

THE EFFECTS OF EXERCISE ON OVERALL HEALTH OUTCOMES FOR
TEACHERS

Presented to the Graduate Council of
Texas State University–San Marcos
in Partial Fulfillment
of the Requirements

for the Degree

Master of ARTS

by

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San Marcos, Texas
August 2013

THE EFFECTS OF EXERCISE ON OVERALL HEALTH OUTCOMES FOR
TEACHERS

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ACKNOWLEDGEMENTS

Thank you, Dr. Howard, for your constant guidance, support, and encouragement. I not only owe her for the completion of this study, but for the completion of my degree. She has pushed me to be my best, provided a listening ear, and has shown me constant care, that I know personally she shows each of her students. I also want to thank Dr. Friedman and Dr. Haskard for their support, humor relief, and push to finish strong.

To my extremely supportive cohort, I am extremely grateful. These two years, no matter how strenuous, have been a wonderful experience, and should be accredited to you all.

Finally, I would like to thank my family. My mother and father have shown my love and patience, as well as caring guidance. Blair O'Brien and Sarah Black have shown me patience and support that could only come from true friends. I thank you all for your patience and support through this endeavor.

This manuscript was submitted on June 22, 2013.

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ABSTRACT

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The primary purpose of the current study was to determine effects of exercise on outcomes in the teacher population. Specific health outcomes include improvement of overall health, including mood improvement and physical health have previously been paired with higher exercise habits, and this study aimed to show that this is carried onto the teacher population. The study showed that various factors are strongly associated with positive outcomes in teachers including age, stress, quality of life, and BMI. Teachers who report being younger and lower BMI's, less stressed, and having higher levels of quality of life reported higher exercise habits. These data can be used to further the investigation of the benefits of exercise, as well as improving the lives of educator.

CHAPTER I

INTRODUCTION

Exercise has been repeatedly shown to have beneficial psychological and physical effects. Based on the findings of numerous studies, exercise is now being prescribed as part of a holistic approach to treat both physical and psychological illnesses (Wedekind, 2010). There is even a positive link between exercise and a person's quality of life, specifically older adults, which leads to the suggestion that this is an added benefit to other positive health outcomes related to exercise (Paxton et al., 2010). Various types of exercise can lower levels of blood glucose and lipids, resulting in an overall improvement in the physical health of an individual (Ross & Thomas, 2010). More importantly for everyday life, exercise has been shown to have a negative correlation with stress (Nishida & Otomo, 2010). With the available research showing the increasing benefits of exercise, attributes tied to those who exercise regularly come into play. The purpose of this study is to identify the characteristics related to healthy exercise regimens for public school teachers, which is a targeted population that is often considered to be a high-stress job.

Overview of Exercise

Research has provided evidence of the beneficial aspects of consistent exercise on both psychological and physical well-being. Exercise is described as activities that allow

the body to move and to burn calories. Examples of aerobic exercise include walking, jogging, or biking. Aerobic exercises benefit the cardiovascular system, while strength and stretching benefit by increasing stamina and flexibility. For the purpose of this research, the terms *exercise* and *physical activity* will be used interchangeably. According to the research conducted by Saint Onge and Kruger (2011) investigating how education and racial-ethnic differences affect the choices of various types of exercise, exercise was divided into three categories: team sports, fitness activities, and activities that require the use of facilities. Examples of team sports were basketball, soccer, and volleyball. Team sports can be defined as exercise that requires endurance and strength, as well as individuals working together for a common goal. Fitness activities are described as exercises that do not need facilities and can be completed with multiple people or alone. Examples of fitness activities are running, walking, or hiking. The third category is described as activities that are dependent on the use of facilities. This group includes activities such as tennis or racquetball. Factors involved in how individuals decide their line of fitness often involve social aspects as well as other demographics mentioned later. Team activities provide more social interactions versus intense exercise, while exercise relying on facilities can be dependent on weather and availability.

With the various types of exercise available, recommendations have been provided so that optimum health benefits can be reached. One particular article by Garber and colleagues in 2011 cited the overload principle of training, which states that the body must be challenged, or overloaded, in order to change, or reach the health benefits desired. Thus, greater benefit is associated with higher amounts of physical activity. As an average goal, people should exercise for approximately seventy-five minutes a week, or one thousand

calories a week (Garber et al., 2011). According to the Centers for Disease Control and Prevention (CDC, 2011), for adults between eighteen and sixty-four years old, two hours and thirty minutes of moderate intensity aerobic activity every week as well as muscle strengthening activities on two or more days a week that challenges all major muscle groups is recommended. It also included requirements for those who choose more vigorous intensity aerobic activities, which would require seventy-five minutes of desired activity per week as well as the same muscle-strengthening exercises.

Health Benefits

It is evident that there are health benefits attached to a physically active regimen. One study examined a self-reported survey investigating various benefits achieved through physical activity (Kruger et al., 2007). This study presented evidence that the self-reported physical activity level was significantly associated with higher rates of quality of life. Also, ninety percent of adults who reported meeting the recommended levels of physical activity rated their health as either good, or better. Finally, physical activity levels have been found to be inversely correlated to a person's body mass index (BMI) (Kruger et al. 2007). Heath and Brown (2009) investigated physical activity and health related quality of life in obese adults. The findings from this study indicated overweight and obese physically inactive adults reported lower rates of quality of life as well as lower rates of overall health compared to overweight or obese physically active adults. The findings from this study support the research that physical activity helps control obesity, prevents chronic disease, and promotes overall healthy life choices.

Past research has reviewed exercise benefits in different situations, including those who are currently dealing with other medical disorders. One study conducted by Kirshbaum (2007) looked at the benefits of exercise during and after treatment for breast cancer. Overall, whole body exercise benefits cancer patients involved in rigorous treatment through decreasing symptoms of anxiety, depression, fatigue and increasing overall well being. The most important finding from this research was in regards to the intensity of the exercise and the limits the patients must acknowledge. Patients receiving treatment for breast cancer are put through rigorous and trying procedures so they, as well as others who are beginning an exercise regimen, must be aware of their physical boundaries such as extreme exhaustion. Another study conducted by Barnett (2011) focused on cognitive performance in school children and showed an opportunity to exercise during the day benefitted overall frontal lobe functioning. The children's ability to focus, as well as to complete various course assignments, increased depending on the opportunity to exercise. Children who had a longer exercise period experienced more mental health benefits versus the children who had the shorter exercise periods. Also, the children who exercised more showed higher levels of energy and a greater willingness to learn.

A study focused on older adults suggested that in the elderly population, a group for whom physical and mental deterioration is often a rational fear, exercise was shown to decrease the deterioration process and actually improve the mental health and functional abilities (Wang et al., 2011). This study was a longitudinal follow-up study that focused on 197 older adults. Participants reported their exercise regimen and were identified as being part of a regular exercise group or an irregular exercise group. The participants were encouraged and educated to sustain or increase their exercise habits for the next two years

depending on their starting point. The regular exercise group exercised at least three times a week, while the irregular group exercised two or less days a week. The changes in exercise habits and overall health were noted after two years. This study showed the importance of the participants' starting points. For instance, the participants who showed an improvement were more likely to be those in the irregular group and often chose less vigorous activities. The changes were found in this group due to the drastic change from the low starting point, meaning most of these participants began the program not exercising. Secondly, this study showed the changes and benefits from ongoing exercise, meaning the regular exercise group participated in an exercise lifestyle for at least two years. This implies that people who engage in regular exercise can reap benefits, but it is not always evident in a short time period.

A new focus has been placed on the psychological benefits received from committing to an exercise regime. Previous research has provided various results of the actual psychological benefits received through exercise. One particular study focusing on MZ twin pairs suggests a strong relationship between exercise and improved positive psychological functioning (Johnson & Kruger, 2007). In the same study, the researchers strongly suggest that exercise is part of a process, both physical and psychological, that helps the human body build protection against stress and the negative impact it can have (Johnson & Krueger, 2007). It is shown that those who are under high amounts of perceived stress benefit the most from an implemented exercise program (Wilfley & Kuncze, 1986). Another study suggests that health improvement and lowering stress through exercise does not depend on the actual physical activity, but the consistency in which a person partakes in the exercise program (Zuzanek et al., 1998).

Barriers to Exercise

Other research continues to focus on barriers to beginning and adhering to an exercise regimen. Eyler et al. (2002) conducted a comprehensive review investigating the demographic factors related to participation in physical activities. The review shows that women consistently have lower levels of physical activity than men. Males have a tendency to be more involved in physical labor, which translates easily to exercise. The study also reviewed different cultural issues and the role that cultural differences may play in females' participation in an exercise regimen. One factor associated with culturally diverse females exercising is the social aspect (Eyler, 2002). When females speak different languages, they are unable to enjoy the social part of exercise, which can diminish their enjoyment, and ultimately their participation. Another factor playing a role in females choosing to exercise is physical appearance. Although most people exercise for the physical benefits, many women struggle with the physical attributes attached to exercise. For instance, the Eyler review found that African American women hesitated in their participation in exercise because sweating and messing up their hair outweighed any benefits that exercise could provide (2002). The article continued to evaluate different ethnic differences, including American Indian women, who reported that exercise has a negative connotation associated with health issues, specifically diabetes. In laymen terms, exercise is associated with unhealthy women, and those who do exercise are often looked down upon. Finally, Asian women reported that their lives require enough physical activity, and any extra should need a purpose attached, for example, walking to the store for groceries (Eyler et al., 2002.).

Various barriers for participating in various exercise regimes were identified in all of the racial/ethnic groups considered. One of the most interesting barriers reported by most women, regardless of race and ethnicity, was money. Multiethnic, black, and American Indian women cited the lack of culturally appropriate programs, as well as facilities being a cause of their unwillingness to participate. In regards to ethnicity, Hispanic women are more likely to participate in exercise that is geared towards care-giving or household activities. In general, white women were most likely to engage in traditional exercise activities (Eyler et al., 2002.).

In the same review conducted by Eyler et al, other factors were compared to see if any play a role in women's commitment to exercise. Education level was found to have a positive correlation with participation in exercise, especially more competitive sports. Another factor that relates to this particular study is employment. Since this was a review of other studies, the relationship between employment and exercise was divided among race. It suggested that the relationship was vague at best, and was completely dependent on race and possible type of job. For instance, there was no relationship in black women between employment and exercise, but in white women, those who were employed full time reported being more physically active (Eyler et al., 2002.).

Along with demographic and cultural barriers, life presents outside barriers for each individual person. One study conducted by Blaney and colleagues (2013) discusses the struggles faced by cancer patients when attempting to be physically active. Cancer patients are constantly exhausted and feel weak. The main barriers reported by the participants were linked to their health or environmental factors. Ironically, the health barriers that the

participants faced, such as health issues, pain, fatigue and weakness possibly could have been alleviated through exercise. Other medical issues, whether they are as chronic and serious as cancer, or short lived, such as a head cold, all play a role as potential barriers against adults exercising.

Just as physical health can cause barriers, mental health can as well. In a study conducted by Brigitte Sabourin and colleagues in 2011, women who suffered from high anxiety symptoms were shown to exercise less due to their anxiety. This study was actually a continuation of a study on men suffering from anxiety and their lack of participation in an exercise regime. In this particular situation, physical attributes attached to physical activity are often also associated with anxiety, for example, rapid breathing or elevated heart rate. Since people who struggle with anxiety do everything in their power to avoid the physical symptoms of anxiety, partaking in exercise that results in those particular symptoms is out of the question.

Strategies to Improve Adherence

Previous research presents various interventions and factors that play a role in individual adherence to a physically active lifestyle. Adherence is defined as a mental and physical commitment to a regimen, or the extent to which a person follows through with the recommendations of their healthcare provider. People who are motivated to perform physically and mentally are more likely to adhere to the regimen even through struggles and

tribulations (Evers et al., 2012). People all have individual circumstances that require different levels of change to integrate activity in their lives.

A systematic review conducted by Tierney and colleagues (2011) focused on exercise adherence for those suffering from heart failure. These participants had stable heart failure and were strongly recommended to participate in daily physical activity. After reviewing studies that included 3,231 patients, the researchers identified various factors that increase the likelihood of the participants exercising. Short-term commitment to exercise was associated with problem solving, goal setting, and continuous feedback. These factors were related to underlying matters dealing with exercise. Goal setting and feedback increased self-efficacy, which has been shown to be a predictor of participation in exercise in medical patients and non-medical patients (Tierney et al., 2011).

In another study focusing on young athletes and exercises preventing injuries, athletes were exposed to strenuous activities challenging their muscles, and often pushing the muscles to a point of deterioration. Strengthening exercises not only prevented immediate injuries, but also helped to sustain endurance and strength. This study is important because it highlights the importance of outside roles in a person adhering to exercise. The study found that encouragement from teammates, coaches, as well as any other affecting roles in the athlete's life was a predictor of adherence. Social support has been repeatedly shown to be an ultimate factor in exercise adherence (Keats et al., 2012).

A study conducted by S.A. Prasad and F.J. Cerny also investigated the factors influencing exercise adherence for patients with cystic fibrosis. This study presented interesting findings, stating that gender, age, and disease progression all played a role in

adhering to an exercise regimen. Higher exercise adherence is associated with exercise programs that are individualized and enjoyable. Participants must see exercise as a fun activity. The focus was placed on changing the participant's lifestyle to focus on overall healthy habits, versus just adding exercise to the daily routine (Prasad & Cerny, 2002).

In another study focusing on characteristics related to adhering to an exercise regimen, age was shown to be a contributing factor. For older adults, participation dropped by more than fifty percent, with the highest participation for individuals between twenty-five to thirty-nine years old (Leslie et al., 2004). Although results were collected through a self-report survey, age is clearly correlated to the level of participation in daily exercise.

Since there is a definite positive relationship between exercise and overall health, a focus must be placed upon identifying those who are most likely to exercise and continue the regime. It is suggested that realistic goals, a strong support system, avoiding injuries, positive self-monitoring, and enjoyable exercise environments are associated with exercise adherence (Wilfley & Kuncze, 1986). Even if a person is equipped with the best of all these variables, there is no guarantee that a person will stick to an exercise plan, much less start one. In regards to gender, the only differences found were in the actual type of exercises in which they partake. Females gravitated towards social aerobic exercises, while males favored independent exercises such as jogging. (Leslie et al., 2004). According to one study conducted by Hopkins and colleagues (2012), the effects of physical exercise on cognition and affect were evaluated. The results showed that a commitment to exercise is strongly correlated to higher cognitive function, as well as higher levels of psychological health in individuals. The study continued to show that after exercise, there were less anxiety-fuelled

actions, such as nail biting or stress eating. Exercise benefits both physical and mental health by providing an outlet for unneeded stress.

A Teacher's Life

According to a recent study, occupation-induced stress is linked to high levels of depression, as well as other mental health distress (Wang et al., 2012). Teaching is one occupation where high levels of stress have been reported and have had negative consequences for teachers. Teachers' levels of stress have been related to their efficacy, their job satisfaction as well as their overall feeling towards their school (Collie et al., 2012). The hypothesis relating to job control and job satisfaction predicting no difference between the two exercise group was formed because the lack of adherence not the impact of stress. The same study cited two main causes of stress: students' behavior and workload. In another study, stress was strongly related to lower levels of quality of life in teachers. This affected teachers' mental and physical health (Wang et al., 2012). This stress ultimately leads to early retirement and higher levels of quitting. Additionally, there is a higher risk of developing somatization disorders and psychological distress. The negative effects of stress on teachers are evident, and the need for relief is necessary.

A review of the increased demand placed on teachers and the scrutiny on current curriculum has increased the level of stress teachers face in their profession (Larchick, & Chance, 2011). Teachers are dealing with the grueling task of meeting near impossible standards, all the while balancing daily personal stressors. The decreased lack of respect from students, their parents, and the community, compromises teachers' overall well-being.

Research has shown that chronic stress can lead to damaging effects on one's health by limiting cognitive functioning, limiting physical ability, and diminishing the strength of the immune system (McEwen, 2008). If teachers are faced with enormous amounts of stress, exercise could provide a positive outlet in which they are able to relieve that stress.

Unfortunately, with the limited hours left in the day, exercise is not always a top priority.

Research conducted by Cladellas and Castello (2011) has shown that time management is crucial in order to reduce stress in teachers. The teachers who set aside time for personal activities, like exercising or spending time with family, reported lower levels of stress. As more outside responsibilities are placed upon an individual, in particular for females, such as household and nurturing responsibilities, exercise is placed farther down the line of importance.

A happy and healthy teacher is more prepared, better suited for the job, and is a better example to students and peers than a teacher who is constantly sick and stressed. Individuals that enter an extremely rigorous and stressful career need an outlet in which they can release steam and care for their emotional and physical well-being.

Purpose of Study

The purpose of this study is to determine characteristics of both positive and negative exercise behaviors of public school teachers. Teachers are in a stressful profession, which means they are likely to benefit from committing to a consistent exercise regimen. The current study was designed to add to the growing literature covering the benefits of exercise

geared to a specific population. The participants were divided into two groups, which were compared on various demographic, occupational, and health characteristics. Participants reporting they exercised zero to three days a week were placed in the first group and labeled as Low Exercise (LE). Participants reporting they regularly exercised four to seven days a week were placed into the second group, labeled as High Exercise (HE). The goal with this cut-off choice was to identify participants who were consistently exercising every week. According to the American Heart Association (2013), five days of moderate exercise for thirty minutes or three days of twenty-five minutes of vigorous exercise combined with two days of moderate to high intensity muscle-strengthening activity was recommended. Using this as a base, four days per week represents a consistent level of exercise per week. In addition to comparing the two groups at a univariate level, a logistic regression analysis was also planned to determine the factors most associated with teachers participating in high rates of exercise.

Hypotheses

Demographic Indicators:

1. The mean age of the LE group will be significantly older as compared to the mean age of the HE group.
2. A higher percentage of males will be associated with the HE group and a higher percentage of females will be associated with the LE group.
3. The ethnicity of the HE group will have a greater proportion of Caucasians compared to the LE group.

4. The marital status of the LE and HE groups will not differ significantly.

Teaching Variables

5. The tenure, or the amount of time which the teachers have been teaching, will not differ significantly between the LE and HE groups.
6. The difference of courses taught, core versus elective, will not differ significantly between LE and HE groups.
7. The difference in school type (elementary, middle or high school) will not differ significantly between LE and HE groups.
8. The perceived level of job control will not differ significantly between the LE and HE groups.
9. The rate of job satisfaction in the LE group will not differ significantly from the HE group.

Self Report Physical and Psychological Indicators:

10. The LE group will report higher levels of perceived stress compared to the HE group.
11. The LE group will contain higher rates of major depressive disorder compared to the HE group
12. The LE group will contain higher rates of panic disorder compared to the HE group
13. The LE group will contain higher rates of anxiety disorder compared to the HE group

14. The LE group will contain higher rates of somatization disorder compared to the HE group.
15. The LE group will report lower levels of Quality of Life (QOL) compared to the HE group.
16. The LE group will report higher levels of Body Mass Index (BMI) compared to the HE group.

CHAPTER II

METHODS

Design

The sample for this study was based on public school teachers from 46 random districts in the state of Texas who were invited to participate in an online comprehensive occupational health study. Email addresses were obtained through the specific districts via the Public Information Act and district websites. A total of 3,361 teachers agreed to participate in this study. The data were collected for various research studies, and formed a useful database for this study.

Participants

To be included in this particular study, the teachers had to respond to the question regarding participation in daily exercise (N=2603). The question asked participants to estimate on average how many days a week he/she exercised using a scale from zero to seven. This sample was then divided into two different groups, depending on the reported amount of exercise per week. Those who reported exercise three or less days a week were placed in the Low Exercise (LE) group (N=1941). The participants who reported exercising four to seven days a week were placed in the High Exercise (HE) Group (N=662).

Measurements

This study focused on the demographic variables consisting of age, gender, ethnicity, and marital status. Teacher-specific information included type of school (elementary, middle, high school, or other), type of class (core versus elective), number of years teaching (tenure), job control and job satisfaction. The job control variable was based on the sum of six items taken from the U.S. Department of Education National Center for Education Statistics (2010) teacher questionnaire. These items evaluate the extent to which teachers report control over selecting materials and instructional techniques, control over homework and assessments, and control over discipline in their classroom. For internal consistency, the Cronbach's alpha for the six items measuring job control is .770. The job satisfaction variable was based on the sum of ten items created to assess the extent to which teachers feel supported from their community, their legislators, their school and district administrators, their peers, their students and their students' parents. For internal consistency for the ten items rating job satisfaction, the Cronbach's alpha is 0.854.

Body Mass Index (BMI) was also included in this study. BMI was calculated using the participants' self-reported height and weight and entering the numbers into the BMI equation, $(\text{Weight in Pounds} / (\text{Height in inches})^2) * 703$. BMI was first divided into seven different categories after calculation: severely underweight, underweight, normal, overweight, obese 1, obese 2, and obese 3. However, due to the low amount of participants in each category, the severely underweight, underweight, and normal categories were combined into one group (BMI <25), overweight was one group (BMI between 25 and 30), and obese 1,2,3, were combined into one group (BMI >30).

In order to properly analyze the mental health of the participants, the Short-Form 36 Health Inventory (SF-36), the Perceived Stress Scale (PSS), and the Patient Health Questionnaire (PHQ) were used.

The SF-36 is a 36-item generic quality of life measure that places value on ones' physical and mental health. Compatibility of the SF-36 was measured in several national calibration studies conducted in 1998 and 1999. The reliability of the measurement has exceeded the minimum standard of .70, and for physical and mental summary scores the reliability mostly exceeds .90. The scores range from zero to one hundred with a mean score being fifty and a standard deviation of ten. Since the SF-36 measures eight different health scales, the overall validity is empirically evident (Ware, 2000). For the purpose of the current study, the Mental Composite Score and the Physical Composite Score will be used.

The Perceived Stress Scale is a commonly used measurement evaluating the perceived amount of stress one is facing. It is a ten item assessment with each answer in the format of a Likert scale, ranging from 0- Never to 4- Very Often. The questionnaire focuses on how respondents view the unpredictability, uncontrollability, and the overload in their lives. Other health statuses that the PSS is related to include Self Reported Health and Health Services Measures, Health Behavior Measures, help seeking behaviors, and Stress Measures. This assessment has been used in various past research studies and is continued to be used in research regarding stress (Cohen and Williamson, 1988).

The Patient Health Questionnaire is a self-report measure that has been validated against the PRIME-MD for diagnosing Axis I mental disorders in a primary care setting. The

portions of the PHQ used in this study evaluate the presence of Major Depressive Disorder, Anxiety Disorder, Somatization Disorder and Panic Disorder (Spitzer et al., 1999).

According to the DSM-IV (1994), Major Depressive Disorder is defined by depressed mood or loss of interest, change in mood, or certain impaired function in day-to-day activities. Using the PHQ, Major Depressive Disorder is assessed by indications of experiencing at least five of nine depressive symptoms more than half of the days during the prior two weeks.

Anxiety disorder is characterized by excessive, uncontrollable, irrational worry strongly affecting day-to-day life. Anxiety Disorder is determined by the PHQ if the participant indicates experiencing at least four of seven anxiety symptoms more than half the days over the past four weeks.

Somatization disorder is defined by recurring multiple clinically significant complaints about pain that limit mobility or normal activities that cannot be explained by any other medical reason. The PHQ assesses Somatization disorder by indications of being 'bothered a lot' over the last four weeks by at least three of thirteen unexplained bodily ailments.

Panic disorder is described as brief periods of intense fear or discomfort usually reaching severe symptoms in the initial ten minutes. Attacks are recurrent and unexpected and are followed by severe fear of more attacks. The PHQ assesses Panic Disorder by indicating suddenly experiencing an anxiety attack or sudden feeling of panic more than once in the past four weeks, along with at least four of eleven additional panic symptoms.

Statistical Analysis

All analyses were conducted using SPSS v. 20. For the demographic, occupational, psychosocial and physical variables, the Pearson chi-square (X^2) test was used to test the association between the Low Exercise group and High Exercise Group for categorical variables. Independent t-tests were used for comparisons of continuous variables. Finally to assess the factors most associated with high exercise tendencies, a simultaneous multivariate binomial logistic regression was used to determine the factors most associated with High Exercise levels. Pairwise deletion was used for missing data. The significance criterion was set at alpha level of $p=.05$. To control for any potential Type I error, a Holms-Bonferonni Step –Down procedure was used. Also, age and gender were controlled for in the univariate comparisons.

CHAPTER III

RESULTS

The appropriate data screening was conducted before analysis to ensure homogeneity of variance, as well as to determine any outliers or skewness. Pairwise deletion was used for any missing survey data.

Demographic Variables

Basic demographic variables are shown in Table 1. Age, gender, ethnicity, and marital status were all considered for the hypotheses regarding the demographic predictors. In regards to hypothesis one the mean age for the Low Exercise group was 44.23 and for the High Exercise group was 43.68. Similar to what was hypothesized, age was a significant predictor for exercise behaviors ($p=.0035$). Since there is a small difference in mean age for the two comparison groups, the significance may be due to being over-powered. Therefore, Cohen's d calculation was appropriate to assess the effect size. For age, the calculated effect size was $d = 0.05$, indicating a very small effect for the differences in age.

The Low Exercise group consisted of 18% males and 82% females. Males made up 27.1% of the high exercise group, and females made up 72.9%. There was a significant difference in gender proportions found between groups ($p < .001$), with a greater percentage of males in the High Exercise group, which matched hypothesis two

In regards to ethnicity and supporting hypothesis three, the Lower Exercise group was comprised of 7.7% African American, 69.7% Caucasian, 18.4% Hispanic, and 4.2% Other. The High Exercise group was comprised of 5.8% African American, 74% Caucasian, 15.1% Hispanic, and 4.7% other. Differences in ethnicity was found to be marginally significant ($p=.06$), with a trend indicating a higher proportion of Caucasians in the High Exercise group.

In regards to marital status, no significant differences were identified between the Low Exercise and High Exercise groups, so hypothesis four was supported ($p=.183$).

Teacher Variables

Teacher variables that were considered as possible predictors included tenure (how long they have been teaching); type of class they taught, (core or elective); school type (elementary, middle, or high school); job control; and job satisfaction. Analysis of the teacher variables can be found in Table 2. The rationale for hypothesis five was that free time does not increase or decrease with the years one has worked, and no matter the time a teacher has worked, they still face the same exercise barriers. The LE mean tenure was 13.36 years, and the HE mean tenure was 13.56 years. No significant difference in tenure was identified between the groups ($p=.374$).

For the type of school, and hypothesis six, the LE group was made up of 44.8% identifying as elementary school teachers, 22.2% reporting as middle/junior high school

teachers, and 33.0% identifying as high school teachers. In the HE group, 39.6 % were elementary school teachers, 23.2% were middle/junior schoolteachers, and 37.2% were high school teachers. There was not a significant difference between the type of school and the exercise group with which they associated ($p=.063$). This was hypothesized because although different levels of schools present different stressors and challenges, they still cause the barriers to exercise that every teacher faces. This is similar to why no difference was predicted between core or elective classes. Additionally, there was no significant difference in rates of teaching Core versus Elective courses between the LE and HE groups, supporting hypothesis seven ($p=.10$).

Job Control was shown to be marginally significant ($p=.079$), which was not what was expected according to hypothesis eight. It was proposed that job control does not limit the barriers to exercise faced, and the effect of job control on outside stressors is limited. The trend supports that participants in the HE group indicated a greater degree of control at work than the LE group. Job satisfaction was also marginally significant ($p=.054$), which contradicted what was expected according to hypothesis nine. The rationale for this hypothesis was to similar to that for job control. Once again, the trend showed that the HE group had a higher mean score of satisfaction with their job than the LE group.

Physical and Psychosocial Variables

Both physical and psychosocial variables were included in the comparisons of Low Exercise and High Exercise habits (see Table 3).

The Perceived Stress Scale (PSS) compared the levels of perceived stress between the Low Exercise and High Exercise groups, and refers to hypothesis ten. The LE group's mean

score was 26.1, which was significantly greater than the HE group whose mean score was 17.0 ($p < .001$). The higher the amount of stress reported, the less likely they were to exercise.

The Patient Health Questionnaire (PHQ) assessed four different Axis 1 diagnoses: somatization, major depression, panic, and anxiety. Teachers in the LE group had significantly higher rates of Axis I psychopathology compared to the HE group (see Table 3). Results for major depression supported hypothesis eleven, with 21.8% of the LE group versus 13.9% of the group meeting criteria for major depression ($p < .001$). Panic disorder was identified in 8.9% of the LE group versus 6.5% of the HE group which supported hypothesis twelve ($p = .054$). Anxiety disorder was identified in 19.1% of the LE group while it was only identified in 12.8% of the HE group, which provides evidence to support hypothesis thirteen ($p < .001$). Within the LE group, 35.8% met criteria for somatization disorder, as compared with only 21.9% of the HE group, which supported hypothesis fourteen ($p < .001$).

Using the SF-36 Quality of Life assessment, various aspects of physical and psychological health were measured. The Physical Composite Summary (PCS) assessed limitations in self-care, severe bodily pain, exhaustion, and overall health. The Mental Composite Summary (MCS) assessed distress, limitations in usual activities and health rating. Overall, the HE group reported significantly higher levels of Quality of Life in both mental composite ($p < .001$) and physical composite ($p < .001$). This evidence supported hypothesis fifteen.

In reference to hypothesis sixteen, Body Mass Index (BMI) was found to vary significantly between the LE and HE groups. Participants with lower BMI made up a larger percentage of the HE group than in the LE group. The LE group was 29.5% normal or underweight, 30.5% overweight, and 40.0% obese. The HE group was 44.8% normal or underweight, 31.2% overweight, and 24.1% obese. There is a significant difference in all three BMI categories when comparing the LE and HE, with the biggest difference found in the obese and normal to underweight groups. The LE group had a greater percentage of participants that were obese, while the HE group had a higher percentage of participants that were normal to underweight ($p < .001$).

The previously determined significant factors were analyzed through a multivariate binary logistic regression in order to control for insignificant factors and decipher which were most significantly related to high levels of exercise. The created model contained two specific blocks. The first block included demographic variables and the second contained the physical and psychosocial variables. The demographic block included age, gender, and ethnicity. The physical and psychosocial variables include Perceived Stress Scale, SF-36 Physical Composite, SF-36 Mental Composite, and BMI categories 1 and 2. Through the additional analysis, the following factors were considered significant above all the rest: male gender, Perceived Stress Scale, SF-36 Physical Composite, SF-36 Mental Composite, and BMI categories 1 (under/normal weight) and 2 (overweight). For instance, males were 1.6 times more likely to exercise than females. In reference to the Perceived Stress Scale, those with higher levels of stress were significantly less likely to be associated with the High Exercise group. For the SF-36, for each unit increase on the Physical Composite score, participants were 4% more likely to exhibit high exercise levels. Additionally, for each unit

increase on the SF-36 Mental Composite score, participants were 2% more likely to be associated with the High Exercise group. Finally, for BMI, both the normal and overweight groups were significantly associated with High Exercise. Participants in the underweight or normal weight groups were 1.4 times more likely to be associated with the High Exercise group. Although depression, anxiety and somatization disorders were previously identified as significant factors at the univariate level, they were not significant when combined with the other factors.

CHAPTER IV

DISCUSSION

Exercise is related to better health and through this study and past research, predictors of exercise habits have been evaluated. This study investigated factors associated with exercise habits in teachers. In a stressful profession, exercise provides a means to ameliorate both psychological and physical issues. It was hypothesized that teachers who exercise more often will live both mentally and physically healthier and happier lives compared to those who exercise less frequently.

Previous research has shown that younger ages are more predictive of better exercise habits (Dunton et al., 2008). As predicted in hypothesis number one, this current study has shown that in the Texas public school teacher population, age is once again a significant predictor for high exercise habits, although the effect size was very small. Gender was also found to be a significant indicator, with males reporting higher exercise habits, which matches what was predicted in hypothesis two. Past research has supported gender being a predictor of exercise habits. Since men traditionally choose labor-intensive jobs, exercise is naturally regimented into their daily schedule. The teacher position is not as physically intensive as other traditional jobs, but males tend to keep exercise in the regimen. Contrary to the originally stated hypothesis number three, ethnicity did not significantly differ between the LE group and HE group. The hypothesis was proposed because of past research showing Caucasians to have higher tendencies to exercise. This study showed a trend indicating that Caucasians were more likely to exercise more frequently compared to other ethnic groups,

which followed past research. When comparing the other ethnicities, there were no significant differences. In regards to marital status, there was no significant difference in

exercise behavior between the statuses, which corresponded with the prediction in hypothesis number four. As with any population, the highest responses to the marital status survey question were married and single, with similar percentages of low and high exercisers in both groups.

Teacher specific comparisons provided non-significant results, which were hypothesized in Teacher Variable hypotheses five through nine. As previous research predicted, the teacher variables were not strong predictors of exercise behaviors. The job control and job satisfaction factors did not differ between the two groups. However, job control and job satisfaction were both identified as marginally significant. In general, the trend shows that teachers who exercise more were more satisfied with their job and felt more in control with their position. This corresponds with past research showing the benefits of exercise in a variety of life domains.

The psychosocial comparisons were the main focus of this study. The levels of Perceived Stress were significantly different as predicted in hypothesis ten, with higher levels of stress reported by those in the LE group. As past research has indicated, exercise helps relieve stress and provides a clearer state of mind. According to Klaperski and colleagues (2013), exercise lowers levels of physical stress, with a positive correlation found between higher levels of exercise and higher reports of stress relief. A study conducted by Nishida and Otomo (2010), focused on the teacher population and exercise as well. Their study findings

revealed that exercise had several mental health benefits, specifically relieving stress and promoting a positive mindset.

The Axis I psychopathology analyses presented similar significant differences between exercise groups as expected in hypotheses eleven through thirteen. Major depression and other depression were more prevalent in those in the LE group than in the HE group. Anxiety was also more prevalent in the LE group versus the HE group. Just as predicted, the percentage of participants taking medication for anxiety or depression was greater in the LE group versus the HE group. Also, the percentage of participants seeing a counselor for issues with anxiety and depression was significantly greater in the LE group than in the HE group. These results are consistent with findings in a study conducted by Motta and colleagues (2012), which stated that those participants who had higher exercise habits had significantly lower levels of depression and anxiety. Since experiencing depression and anxiety and seeking help for those issues go hand and hand, it would only make sense that the LE group had a higher percentage of both factors. In the Mota-Pereira study (2011), treatment for major depressive disorder with an exercise plan had a higher success rate than treatment without exercise. Another study conducted by Herring and colleagues in 2011 found that exercise in addition to medication or talk therapy, as an additional treatment plan for General Anxiety Disorder, was extremely successful.

In the current study, rates of somatization disorder were also significantly higher in the LE group compared to the HE group. This disorder was the highest reported disorder out of all the other disorders assessed by the PHQ. Current treatments are based on cognitive behavioral aspects and controlling the pain (Woolfolk & Allen, 2011). Exercise treatment has

been successful in relieving somatic pain, as well as other factors associated with somatization disorder such as anger and frustration (Nickel et al., 2006). Continued exercise increases flexibility and movement throughout the body, which could eliminate some pain.

Finally, rates of panic disorder were also significantly different between the two comparison groups. More people suffered from panic disorder in the LE group than in the HE group. This current study's results mirror findings in a study conducted by Wedekind and colleagues (2010) showing that exercise combined with medication or a placebo both provided a positive effect on the patients. Exercise relieves stress, provides an outlet for built up tension, and creates a healthier state of mind.

Reviewing the Quality of Life variables, differences in physical and mental composite scores were both significant between the comparison groups as predicted in hypothesis fifteen. The HE group reported higher levels of physical and mental quality of life indicators compared to those in the LE group. These findings are consistent with the findings in the Mesquita and colleagues (2012) study, showing that exercise not only improves mental health, but overall quality of life as well.

This study also investigated how BMI differed between the comparison groups. As predicted in hypothesis sixteen BMI was significantly higher in the LE group than the HE group, as expected. Exercise creates a physically stronger and healthier body, which in turn lowers the overall BMI.

The final multivariate analysis identified the main characteristics associated with high exercise behaviors. Males have a greater tendency to exercise more, as past research has suggested. Perceived stress was also a strong predictor, stating that those who had higher

levels of stress exercised less. The Motta and colleagues study (2012) showed that along with depression and anxiety, reported stress was reduced with exercise. The Wedekind and colleagues study showed that in individuals with panic disorder, an exercise regime has shown to have a positive effect on overall quality in life (2010). Mesquita and colleagues (2012) found that exercise increases overall mental health as well as physical health. The other strong factors found in this study included the mental and physical component, as well as the BMI categories 1,2, and 3. Due to past research, an inverse relationship between the amount exercised and BMI was expected (Kruger et al., 2007). These results give more strength to the previous research.

This current study has added more support to past research showing the benefits of exercise, and supports the need for an implemented exercise plan for teachers. Increasing exercise levels will create healthier lives and will hopefully in turn benefit teachers in all areas of their lives. Teachers strongly impact our growing future. Their health is crucial not only to their own lives and families, but also to the children that attend their classes on a daily basis. If our teachers are consistently suffering from high levels of stress and other mental disorders, they are unable to provide the best services they can to the children. We trust our teachers to educate our children, show them right from wrong, and make them a better person each and every day. If we are handing over this responsibility to our teachers, the least we can do is provide research and options to help the teachers be the healthiest, both physically and mentally, that they can be.

Limitations in this study include how exercise was assessed. Since a pre-existing data set was used, the type of exercise was not specified. The duration in which the participants

exercised was also not specified and this could affect the outcomes since the duration of exercise can vary greatly. Finally, other details about the reported exercise were not included. This is a limitation because reported exercise can vary depending on an individual's definition of exercise. Other limitations also focus on the survey's original questions. Specific data about the individuals that could be useful for this study and future similar studies were not reported. Specifically, factors that may have affected the participant's ability to exercise were not addressed. These could include lack of childcare, other job responsibilities, injuries, or any other possible personal limitations.

Future research on this topic should focus on different types of exercise, meaning which type is necessary to achieve the minimum effects, and which type provides the maximum effects on overall mental health, including levels of stress and quality of life. Particular studies can specifically focus on mental health, stress levels, and reported quality of life individually. This would allow researchers to understand the unique relationship between desired variables and exercise habits. Other demographic variables should be assessed in future research, such as number of children and work-life balance factors. Additionally, nutritional variables, such as daily caloric intake and the nutritional value of their diets should be assessed. Finally, this study, along with past studies, and future studies should be used to develop feasible interventions for teachers to increase their levels of exercise. Possible interventions can be established by the school districts to encourage healthier habits and to reduce stress. One possible intervention includes group exercise classes offered at said school after children are dismissed with the goal of improving overall mental and physical health. Another intervention could involve the children and their physical exercise activity time, encouraging the teachers as well as the students to learn healthy exercise habits that can be extended past

school time. These interventions will not only benefit the teachers' health and children's education, it can also benefit the district in that less money may be spent on health care. This can lead to improvements in educational outcomes and less absenteeism in teachers. By fostering positive exercise habits for teachers, not only will their overall mental and physical health improve, but there may be positive impacts on their occupational outcomes.

Table 1. Demographic Variables

	Low Exercise 0-3 Days N = 1941	High Exercise 4-7 Days N = 662	Statistical Comparison <i>p</i> value
Age: Mean (St. Dev)	44.23 (11.61)	43.68 (12.37)	<i>p</i> = .003
Gender: %			
Male	18.0%	27.1%	<i>p</i> < .001
Female	82.0%	72.9%	
Ethnicity (%)			NS
African American	7.7%	5.8%	
Caucasian	69.7%	74.4%	
Hispanic/Latino	18.4%	15.1%	
Other	4.2%	4.7%	
Marital Status (%)			NS
Single	21.8%	25.1%	
Married	63.5%	61.9%	
Separated	1.2%	.9%	
Divorced	12.1%	9.9%	
Widowed	1.4%	2.1%	

Table 2. Teacher-Specific Comparisons

	Low Exercise 0-3 Days N = 1941	High Exercise 4-7 Days N = 662	Statistical Comparison <i>p</i> value
Tenure mean years (st.dev)	13.36 (9.5)	13.56 (9.7)	NS
School Type %			
Elementary	44.8%	39.6%	NS
Middle/Junior High	22.2%	23.2%	
High School	33.0%	37.2%	
Subject Taught %			
Core Courses	40.0%	40.0%	NS
Elective Courses	60.0%	60.0%	
Job Involvement mean (st.dev)	53.49 (7.48)	54.40 (7.61)	NS
Job Satisfaction mean (st.dev)	55.7 (20.44)	57.7 (20.7)	NS (p=.054)
Job Control mean (st.dev)	17.0 (3.84)	17.3 (3.83)	NS (p=.079)

Age and Gender are controlled for using Multivariate Logistic Regression.

Table 3. Physical and Psychosocial Comparisons

	Low Exercise 0-3 Days N = 1941	High Exercise 4-7 Days N = 662	Statistical Comparison <i>p</i> value
BMI (%)			
% Underweight to Normal	29.5%	44.8%	<i>p</i> < .001
% Overweight	30.5%	31.2%	<i>p</i> < .005
% Obese	40.0%	24.1%	<i>p</i> < .001
Perceived Stress Scale			
mean (st.dev)	26.1 (5.0)	17.0 (6.4)	<i>p</i> < .001
SF-36 Quality of Life			
mean (st.dev)			
Physical Composite	49.80 (9.2)	51.1 (9.2)	<i>p</i> < .001
Mental Composite	40.82 (12.6)	44.68 (13.07)	<i>p</i> < .001
Axis I Psychopathology (%)			
Major Depression	21.8%	13.9%	<i>p</i> < .001
Other Depressive Disorder	8.3%	4.7%	<i>p</i> < .001
Panic Disorder	8.9%	6.5%	<i>p</i> = .054
Somatization Disorder	35.8%	21.9%	<i>p</i> < .001
Anxiety Disorder	19.1%	12.8%	<i>p</i> < .001
Treatment for Depression or Anxiety (%)			
% Taking Medication	24.0%	13.0%	<i>p</i> < .001
% Seeing Counselor	10.2%	6.6%	<i>p</i> < .005

Age and Gender are controlled for using Multivariate Logistic Regression.

Table 4. Logistic Regression

	B	S.E.	Wald χ^2	df	Sig	Exp(B)
Gender	.499	.124	16.058	1	.000	1.646
Age	.001	.005	.024	1	.875	1.001
Ethnicity (Reference Group: Caucasian)						
African American						
Asian	.319	.228	1.959	1	.162	1.375
Hispanic/Latino	.157	.546	.082	1	.774	1.169
Other	.206	.144	2.061	1	.151	1.229
	-.279	.495	.318	1	.573	.756
Perceived Stress Scale	-.033	.011	8.353	1	.004	.967
Axis I Psychopathology						
Major Depression	-.242	.179	1.8222	1	.177	.785
Somatization Disorder	.058	.142	.165	1	.685	1.059
Anxiety Disorder	-.204	.180	1.287	1	.257	.816
SF-36 Quality of Life						
Physical Composite	.048	.008	39.887	1	.000	1.049
Mental Composite	.020	.007	8.495	1	.004	1.021
BMI (%) (Reference Group: Obese)						
% Underweight to Normal	.811	.136	35.438	1	.011	1.415
% Overweight	.347	.137	6.427	1	.000	.012

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