively active and healthy group also showing that any age group can fall into the pattern of decreasing exercise, especially the age group targeted in this study.

Rebar and colleagues also suggest that habits predict physical activity choices on days when intentions are weak (Rebar, Elavsky, Doerksen & Conroy, 2014). Researchers suggest that people's intentions vary day by day, and intentions relate to physical activity more strongly for some people with weak habits than for people with strong habits. Therefore, physical activity may be regulated by habits unless daily physical activity intentions are strong (Rebar, Elavsky, Doerksen & Conroy, 2014). Making regular physical activity a natural habit may increase a persons' likelihood to engage in physical activity more often and weigh out the negative intentions to not exercise. This concept may be very important when trying to convince college

students to break bad habits and form new ones to better their lifestyle during daily study sessions.

Moderate physical activity levels have also been shown to correlate with higher quality of life satisfaction (Dilek, Aysegul, Ozden & Fatma, 2013). Satisfaction with life is described as people's positive evaluation about their life in accordance with the criteria determined by themselves. A study on the difference in levels of physical activity on life satisfaction showed that as physical activity levels increased so did scores of physical functioning, energy/fatigue and general health domains of quality of life (Dilek, Aysegul, Ozden & Fatma, 2013). With these positive results, the researchers suggest promotion of necessary interventions to increase people's physical activities in order to increase their satisfaction with life. If life satisfaction increases, people may be more ambitious to continue physical activity and many other aspects of life can increase as well as physical and mental health.

More important than life satisfaction, is the overall importance of physical activity for physical well-being. Inactive individuals not only can feel unsatisfied with life mentally, but they can cause serious damage to their body by not moving and expending sufficient amounts of calories to stay healthy. Physical activity is associated with better health, and can prevent the development of many noncommunicable diseases such as coronary heart disease and type 2 diabetes (Reiner, Niermann, Jekauc & Woll, 2013). Reiner and colleagues (2013) found through their systematic review of longitudinal studies that physical activity in the long-term leads to less weight gain, reduced risk of coronary heart disease with as little as an additional energy expenditure of 1,000 to 2,000 kcal per week, reduced risk of type 2 diabetes, as well as decreasing the risk of developing cognitive impairments such as dementia and Alzheimer's.

College students are in the beginning phase of adulthood and should definitely be aware of the risks that correlate with prolonged sitting time as they soon transition into an academic intensive portion of their lives. Promotion of physical activity at the beginning of adulthood is of major importance to decrease risk factors in the long run.

## Recommendations for Exercise and Sitting Time

The American College of Sports Medicine (ACSM) still supports the 2008 Physical Activity Guidelines for Americans, which suggests that adults participate in at least 150 minutes of moderate-intensity physical activity, which can be achieved in 30-minute segments five days a week (United States Department of Health and Human Services, 2008). ACSM also revealed that prolonged, unbroken sitting time is related to people's risk of obesity and type 2 diabetes. Much of this prolonged sitting time comes from watching television, playing video games, using the computer, reading, and doing homework (The Science of Sedentary Behavior: Too Much Sitting and Too Little Exercise, 2014). While there are no public health guidelines on how long adults should sit, it is recommended that adults aim to reduce their total amount of time they sit during the day, also known as 'overall sitting time' (Sitting Less for Adults, 2011). Australian Government's physical activity recommendations for five to 18 year olds suggest limiting computer and television use to less than two hours a day since many of these activities usually involve sitting for long periods of time (Sitting Less for Adults, 2011). More research is soon to be focused on the benefits of getting up from your chair more often throughout the day to decrease the risks associated with the nearly eight hours of sedentary activity on average per day in the U.S.

Scientists Genevieve Healy and David Dunstan used accelerometers in a study to measure sedentary behavior in order to confirm their previous studies showing harmful metabolic relationships with blood fats and blood glucose. This study showed that too much sitting during the day impairs the body's ability to deposit fat from the blood stream into the body, significantly increasing the risk of cardiovascular disease (Dunstan, Howard, Healy & Owen, 2012). To further enhance the quality and quantity of just 30 minutes of cardio-respiratory exercise daily, adults are recommended to gradually increase exercise time, frequency, and intensity as well as including resistance exercise, flexibility exercise, and neuromotor exercises (ACSM Issues New Recommendations on Quantity and Quality of Exercise, 2014). Thirty minutes of exercise, five times weekly, is the recommended amount for people who are not sedentary for the rest of the week otherwise it may not be enough. Upwards of the minimum recommended exercise time would be more beneficial to reduce health risks.

Recent research has also shown that adults with high screen time (computer, TV, or video game use) are more likely to have metabolic syndrome due to the increased sedentary behavior correlated to screen time use (Saleh & Janssen, 2014). Sedentary time and sleep duration have both been linked to metabolic syndrome, along with risk factors for cardiovascular disease and type 2 diabetes. Saleh and Janssen (2014) portrayed how sedentary time and screen time were significantly associated with a high waist circumference, high triglycerides, and a low HLD-cholesterol level. Dunstan and colleagues (2012) describe that these detrimental associations remain even after accounting for time spent in leisure time physical activity, however prolonged sitting time is a modifiable health risk that can be decreased over time. Moderate to vigorous physical activity has been shown to be consistently associated with reduced risk of type 2

diabetes, cardiovascular disease, and premature mortality, which is why physical activity is being promoted by public health and US Federal Guidelines. Activity monitors are being promoted for users to monitor their daily behavior, and they also provide scientists with accurate and valid results for research (Dunstan, Howard, Healhy & Owen, 2012). Small bouts of physical activity may not even counter-act the risks of prolonged sitting if continuous sedentary activities prevail. By following the recommended amount of moderate to vigorous physical activity each week, and decreasing prolonged sitting time, college students can begin to enjoy a healthy lifestyle that will hopefully follow them into later adulthood.

## Recommended Time to Use Breaks

Occupational sitting has become a large hazard as shown in workplace environments, with an average of 6.82 hours of sitting or sedentary behavior per day (Clark, et al., 2011). Clark and colleagues (2011) designed a self-report study for employees to examine the number of active breaks taken and total hours of sedentary time accumulated during work days, and then compared it to an accelerometer. Active breaks were defined as standing up, stretching, or taking a short walk. Surprisingly, employees self-reported more sedentary time than they actually engaged in, but the physical activity they accumulated was most frequently low-intensity movement. Participants also recalled taking less active breaks than they actually did, such as not counting a short walk at lunch. Researchers recommend that even though the participants were more active than they self-recorded, their movement at work needs to become higher intensity, rather than low to moderate intensity, to delay the onset of disease and gain health benefits (Clark, et al., 2011). However, breaking up prolonged periods of sitting with low intensity

exercise is still important and beneficial compared to no activity, when moderate or high intensity exercise cannot be achieved at certain times.

Recent research has shown that frequent active rest breaks, three 30-second and one 3-minute break, from computer work each hour in addition to conventional rest breaks were beneficial on work productivity (Henning, Jacques, Kissel, Sullivan & As-Webb, 2014). This experiment was conducted at a workplace where everyone engaged in these different lengths of rest breaks to see which times were more beneficial. Short rest breaks at 15-minute intervals improved worker productivity and well-being at one work site. Significant improvement in eye comfort was seen in one of the job sites after receiving brief (10-15 seconds) rest breaks at 6-minute intervals. Leg and foot comfort also was benefitted at this same job site from the stretching exercise targeted for the lower back since this exercise was performed while standing and would increase blood circulation in the lower extremities. Therefore, taking active breaks more often, instead of inactive or no breaks, have shown to be most beneficial in productivity and overall comfort when having to sit at a job site for long periods of time.

Overall, more frequent active rest breaks with stretching exercises are more beneficial to work productivity and mood compared to no breaks, or inactive rest breaks. It refreshes the mind and body and allows you to come back to the same task fully recovered in a few seconds to minute's time. Therefore, incorporating active breaks into study sessions could potentially increase productive studying and improve students' mood, thus promoting better learning.

## Work Place Break Benefits

A majority of sedentary time during the day is due to occupation, and can lead to health risks, stress, anxiety, and weight gain. These prolonged hours of sedentary behavior shows the importance of using active work breaks. Taking active breaks at a sedentary work environment can be beneficial by reducing stress levels, improving mood, curing sleepiness, and increasing work productivity. Many work places are trying to implement these active breaks into their employees work day to increase physical activity levels and promote worker productivity and overall enjoyment while at the workplace (Burkland, 2013).

Burkland examined the need for a rest break when looking at the differences of a difficult versus easy work task (Burkland, 2013). Individuals working on either difficult or easy tasks indicated a need for recovery, but those working on a difficult task indicated a higher need for recovery. The more difficult tasks also raised stress levels higher, showing the need for a rest break. Burkland (2013) illustrates that a short break provides an opportunity for a psychological detachment, a means to get away from the task and focus on another subject for a moment. These findings are very generalizable to the broad public that sit at a computer or desk all day; in particular if they endure difficult tasks all day and need to remain at the same productivity level. This idea could potentially be correlated to help studying as well during high stress times, such as mid-term or final exams. Breaks could be more beneficial for faster recovery time with having to learn more difficult study material in a short period of time. Students then would come back with a refreshed mind after an active study break, and be able to study more productively for another bout of time until another study break is needed.

A Booster Break program was utilized in a workplace to interrupt the sedentary workday with health-promoting work breaks that can counter the negative health effects (Taylor, et al., 2013). The Booster Break program is designed to interrupt prolonged sitting at the workplace, and the breaks are defined as organized, routine work breaks intended to improve physical and psychological health, enhance job satisfaction, and sustain or increase work productivity. Booster Breaks are performed in common work attire during work breaks, and practices include physical activity, meditation, and rhythmic breathing (Taylor, et al., 2013). Qualitative responses from 35 participants were analyzed from five different work sites where one 15-minute physical activity break was taken each workday. Two worksites completed a 1-year intervention and three worksites completed a 6-month intervention. The Booster Break was analyzed to perform a program evaluation of the intervention. Systematic data collections were taken to evaluate the activities and characteristics about the program effectiveness, and inform decisions about future programs. Participants were then asked open ended questions about their thoughts on the Booster Break system. The overall benefitted themes from this intervention were reduced stress and promoted enjoyment, increased health awareness and facilitated behavior change, and enhanced workplace social interaction (Taylor, et al., 2013). This suggests that more work places should be implementing these Booster Break programs, or forms of physical activity interventions, into their employees daily work schedule to gain the benefits of reduced stress, increased physical activity, and increased productivity.

## How to Increase Physical Activity Levels at Work

With all of the known benefits of physical activity comes the question of how do you implement this exercise into a daily routine if working an eight hour shift at a desk job? There

are numerous ideas out there to help get anyone active in a sedentary environment. *USA Today's* Nanci Hellmich developed several ways to bypass the sedentary time at work when your work does not have a break program (Hellmich, 2012). Nanci recommends pacing when talking on the phone, climbing stairs whenever you can, standing while talking to a friend or colleague. Have a walk-and-talk meeting with your colleagues instead of sedentary meetings. Some offices are even offering treadmills in conference rooms or standing desk options, or you could even slip a stepper under your desk and use it while you talk on the phone. A self-monitoring device can also be helpful in buzzing to notify you when you have been sitting for too long (Hellmich, 2012).

Workplace physical activity interventions have proven to be quite successful in improving productivity, social interactions, mood, and enjoyment in the workplace (Tudor-Lock, et al., 2014; Burkland, 2013; Henning, Jacques, Kissel, Sullivan & As-Webb, 2014; Taylor, et al., 2013). Christensen and colleagues (2011) formed a workplace intervention as part of the FINALE program, to reduce body weight and increase physical capacity in health care workers, which included an individual dietary plan, strengthening exercises, and cognitive behavioral training during working hours for one hour per week. A total of 98 overweight female health care workers were recruited for this study, and cluster-randomized into the intervention group or reference group. The intervention group were provided with the diet, exercise, and cognitive protocols, while the reference group were only given oral presentations. The intervention group significantly reduced body weight, body fat percentage, waist circumference, and blood pressure after 12 months, with an overall significant difference between the intervention and control group as well (Christensen, et al., 2011). The workplace intervention gave these females the time

to actually perform these activities during the work day, which led to much better results than just hearing about the benefits of physical activity like the reference group.

A similar study was implemented in an office-based health insurance workplace where a 6-month randomized controlled treadmill desk intervention was implemented for employees (Tudor-Locke, et al., 2014). This study proved how difficult it is to get employees active during a busy work day, and how plan adherence decreases significantly, meaning employees lose motivation to stay active and return to their sedentary habits after a period of time. The WorkStation Pilot Study initially aimed to recruit and enroll up to 60 overweight/obese workers whose job descriptions required continuous sitting-related desk work. Two groups were formed, The Usual Working Group (maintained seated working patterns) and the Treadmill Desk Group, which had to have 2 sessions of 45 minutes using the treadmills per day. All participants were evaluated at baseline, and then throughout the 6 month period, including body weight, body mass index, bioelectrical impedance analysis-determined body fat percentage, waist circumference, accelerometer-measured sedentary behavior and physical activity, gait speed, self-reported fatigue, stress, and quality of life. Treadmill adherence was shown to remain stable in the first 3 months, and then decrease after 3 months. Participants consistently commented on perceived positive effects on overall health, including improved energy, weight loss, improved mood, reduced stress, and increased productivity. Negative comments included participants blaming poor adherence to treadmill unavailability and conflict with a busy work schedule, difficulty of using the treadmill twice each day, as well as prioritizing more important work getting done at their desk rather than on the treadmill that may not be equipped with a telephone (Tudor-Locke, et al., 2014). This study provides evidence that physical activity is not always easy to fit into a

busy work day, especially when high productivity is limited in certain areas. Thus, implementing shorter, more frequently and less invasive breaks may be a solution to all day sedentary behavior at work.

However, worksites can also be major contributors to workplace wellness programs that offer health promotion programs to help combat health care costs by decreasing sedentary time and increasing physical activity (Lankford, Lang, Bowden & Baun, 2013). Obesity is a risk factor for many chronic conditions and is known to be related to increased injuries and health care costs, therefore businesses are saving money by keeping their employees happy and healthy. The cost burden of obesity ranges from $462-$2,027 among men and $1,372-$2,164 among women in comparison to normal-weight employees (Lankford, Lang, Bowden & Baun, 2013). The National Physical Activity Plan (NPAP), The National Prevention Strategy (NPS), and Healthy Workforce 2010 and Beyond all have a common idea to encourage healthy workplace environments by increasing physical activity and supporting healthy eating. Active living is promoted by employers adopting policies and programs that promote walking, bicycling, and use of public transportation. Communities promote designing or redesigning of areas that promote active transportation. These companies can also help by sponsoring a new or existing park, playground, or trail for increased recreational activities (Lankford, Lang, Bowden & Baun, 2013). The first hurdle is realizing the impact that obesity has on a company's employees and overall business, and then actions can be taken to improve worksite wellness.

## Improving Study Habits

There are many distractions with today's media and electronic devices when it comes to studying, so productive study habits have become exceedingly difficult to accomplish. The evidence is mixed on whether study breaks and studying over several days is more beneficial to academic performance compared to prolonged studying (cramming) for a shorter amount of time. Nonis & Hudson (2010) found that the quantity of time spent studying has an influence on performance, but that this influence is moderated by a third variable, the study habits used by students. Student's that crammed in studying the night before did just as well as student's that spaced out studying for many more days. The ability to concentrate always influenced student's studying in a positive way, which could be a link to active breaks becoming an encouraging way to recover and then re-attempt the heavy material while studying. Although the study was limited to academic performance which has its many limitations, the study shows the strong correlation of the necessary study habits such as concentration, and time management to perform well academically and study well.

A recent study looked at reasons why certain medical students excel over others through a self-administered questionnaire (Shawwa, et al., 2015). Medical students with a GPA of 4.5 or greater (out of 5) were included and compared to medical students with a GPA below 4.5. Out of the 359 undergraduate students participating, there were no significant differences found regarding the time spent on outings and social events. The significant difference was found in social networking; 60.7% of high GPA students spent less than 2 hours on social networking per day as compared to 42.6% of the lower GPA students. Also, 79% of high GPA students prefer to study alone, and 68% required silence and no interruptions during studying time (Shawwa, et al.,

2015). This study provides evidence that a distracting study setting (social media and networking) can promote negative study habits and decrease learning and performance in college courses.

Technology may be a leading distraction for today's college students, but it has also been shown that computer-assisted instruction increases student performance more than traditional instruction (Timmerman & Kruepke, 2006). This could be because students are engaged with text, pictures, and audio, or that it is just an easier learning style than a large, overcrowded lecture hall. However, this study did not take into account web surfing, cell-phone use, or other distractions that could lead to unproductive time loss. Cell phones are a major distraction to college students trying to study, and decreased cell phone use could lead to more productive studying with less distractions. Cell phones are not only a major distraction for students in school, but they also increase student's sedentary time with repeated inactive study breaks as well as losing productive study time. Without this distraction, students could potentially be engaging in more active study breaks to increase physical activity levels, break up prolonged sitting time, and increase productivity.

## Minimizing the Barriers

Beginning to incorporate active study breaks into a study routine may be a difficult task if an individual is not usually an active person or has negative study habits. It is important to understand the personal barriers that prevent individuals from taking active study breaks, such as extended cell phone use, unproductive social interactions, social media, and others. Students should engage in physical activity outside of studying so that their bodies feel the benefits of the

enlarged energy and motivation. After experiencing this euphoria they will potentially be more eager to exercise for short amounts after being sedentary for so long while studying to get that energy and focus back. If an individual does not feel comfortable doing physical activity such as stretching, squats, or jumping jacks in a public setting, try studying at home and slowly incorporating these active breaks into a study time schedule. A good system could be to keep track of how well your studying has been going over the few times that you use active breaks, or non-active breaks, and compare study productivity, overall mood, stress levels, amount of physical activity accumulated, and outcomes (Dilek, Aysegul, Ozden & Fatma, 2013; Friederichs, Bolman, Oenema & Lechner, 2015; Reiner, Niermann, Jekauc & Woll, 2013).

## Summary

This literature provides evidence that society is becoming increasingly sedentary and accumulating hazardous risk factors that attribute to the obesity epidemic. By promoting active study breaks in college study settings, students will become aware of their amount of sedentary time that they accumulate throughout each day, and can attempt to increase physical activity levels to reduce disease risks and promote healthier, more productive study habits. Work breaks discussed in the provided literature also show that breaks at work including physical activity are very beneficial not only for the co-workers but the overall business industry.

Getting college students to be more active in young adulthood is necessary to provide lifelong behavior changes to promote physical activity and a healthy lifestyle in an otherwise increasingly sedentary period in their lives. Higher education requires many hours of studying, just like desk jobs promote sedentary work days, therefore if students can learn to fit short bouts

of physical activity into their busy schedules they will maintain that benefit into their future careers.

There are many ways to stay active while studying or working, it is just important to determine a way to remind an individual to take a break, such as a timer or alarm to be aware of the amount of time one remains sedentary. The study break intervention implemented is an attempt to be this reminder for students to get up and be active for short amounts of time when a break is needed, to help with overall studying productivity, and of course to increase physical activity and decrease hazardous prolonged sitting time.

# CHAPTER III

# METHOD

During the fall of 2014, at a Midwest University, this study observed students in a University library to examine the effects of an active study break intervention. The observation for this study took place in two separate study areas located in the Chester Fritz Library on the University of North Dakota campus. Observation hours were conducted to examine the use of active versus inactive study breaks. Students were observed for one week, then students were observed during a second week while a signage intervention took place, and observed during a third week post- intervention. The three weeks of observation were scheduled for the mid-term exam point of the semester to ensure an adequate sample population would be observed.

## Participants

Participant informed consent was not required as this was solely an observational study and no identifying markers were recorded. The library gave permission to conduct this study, as well as the Institutional Review Board.

A total of three researchers were trained to observe student study break behaviors. Two researchers observed at one time in two different study areas looking primarily at college aged students. Inclusion criteria for participants were to observe anyone looking to be between the

ages of 18 and 25 (college-age). Therefore, both undergraduate and graduate students were included in this study.

Twelve observation hours were completed in the week before the intervention, during the intervention, and the week after, adding up to a total of 36 observation hours. The first study area provided 128 seats and the second study area provided roughly 70-75 seats, for an estimated total of 200 seats. Approximately a total of 458 students were observed during this study, 246 males and 212 females.

## Measures

Direct and systematic observation has had a long history in studying human behavior in natural settings, including sport and physical education environments (McKenzie, 2009). Although it has been a common and essential method for studying behavior in a wide range of applied disciplines, it is still often overlooked as a viable method (McKenzie, 2009; Ward, et al., 2008; Brown, et al., 2006; Pate, McIver, Dowda, Brown & Addy, 2008).

The System for Observing Play and Leisure in Youth (SOPLAY) is a validated method to observe participants and their physical activity levels during play and leisure opportunities in specific target areas (i.e. parks, playgrounds, and recess at school). This observation system provides separate scans for boys and girls, and simultaneous entries record their accessibility, usability, and whether or not supervision, organized activities, and equipment are provided, as well as the predominant type of activity engaged in by area users (McKenzie, 2009). The Observational System for Recording Physical Activity in Children-Preschool Version (OSRAC-P) is another validated measure for physical activity levels and related factors of young children

attending preschools and other structured child development programs (Pate, McIver, Dowda, Brown & Addy, 2008).

Therefore, SOBREAK, (systematic observation of study breaks) a systematic observational data collection was developed for this study. Due to the size of the library observation areas chosen, two researchers were needed at a time to capture all student activity. This systematic observation system is similar to SOPLAY, which was conducted in free play settings. However, for this study the observation was with college-aged students at a University Library.

To systematically observe students' active versus inactive breaks, a data table was developed (Figure 1). Specifically, male and female students were observed separately to identify gender differences in study breaks. Student breaks were observed and categorized as active or inactive. Active study breaks were operationally defined as any time the student got up and out of their chair such as walking, stretching, lunges, jumping jacks, squats, etc. Inactive study breaks were operationally defined as any time the student was taking a break but stayed seated in their chair such as pulling out a cell phone to text, socializing with friends, snacking, or anything not related to studying.

All researchers participating in the observation hours discussed how to operationally define what they should consider an active versus inactive break to ensure accurate and reliable results. A pilot study was completed before Fall of 2014 to ensure proper systematic observational scanning agreement and inter-rater reliability between all three trained researchers

(93%). The pilot study also helped operationalize key activities, such as a seated stretch, which was agreed to be termed as an active break.

**Location**: A-Study Room 1 **Observer**: 2 **Day**: Sunday **Time**: 1:00 PM to 3:00 PM

| Scan | M-Active | M-Non | F-Active | F-Non | Total # Breaks | #Female Breaks | #Male Breaks | Total Students |
|---|---|---|---|---|---|---|---|---|
| Scan 1 | | | | | | | | |
| Scan 2 | | | | | | | | |
| Scan 3 | | | | | | | | |

**Figure 1. Example Data Collection Table**

## Procedures

Both researchers observed one area at a time in the library at the same time, each taking half of the area to scan. Specific times were set up to view both areas before and after the intervention as seen in Figure 2, and they are spread out to cover morning, afternoon, and evening study times.

| Study Area #1 | Study Area #2 |
|---|---|
| Sunday: 1:00-3:00 PM | Sunday: 6:00-8:00 PM |
| Monday: 6:00-8:00 PM | Monday: 2:00-4:00 PM |
| Tuesday: 3:00-5:00 PM | Tuesday: 7:00-9:00 PM |

**Figure 2. Observation Time Intervals**

Twelve hours of observation were completed, and then the intervention was posted, followed by another 12 hours of observation. A follow-up week of an additional 12 hours was completed to examine longitudinal effects of the signage intervention. As seen in Figure 1, systematic observation was completed by researchers using tally marks. The systematic observation was set up using a scan technique, with each scan taking approximately 30 seconds to complete and 120 scans per hour for each researcher.

Figure 3 and 4 show the set-up and table arrangements for the study rooms observed. For figure 3, since they were neatly arranged in a rectangle, each scan began on the left side, and moved around in the order of the numbered tables. For example, it started with table 1 and moved to the right until table 4 and back around until table 8 was reached.

Study room 2 is arranged in a scattered form, so the systematic scan began on the left and bounced around to each table toward the right until all seats were viewed. Study room 2 did include couches to view as well, which are labeled blue in this figure, and does not include

numbered tables because the numbers will not be used in data collection and are only shown in Figure 3 to help in understanding how the scan will be implemented.

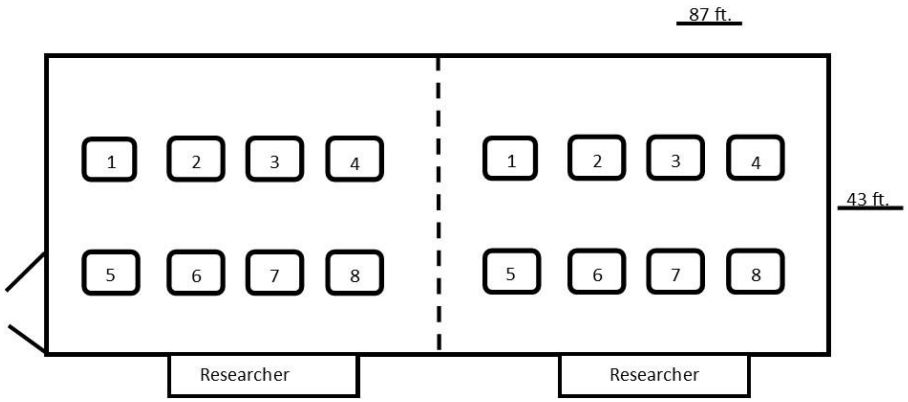


**Figure 3. Study Area 1**

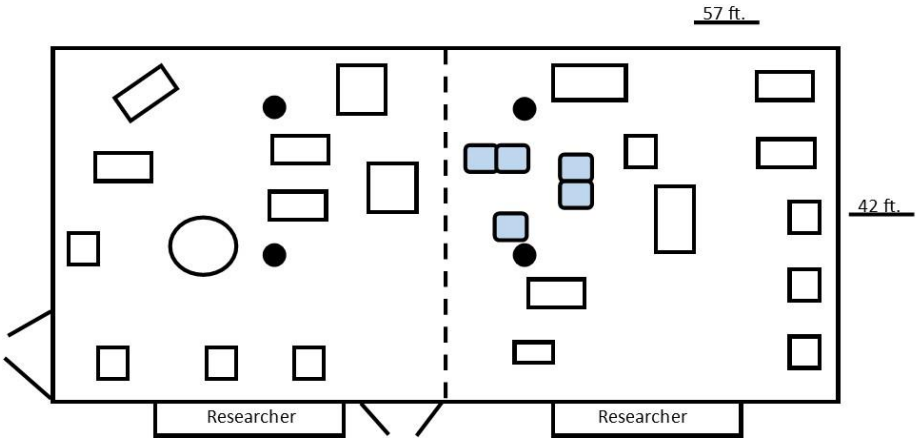


**Figure 4. Study Area 2**

The intervention posted the second week of observation included brightly colored posters, table tents, and signs that list the several benefits of increased physical activity levels

and how they can be reached by attempting to implement an active study break into students' daily study routine. Some listed benefits on the intervention signs included increased productivity, improved mood, improved retention rates, improved grades, and increase energy expenditure.

The posters and table tents displayed during the signage intervention were strategic motivational factors. Based on the social cognitive theory that human behavior is extensively motivated and regulated by self-influence, these displays would potentially create the initiative that students need to get active during studying (Bandura, 1991). When students read the posters during the intervention, they receive the influence to take part in the activities listed to better themselves, but they feel that they have created that motivation all on their own. Therefore, the intervention is a visual reference or reminder, for students to change their behavior while still having it be their own decision.

The use of the intervention was thought to increase active study breaks due to increased motivation, achievement, and self-regulation; all products of self-efficacy. The outcome expectancy was based on the idea that individuals taking time out of their day to study at a University library will have high self-efficacy, and will most likely choose to take part in the active study breaks, and expend effort, persistence, and interest (Schunk & Pajares, 2009). These students will also be more likely to set goals for themselves, such as taking a certain number of active breaks per hour, or only checking their cell phone once every hour. After performing more active study breaks, students will most likely evaluate their behaviors and interpret their performances, hopefully further increasing their self-efficacy.

Individuals also acquire information about their capabilities through watching others perform certain tasks (Schunk & Pajares, 2009). Similarities to others is a cue for gauging one's self-efficacy and can often increase observer's self-efficacy and motivate them to participate in the task because they believe that they can do it if others can. Social persuasions play a major role in developing an individual's self-efficacy, and if students observe other students participating in active study breaks in the library, then they may be persuaded to participate as well.

## Design and Analysis

A pilot study was conducted before the actual observation hours to provide reliability and validity between all three researchers and finalize the scan length and time and operationalize active and inactive breaks. This provided accurate information on how many scans were reasonable to complete within each two hour segment of observation. Also, we were able to more specifically operationally define active and inactive study breaks when we observed some examples of student activity.

Data was analyzed using a repeated measures ANOVA (SPSS v21) to examine pre-post differences pertaining to the outcome of the intervention and the follow-up week. The ANOVA compared active vs. inactive breaks, and male vs. female use of study breaks. We also looked at the frequency that both genders used active and inactive study breaks to analyze who used breaks more often and is more likely to keep using them in their future study habits.

# CHAPTER IV

## RESULTS

The primary aim of the study was to investigate the effects of a signage intervention in a Midwestern University library designed to increase active study breaks among college students. A total of 4,320 scans observed 458 students. As shown in Figure 5: 164 students were observed during the pre-intervention week, 179 students during the signage intervention week, followed by 115 students during the post-intervention week. During the pre-intervention week, 62 females were observed and 102 males were observed, versus the signage intervention week there were 91 females observed and only 88 males. The post-intervention week numbers decreased with 59 females and 56 males observed.

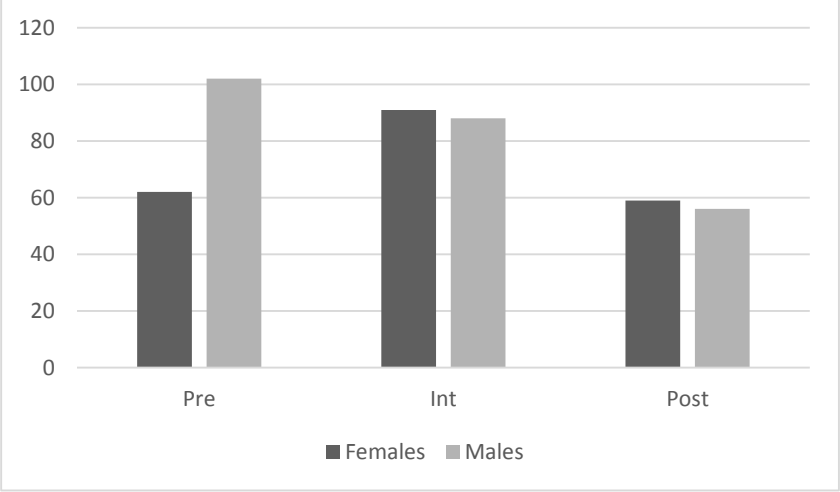


**Figure 5. Number of Females and Males Present During Observation**

The signage intervention was successful at significantly increasing active study breaks compared to pre- and post- intervention weeks (PRE=4.3% vs. INT=5.5% vs. POST =2.3%; p≤.001). Inactive breaks during the signage intervention were also lower than pre- and post-intervention weeks (PRE=9.0% vs. INT=7.9% vs. POST=6.7%; p≤.001).

The secondary aim was to examine female vs. male study breaks. Female active study break use during the signage intervention was higher compared to pre-intervention, but not post-intervention (PRE=3.0% vs. INT=3.7%; p≤.001). Female inactive study break use was lower pre-intervention than intervention (PRE=7.3% vs. INT=8.6%; p≤.001). Male use of active study breaks during the intervention was higher than during pre- and post- intervention weeks (PRE=5.6% vs. INT=7.3% vs. POST=2.6%; p ≤ 0.001), and male inactive break use during the signage intervention was lower than pre-intervention, but higher than post-intervention (PRE=10.8% vs. INT=7.2% vs. POST=6.0%; p≤.001). Table 1 shows the active and inactive study breaks.

***Table 1: Percentage of break use pre-intervention, intervention, and post-intervention***

| | Pre-Intervention | Signage Intervention | Post-Intervention |
|---|---|---|---|
| Total Active Breaks | 4.3%** | 5.6%** | 2.3%** |
| Total Inactive Breaks | 9.0%** | 7.9%** | 6.7%** |
| Female Active Breaks | 3.0%* | 3.7%* | 3.0% |
| Female Inactive Breaks | 7.3%** | 8.6%** | 7.6% |
| Male Active Breaks | 5.6%** | 7.3%** | 2.6%** |
| Male Inactive Breaks | 10.8%** | 7.2%** | 6.0%** |

**p≤0.05; **p≤0.001*

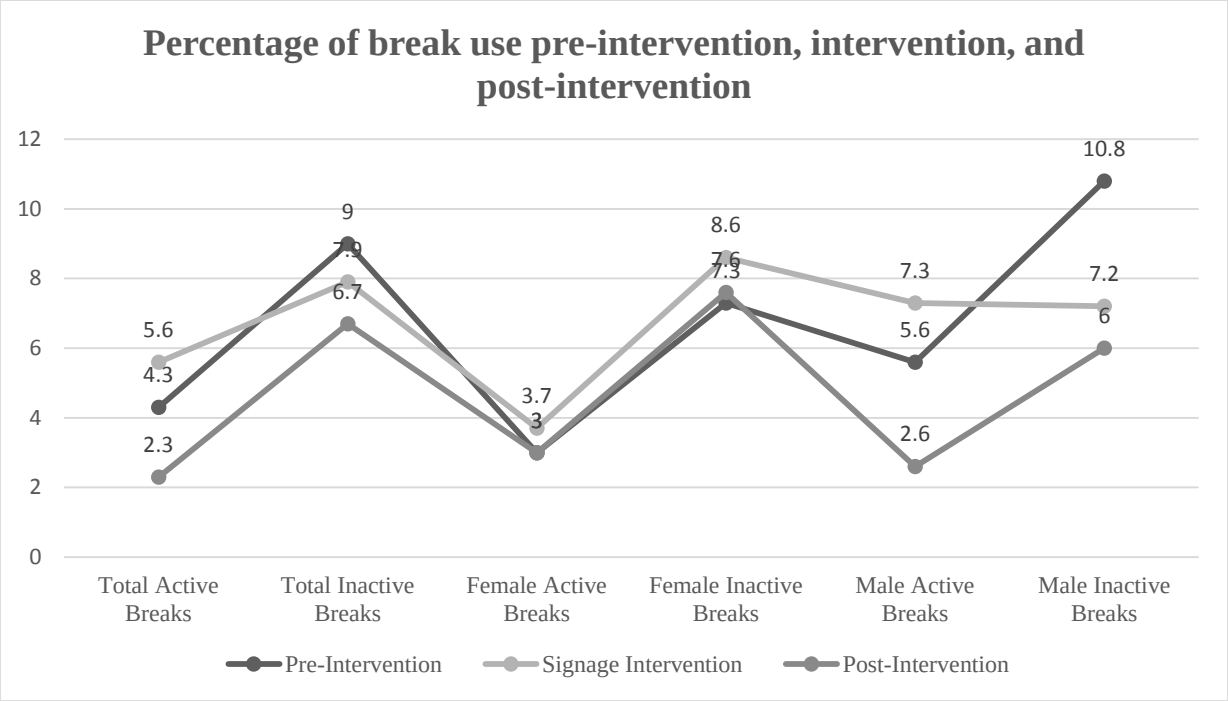


**Figure 6. Percentage of break use pre-intervention, intervention, and post-intervention.**

# CHAPTER V

# DISCUSSION

This study investigated the effects of a signage intervention in a Midwestern University library designed to increase active study breaks among college students. Promoting active breaks has been a popular issue for research in recent years pertaining to work environments, while, few, if any studies have looked at active breaks among college-aged students. In the present study, the intervention successfully increased active study break use, and decreased inactive study break use.

Prolonged sitting is hazardous and has become a main contributor to lifestyle diseases with the rise of sedentary behavior both at home and at work (Studebaker & Murphy, 2014). Many workplace wellness programs are designed to combat prolonged sitting time that include group walking programs, group exercise classes, sit-stand desks, and offer pedometers for increasing physical activity levels. The sit-stand stations have been shown to decrease musculoskeletal discomfort when combined with decreased sitting time. These opportunities could be very beneficial in a college setting to break up student's prolonged sitting time while studying.

The primary aim of this study was to observe the effects of a signage intervention to increase active study breaks and physical activity levels among college students. The

intervention was successful to influence students to be more active when compared to pre- and post- intervention weeks. Inactive breaks also were lower than pre- and post- intervention weeks. This novel study relates to the increasing number of workplaces implementing break systems for their employees to increase physical activity and decrease sitting time (Burkland, 2013; Clark, et al., 2011). Having shown many benefits in the workplace, (increased productivity, increased energy expenditure, and increased mood) this study investigated if break use could be increased in a university library by students while studying (Henning, Jacques, Kissel, Sullivan & As-Webb, 2014; Taylor, et al., 2013). With this being the first study, to our knowledge, to observe study breaks in college students, much of the related literature is based in workplaces. However, the same benefits to employees could be applied to students, as they are often sedentary throughout the day.

A recent study examined workplace physical activity levels by installing sitting pads to employee's office chairs to count the number of transitions to and from sitting at work by a pressure sensor (Ryde, Brown, Peeters, Gilson & Brown, 2013). Waist circumference was measured and BMI was calculated, to find a potential correlation between body size and physical activity levels. Results suggested that individuals with high waist circumference and BMI are more likely to have high levels of desk-based sitting time than those that are not associated with a large waist circumference and BMI. Prolonged sitting time is therefore potentially linked to these overweight individuals. Active breaks during the work day could suggestively help get these overweight individuals more active, expending more calories, and help them feel better. Similarly, the SOBREAK intervention found that students are primarily sedentary without a visual reminder, and more interventions are necessary to increase active breaks.

Friederich and colleagues (2015) similarly examined ways to promote physical activity uptake and maintenance in individuals who do not comply with physical activity guidelines, as it is important to increase our understanding of physical activity motivation among this group. Also, the lack of knowledge shows the need for an informative and motivational intervention like the one completed in this study. When looking at different groups, individuals with autonomous motivation were more likely supportive and resulted in higher physical activity levels. Both of these studies correlate with the idea of improving health benefits through physical activity promotion, and the importance of making it an individual's choice to stay active because they are autonomously motivated and informed on the benefits of their actions. The present study targeted physical activity levels and sitting time through an active break signage intervention, which may increase autonomous motivation in students to be active.

Other research has shown that physical activity can be increased through interventions, and addressing barriers to improve knowledge (Gazmararian, Elon, Newsome, Schild & Jacobson, 2013), however exercise adherence is difficult to maintain. Adherence to an exercise program requires effort and self-regulatory skills. Research has shown that when people's self-regulatory resources are depleted, or they are being forced to do something they dislike, exercise adherence decreases and they exert less effort during exercise and often begin to skip workouts (Ginis & Bray, 2009). Therefore, this intervention supports the idea of promoting an individual's choice to take an active break while studying, but doesn't necessarily show adherence to continue to keep taking active breaks once the intervention is out of sight. The present study did not focus on active break adherence, as this was the first study to conduct an observational study break intervention in a college-aged sample. Future research should examine ways to increase

adherence and thus, the benefits of physical activity, reduced sitting time and active breaks will be longer term.

A workplace intervention promoted physical activity to physically inactive, non-faculty employees at a large Southeastern university (Gazmararian, Elon, Newsome, Schild & Jacobson, 2013), Gazmararian and colleagues (2013) used a randomized controlled trial in which 60 university departments were randomized into five groups ((1) control, (2) gym membership, (3) gym + PA education, (4) gym + gym time during the work day, and (5) gym + education + time). The results showed that after 9 months, (3) education + gym, (4) gym + time, and (5) gym + education + time were significantly more effective in increasing physical activity levels for a prolonged period of time than the control group. The gym membership group did not see as good of results as groups 3, 4, and 5. This study provides evidence that a physical activity intervention including educational information is highly effective compared to just having a gym membership and not being informed on all aspects of physical activity (Gazmararian, Elon, Newsome, Schild & Jacobson, 2013), Therefore, having educational information in the signage intervention of this present study not only served as a visual reminder, but may have influenced student's to make a positive behavior change since they were informed of possible outcomes rather than just being told to get active.

Overall, there is an overwhelming need for breaking up prolonged sedentary activities with increased physical activity in college students and adults to increase productivity, and improve mental and physical health. In the present study, the week of the intervention showed the largest increase in active breaks, and also the lowest number of inactive breaks for both males and females. However, males' use of active study breaks decreased in the post-

intervention week, while females did not. Both males and females also used more inactive breaks during the post- intervention week than during the signage intervention. Many workplaces have attempted to create interventions to examine the benefits of increased physical activity and how it effects their workers. These physical activity interventions could potentially create many of the same positive findings in college-aged students, hence the importance in promoting awareness to college students. The intervention increased student's awareness to get active while studying, and then decreased during pre- and post- weeks when the visual reminder was removed. This provides preliminary evidence that students are potentially willing to get active when motivated, reminded, or promoted to do so.

The secondary aim of this study was to examine female versus male study break use. Males engaged in more active study breaks pre- intervention and during the intervention than females. However, there were more female active breaks post- intervention than males. Females engaged in less inactive breaks pre- intervention, but then used more inactive breaks than males during the intervention as well as post- intervention. This provides evidence that males adhered to the signage intervention more than women to become active while studying.

Munir and colleagues (2015) found similar findings in a self-report study in a workplace setting to assess how many days in a 7-day period that employees had undertaken 30 minutes or more of physical activity. Overall sitting times were less for men than women with an average of each individual sitting for 6.32 hours per workday, with much of this time being accrued through prolonged unbroken bouts. This same finding was demonstrated in the signage intervention with males taking more active study breaks than females, (7.3% vs. 3.7%) even though both genders increased active study break use during this week of the observation. Individuals with higher

work engagement, job performance, and job grade, were correlated to having lower occupational sitting times. This possibly suggests those with higher work engagement, subsequently males, are more likely to break up prolonged sitting periods more often, as well as being more productive, having good mental health, and physical health. This study provides preliminary evidence that breaking up prolonged sitting time is beneficial both mentally and physically, creating healthier and happier employees while also helping fight health risks. Students observed taking active study breaks during the intervention could potentially be gaining the same mental and physical health benefits that these employees do by decreasing sedentary time and becoming more active.

There were several strengths of this study. First, a large sample size of over 400 students was used. Second, researchers reached a high inter-rater reliability (93%), which helps to minimize observational error and bias among researchers. Third, this is a novel observational study, rather than using self-report to examine study breaks. Last, males and females were observed, as intervention strategies targeting college-aged students need to be gender appropriate.

In addition to the strengths, there are also several limitations to note. First, the observation protocol was developed based on the literature and during the pilot study and has not been previously validated. Second, only two rooms in the university library were observed, and students in the computer area, private study rooms, or studying at home or elsewhere were not captured. Last, because of time and feasibility constraints, race/ethnicity was not observed, and we recognize that this ignores important differences in study break behaviors among different groups.

This study provides preliminary evidence that a visual reminder to take an active break while studying can positively influence physical activity. However, a visual reminder may be necessary for sustained active breaks, and that a one-time signage intervention may not be enough to encourage long-term active break use. This was illustrated specifically when male's active study break use decreased during the post- intervention week, followed by both male and female inactive breaks increasing during this same time.

In summary, this is a novel study that shows the need for increasing active study break use in college students to promote physical activity levels and decrease sedentary time. This is the first study, to our knowledge, to observe rather than rely on self-report study break behaviors. Overall, active study breaks may increase academic performance (Nonis & Hudson, 2010), improve physical well-being (Randall, Han, Heesch, Fields & Knehans, 2007) relieve stress (Dilek, Aysegul, Ozden & Fatma, 2013), improve mood (Taylor, et al., 2013), and increase productivity (Henning, Jacques, Kissel, Sullivan & As-Webb, 2014; Burkland, 2013). Future studies could examine active breaks vs. inactive breaks in different ethnic groups and overweight compared to normal weight individuals.

# APPENDICES

# Appendix A

## Motivational Posters

# Get active while studying!

**Did you know that increasing sedentary time has been associated with greater cardiovascular and metabolic risk, as well as premature mortality? Interrupt your sedentary study time with health-promoting active breaks and counter these negative health effects!**

*Taylor, W.C., King, K.E., Shegog, R., Paxton, R.J., Evans-Hudnall, G.L., Rempel, D.M., Yancey, A.K. (2013). Booster Breaks in the workplace: participants' perspectives on health-promoting work breaks.*

# Choose to stay active!

**Active breaks have been shown to be of significant value in work related environments, producing increased work productivity, socialization, increased physical activity levels, and increased mood!**

*Taylor, W.C., King, K.E., Shegog, R., Paxton, R.J., Evans-Hudnall, G.L., Rempel, D.M., Yancey, A.K. (2013). Booster Breaks in the workplace: participants' perspectives on health-promoting work breaks. Health Education Research, 414-425.*

**An active break while studying could give you these same benefits!**

# Practice healthy study habits!

**Media distractions can lead to decreased productivity while studying. Implement an active study break into your routine every time you check your cell phone to replace a distraction with a helpful study habit.**

# Stretch it out!

**Research has shown that short breaks including physical activity (30 seconds to 3 minutes in duration) every 15 minutes, can have a major impact on well being and productivity!**

Henning, R.A., Jacques, P., Kissel, G.V., Sullivan, A. B., & As-Webb, S. M. (2014) Frequent short rest breaks from computer work: effects on productivity and well-being a two field sites. Ergonomics, 78-91.

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