# THE RELATIONSHIP BETWEEN PHYSICAL EXERCISE AND JOB PERFORMANCE: THE MEDIATING EFFECTS OF SUBJECTIVE HEALTH AND

GOOD MOOD



# THE RELATIONSHIP BETWEEN PHYSICAL EXERCISE AND JOB PERFORMANCE: THE MEDIATING EFFECTS OF SUBJECTIVE HEALTH AND

GOOD MOOD

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by

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#### ABSTRACT

At the present time, health care costs for companies are drastically increasing. This issue has become an increasing problem due to the many complications that come with individuals not being physically active. Obesity has now become the fourth largest cause of death in the world. In order for companies to think about ways to reduce costs, perhaps management can look to exercise as a way to improve employee performance, mood and subjective health. For the purpose of this study, physical exercise was defined as planned, structured, and repetitive activities aimed at improving physical fitness and health. Job performance was defined as employee behaviors that contribute to organizational goals. Mood was defined as particular feeling or state of mind experienced by the participant. Subjective health was defined as the perception of their own health... This study gives an insight into to the relationship between physical exercise and job performance as well as the mediating effects of subjective health and good mood. The results of the data analysis indicated that participants who engaged in physical exercise experienced an increase in job performance. The results also indicated that participants increased their job performance through subjective health and good mood.

Keywords: Physical Exercise, Job Performance, Subjective Health, and Good Mood

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# TABLE OF CONTENTS

| ABSTRACTiv                                    |
|---|
| ACKNOWLEDGEMENTv                              |
| LIST OF TABLESix                              |
| LIST OF FIGURESx                              |
| CHAPTER 1: INTRODUCTION 1                     |
| 1.1 Rationale and Problem Statement           |
| 1.2 Objectives of Study                       |
| 1.3 Scope of the Story                        |
| 1.4 Research Questions                        |
| 1.5 Research Assumptions                      |
| 1.6 Significance of the Study                 |
| 1.7 Definition of Terms4                      |
| 1.8 Research Model and Hypotheses5            |
| 1.9 Limitation of the Research                |
| 1.10 Conclusion7                              |
| CHAPTER 2: LITERATURE REVIEW                  |
| 2.1 Related Literature and Previous Studies   |
| 2.1.1 Physical Exercise and Job Performance8  |
| 2.1.2 Physical Exercise and Subjective Health |
| 2.1.3 Physical Exercise and Good Mood15       |

# TABLE OF CONTENTS (Continued)

| CHAPTER 3: RESEARCH METHODOLOGY           | 20 |
|---|----|
| 3.1 Participants                          | 20 |
| 3.2 Instruments                           | 21 |
| 3.2.1 Job Performance                     | 21 |
| 3.2.2 Mood                                | 22 |
| 3.2.3 Subjective Health                   | 22 |
| 3.3 Procedure                             | 23 |
| 3.3.1 Research Design                     | 23 |
| 3.3.2 Population and Sample Selection     | 23 |
| 3.3.3 Sample Size                         | 24 |
| 3.3.4 Research Instrument                 | 24 |
| 3.3.5 Sampling and Data Collection Method | 24 |
| 3.3.6 Construct Validity                  | 25 |
| 3.3.7 Pre-Test Reliability                | 25 |
| 3.3.8 Finding from Pre-test               | 25 |
| 3.3.9 Research Measurement                | 26 |
| 3.3.10 Data Analysis                      |    |
| CHAPTER 4: DATA ANALYSIS                  | 26 |
| 4.1 Preliminary Analysis                  | 27 |
| 4.2.1 Tests of Hypotheses                 | 28 |

# TABLE OF CONTENTS (Continued)

# CHAPTER 4: DATA ANALYSIS (Continued)

| 4.2.2 Analysis of Hypothesis variables |    |
|--|----|
| 4.3 Additional Analysis                |    |
| CHAPTER 5: DISCUSSION AND CONCLUSION   | 34 |
| 5.1 Discussion                         |    |
| 5.2 Recommendation                     | 35 |
| 5.3 Conclusion                         | 36 |
| BIBLIOGRAPHY                           |    |
| APPENDIX                               | 49 |
| BIODATA                                | 69 |
| LICENSE AGREEMENT OF THESIS PROJECT    | 70 |
|  |    |

# LIST OF TABLES

| Table 3.1 Participant's Demographic Characteristics's                     | 21 |
|---|----|
| Table 4.1 Descriptive Statistics  | 28 |
| Table 4.2 Bootstrap Results to Test Significance of Mediation Effects     | 29 |
| Table 4.3 Multiple Regression of Independent Variables on Job Performance | 32 |
| Table 4.4 Model Summary   | 33 |



# LIST OF FIGURES

Page

| Figure 1.1 Proposed Mediational Model  | 6 |
|--|---|
| Figure 4.1 Upper Figure Total Effect (Physical Exercise and Job Performance)30 | ) |
| Figure 4.1 Lower Figure Total Effect (Physical Exercise and Job Performance)3  | 0 |



#### CHAPTER 1

## INTRODUCTION

#### 1.1 Rationale and Problem Statement

The health and fitness trend is exploding across the United States and globally around the world. According to IBIS World: the nation's largest publisher of industry research, gym membership numbers have increased considerably over the past 10 years, rising from 36.3 million in 2002 to more than 42.8 million by 2011 (IBISWorld, 2011).

As individuals are becoming more and more educated on the topic of physical exercise and the benefits, the number of gym memberships have increased as well. With such a large number of the population, nearly 43 million in 2011, who purchased gym memberships, it is shocking that physical inactivity is the fourth leading risk factor for all global deaths, with 31% of the world's population not physically active (World Health Organization, 2011).

Health benefits from physical exercise are the main reason for individuals to begin and continue exercising on a regular basis. Recent studies showed that physical exercise had in fact been proven to increase mood and increase job performance. Many psychologists and top companies have incorporated physical exercise into the corporate strategy to help increase mood and job performance which results in more productive employees. Individuals today have many options as to the forms of physical exercise they wish to engage in. Anything from the gym (lifting weights) to sports (tennis, basketball, swimming, etc.) to going for a run outside. An average American, watched more than 4 hours of TV each day or 28 hours/week, or 2 months of nonstop TV-watching per year (Herr, 2007). It's even more important now to participate in healthy activities. Despite the trend inactivity and the increasing issue of obesity across the United States and around the world, there are still a record number of gym memberships and fitness centers for individuals to take full advantage of the wide range of benefits that come from physical exercise.

1.2 Objectives of the Study

The objectives of this research study are:

1.2.1 To study an individual's job performance as a result of physical exercise;1.2.2 To study an individual's subjective health as a result of physical exercise;

1.2.3. To study an individual's mood as a result of physical exercise

1.3 Scope of the Story

This study investigated the relationship between physical exercise and job performance as well as the mediating effects of good mood and subjective health. The study was conducted among 405 respondents working in Baltimore County, Maryland. The participants received a structured questionnaire that assessed their physical exercise, job performance, good mood and subjective health. The study was conducted from July 2013 to December 2014.

1.4 Research Questions

Major research question

1.4.1 The effects of physical exercise on job performance?

Sub research questions

1.4.2 Whether or not an individual's job performance increased, as a result of physical exercise.

1.4.3 Whether or not an individual's mood increased, as a result of physical exercise.

1.4.4 Whether or not an individual's subjective health increased, as a result of physical exercise.

**1.5 Research Assumptions** 

1.5.1 This research can explain whether or not there is a relationship between physical exercise and job performance, as well as mediating effects good mood and subjective health.

1.5.2 The statistical method and techniques for collecting data are valid only for this research study.

1.5.3 The data collected and analyzed are valid for this study.

1.6 Significance of the Study

This study contributes to theory of effects of exercise on job performance (McKenna, Coulson, Field, 2006); to examine the mechanism by which subjective health and good mood influence job performance and to contribute to the knowledge in this area.

Two groups on individuals may benefit from this study.

Firstly, individuals who exercise will have more understanding of the effects and benefits from engaging in physical exercise on a regular basis. Secondly, the managers and supervisors will have more information to make an informed decision on how to improve job performance in the workplace.

#### 1.7 Definition of Terms

Physical Exercise: According to the Harvard School of Public Health, there was confusion between the terms "physical fitness", "physical activity" and "exercise" (Harvard School of Public Health, 2013). Though people often used "physical activity" and "exercise" interchangeably, the terms had different definitions. "Physical activity" refers to any body movement that burns calories, whether it is for work or play, daily chores, or the daily commute. "Exercise," a subcategory of physical activity, refers to "planned, structured, and repetitive" activities aimed at improving physical fitness and health. Researchers sometimes used the terms "leisure-time physical activity" or "recreational physical activity" as synonyms for exercise (Caspersen, Powell, Christenson, 1985).

The road to physical fitness included proper medical care, the right kinds of food in the right amounts, good oral hygiene, appropriate physical activity/exercise that was adapted to individual needs and physical limitations, satisfying work and study, healthy play and recreation and proper amounts of rest and relaxation (Prentice, 1999). Both physical activity and physical exercise are components that helped people lead physically active lifestyles. Leading active lifestyles have been proven to help generate more energy, control weight, manage stress, and boost immune system (Fahey, Insel and Roth, 1999).

Job Performance: Job performance may be defined in terms of whether employee behaviors contribute to organizational goals. This includes in-role performance, or behaviors necessary for a person to fulfill their formal organizational role, usually as implied in a job description. The definition also included several other behaviors that were not part of in-role performance, but contributed to the attainment of organizational goals: these organizational citizenship behaviors or extra-role behaviors in helping colleagues and not complaining about trivial matters at work (Daniels, Harris, 2000). Many business personnel directors assessed the job performance of each employee on an annual or quarterly basis to help them identify suggested areas for improvement (Business Dictionary, 2013).

Mood: To enhance performance, it is critical to acknowledge and reduce the negative moods that employees bring to work. At the same time, reinforcing good moods, by offering cookies in the break room, may lead to an improvement in the quality of work produced. A manager might choose to focus on minimizing negative moods or more on reinforcing positive ones, depending on which performance goal—productivity or quality—was more important (Rothbard, 2011).

Subjective Health: Subjective health measurements were increasingly used in clinical studies to assess patients' perception of their own health. For example, the measurements assessed quality of life, tiredness, depression or anxiety. Assessing these subjective measurements was usually done by using self-assessment questionnaires called patient reported outcomes (PRO) (Hamel, Hardouin, 2012). 1.8 Research Model and Hypotheses It was hypothesized that (H1) physical exercise would predict job performance. It's further expected that good mood and subjective health would mediate the physical exercise-job performance relationship Therefore, it was hypothesized that (H2) subjective health and (H3) good mood would mediate the relationship of physical exercise to job performance.

Independent Variable

Mediating Variable

Dependent Variable



Figure 1.1: Proposed Meditational Model

Hypothesis 1: Physical exercise would predict job performance.

Hypothesis 2: Subjective health would mediate the physical exercise-job performance relationship.

Hypothesis 3: Good mood would mediate the physical exercise-job performance relationship.

1.9 Limitation of the Research

This study was limited to a sampling of four hundred and thirteen conveniently selected participants (men and woman) who were part of the work force in Baltimore County, Maryland in the United States of America.

## 1.10 Conclusion

It is well-documented and common knowledge about the benefits of engaging in physical exercise on a regular basis (i.e. health benefits). This includes lowering the risk of heart disease, diabetes, stroke, high-blood pressure, and certain cancers.

The population has become less and less active, and has led to increasingly high health care costs for companies around the world. An estimated 60% of the U.S. population did not exercise regularly (Parker, 2013). Companies were now facing much higher health care costs as obesity and not being active caused many different health issues. In 2012, IBISWorld estimated that poor health and its impact on productivity costs the US economy \$576 billion dollars (IBISWorld, 2011).

With the growing concerns of obesity, owners and managers of companies were looking for new ways to reduce health care costs and to improve the performance of their employees. This has led companies to incorporate on-site fitness center and wellness programs for their employees. This new topic has sparked many research studies.

#### CHAPTER 2

#### LITERATURE REVIEW

The mechanism by which subjective health and good mood influence job performance has not yet been studied. The insight gained from this study will help contribute to the knowledge in the area of physical exercise and its impact on job performance. The researcher believed that engaging in physical exercise would increase job performance through increased subjective health and good mood.

2.1 Related Literature and Previous Studies

2.1.1 Physical Exercise and Job Performance Positive Effects of Exercise on Job Performance.

Keeping active can help people stay at a healthy weight or lose weight. It can also lower the risk of heart disease, diabetes, stroke, high blood pressure, osteoporosis, and certain cancers, as well as reduce stress and boost mood. Inactive (sedentary) lifestyles did just the opposite (Harvard School of Public Health, 2013). The positive effects of exercise on work performance span far and wide. In addition to sharpening mental performance, regular physical activity improved time-management skills, which in turn improved the ability to meet deadlines (Thomas, 2003).

Exercise caused an overall work performance boost of about 15 percent, according to a 2005 study performed by health professor Jim McKenna of Leeds Metropolitan University (McKenna, 2006). About 200 workers at three sites were studied: a university, a computer company and a life insurance firm. Workers were asked to complete questionnaires about their job performance and mood on days when they exercised at work and days when they did not. Participants were free to engage in the physical activity of their choice. Most of them spent 30 to 60 minutes at lunch doing everything from yoga and aerobics to strength training and playing pick-up games of basketball. Six out of 10 workers said their time management skills, mental performance and ability to meet deadlines improved on days when they exercised (McKenna, 2006). McKenna said his findings should give companies an additional incentive to offer workplace exercise programs, which might also help cut down on sick days and reduce health-care costs (Stenson, 2005).

Harvard researchers found that post-workout blood flow created the optimal conditions for performing tasks that required focused thinking (Thomas, 2013). We often hear about the physical benefits of exercise (e.g., increasing heart health), less often of the psychological benefits promoted. Yet, engaging in a moderate amount of physical activity will result in improved mood and emotional states. Exercise could promote psychological well-being as well as improve quality of life (Association for Applied Sport Psychology, 2012). Improved mood, reduced stress as well as an improved ability to cope with stress, improved self-esteem, pride in physical accomplishments, increased satisfaction with oneself, improved body image, increased feelings of energy, improved in confidence in your physical abilities, decreased symptoms associated with depression were common psychological benefits gained through exercise (Association for Applied Sport Psychology, 2012).

Research was conducted to gather data to show how exercise actually improved the brains ability to make decisions faster and more effectively (Mulcahy, 2003). It was found that steady-paced aerobic exercise improved the brain's ability to solve problems and make decisions fast and effectively. After exercise, people seemed to be able to concentrate and focus much better than before. They were better able to block information that was irrelevant to the task at hand, and responded much faster to information relevant to the task. The benefits were seen in both men and women (Mulcahy, 2003).

One test the scientists used to measure improved focus and concentration was the Stroop test. The Stroop test was invented by J Ridley Stroop back in the 1930's and is still widely used by psychologists today. The faster a person is at completing the Stroop test, the more focused they are (Mulcahy, 2003).

Decision-making and problem solving ability are also found to improve after exercise. In one test, male soccer players were asked to run on a treadmill for two 45minute periods, with a short break in between. On three separate occasions - before they started running, after the first 45 minutes and after the second 45 minutes - the players were shown slides depicting real game situations. Their job was to decide what the next step in the game should be and a panel of soccer experts then judged their decisions. The panel found that the longer the soccer players had been running, the better they were at making decisions (Marriott, Reilly and Miles, 1993).

In 1985, 1,400 of Conoco's 2,000 Houston-based employees enrolled in their company's wellness program. The 1987 study based on responses of 606 participants who returned questionnaires revealed a strong positive relationship between exercise and work productivity (Smith, 1990).

Increased Job Performance from Exercise

According to one study, when employees engaged in physical activity, work performance increased; physically fit workers were likely physically stronger, had greater endurance, and were less likely to feel fatigued (Demitropoulos, 2011). The researchers found significant associations between these areas and lifestyle factors. Specifically, the study found that moderate physical activity was related to both quality of work performed and overall job performance. Workers who engaged in moderate and vigorous physical activity were more likely to rate job performance higher. Cardiorespiratory fitness made workers more efficient in completing a greater quantity of work (Demitropoulos, 2011).

#### Amount and Frequency

The following dimensions are among the most common topic of physical exercise among experts: F.I.T or Frequency, Intensity and Time/Duration. F = frequency - How often you should do an exercise to maintain or improve fitness. I = intensity - how hard you should exercise to maintain or improve fitness. T = time - how long you should exercise to maintain or improve fitness.

Frequency (how often): There was no precise frequency or number of workouts needed to improve the level of fitness. Many experts on the topic mentioned frequency, expressed in number of days per week, and varied with the component being developed and the individual's fitness goals. For most people, a frequency of 3-5 days per week for cardiorespiratory endurance exercise and 2-3 days per week for resistance and flexibility training was appropriate for a general fitness program (Fahey, Insel, Roth, 2003).

Intensity (how hard): The most basic understanding of intensity for the purpose of this study would be pushing the body above the individual's normal level of activity: fitness benefits occur when a person exercises harder than his or her normal level of activity. The appropriate exercise intensity varies with each fitness component. To develop cardiorespiratory endurance, for example, a person must raise his or her heart rate above normal; to develop muscular strength, a person must lift a heavier weight than normal; to develop flexibility, a person must stretch muscles beyond their normal length. (Fahey, Insel, Roth, 2003). The greater the intensity of exercise, the less time is needed to obtain physical benefits. For high-intensity exercise, such as running, for example, 20-30 minutes is appropriate. On the other hand, for more moderate –intensity exercise, such as walking, 45-60 minutes may be needed (Fahey, Insel, Roth, 2003).

Duration/Time (how long): The American College of Sports Medicine or ACSM recommended 20-60 minutes (Robbins, Powers and Burgess, 1991 & 1994).

The above evidence suggests that there will be a positive relationship between physical exercise and job performance. Therefore; Hypothesis 1: Physical exercise will predict job performance.

2.1.2 Physical Exercise and Subjective Health

A study took 40 participants, all of whom had been recently diagnosed with depressive disorders but were not taking any form of antidepressant medication, and divided them into two groups: a control group that rested for 30 minutes and an exercise group that walked on a treadmill for 30 minutes (Bailey, 2010). The participants were asked to complete written surveys before their rest or exercise and at regular intervals afterwards. The results showed that although both groups reported fewer feelings of negativity afterwards (tension, depression, anger, fatigue), only the exercise group expressed increased good feelings such as 'vigour' or 'well-being' (Bailey, 2010).

# Subjective Health & Job Performance

Research showed that the health status of the employees directly influences their work behavior, attendance and on-the-job performance. Therefore, improving employee well-being will result in a more productive workforce. Three fourths of high performing companies measured employee health status as a key part of their overall risk management strategy, and many pursued active wellness programs (Chenoweth, 2011). These, often larger, organizations recognized that the workplace could be used to promote or reinforce healthier working practices and lifestyle choices. They could influence several aspects of their employee's physical and psychological well-being to improve their productivity, commitment and attendance (Bevan, 2010).

In today's competitive business environment, it is critical for organizations to invest in human capital. As the research shows, an organization's health and prosperity were directly influenced by the health and well-being of its employees (Chenoweth, D, 2011).

Benefits of Healthy Employees: For Managers and Employees

As health care costs continue to sky rocket and the economy remains challenging, business owners and managers are being forced to look at all costs related to their number one asset – their employees. The benefits of fit employees are numerous for both the employer and the employee. There are many benefits from a monetary stand point as the fit employee is less likely to get sick. Reduced absenteeism and reduced health care expenditures were top of the list (Reece, 2012). Health Care:

Studies at Bank One, Ceridian Corporation, Dow Chemical, DuPont, Daimler/Chrysler, General Electric, General Motors, Goldman Sachs, Novartis, Pepsi Bottling Group, Procter & Gamble, Prudential Insurance and Steelcase showed that American companies collectively spent billions of dollars each year on employee health problems tied to physical inactivity, obesity, smoking, poor nutrition, stress, diabetes and other modifiable risk factors (Chenoweth, 2011). However, age was less a factor in health care costs than the presence of risk factors, such as smoking, obesity, physical inactivity and diabetes. High-risk 40- to 60-year-oldworkers incurred two to three times higher medical costs than low-risk workers in the same age group (Chenoweth, 2011). One thousand two hundred randomly selected human resource professionals indicated that their top two human resource issues were an aging workforce and rising health care costs. It is indisputable that middle-aged workers currently made up the majority of America's workforce, with younger, entrylevel workers constituting just one-third of today's workforce. Not surprisingly, small business owners also ranked escalating health care costs as their primary concern (Chenoweth, 2011).

Absenteeism and Presenteeism:

The Integrated Benefits Institute conducted a study to see how much poor health cost the US economy: The Institute represents some of the nation's biggest employers, including Caterpillar (CAT), Chevron (CVX), Google (GOOG), Microsoft (MSFT), and Wells Fargo (WFC). (Integrated Benefits Institute, 2012) The Institute also represents municipalities, unions and universities. Analysis shows that poor health and its impact on productivity costs the U.S. economy \$576 billion per year. In addition to showing the entire financial burden of poor health, IBI researchers found that 39 percent—or \$227 billion—was due to lost productivity associated with poor health. Lost productivity resulted when employees were absent due to illness or when they were underperforming due to poor health ("presenteeism"—when employees were at work but not performing at their peak) (Integrated Benefits Institute, 2012). Initially conceived by an English researcher Dr. Gary Cooper in 1998, presenteeism has surfaced as one of the most pressing lost productivity issues in all types of work sites. Many recent studies show that presenteeism could cut individual productivity by as much as one third—far more than absenteeism. Over the past decade, numerous large organizations, including Bank One, Dow Chemical, International Truck & Engine, Lockheed Martin and PPG conducted in-house studies showing that presenteeism cost also greatly exceed employee medical care costs (Chenoweth, 2011). For example, Bank One's cost distribution showed presenteeism made up 63 percent of all costs, followed by medical and pharmaceutical costs at 24 percent, absenteeism at 6 percent, short-term disability at 6 percent, long-term disability at 1 percent, and workers' compensation at less than 1 percent (Chenoweth, 2011).

The above evidence suggests that subjective health mediates the physical exercise-job performance relationship. Therefore; it was hypothesized that Hypothesis 2: Subjective health would mediate the physical exercise-job performance relationship.

2.1.3 Physical Exercise and Good Mood

Exercise Improves Mood

The idea is just to get active to trigger the mechanisms that reduce negative moods and promote positive moods. When you are feeling low or anxious this can feel daunting, but including exercise in your daily activities is easily done with a little planning. Making just a few changes to incorporate exercise into your daily routine would enable you to manage your anxiety and/or depression more effectively (Learmonth, 2007). But how does exercise help? Exercise triggers mechanisms in the body which increase levels of mood-enhancing neurotransmitters in the brain - such as endorphins. Endorphins make us feel better, improve our mood, increase pleasure, and minimize pain. Exercise also helps to release tension in our muscles, increase body temperature, improve sleep, and reduce levels of the stress hormone cortisol. All of these actions had calming effects on the body (Learmonth, 2007).

Exercise helped you feel like the captain of your own ship, explains Sonja Lyubomirsky, PhD, the author of *The How of Happiness* (The Editors of Prevention). It may be the last thing you feel like doing when you are depressed, but going for a run or hitting the gym can actually make you feel better. When done regularly, 30 minutes or more of vigorous exercise has been shown to improve the symptoms of depression (Health Magazine, 2013). In one study, patients who worked out regularly on a treadmill or stationary bike for 12 weeks saw the severity of their symptoms reduced by nearly 50%. Exercise had short-term benefits too: Other research found that workouts could boost your mood for up to 12 hours (Health Magazine, 2013).

Regular exercise acts as a mood booster and happens to be good for people. The person hitting the gym daily can expect a mood boost. The brain became conditioned to the expectation of the regular release of endorphins and other moodenhancing chemicals (Whitney, 2012). Exercise experts have known that moderate physical activity improved mood (Hellmich, 2009). A study shows that people were in a better mood for up to 12 hours after they work out. Researchers at the University of Vermont had 24 college students ride an exercise bike for 20 minutes at a moderate intensity. Another 24 people did no exercise during the same time period. Afterward, everyone in both groups filled out questionnaires that evaluated their overall mood at several intervals: one hour, two, four, eight, 12 and 24 hours. The questions addressed tension, anger, vigor, fatigue, confusion and depression (Hellmich, 2009). The researchers found that people in the exercise group experienced a significant improvement in mood immediately after the exercise. They also had improved moods after two, four, eight and 12 hours compared with the people who did not exercise (Hellmich, 2009).

If you have ever gone for a run after a stressful day, chances are you would feel better afterward. "The link between exercise and mood is pretty strong," Otto says (Otto, Smits, 2011). "Usually within five minutes after moderate exercise you get a moodenhancement effect."... But the effects of physical activity extend beyond the shortterm. Research shows that exercise could also help alleviate long-term depression (Weir, 2011).

With regular exercise, one can expect to be better protected against stress and to experience fewer problems with mood and anxiety. Exercise is an effective treatment for major depression and anxiety. Perhaps one of the most appealing features of exercise for improving your mood and well-being is that you can expect to see immediate evidence of its effects. Each bout of exercise came with positive mood effects that could be experienced right away (Otto, Smits, 2011).

## The Science Behind Good Mood

Exercise is one of the best things to do to stay positive. Exercise releases endorphins, which are natural chemicals produced by the brain. Endorphins are similar to and more powerful than morphine. According to the Merck Online Medical Library, endorphins reduce pain and induce a sense of well-being. Exercise appeared to help improve mood and energy levels and might even help alleviate depression (Michel, 2011). The lead researcher for the new study, Dr. Henning Boecker of the University of Bonn, said he got the idea of testing the endorphin hypothesis when he realized that methods he and others were using to study pain were directly applicable (Kolata, 2008). The idea was to use PET scans combined with recently available chemicals that reveal endorphins in the brain, to compare runners' brains before and after a long run. If the scans showed that endorphins were being produced and were attaching themselves to areas of the brain involved with mood, that would be a direct evidence for the endorphin hypothesis. And if the runners, who were not told what the study was looking for, also reported mood changes whose intensity correlated with the amount of endorphins produced, that would be another support for the argument (Kolata, 2008). Dr. Boecker and colleagues recruited 10 distance runners and told them they were studying opioid receptors in the brain. But the runners did not realize that the investigators were studying the release of endorphins and the runner's high. The athletes had a PET scan before and after a two-hour run. They also took a standard psychological test that indicated their mood before and after running. The data showed that endorphins were produced during running and were attaching themselves to areas of the brain associated with emotions (Kolata, 2008).

Good Mood & Job Performance

Good Mood Increasing Job Performance

A new study of telephone customer service representatives shows just how important it is for employees to start the workday in a good mood (Grabmeier, 2011). Researchers found that employees' moods when they clocked in tended to affect how they felt the rest of the day. Early mood was linked to their perceptions of customers and to how they reacted to customers' moods. And most importantly to managers, employee mood had a clear impact on performance, including both how much work employees did and how well they did it (Grabmeier, 2011). The study involved 29 customer service representatives who handled phone calls made by customers to a large U.S. insurance company. Over the course of about three weeks, the participants filled out measures of their mood at the beginning of the workday and two other random times during each day. At those two other points in the day, they also indicated how their latest customer seemed to them, such as whether they were rude, calm, insulting or cheerful (Grabmeier, 2011).

The results showed that when employees started the day in a good mood, they tended to rate customers more positively through the day. They also tended to feel more positively themselves as the day progressed. A good mood generally meant that the quality of their work improved. A higher-than-normal positive mood was related to greater verbal fluency on the phone – minimal use of pauses in speech and fillers such as "um" and "uh" and less verbal fumbling, such as tripping over words or mumbling. The research has clear implications for managers: do everything you can to help your employees start the day in a good mood (Grabmeier, 2011). Companies have a reason to be concerned about employee moods; they affect performance (Grabmeier, 2011).

The above evidence suggests that there would be a mediating effect of good mood on the physical exercise-job performance relationship. Therefore; It was hypothesized that Hypothesis 3: Good mood would mediate the physical exercise-job performance relationship.

## CHAPTER 3

#### **RESEARCH METHODOLOGY**

3.1 Participants

The population for this study was comprised of full-time working population in Baltimore County, Maryland. A sample of 405 participants participated in this study. Table 3.1 shows that about 2/3 of the participants, (62.22 %), were female while 37.78% were male. The research showed that the majority of respondents (30.86 %) were between the ages of 18 - 24 years and (18.52 %) were between the ages of 25- 34 years. Additionally, the research showed that (17.28 %) were between the ages of 35 - 44 years and (21.48%) were between the ages of 45 - 54. Finally, (4.3%) were between the ages of 55 - 64 year and (4.94%) we ages 65 and above.

Table 3.1 shows that more than half of the respondents held a bachelor's degree or higher. The research showed that (6.67 %) graduated from high school and (11.85 %) have some college credit but no degree. It also showed that (.25%) had trade/technical/vocational training and (3.21 %) had an associate's degree. (47.65%) of the respondents had a bachelor's degree and (24.44%) had a master's degree. Finally, (1.48%) of the respondents had a doctorate degree and (4.44%) had a professional degree.

Table 3.1 shows that the majority of the respondents, 82.47% were predominately white. It also showed that (7.16%) we of the Hispanic or Latino ethnicity and (2.22%) were part of the black or African American ethnicity. Finally, the results of the study showed that (0.25%) we of the Native American or American Indian ethnicity, (6.42%) were part of the Asian or Pacific Islander ethnicity and (1.48%) were part of an ethnicity not listed as an option.

| Variable  | Category                            | Frequency | Percentage |
|-----------|-------------------------------------|-----------|------------|
| Gender    | Male                                | 153       | 62.22      |
|           | Female                              | 252       | 37.78      |
| Age       | 18 - 24 Years                       | 125       | 30.86      |
| -         | 25 - 34 years                       | 75        | 18.52      |
|           | 35 - 44 years                       | 70        | 17.28      |
|           | 45 - 54 years                       | 87        | 21.48      |
|           | 55 - 64 years                       | 28        | 6.91       |
|           | 65 years and over                   | 20        | 4.94       |
| Education | Some High School, No Diploma        | 0         | 0          |
|           | Graduated from High School          | 27        | 6.67       |
|           | Some College Credit, No Degree      | 48        | 11.85      |
|           | Trade/Technical/Vocational Training | ş 1       | 0.25       |
|           | Associate Degree                    | 13        | 3.21       |
|           | Bachelors Degree                    | 193       | 47.65      |
|           | Masters Degree                      | 99        | 24.44      |
|           | Professional Degree                 | 6         | 1.48       |
|           | Doctorate Degree                    | 18        | 4.44       |
| Ethnicity | White                               | 334       | 82.47      |
| -         | Hispanic or Latino                  | 29        | 7.16       |
|           | Black or African American           | 9         | 2.22       |
|           | Native American or American India   | n 1       | 0.25       |
|           | Asian or Pacific Islander           | 26        | 6.42       |
|           | Other                               | 6         | 1.48       |

# Table 3.1: Participant's Demographic Characteristic's (n=405)

3.2 Instruments

The questionnaire was divided into four sections: (1) Physical Exercise (2) Job Performance (3) Mood and (4) Subjective Health.

## 3.2.1 Job Performance

Job performance was assessed with the perceived productivity scale (Wattles and Harris, 2003). The participant responded on the Likert scale from 1to 5. 1. SD (Strongly Disagree), 2. D (Disagree), 3. UD (Undecided), 4. A (Agree), 5. SA (Strongly Agree). The participants were then asked to apply one of the above values (1-5) to a list of seven statements. The seven item scale measuring employees' perceived productivity had a reliability coefficient of alpha=0.92. Nearly 92% of all employees agreed or strongly agreed that regular exercise would help them to be more productive at work.

#### 3.2.2 Mood

Mood was assessed with PANAS scale (Crawford and Henry, 2004). The scale assessed the participants' mood by asking questions about their mood after engaging in exercise. The participants were asked to read each item and list the number from the scale next to each word. The participant was to indicate to what extent they feel this way right now, that is at the present moment (after exercising). The participant responded on the Likert scale from 1 to 5. 1. (Very slightly or Not at all), 2. (A little), 3. (Moderately), 4. (Quite a bit), 5. (Extremely). The reliabilities of the PANAS scales, as measured by Cronbach's alpha, were .89 for PA and .85 for NA. The narrowness of the confidence limits associated with these coefficients indicate that they could be regarded as providing very accurate estimates of the internal consistency of the PANAS in the general adult population. Thus, both PA and NA scales can be viewed as possessing adequate reliability (Crawford and Henry, 2004).

#### 3.2.3 Subjective Health

Subjective health was assessed with Short Form 12 Health Survey or (SF-12) scale (Jenkinson and Layte, 1997). The scale section assessed the participants' subjective health. There were 3 different scales used for subjective health questions including:

1. (Yes, Limited A lot), (Yes, Limited a little), (No, Not limited at all).

2. (All of the time), (Most of the time), (Some of the time), (A little of the time), (None of the time).

3. (Not at all), (A little bit), (Moderately), (Quite a bit), (Extremely).

The SF-12 was able to produce the two summary scales originally developed from the SF-36 with considerable accuracy and yet with far less respondent burden. Consequently, the SF-12 might be an instrument of choice where a short generic measure providing summary information on physical and mental health status was required (Jenkinson and Layte, 1997).

The SF-12 was studied and found to have internal consistency and construct validity (Jenkinson and Layte, 1997). The two summary scales of the short form 12item survey, physical component summary and mental component summary, demonstrated internal consistency reliability, with Cronbach alpha for both scales exceeding the recommended level of 0.70 demonstrating the reliability of the short form 12-item survey.

3.3 Procedure

3.3.1 Research Design

This study used a survey/questionnaire to identify if there was a relationship between physical exercise and job performance, and the mediating effects subjective health and good mood.

#### 3.3.2 Population and Sample Selection

The target population of this research study was the working labor force of men and woman in Baltimore County, Maryland in the United States of America. In 2010, the total population of Baltimore County was an estimated by the U.S. Department of Commerce, United States Census Bureau at around 805,029 people. More specifically for this study, the researcher aimed at collecting information from the working population of men and woman in Baltimore County, Maryland. In 2014, Maryland's Department of Labor, Licensing and Regulation estimated Baltimore County's Labor Force average population at 448,635 people. The sampling method for this study was a non-probability convenient sampling.

#### 3.3.3 Sample Size

The sample size of this research was determined using the table suggested by Krejcie & Morgan (1970) to represent the population in the millions. Within the sample size of 384, according to (Krejcie & Morgan, 1970) standard error was assumed at .05. The researched planned on a sample size of 384, but an additional 21 respondents completed the survey within the given time period, resulting in a total of 405 respondents.

## 3.3.4 Research Instrument

The research instrument used to collect the data for this study was a questionnaire using Survey Monkey (see Appendix 1). The questionnaire was in English language, as English was the language spoken by the majority of the target population in Baltimore County, Maryland. The research questions were designed to answer the main objectives of the study. The researcher selected 384 potential participants who fit the requirement. Emails were sent directly to the participants with a link that took the participant directly to the questionnaire.

3.3.5 Sampling and Data Collections Method

A link directing the participant directly to the questionnaire was provided in an email and distributed directly to the participants. Once the participant completed the questionnaire, the program automatically saved the results. This allowed the researcher to collect, record, and analyze the results once all the participants finished.

#### 3.3.6 Construct Validity

To ensure that the questionnaire was constructed properly, the researcher proposed a draft of the questionnaire to both thesis advisors for approval. Once the revision was finalized, the researcher conducted the pre-test to ensure that the questionnaire could be easily understood. The questionnaire was distributed to those who had similar characteristics to the population.

# 3.3.7 Pre-Test Reliability

A pilot research study or pre-test was conducted to check the clarity with a questionnaire being administered to 30 randomly selected participants who had similar characteristics to the population. A cover page was included to explain the purpose of the study and that results would remain confidential. A link to the questionnaire was sent directly to the participants in an email. The questionnaire was divided into five sections: Demographics, Physical Exercise, Job Performance, Mood and Subjective Health.

3.3.8 Findings from Pre-Test

After distributing the questionnaire to a convenient sample of 30 participants, the researcher gained valuable insight that was necessary to the success of this study. The researcher was able to conclude that the questionnaire was not confusing and easily understood by the participants. The participants on average took around 5-8 minutes to complete the survey. The questionnaire was short enough to not take up a lot of the participants' time. None of the respondents felt that the questionnaire took too long and all of the participants in the pre-test felt that the questionnaire was
interesting enough to keep their attention. There were no refusal to participate and all of the respondents felt that the introduction on the confidentiality page shed enough light into the purpose of the study.

#### 3.3.9 Research Measurement

The questionnaire for this research study confirmed specific scales that the researcher believed would measure and gather information on the specific variables in the most effective way. The questionnaire included dichotomous questions, questions based on level of measurement (ordinal & nominal), interval questions and filter or contingency questions.

#### 3.3.10 Data Analysis

For this research study, descriptive statistics was performed first followed by bootstrapping to analyze the data. The term bootstrapping refers to any test or metric that relies on random sampling with replacement. Bootstrapping allows assigning measures of accuracy to sample estimates (Wikipedia 2016). This study used multiple regression analysis with bootstrapping called "indirect script" by Preacher and Hayes (2008) to evaluate the research model. The researcher predicted that physical exercise would predict job performance, and that the relationship would be mediated by subjective health and good mood.

#### CHAPTER 4

#### RESULTS

### 4.1 Preliminary Analysis

The data for this research were analyzed using Statistical Package for the Social Sciences 22th version for Mac OSX. To detect multi-collinearity effect, the researcher ran correlations between demographic characteristics such as gender, age, education and ethnicity and the variables in the models including good mood, subjective health and job performance. Table 4.1 presents means and standard deviation of respondents' gender, age, education and ethnicity and their correlations with good mood, subjective health and job performance.

Gender was significantly related to good mood, subjective health and job performance. As gender was dichotomous with 2 designated as female the results indicated that female participants tended to have good mood, enjoyed good subjective health and performed well in their jobs.

Age was significantly related to good mood and job performance. The majority of participants were within the 18-24 age group and tended to experience positive moods and had high level of performance at their job. The correlation between the participant's age and subjective health was not significant.

Education was significantly related to good mood, subjective health, and job performance. The participants with higher education tended to experience positive moods, increased sense of subjective health, and higher level performance at their job.

Ethnicity was significantly related to good mood only.

|             | Mean | Std.  |        |      |           |           |      | Subjective | Job         |
|-------------|------|-------|--------|------|-----------|-----------|------|------------|-------------|
|             |      | Dev   | Gender | Age  | Education | Ethnicity | Mood | Health     | Performance |
| Gender      |      |       | 1      |      | -         |           |      |            |             |
|             | 1.33 | .535  |        |      |           |           |      |            |             |
| Age         |      |       | .03    | 1    |           |           |      |            |             |
|             | 1.58 | 1.133 |        |      |           |           |      |            |             |
| Education   |      |       | .32    | .14- | 1         |           |      |            |             |
|             | 6.04 | 1.680 |        |      |           |           |      |            |             |
| Ethnicity   |      |       | .22    | .06  | .23-      | 1         |      |            |             |
|             | 1.30 | 1.000 |        |      |           |           |      |            |             |
| Good Mood   |      |       | .20    | .16- | .36-      | .10-      | 1    |            |             |
|             | 4.17 | 1.222 |        |      |           |           |      |            |             |
| Subjective  |      |       | .26    | .047 | .31-      | .09       | .25  | 1          |             |
| Health      | 2.0  | .953  |        |      |           |           |      |            |             |
| Job         |      |       | .20    | .12  | _38-      | .043      | .28  | .15-       | 1           |
| Performance | 3.96 | 1.557 |        |      |           |           |      |            |             |

\*\*. Correlation is significant at the 0.01 level (2-tailed).

\*. Correlation is significant at the 0.05 level (2-tailed).

## 4.2.1 Tests of Hypotheses

Regression analysis in the SPSS program with indirect script (Preacher & Hayes, 2008) was used to test the model. Table 4.2 and Figure 4.1 display the results of the regression analysis. As shown in Table 4.2 and Figure 4.1 physical exercise is related to job performance ( $\beta = .1140$ , p < .001).

| .1140<br>.6812<br>.7220 | SE<br>.15   | p<br><.00  |
|-------------------------|---|--|
| .1140<br>.6812<br>.7220 | .15   | <.00   |
| .6812<br>7220           | 11  |  |
|                         | .08   | <.00<br><.00   |
| 2212<br>0536            | .06<br>.08  | <.00<br><.00   |
| 3034                    | .16   | <.00   |
| .0295<br>.0062<br>.0302 | .0880<br>.0567<br>.0683                                     |  |
| 1830                    | .14   | <.00   |
| 0875                    | .06   | .0232  |
| 2846                    | .04   | <.00   |
|                         | 0536<br>3034<br>0295<br>0062<br>0302<br>830<br>9875<br>2846 | 0536       .08         0034       .16         0295       .0880         0062       .0567         0302       .0683         830       .14         0875       .06         0846       .04 |

corrected and accelerated options in the bootstrap dialogue box in indirect script

produced with bootstrap re-sample of 5000, 95% confidence interval and bias

(Preacher & Hayes, 2008)



Figure 4.1: Upper figure: Total effect (physical exercise and job performance). Lower figure: Indirect effect, subjective health and good mood as mediators. Total indirect effect ( $\beta$ ) = -.0295, *SE* = .0880; Good Mood ( $\beta$ ) = -.0062, *SE* = .0567; Subjective Health ( $\beta$ ) = -.0302, *SE* = .0683. \*\*\* *p* < .001.

#### 4.2.2 Analysis of Hypothesis Variables

The mediation effects were tested using a bootstrap script (Preacher & Hayes, 2008), specifying 95% confidence interval and 5,000 bootstrap re-samples (Zhao, Lynch, & Chen, 2010). As gender, age and education were correlated with dependent variable, job performance, they were entered as control variables in bootstrap script. Table 4.2 displays the results of the mediating effects of subjective health and good mood on the relationship between physical exercise and job performance.

The relationship between physical exercise and job performance (*c* path) was hypothesized in our study and was statistically significant ( $\beta = .1140$ ; *p* <.001); Hypothesis 1 was supported. In the mediation model with subjective health and good mood as mediators, the direct effects of physical exercise and subjective health (*a* path,  $\beta = .7220$ ; *p* <.001), and on good mood (*a* path,  $\beta = .6812$ ; *p* <.001) were statistically significant. The direct effect subjective health and job performance (*b* path,  $\beta = .0536$ ; *p* <.001) and the relationship between good mood on job performance (*b* path,  $\beta = .2212$ ; *p* < .001) were statistically significant.

The *a* x *b* indirect effects of the independent variable (physical exercise) on dependent variable (job performance) through the mediation of good mood was significant (bootstrap result,  $\beta = -.0062$ , bias corrected and accelerated confidence interval ([BCACI] = -.0217 to -.0090). The *a* x *b* indirect effect of the independent variable (physical exercise) on dependent variable (job performance) through the mediation of subjective health was significant (bootstrap result,  $\beta = -.0302$ , bias corrected and accelerated confidence interval ([BCACI] = -.0444 to -.0077). Therefore, Hypotheses 2, and 3 were supported.

#### 4.3 Additional Analysis

The researcher also included a multiple regression analysis in order to better understand the relationships among the variables. This analysis examines the effects of multiple independent variables on the value of a dependent variable, calculating a coefficient and statistical significance for each independent variable.

Table 4.3 shows the coefficient value physical exercise was -.09, p = .60. The coefficient value of good mood was .315, p<.001. The coefficient value of subjective health was .030, p = .57. Only good mood significantly predicted job performance in this immediate model. Table 4.9 shows that the prediction accounted for 11% of the variance.

| Unstandardized Coefficients |                   | Standardized Coefficients |            |      | 95.0% Confidence Interval for B |      |             |             |
|-----------------------------|-------------------|---------------------------|------------|------|---------------------------------|------|-------------|-------------|
| М                           | odel              | В                         | Std. Error | Beta | t                               | Sig. | Lower Bound | Upper Bound |
| 1                           | (Constant)        | 2.678                     | .233       |      | 11.484                          | .000 | 2.219       | 3.136       |
|                             | Physical Exercise | 090                       | .171       | 031  | 523                             | .601 | 426         | .247        |
|                             | Good Mood         | .315                      | .063       | .323 | 4.968                           | .000 | .190        | .439        |
|                             | Subjective Health | .030                      | .054       | .038 | .566                            | .572 | 075         | .136        |

Table 4.3: Multiple-Regression of independent variables on job performance

Dependent variable: Job Performance

## Table 4.4: Model Summary

| Model | R     | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------|----------|-------------------|----------------------------|
| 1     | .333* | .111     | .105              | 1.498                      |

Dependent Variable: Job Performance

Predictors: (Constant), Subjective Health, Physical Exercise, Good Mood accounted for 11% of the variance.

#### CHAPTER 5

#### DISCUSSION

#### 5.1 Discussion

The objective of this research was to examine the relationship between physical exercise and job performance. In addition, this study examined the mediating effects subjective health and good mood. Results of the study provide important information about the relationship among physical exercise, job performance, subjective health and good mood.

The first hypothesis of the study stated that physical exercise would predict job performance. The result of this research was consistent with the previous studies that physical exercise would have a positive impact on job performance. Studies on the relationship between physical exercise and job performance supported the claim that engaging in physical exercise would lead to an increase on job performance. A study by health professor supported the claim that engaging in exercise has a positive impact on job performance; in this study, researchers found that exercise caused an overall work performance increase by about 15 percent (McKenna, 2006). The researcher delved deeper into the mediating effects of subjective health and good mood.

The second hypothesis of the study stated that subjective health would mediate the physical exercise-job performance relationship. The result of this study provided support for the mediating effect of subjective health. Participants who engage in physical exercise experience increased feelings well-being. (Bailey, 2010). The researcher identified a positive correlation between physical exercise and subjective health. The result of this study showed positive mediation of physical exercise to subjective health. Health status of employees directly influenced their on-the-job performance and improving employee well-being would result in a more productive workforce (Chenoweth, 2011). The result of the study identified a positive mediation of subjective health to job performance.

The third hypothesis of the stated that good mood would mediate the physical exercise-job performance relationship. A study by researchers at the University of Vermont supported the claim that physical exercise was related to good mood (Hellmich, 2009). In this study, people were in a better mood for up to 12 hours after having engaged in physical exercise. A recent study found employee mood had a clear impact on performance, including both how much work employees did and how well they did it (Grabmeier, 2011). Results of his study supported the mediating effect of good mood.

### 5.2 Recommendation

It is apparent that engaging in physical exercise increases or has a positive impact on job performance. There were also mediating effects of good mood and subjective health. Participants who engaged in physical exercise experienced an increase in job performance, and the increase in job performance was due also to good mood and subjective health.

There are some limitations of this research. Future researchers may study the relationship between physical exercise and job performance with respondents located in different geographic locations as environments may have a different impact on this relationship. This research was limited to the participants in Baltimore County,

Maryland, the relationship found may not be true for other states and countries outside the United States.

Future researchers should test the optimal time of the day to exercise to maximize job performance. Researchers should test respondents at different times during the day (morning, noon and night) to see which exercise time periods increase job performance the most. This could help give business owners and decision makers necessary knowledge to start work later or extend lunch breaks. The result would be happier, healthier, and more productive employees and potentially yielding high returns for the company.

5.3 Conclusion

Engaging in physical exercise has become a key component to increased job performance. Engaging in physical exercise increases job performance through the mediating effects good mood and subjective health. Research shows that health care costs are becoming high as a result of the inactivity. Owners and managers of companies are looking for new ways to decrease health care costs and to improve the performance of their employees. This has led to companies to offer gym memberships and even wellness programs to help get their employees active and healthy.

As such, the result of this study showed that engaging in physical exercise would result in an increase of job performance through increased good mood and subjective health. Therefore companies looking to reduce health care costs should consider incentives to get the employees to engage in physical exercise. It is also important for companies to understand the mediating effects of good mood and subjective health. Participants who engaged in physical exercise experienced an increase in good mood and subjective health that made them more productive. This means that participants are in good moods and feel healthier may be more productive workers.



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# Appendix 1- Pre-Test and Test Questionnaire

| hesis: Relationship   | p Between Physical Exercise and Job Performance: Th   |
|---|---|
| Hey Everyone! Your  | participation in this thesis study is greatly appreciate  |
| I am in the last few months o<br>Thesis study.  | of my MBA graduate program and, as a course requirement; I am required to complete a  |
| I am conducting a research s<br>performance, as well as med<br>asking if you would agree to | study to try and identify if there is a relationship between physical exercise and job<br>liating effects of physical exercise such as subjective health and good mood. I am therefor<br>participate in my research by answering a questionnaire. |
| The questionnaire has 5 sec   | tions and should only take a few minutes to complete.   |
| 1. Do you agree to be a   | a participant in this thesis study?   |
| C Yes   | C No  |
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| Thesis: Relationship Between Physical Exercise and Job Performance: The |
|---|
| Section 1: Demographics   |
| Please mark only (1) box per section                                    |
| *2. What is your gender?  |
| C Female  |
| C Male  |
| *3. What is your age?   |
| C 18 to 24  |
| C 25 to 34  |
| C 35 to 44  |
| C 45 to 54  |
| C 55 to 64  |
| C 65 and over   |
| *4. What is the highest level of education you have completed?          |
| *5. What is you ethnicity?  |
| C White   |
| C Hispanic or Latino  |
| C Black or African American   |
| C Native American or American Indian                                    |
| C Asian/ Pacific Islander   |
| C Other   |
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| Thesis: Relationship Between Physical Exercise and Job Performance: The                               |
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| Section 2: Physical Exercise  |
| *6. Important: Please fill in your estimated height in feet. (i.e. 6'2" would be 6 feet and 2 inches) |
|   |
| ≭7. Important: Please fill in your estimated weight in pounds. (i.e. 200lbs would be 200 pounds)      |
| ×.<br>•   |
| $igstar{0}$ 8. Do you currently engage in physical exercise on a regular basis?                       |
| C Yes   |
| C No  |
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| Thesis: Relationship Between Physical Exercise and Job Performance: The   |
|---|
| If Yes (Physical Exercise section continued)  |
| 9. What kind of exercise do you do on a regular basis?  |
| E Swim  |
| Bike  |
| Cutside Run   |
| C Sports  |
| Gym   |
| Voga or Pilates   |
| Other   |
| 10. How frequently do you exercise?   |
| C I exercise [0-1 days per week]  |
| C   exercise [1-2 times per week]   |
| C   exercise [ 3-4 times per week]  |
| C I exercise [5 or more times per week]   |
| *11. How long/ what is the duration of your exercise?   |
| C <20 Minutes   |
| C 20-30 Minutes   |
| C 30-40 Minutes   |
| C 40-60 Minutes   |
| C >1 Hour   |
| *12. What intensity (perceived exertion) would you rate your exercise?  |
| C None- 6 (Reading a book, watching TV).  |
| C Very Very Light- 7-8 (Tying Shoes)  |
| C Very Light- 9-10 (Chores like folding clothes that seem to take a little effort)                                  |
| Fairly Light- 11-12 (Walking through the grocery store which requires some effort)                                  |
| Somewhat Hard- 13-14 (Brisk walking which requires moderate effort but doesn't make you feel out of breath)         |
| Hard- 15-16 (Buch as bicycling, swimming or other activities that take vigorous effort and gets the heart pounding) |
| C Very Hard- 17-18 (Highest level of activity you can sustain)  |
| Very Very Hard- 19-20 (Burst of activity that you can't maintain for long; such as a sprint at the end of a race)   |

| Thesis: Relationship Between Physical Exercise and Job Performance: The                   |
|---|
| If No (Physical Exercise section continued)   |
| *13. What sort of activities do you engage in on a regular basis?                         |
| Music Nusic   |
| C Reading   |
| Cooking   |
| Sleeping (Taking a Nap)   |
| Other (please specify)  |
|   |
| st 14. Do you feel that the above activity is a valid alternative to exercise?            |
| C Yes   |
| C No  |
| st 15. Do you feel that the above activity has in fact improved your performance at work? |
| C Yes   |
| C No  |
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| Thesis: Relationship Between Physical Exercise and Job Performance: The                  |
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| Section 4: Physical Exercise & Job Performance   |
| Please place one of the following values to each question 1-7                            |
| Do you SD (Strongly Disagree) D (Disagree) UD (Undecided) A (Agree) SA (Strongly Agree)  |
| ★16. After engaging in physical exercise I feel: More productive at work.                |
| C 3D (Strongly Disagree)   |
| C D (Disagree)   |
| C UD (Undecided)   |
| C A (Agree)  |
| C 3A (Strongly Agree)  |
| *17. After engaging in physical exercise I feel: That I relax better at home.            |
| C 3D (Strongly Disagree)   |
| C D (Disagree)   |
| C UD (Undecided)   |
| C A (agree)  |
| C 3A (Strongly Agree   |
| *18. After engaging in physical exercise I feel: I think more clearly about work-related |
| problems.  |
| C SD (Strongly Disagree)   |
| C D (Disagree)   |
| C UD (Undecided)   |
| C A (Agree)  |
| C 3A (Strongly Agree)  |
| *19. After engaging in physical exercise I feel: I concentrate on work tasks.            |
| SD (Strongly Disagree)   |
| D (Disagree)   |
| UD (Undecided)   |
| A (Agree)  |
| SA (Strongly Agree)  |

| <ul> <li>*20. After engaging in physical exercise I feel: I enjoy my work better.</li> <li>so (drongly Disagree)</li> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>SD (drongly Disagree)</li> <li>UD (Undecided)</li> <li>A (darce)</li> <li>SA (drongly Agree)</li> <li>*22. After engaging in physical exercise I relate better to my co-workers.</li> <li>SD (drongly Disagree)</li> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>SD (drongly Agree)</li> <li>*22. After engaging in physical exercise I feel: It has no effect on how I perform at work.</li> <li>SD (drongly Disagree)</li> <li>D (Disagree)</li> <li>D (Disagree)</li> <li>D (Disagree)</li> <li>D (Disagree)</li> <li>D (Maccided)</li> <li>A (Agree)</li> <li>SD (drongly Disagree)</li> <li>D (Disagree)</li> <li>D (Maccided)</li> <li>A (Agree)</li> <li>SA (drongly Agree)</li> </ul>  | Thesis: R  | Relationship Between Physical Exercise and Job Performance: The                     |
|--|------------|---|
| <ul> <li>BD (Brongly Diagree)</li> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>BA (Brongly Agree)</li> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>D (Diagree)</li> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>BA (Brongly Agree)</li> <li>*22. After engaging in physical exercise I feel: It has no effect on how I perform at work.</li> <li>BD (Brongly Diagree)</li> <li>D (Diagree)</li> <li>D (Diagree)</li> <li>BA (Brongly Agree)</li> <li>*21. After engaging in physical exercise I feel: It has no effect on how I perform at work.</li> <li>BD (Brongly Diagree)</li> <li>D (Diagree)</li> <li>D (Diagree)</li> <li>BA (Brongly Agree)</li> <li>SD (Brongly Agree)</li> </ul>   | *20. Afte  | er engaging in physical exercise I feel: I enjoy my work better.                    |
| <ul> <li>D (Disagrec)</li> <li>UD (Undecided)</li> <li>A (Agrec)</li> <li>BA (Strongly Agrec)</li> <li>C (Disagrec)</li> <li>D (Disagrec)</li> <li>UD (Undecided)</li> <li>A (Agrec)</li> <li>BA (Strongly Agrec)</li> <li>*22. After engaging in physical exercise I feel: It has no effect on how I perform at work.</li> <li>BD (Disagrec)</li> <li>D (Disagr</li></ul>                             | C SD (Stro | ngly Disagree)  |
| <ul> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>BA (Btrongly Agree)</li> <li>D (Disagree)</li> <li>D (Disagree)</li> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>BA (Btrongly Agree)</li> <li>D (Disagree)</li> <li>D (Disagree)</li> <li>A (Agree)</li> <li>BA (Btrongly Disagree)</li> <li>D (Disagree)</li> <li>D (Disagree)<th>C D (Disag</th><th>ree)</th></li></ul> | C D (Disag | ree)  |
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| <ul> <li>*21. After engaging in physical exercise: I relate better to my co-workers.</li> <li>aD (Btorogly Disagree)</li> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>aA (Btrongly Agree)</li> <li>*22. After engaging in physical exercise I feel: It has no effect on how I perform at work.</li> <li>aD (Btorogly Disagree)</li> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>aA (Btrongly Agree)</li> <li>A (Agree)</li> <li>aA (Btrongly Agree)</li> </ul>   | C SA (Stro | ngly Agree)   |
| <ul> <li>BD (Strongly Disagree)</li> <li>D (Disagree)</li> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>SD (Strongly Agree)</li> <li>D (Disagree)</li> <li>D (Disagree)</li> <li>D (Disagree)</li> <li>D (Disagree)</li> <li>A (Agree)</li> <li>SA (Strongly Agree)</li> </ul>   | *21. Aft   | er engaging in physical exercise: I relate better to my co-workers.                 |
| <ul> <li>D (Disagree)</li> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>SA (Btrongly Agree)</li> <li>D (Disagree)</li> <li>D (Disagree)</li> <li>D (Disagree)</li> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>SA (Btrongly Agree)</li> </ul>   | C SD (Stro | ngly Disagree)  |
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| <ul> <li>SA (Strongly Agree)</li> <li>SD (Strongly Disagree)</li> <li>D (Disagree)</li> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>SA (Strongly Agree)</li> </ul>  | C A (Agree | 9   |
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| <ul> <li>D (Disagree)</li> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>3A (Btrongly Agree)</li> </ul>   | SD (Stro   | ngly Disagree)  |
| <ul> <li>UD (Undecided)</li> <li>A (Agree)</li> <li>SA (Brongly Agree)</li> </ul>  | 🔲 D (Disag | ree)  |
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# Thesis: Relationship Between Physical Exercise and Job Performance: The

#### Section 5: Mood

\*23. The scale consists of a number of words that describe different feelings and emotions. Read each item and then choose a number from the scale. Indicate to what extent you feel this way right now, that is, at the present moment (AFTER YOU EXERCISE).

|              | Very Slightly or Not at<br>al | A Little | Moderately | Quite a Bit | Extremely |
|--------------|-------------------------------|----------|------------|-------------|-----------|
| Interested   | C                             | C        | C          | C           | C         |
| Distressed   | C                             | C        | C          | C           | C         |
| Excited      | С                             | С        | С          | С           | С         |
| Upset        | C                             | C        | C          | C           | C         |
| Strong       | С                             | C        | С          | С           | C         |
| Gullty       | C                             | C        | C          | C           | C         |
| Scared       | С                             | С        | C          | С           | C         |
| Hostle       | C                             | C        | C          | C           | C         |
| Enthusiastic | C                             | C        | C          | C           | С         |
| Proud        | C                             | 0        | 0          | C           | 0         |
| Irritable    | C                             | C        | C          | C           | С         |
| Alert        | C                             | C        | C          | C           | 0         |
| Ashamed      | C                             | C        | C          | C           | C         |
| Inspired     | C                             | C        | 0          | C           | 0         |
| Nervous      | С                             | C        | C          | с           | C         |
| Determined   | C                             | C        | 0          | C           | C         |
| Attentive    | с                             | C        | C          | с           | С         |
| Jittery      | C                             | C        | C          | C           | C         |
| Active       | С                             | C        | C          | С           | C         |
| Afraid       | C                             | C        | 0          | 0           | C         |

| Thesis: Relations  | hip Betwee      | en Physical      | Exercise an           | d Job Perfor         | mance: The       |
|--|-----------------|------------------|-----------------------|----------------------|------------------|
| Section 6: Subject   | ive Health      |                  |                       |                      |                  |
| ≭24. In general, wo  | ould you say    | your health is?  |                       |                      |                  |
| C Excellent  |                 |                  |                       |                      |                  |
| C Very Good  |                 |                  |                       |                      |                  |
| C Good   |                 |                  |                       |                      |                  |
| C Fair   |                 |                  |                       |                      |                  |
| C Poor   |                 |                  |                       |                      |                  |
| *25. The following   | questions ar    | e about activit  | ies you might d       | lo on a typical d    | lay. Does        |
| your health now lim  | it you in thes  | e activities? If | so, how much?         | 2                    |                  |
|  | Yes, Limited    | A Lot            | Yes, Limited a little | No, No               | t limited at all |
| Moderate activities, such as<br>moving a table, pushing a<br>vacuum cleaner, bowing or<br>playing golf | C               |                  | C                     |                      | C                |
| Climbing several flights of stairs   | C               |                  | С                     |                      | C                |
| *26. During the pas  | st 4 weeks, h   | ow much of th    | e time have you       | u had any of the     | following        |
| problems with your   |                 |                  |                       |                      |                  |
| work or other regula   | ar daily activi | ties as a result | t of your physic      | al health?           |                  |
|  | All of the time | Most of the time | Some of the time      | A little of the time | None of the time |
| Accomplished less then you<br>would like   | C               | C                | C                     | C                    | C                |
| Were limited in the kind of<br>work or other activities  | C               | C                | 0                     | C                    | C                |
| *27. During the pas  | st 4 weeks, h   | ow much of th    | e time have yo        | u had any of the     | following        |
| problems with your   |                 |                  |                       |                      |                  |
| work or other regula   | ar daily activi | ties as a result | t of any emotion      | nal problems (S      | uch as feeling   |
| depressed or anxiou  | us).            |                  |                       |                      |                  |
| Accomplished lass than you   | All of the time | Most of the time | Some of the time      | A little of the time | None of the time |
| would like   | ~               |                  |                       |                      |                  |
| Did work on other activities<br>less carefully then usual  | C               | C                | 0                     | C                    | C                |
|  |                 |                  |                       |                      |                  |
|  |                 |                  |                       |                      |                  |
|  |                 |                  |                       |                      |                  |

| *28. During the past 4 weeks, how much did pain interfere with your normal w<br>(including both work outside the house and housework?   Not at all   Not at all   A little Bit   Moderately   Quite a Bit   Extremely   *29. These questions are about how you feel and how things have been with a the past 4 weeks. For each question, please give the one answer that comes closest to the way y been feeling. How much of the time during the PAST 4 WEEKS All of the time Most of the time a little of the time have you feel and how the past 4 weeks. For each question, please give the one answer that comes closest to the way y been feeling. How much of the time during the PAST 4 WEEKS All of the time Most of the time a little of the time have you feel call and depressed? *30. Final Question: During the past 4 weeks, how much of the time has your physical health or emotoproblems interfered with your social activities (like visiting friends, relatives, etc.)? All of the time Most of th  | In the past 4 weeks, how much did pain interfere with your normal work<br>ing both work outside the house and housework?<br>It all<br>a Bit<br>instru-<br>t a Bit<br>metry<br>These questions are about how you feel and how things have been with you during<br>t 4 weeks.<br>In question, please give the one answer that comes closest to the way you have<br>eling.<br>Uch of the time during the PAST 4 WEEKS<br>The question, please give the one answer that comes closest to the way you have<br>eling.<br>Uch of the time during the PAST 4 WEEKS<br>The function of the time Most of the time Some of the time A little of the time None of the time<br>t a little and Most of the time Some of the time A little of the time None of the time<br>the case and Most of the time Boome of the time A little of the time None of the time<br>the tam and Most of the time Boome of the time A little of the time None of the time<br>the case and Most of the time Boome of the time A little of the time None of the time<br>the tam and Most of the time Boome of the time A little of the time None of the time<br>the tam and Most of the time Boome of the time A little of the time None of the time<br>the tam and Most of the time Boome of the time A little of the time None of the time<br>the tam and Most of the time Boome of the time A little of the time None of the time<br>the tam and Most of the time A little of the time A little of the time None of the time<br>the time<br>of the time<br>of the time<br>of the time<br>of the time<br>of the time  | nesis: Relationst                           | nip Betwee      | n Physical E      | Exercise an      | d Job Perfo          | rmance: T        |
|---|---|---|-----------------|-------------------|------------------|----------------------|------------------|
| Including both work outside the house and housework?   Not at all A little Bit Guite a Bit Extremely *29. These questions are about how you feel and how things have been with the past 4 weeks. For each question, please give the one answer that comes closest to the way yoeen feeling. How much of the time during the PAST 4 WEEKS All of the time Most of the time Bome of the time A little of the time Received and depressed? *30. Final Question: During the past 4 weeks, how much of the time has your physical health or emory roblems Interfered with your social activities (like visiting friends, relatives, etc.)? All of the time Most of the time  | ing both work outside the house and housework?  t all e Bit srately a Bit mety  hese questions are about how you feel and how things have been with you during t 4 weeks. th question, please give the one answer that comes closest to the way you have eling. uch of the time during the PAST 4 WEEKS  All of the time Most of the time Some of the time Allthe of the time None of the time the caim and All of the time Most of the time Some of the time Allthe of the time None of the time the caim and All of the time Most of the time Some of the time Allthe of the time None of the time the caim and All of the time Most of the time Some of the time Allthe of the time None of the time the caim and All of the time Most of the time Some of the time Allthe of the time None of the time the caim and All of the time Most of the time Some of the time Allthe of the time None of the time the caim and All of the time the time None of the time Allthe of the time None of the time the time allthe of the time the time the time the source of the time of the time the time the time the time the source of the time time the time the source of the time time of the time time of the time time time the time time time time time time the source of the time time of the time time time time time time time tim  | *28. During the pas                         | t 4 weeks, ho   | w much did pa     | in interfere w   | ith your normal      | work             |
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| Did you have a lot of<br>energy?<br>Have you feit downhearted<br>and depressed?<br>* 30. Final Question:<br>Ouring the past 4 weeks, how much of the time has your physical health or emo<br>problems<br>Interfered with your social activities (like visiting friends, relatives, etc.)?<br>All of the time<br>Most of the time<br>Some of the time  | we a lot of C C C C C C C C C C C C C C C C C C   | Have you felt calm and<br>peaceful?         | C               | C                 | C                | C                    | С                |
| Have you felt downhearted<br>and depressed?<br><b>* 30. Final Question:</b><br>During the past 4 weeks, how much of the time has your physical health or emo<br>problems<br>Interfered with your social activities (like visiting friends, relatives, etc.)?<br>All of the time<br>Most of the time<br>All the time<br>All the time   | tet downhearted<br>sed?<br>inal Question:<br>the past 4 weeks, how much of the time has your physical health or emotional<br>ns<br>red with your social activities (like visiting friends, relatives, etc.)?<br>the time<br>of the time<br>e of the time<br>of the time<br>of the time  | Did you have a lot of<br>energy?            | C               | C                 | C                | C                    | C                |
| <ul> <li>* 30. Final Question:</li> <li>Ouring the past 4 weeks, how much of the time has your physical health or emotoroblems</li> <li>Interfered with your social activities (like visiting friends, relatives, etc.)?</li> <li>All of the time</li> <li>Most of the time</li> <li>Some of the time</li> <li>A little of the time</li> </ul>  | inal Question:<br>the past 4 weeks, how much of the time has your physical health or emotional<br>ns<br>ed with your social activities (like visiting friends, relatives, etc.)?<br>The time<br>of the time<br>e of the time<br>of the time<br>of the time  | Have you felt downhearted<br>and depressed? | C               | C                 | C                | c                    | C                |
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| C Most of the time<br>Some of the time  | of the time<br>e of the time<br>of the time   | All of the time                             |                 | es (like visiting | menus, relati    | ves, etc./:          |                  |
| C Some of the time  | e of the time<br>of the time  | C Most of the time                          |                 |                   |                  |                      |                  |
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| O HAVE MI WE WITE   | of the time   | C A little of the lime                      |                 |                   |                  |                      |                  |
|   | or the time   |   |                 |                   |                  |                      |                  |
| None of the time  |   | None of the time                            |                 |                   |                  |                      |                  |
|   |   |   |                 |                   |                  |                      |                  |
|   |   |   |                 |                   |                  |                      |                  |
|   |   |   |                 |                   |                  |                      |                  |
|   |   |   |                 |                   |                  |                      |                  |



Physical Exercise Frequency and Time:

The physical activity pyramid can be seen as figure 1 above: in the tables and figures section. Similar to the food guide pyramid, this physical activity pyramid is designed to help people become more active. If you are currently sedentary, begin at the bottom of the pyramid and gradually increase the amount of moderate-intensity physical activity in your life. If you are already moderately active, begin a formal exercise program that includes cardiorespiratory endurance exercise, flexibility training, and strength training to help you develop all the health-related components of fitness. (Fahey, Insel, Roth, 2003)

The following is an example of the different section that comprise the physical activity pyramid as described in the book Fit & Well by Thomas D. Fahey, Paul M. Insel and Walton T. Roth

- Sedentary Activities: *Do infrequently* (Watching television, surfing the internet, talking on the telephone)
- Strength Training: 2-3 days per week (all major muscle groups) (Biceps curls, push-ups, abdominal curls, bench press, calf raises, etc.)

- Flexibility Training: 2 or more days per week (all major joints) (Calf stretch, side lunge, step stretch, hurdle stretch, etc.)
- Cardiorespiratory Endurance exercise: *3-5 days per week (20-60 minutes)* (Walking, jogging, bicycling, swimming, aerobic dancing, in-line skating, cross-country skiing, dancing, basketball, etc.)
- Moderate-Intensity Physical Activity: *Most days-preferably every day (about 30 minutes)* (Walking to the store or bank, waking your car, climbing stairs, working in your yard, walking your dog, cleaning your room, etc.

Appendix 3: BORG Rating of Perceived Exertion Scale

| Number rating | Verbal rating    | Example  |
|---------------|------------------|--|
| 6             |                  | No effort at all. Sitting and doing nothing.   |
| 7             | Very, very light | Your effort is just notice-<br>able.   |
| 8             |                  |  |
| 9             | Very light       | Walking slowly at your own pace.   |
| 10            |                  | Light effort.  |
| 11            | Fairly light     | Still feels like you have<br>enough energy to continue<br>exercising.  |
| 12            |                  |  |
| 13            | Somewhat hard    |  |
| 14            |                  | Strong effort needed.  |
| 15            | Hard             |  |
| 16            |                  | Very strong effort needed.   |
| 17            | Very hard        | You can still go on but you<br>really have to push yourself<br>It feels very heavy and<br>you're very tired. |
| 18            |                  |  |
| 19            | Very, very hard  | For most people, this is the<br>most strenuous exercise<br>they have ever done. Almos<br>maximal effort.     |
| 20            |                  | Absolute maximal effort<br>(highest possible). Exhaus-<br>tion.  |
### Appendix 3 continued:

| How you might<br>describe your<br>exertion | Borg rating<br>of your<br>exertion | Examples<br>(for most adults <65 years old)   |
|--|------------------------------------|---|
| None                                       | 6                                  | Reading a book, watching television   |
| Very, very light                           | 7 to 8                             | Tying shoes   |
| Very light                                 | 9 to 10                            | Chores like folding clothes that seem to take little effort   |
| Fairly light                               | 11 to 12                           | Walking through the grocery store or other activities that require<br>some effort but not enough to speed up your breathing                   |
| Somewhat hard                              | 13 to 14                           | Brisk walking or other activities that require moderate effort and<br>speed your heart rate and breathing but don't make you out of<br>breath |
| Hard                                       | 15 to 16                           | Bicycling, swimming, or other activities that take vigorous effort<br>and get the heart pounding and make breathing very fast                 |
| Very hard                                  | 17 to 18                           | The highest level of activity you can sustain   |
| Very, very hard                            | 19 to 20                           | A finishing kick in a race or other burst of activity that you can't maintain for long  |

## Measuring Physical Exercise Intensity

Exercise intensity (how you feel) is a subjective measure of how hard physical activity feels to you while you're doing it — your perceived exertion. Your perceived level of exertion may be different from what someone else feels doing the same exercise. For example, what feels to you like a hard run can feel like an easy workout to someone who's more fit? (Mayo Clinic Staff, 2011).

### The Borg Scale of Perceived Exertion

(An example of The Borg Scale of Perceived Exertion can be seen at figure 2 above in the tables and figures section).

In the early 1960s, Gunnar Borg developed the 6–20 Rating of Perceived Exertion (RPE) scale. This scale has been widely applied as a valuable, reliable, and easily understood means of quantifying, monitoring and evaluating the exercise tolerance and magnitude of exertion in healthy adult populations and other groups from American College of Sports Medicine [ACSM] 2006 (Faulkner, J & Eston, R). One way to gauge how hard you are exercising is to use the Borg Scale of Perceived Exertion (Harvard School of Public Health, 2013).

The Borg Scale takes into account your fitness level: It matches how hard you *feel* you are working with numbers from 6 to 20; thus, it is a "relative" scale. The scale starts with "no feeling of exertion," which rates a 6, and ends with "very, very hard," which rates a 20. Moderate activities register 11 to 14 on the Borg scale ("fairly light" to "somewhat hard"), while vigorous activities usually rate a 15 or higher ("hard" to "very, very hard") (Harvard: School of Public Health, 2013). Dr. Gunnar Borg, who created the scale, set it to run from 6 to 20 as a simple way to estimate heart rate—multiplying the Borg score by 10 gives an approximate heart rate for a particular level of activity (Harvard: School of Public Health, 2013). Stanish and Aucoin (2007) found the following:

Rated perceived exertion scales are especially valuable as an indicator of exercise intensity for individuals who have difficulty palpating heart rate or who have limited experience engaging in exercise. The scales have been used with various populations including older adults (Shigematsu, Ueno, Nakagaichi, Nho, & Tanaka, 2004), children (Tenenbaum, Falk, & Bar Or, 2002), and individuals with disabilities (Birk & Mossing, 1988; Holland, Bouffard, & Wagner, 1992; Ward, Bar-Or, Longmuir, & Smith, 1995) as a means of allowing people to express feelings of fatigue and exertion while engaging in physical activity (Stanish, Aucoin, 2007)

Stanish and Aucoin (2007) found the following:

Rated perceived exertion is a reliable indicator of an individual's exercise tolerance (American College of Sports Medicine, 2000). Since RPE is highly correlated with exercise heart rate and workload, RPE scales are frequently used by practitioners during exercise tests and for exercise prescription. Borg's RPE Scale is one of the most widely used of the existing scales and was developed as a subjective measure of feelings during exercise that takes into account fitness level, the environment, and fatigue (Borg, 1970; 1998)

Appendix 4: PANAS

# Worksheet 3.1 The Positive and Negative Affect Schedule (PANAS; Watson et al., 1988)

#### **PANAS** Questionnaire

This scale consists of a number of words that describe different feelings and emotions. Read each item and then list the number from the scale below next to each word. **Indicate to what extent you feel this way right now**, **that is, at the present moment** *OR* **indicate the extent you have felt this way over the past week (circle the instructions you followed when taking this measure)** 

| 1                    | 2        | 3          | 4           | 5         |
|----------------------|----------|------------|-------------|-----------|
| Very Slightly or Not | A Little | Moderately | Quite a Bit | Extremely |
| at All               |          |            |             |           |



### Scoring Instructions:

Positive Affect Score: Add the scores on items 1, 3, 5, 9, 10, 12, 14, 16, 17, and 19. Scores can range from 10 - 50, with higher scores representing higher levels of positive affect. Mean Scores: Momentary = 29.7 (*SD* = 7.9); Weekly = 33.3 (*SD* = 7.2)

Negative Affect Score: Add the scores on items 2, 4, 6, 7, 8, 11, 13, 15, 18, and 20. Scores can range from 10 - 50, with lower scores representing lower levels of negative affect. Mean Score: Momentary = 14.8 (SD = 5.4); Weekly = 17.4 (SD = 6.2)

Copyright © 1988 by the American Psychological Association. Reproduced with permission. The official citation that should be used in referencing this material is Watson, D., Clark, L. A., & Tellegan, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. Journal of Personality and Social Psychology, 54(6), 1063–1070. According to authors John R. Crawford and Julie D. Henry, The Positive and Negative Affect Schedule (PANAS) is a 20-item self-report measure of positive and negative affect developed by Watson, Clark, and Tellegen (1988b). NA and PA reflect dispositional dimensions, with high-NA epitomized by subjective distress and unpleasurable engagement, and low NA by the absence of these feelings. By contrast, PA represents the extent to which an individual experiences pleasurable engagement with the environment. Thus, emotions such as enthusiasm and alertness are indicative of high PA, whilst lethargy and sadness characterize low PA (Watson & Clark, 1984). (Crawford, Henry, 2004).

Positive Affect Score: Add the scores on items 1, 3, 5, 9, 10, 12, 14, 16, 17, and 19. Scores can range from 10–50, with higher scores representing higher levels of positive affect. Negative Affect Score: Add the scores on items 2, 4, 6, 7, 8, 11, 13, 15, 18, and 20. Scores can range from 10–50, with lower scores representing lower levels of negative affect (The American Psychological Association, 1988).

Figure 4: The Short-Form-12 Health Survey (See below)

The 36 item short form health survey (SF-36) has proved to be of use in a variety of settings where a short generic health measure of patient-assessed outcome is required. This measure can provide an eight dimension profile of health status, and two summary scores assessing physical function and mental well-being. The developers of the SF-36 in America have developed algorithms to yield the two summary component scores in a questionnaire containing only one-third of the original 36 items, the SF-12. (Jenkinson, Layte, 1997)

This abbreviation of the SF-36 Health Survey was designed to be broad ranging but brief enough for practical use in large-scale surveys and yet still reproduce the physical and mental scores of the complete Survey. Although the SF-36 includes eight dimensions, the physical and mental summary scores account for 80 to 85% of reliable variance in the eight scores, so reducing the number of health dimensions does not seriously compromise validity (McDowell, 2006).

The SF-12 was developed with the goals of accounting for at least 90% of the variance in the SF-36 physical and mental summary scores, of providing summary scores that would coincide with the average scores on the complete SF-36, and of being brief enough to be printed on a single page and administered in less than two minutes (McDowell, 2006).

There has been much progress in evaluating and documenting the SF-12 since its development began at The Health Institute in the spring of 1994. A journal article summarizing preliminary tests of reliability and validity completed peer review and published in Medical Care early this year. The Medical Outcome Trust's Scientific Advisory Committee has completed its own peer review of the SF-12 and has approved its distribution (Ware, Kosinski, Keller, 1996).

SF-12 reproduces the eight-scale profile with fewer levels than SF-36 scales and yields less precise scores, as would be expected for single-item and two-item scales. For large group studies, these differences are not as important, because confidence intervals for group averages in health scores are largely determined by sample size (Ware, Kosinski, Keller, 1996)

The SF-12 Health Survey is most likely to prove to be a satisfactory alternative to the SF-36 when samples are large and the objective is to monitor overall physical and mental health outcomes (Ware, Kosinski, Keller, 1996).

|   |   | V.I                                      | 1.1.1                             | I WZ II D                 |                                   |                             |                        |                              |
|---|---|--|-----------------------------------|---------------------------|-----------------------------------|-----------------------------|------------------------|------------------------------|
|   |   | Your F                                   | lealth an                         | d Well-Be                 | ing                               |                             |                        |                              |
| This survey asks<br>how well you ar                 | s for your views a<br>re able to do your              | about your healt<br>usual activities     | th. This inf<br>. <i>Thank ye</i> | formation v<br>ou for com | vill help keep<br>bleting this si | track of ho<br>avey!        | w you feel             | and                          |
| For each of the l                                   | following questio                                     | ns, please mark                          | an X in th                        | e one box                 | that best desc                    | ribes your a                | nswer.                 |                              |
| 1. In general, w                                    | ould you say you                                      | r health is:                             |                                   |                           |                                   |                             |                        |                              |
| Excellent   | Very Good   | Good                                     | Fair                              | Poor                      |                                   |                             |                        |                              |
| •   | •   | •  | •                                 | •                         |                                   |                             |                        |                              |
|   |   | □3                                       | 4                                 |                           |                                   |                             |                        |                              |
| 2. The followin<br>you in these                     | g questions are a<br>activities? If so, h             | bout activities y<br>ow much?            | ou might d                        | lo d <mark>uring a</mark> | typical day. I                    | Does y <i>our h</i>         | ealth nou              | limit                        |
|   |   |  |                                   |                           | Yes,<br>Limited                   | Yes,<br>Limited             | I A                    | No, Not<br>Limited<br>At All |
|   |   |  |                                   |                           | •                                 | •                           |                        |                              |
| a. Moderate<br>a vacuum                             | activities, such a cleaner, bowling                   | s moving a tabl                          | e, pushing                        |                           |                                   |                             | e.                     |                              |
| h Climbing  | several flights of                                    | stairs                                   |                                   |                           |                                   |                             | ,                      |                              |
| 3. During the po<br>other regular                   | ast 4 weeks, how<br>daily activities a                | much of the tin<br>a result of yo        | ne have yo<br>ur physica          | u had any                 | of the followi                    | ng problems                 | with you               | r work or                    |
|   |   |  | All of<br>the<br>Time             | Most<br>of the<br>Time    | Some<br>of the<br>Time            | A Little<br>of the<br>Time  | None<br>of the<br>Time |                              |
|   |   |  | -                                 | -                         | -                                 | •                           | -                      |                              |
| a. Accomplis<br>would like                          | shed less than you<br>c                               | u<br>                                    |                                   | □2                        | □3                                | 4                           | □5                     |                              |
| b. Were limit<br>or other a                         | ted in the <i>kind</i> of<br>ctivities                | f work                                   | 1                                 | □2                        | □3                                | 4                           | □5                     |                              |
| <ol> <li>During the pa<br/>other regular</li> </ol> | <i>ast 4 weeks</i> , how<br>daily activities <i>a</i> | much of the tir<br><i>a result of an</i> | ne have yo<br>y <i>emotion</i>    | u had any al problem      | of the following (such as fee     | ng problems<br>ling depress | with you<br>ed or anx  | r work or<br>ious)?          |
|   |   |  | All of<br>the<br>Time             | Most<br>of the<br>Time    | Some<br>of the<br>Time            | A Little<br>of the<br>Time  | None<br>of the<br>Time |                              |
|   |   |  | •                                 |                           | •                                 | •                           | •                      |                              |
| a. Accomplis<br>would like                          | s <i>hed less</i> than you                            | u<br>                                    | □ 1                               | 2                         | □ 3                               | 4                           | 5                      |                              |
| b. Did work<br>less carefu                          | or other activitie                                    | s<br>                                    | 🗆 1                               | 2                         | 3                                 | 4                           | 5                      |                              |
| 5. During the pa<br>the home and                    | <i>ast 4 weeks</i> , how<br>1 housework)?             | much did pain                            | interfere v                       | with your n               | ormal work (                      | including bo                | oth work o             | outside                      |
| Not at all  | A little bit  | Moderately                               | Quit                              | e a bit                   | Extremely                         |                             |                        |                              |
| •   | •   | •  | -                                 | •                         | •                                 |                             |                        |                              |
|   | 2   |  | [                                 | 4                         |                                   |                             |                        |                              |

### Appendix 5 continued.

6. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks ...

|  | All of<br>the<br>Time | Most<br>of the<br>Time | Some<br>of the<br>Time | A Little<br>of the<br>Time | None<br>of the<br>Time |
|--|-----------------------|------------------------|------------------------|----------------------------|------------------------|
|  | •                     |                        |                        | •                          | •                      |
| a. Have you felt calm and peaceful?            |                       | 2                      |                        | 4                          |                        |
| b. Did you have a lot of energy?               |                       |                        | □3                     | □4                         | $\Box s$               |
| c. Have you felt downhearted<br>and depressed? |                       | <b>2</b>               | □3                     | □4                         | □5                     |

7. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc)?

| All of<br>the<br>time | Most<br>of the<br>time | Some<br>of the<br>time | A little<br>of the<br>time | None<br>of the<br>time |
|-----------------------|------------------------|------------------------|----------------------------|------------------------|
|                       |                        | -                      | •                          | -                      |
|                       | 2                      | 3                      | 4                          |                        |



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