Does Fitness and Exercises Increase Productivity? Assessing Health, Fitness and Productivity Relationship

Mansour Sharifzadeh
California State Polytechnic University Pomona

As the American workforce increases, so does its waistline. It is estimated that 64% of the adults in the United States are obese, with nearly 9 million children age six and older becoming obese. With obesity come serious health problems such as heart disease, diabetes, hypertension and high blood pressure. Americans are faced with the challenge of trying to manage a higher cost of living that requires them to work more hours. They have to deal with the fact that an increase in the hours they work takes time away from their time to cook, which leads to unhealthy fast food choices and even less time to exercise. Employers are investing large amounts in employee fitness programs, but the value of physical exercise and lifestyle has yet to be established. This paper provides a critique of the applied and experimental research related to the impact of the employee fitness programs on work-related variables and discusses future research directions. More and more companies either are planning or have developed physical fitness programs for their employees. In the United States approximately 55,000 companies are involved in employee fitness and promote physical activities.

INTRODUCTION

The scope of employee fitness programs ranges from the company paying for memberships at a private fitness club to complete on- site fitness facilities. These programs cost anywhere from $2000 to millions. Organizations that support these programs consider them as an inexpensive benefit that produces the following returns: 1) increased ability to attract competent employees, 2) improved attitudes and loyalty, and 3) increased employee productivity.

The current idea has always been that there is a relationship between fitness and productivity, but is this relationship a reality? The belief that there is a relationship can easily be rationalized without much thought, as many jobs do require physical skills. Therefore, if a person is fit, he/she will be able to handle more physically demanding tasks, such as carrying more weight, or working longer and harder without having to take as many breaks. However, in today's job market, most jobs require little or no physical exertion. Therefore fitness and productivity are not really related. For instance in an office job, would an athlete be any more productive than one who is overweight, or even obese? When productivity is measured, it can be measured in both absenteeism and presenteeism. Absenteeism is the loss of productivity due to absence, while presenteeism is the loss of productivity while present. Presenteeism is a better measure of pure productivity as it measures how productive someone is while they are working, as opposed to the loss of productivity from vacations, sick days, and lateness. The majority of scholarly articles hold the belief that there is a relationship between fitness and productivity. If fitness could be increased through some type of fitness program, there would be a noticeable increase in productivity.

Other articles suggest that there is a relationship between fitness and productivity, yet only in the extreme cases. Still other articles suggest that a relationship may exist, but it cannot be proven without more research.

REVIEW OF THE LITERATURE

Aghop Der-Karabetian, University of La Verne, and Norma Gebharbp, *General Dynamics,* conducted a study to measure job satisfaction, body image, and sick days for those who exercised and those who did not. They selected two groups from a large Southern California company. The first group participated in a physical fitness program for six months. The three variables— job satisfaction, body image, and sick days— were measured at the start of this program and again six months later. The second group was used as a control group, to make sure no major external factors affected the variables. They found that after the six months' time the employees who participated in the fitness program had a higher job satisfaction and body image, and had less sick days than the control group. They then suggested that every company should focus on employee fitness since it reduces absenteeism (sick days), and increases morale of the employees which will increase productivity. (Der-Karabetian and Gebharbp, *Effect of Physical Fitness Program in the Workplace,* Journal of Business and Psychology)

Mills PR, Kessler RC, Cooper J, and Sullican S wrote in their article *Impart of a Health Promotion Program on Employee Health Risks and Work Productivity* that being part of a company's fitness program increased productivity levels. This survey consisted of a variable group (n=266) and a control group (n=1242). The variable group was placed in a multi-component health promotion program which showed participants their health risks, a personalized health improvement plan, literature, and lectures focused on health improvement. Using the World Health Organization health and work performance questionnaire they concluded that those enrolled in the multi-component health promotion program reduced their health risks by 0.45, lowered their monthly absenteeism days by 0.36, and had a mean increase on the work performance scale of 0.79. These results suggest that implementing a multi-component health promotion program to increase the fitness levels of its participants, would also make noticeable differences in health risks and productivity.

Wayne N. Burton MD, Katherine T. McCalister EdD, Chin-Yu Chen PhD, and Dee W. Edington PhD conducted a study in which they surveyed both people enrolled (n=854) and not enrolled in a company's fitness center (n=4543), and asked questions based on their productivity in the workplace. They concluded that those employees who were not participating in their company's fitness program reported higher loss of productivity due to time management, physical difficulty of the work, limitations of output, and overall loss of productivity than comparables of the same race, age, gender, and work location who were enrolled in their company's fitness center. (*The Association of Health Status, Worksite Fitness Center Participation, and Two Measures of Productivity)*

Christopher P. Neck and Kenneth H. Cooper believe that the higher one's fitness is, the higher their productivity will be. They mention in their article "*The fit executive: Exercise and diet guidelines for enhancing performance",* many studies which show that fitness and work productivity are related. In one study by Frew, D. R. & Brunning that measured improved productivity and job satisfaction with enrollment in an employee exercise program, commercial real estate stock brokers who participated in an aerobics program for 12 weeks had higher sales than their comparable brokers during and after the 12-week aerobic program. Another study which looked at 56 college professors, noticed that the physically active professors were able to retain information better, as well experience slower decline in memory with age. (Research Quarterly For Exercise and Sport, 64(2):144-151).

Paul L. Lloyd, *Lloyd & Associates* and Sandra L. Foster, *Success at Work* suggest that there is a relationship between fitness and productivity only when fitness is extremely low. For example someone who is extremely obese, or someone who had severe diabetes, or even someone who had heart disease needs to worry about loss of productivity; yet someone who is slightly overweight, or is not fit will experience no loss of productivity. They suggest that lack of fitness is a major health risk and it could affect workplace productivity.

Garland Y. DeNelsky and Michael G. McKee tried to predict the job performance of individuals based on an assessment which included fitness. They had a sample of 32 government employees, to whom they gave a health assessment which predicted their individual job performance as above average, average, or below average. Their results showed that 71% of those who received an above average or average score on the assessment performed at an above average, or average level. Sixty percent of those who received a below average score on their assessment performed at a below average level. This assessment was able to predict performance better than just plain chance; yet this study does not provide enough support to the claim that fitness affects productivity, as psychologists used the health assessment to determine whether each person was a motivated person, which does affect productivity. (*Journal of Applied Psychology* Vol. 53, No. 6 Prediction of Job Performance from Assessment Reports: Use of a modified Q-sort technique to expand predictor and criterion variance)

Allen, Harris PhD wrote in the *Journal of Occupational & Environmental Medicine* about his study on whether health affected productivity. He created a Health Risk Appraisal which examined health in the contexts of work, mental health, and demands from personal life. He had 17,821 respondents to his Work Limitation Questionnaire, and his study confirmed that there are two types of productivity loss due to health conditions: presenteeism and absenteeism as discussed earlier. His study showed that health is one of eight factors that affect productivity. The others include: work-life balance, personal life impact, stress, financial concerns, job characteristics, employee characteristics, and company characteristics. Although health does affect productivity the other seven factors together impact productivity five times as much as health. This study confirms that health and fitness has some impact on productivity, yet is not the primary determinant.

Bernaards, Claire M. PhD; Proper, Karin I. PhD; Hildebrandt, Vincent H. PhD, MD wrote in the *Journal of Occupational & Environmental Medicine* about their study on how physical activity, cardio-respiratory fitness, and body mass index affect work productivity, and absence due to sickness in employees who do office work. All their participants had neck, arm and hand pain within the six months before the study. The productivity was measured using the Health and Performance Questionnaire. They concluded that the amount of physical activity and cardio-respiratory fitness did not have an effect on work performance or sick absences; however obese male workers did have significantly lower productivity levels than lean workers.

Loren E Falkenberg, wrote in his article, "*Employee Fitness Programs: Their Impact on the Employee and the Organization"*, that there is not enough evidence to show that fitness increases workplace productivity at all. Falkenberg agrees that higher fitness levels do benefit body and mind in many positive ways. It has been proven that those who are fit have less depression, less stress, and less anxiety than comparable people who are not fit. There is sufficient evidence to show that fitness significantly lowers absenteeism (Cox, Shephard & Corey 1981) (Bertera 1990). The only reasoning for this drop in absenteeism that can be suggested is that fitness makes one healthier. However although fitness is good for you, and might make you healthier, it has never been shown to affect presenteeism (productivity while working).

With all the current studies that have been conducted, there still does not seem to be enough support to show that there is a strong relationship between fitness and productivity. Although the relationship can be pinpointed through small surveys and studies, other external factors such as personal differences, motivation, differences in jobs and stress could very well affect both productivity and fitness. This would make both fitness and productivity the effect of some external cause, opposed to the theory that changes in fitness cause changes in productivity.

DEFINITIONS

Body mass index is a statistical measure of the weight of a person scaled according to height. BMI is useful for population measure, not for diagnosing individuals. The formula was invented between the 1830's and 1850's. The body mass index can be found in two different ways. The formula for measuring the BMI is body weight divided by the square of the height. The relationship between BMI and health is

that medical professionals use the BMI test to determine if a person is physically active or inactive. Then based on their results they can determine if their current weight is healthy for them. When an individual's BMI is below 18.5 it commonly means the person is underweight (when a person's BMI is below 17.5 they are classified as anorexic). When the BMI is between 18.5 and 25 it means the person is at their optimal weight. The BMI of above 25 shows that the person is overweight, and when a person's BMI is 30 or above the person is obese (when BMI is 40 it is called morbidly obese). If the BMI were above or below the optimal zone it would reflect the current health as being good or not good.

Productivity is the measure of output from a production process per unit of input. The emphasis is on quantitative output and sometimes on input. Productivity accounts for monetary values of what is being produced and the cost of inputs being used. The formula used to determine the productivity is: "Total productivity equals output quantity divided by input quantity". There are a variety of methods to determine the level of productivity. A common way of increasing productivity is by using computers and machines to perform more tasks for the company. The company will increase productivity because they will not have to pay employees to do the work the computer or machines are completing. The average person uses the word productivity to describe the effectiveness and ability to obtain goals for a day or a set time period. Productivity is important to management because their job is to be sure that productivity increases or stays constant. The management team has the job of making sure that workers are working effectively and that they are doing their job.

Fitness is comprised of general fitness and specific fitness and is defined as the capacity to carry out the day's activities without undue fatigue. It is the measure of the body's ability to function efficiently and effectively in work and leisure activities, to be healthy, and to resist emergency situations. There are different levels of fitness that must be incorporated to be considered fit. The following are taken into consideration: cardiovascular, strength, muscular endurance, flexibility, and body composition. Also, the mental or emotional health as well as the age or bone structure of the individual should be taken into consideration. If a person is active on a daily basis and has good eating habits, that could help maintain their fitness. People that are fit can be overweight or fat. However, most people that are obese are not fit at all. Most people that are fit are not overweight and are conscious of their physical appearance and their health.

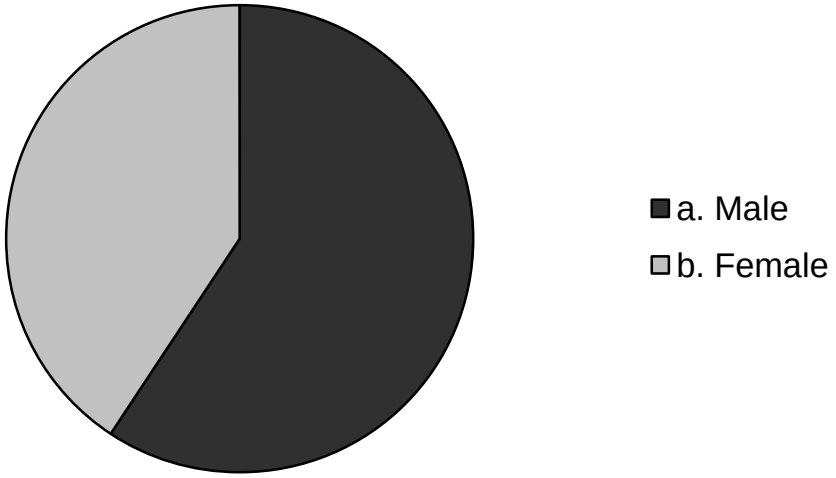
Health is defined as optimal functioning with freedom from disease and abnormality. It is a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity. A sick person can be fit depending on the sickness. If a person is ill with a disease or disorder they may still be fit in other areas. A person can be productive and unhealthy. Being healthy might be a benefit to being productive but is not a necessity. For example Steve Jobs, the founder of APPLE INC. was very productive during his major illness. Although he was sick he still was working and being productive.

RESULTS OF THE FITNESS AND PRODUCTIVITY SURVEY

The purpose of this research paper was to show that there is no correlation between fitness and productivity. A questionnaire was developed with 17 questions. The first set of questions measured BMI, the body mass index. The next set of questions measured fitness and health and the last set of questions measured productivity. Questionnaires were sent to 1765 Cal Poly College of Business alumni. A total of 355 people responded to the questionnaire, but only 328 of them were complete.

Are you male or female?	Response Percent	Response Count
a. Male	59.3%	201
b. Female	40.7%	138
answered question		339
skipped question		2

Are you male or female?

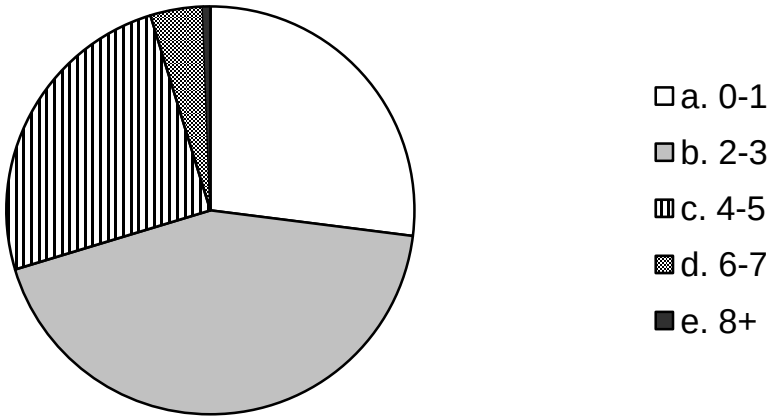


The majority of the respondents were male, accounting for more than half of the responses totaling to 59.3%. The response from the female population surveyed accounted for only 40.7% of the surveys returned. The total number of responses with all the questions completed was 339 surveys. Only two surveys were returned with one or more incomplete answers.

Respondent were mostly in their 30's. The youngest one was 22 and the oldest was 74 years old. The second highest category were respondent who were in their 20's and then those who were in their 50's.The following table shows the category of the respondent based on their age.

63 were in 20's
182 were in 30's
59 were in 40's
23 were in 50's
6 were in 60's
2 were in 70's

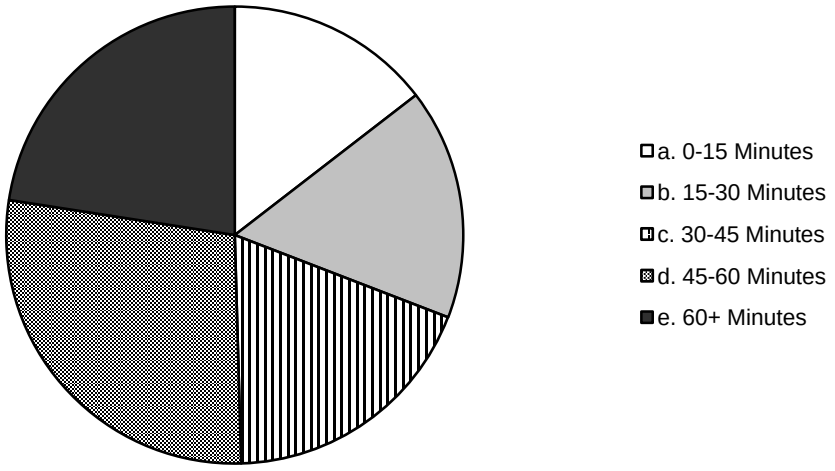
How many times a week do you typically exercise?	Response Percent	Response Count
a. 0-1	27.0%	91
b. 2-3	43.3%	146
c. 4-5	24.9%	84
d. 6-7	4.2%	14
e. 8+	0.6%	2
answered question		337
skipped question		4



As far as how many times they typically exercise, a high percentage of the survey respondents, 43.3% stated that they exercised an average of 2-3 times a week. The next highest portion of respondents, 27.0%, stated that they typically exercised 0-1 times a week. This percentage is close to the portion of respondents, 24.9%, who stated that they exercised 4-5 times a week. There was only a small portion of respondents, 4.2%, who stated that they exercised 6-7 times a week. The smallest portion of respondents, 0.6%, stated that they would work out as much as 8 times or more within a week.

How long do you typically set aside for exercise? (Including warm-up & cool-down)	Response Percent	Response Count
a. 0-15 Minutes	14.5%	49
b. 15-30 Minutes	16.3%	55
c. 30-45 Minutes	18.7%	63
d. 45-60 Minutes	**27.9%**	**94**
e. 60+ Minutes	22.6%	76
answered question		**337**
skipped question		**4**

How long do you typically set aside for exercise? (Including warm-up & cool-down)

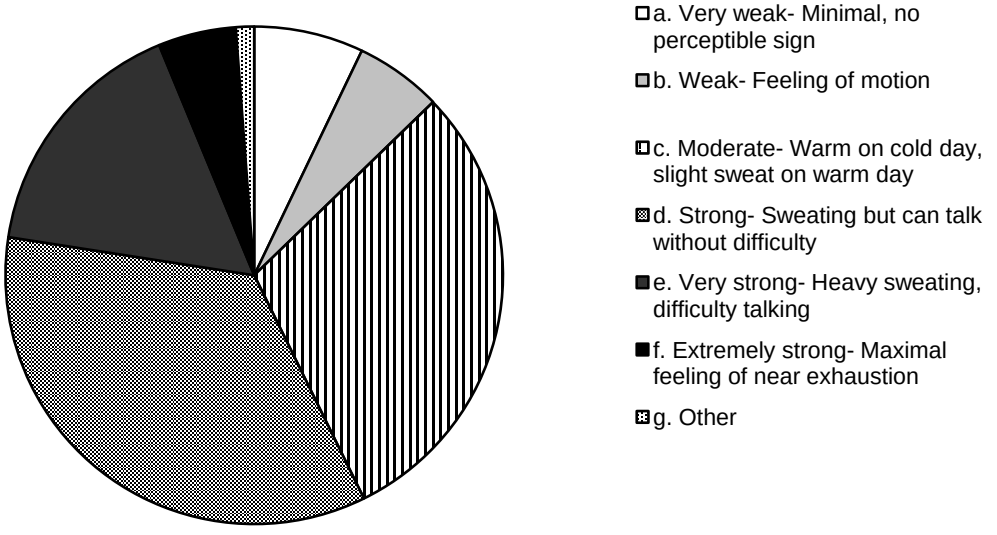


All of the survey respondents stated that they participated in some form of exercise on a weekly basis. The chart above illustrates a breakdown of how long they actually engage in the exercise of their choice. The most significant percent, 27.4 %, stated that their workout was approximately 45-60 min, including warm-up and cool-down. The second largest percent, 22.6%, stated that their entire workout was as long as 60 min+. Next, 18.7 % of the respondents stated that the length of their workout was 30-45min. The second smallest portion of respondents, 16.3%, stated that the duration of the workout was 15-30 min, while the smallest portion of the respondents, 0.5%, stated that their entire workout was only 0-15min. Despite the fact that the survey revealed that 30.8% of the respondents engaged in their choice of exercise for 30 min or less, it also revealed that an overwhelming 50.5% engaged in some form of exercise for 45 min or more.

Please select the highest level of exercise you have achieved in the last week based on perceived exertion and physical signs.

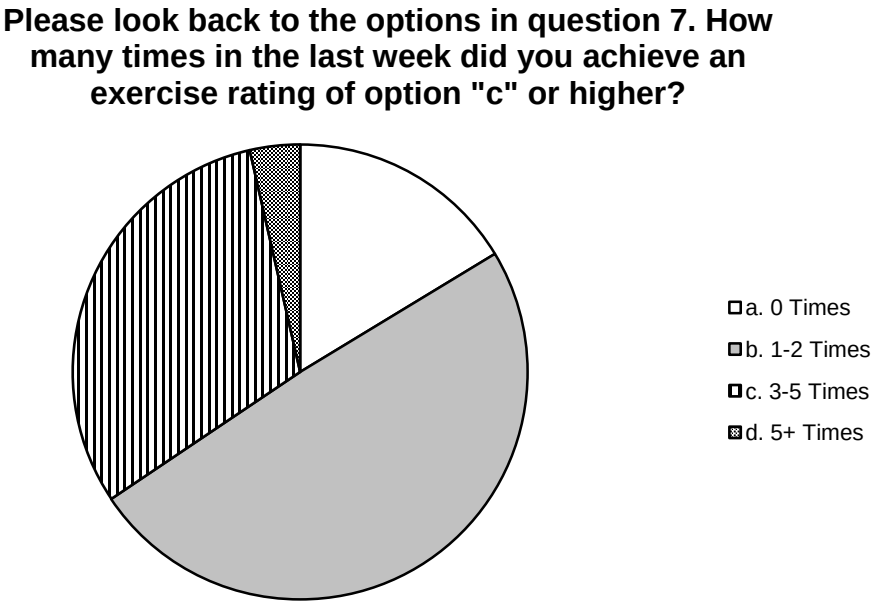
	Response Percent	Response Count
a. Very weak- Minimal,no perceptible sign	7.1%	24
b. Weak- Feeling of motion	5.6%	19
c. Moderate- Warm on cold day, slight sweat on warm day	30.0%	101
d. Strong- Sweating but can talk without difficulty	**34.7%**	**117**
e. Very strong- Heavy sweating, difficulty talking	16.3%	55
f. Extremly strong- Maximal feeling of near exhaustion	5.0%	17
g. Other	1.2%	4
answered question		**337**
skipped question		**4**

Please select the highest level of exercise you have achieved in the last week based on perceived exertion and physical signs



While the previous survey question revealed the amount of time the respondents engaged in some form of exercise, this question revealed the respondents' perceived exertion and physical signs of their effort. The majority of the respondents, 34.7%, stated their perceived exertion was strong; during exercise they experienced sweating and could talk without much difficulty. The second largest portion of respondents, 30.0%, stated that they felt their physical exertion to be moderate, causing their body to become warm on a cold day and producing a slight sweat on a warm day. The next largest portion of respondents, 16.3%, stated they perceived their physical exertion to be quite strong, which causes them to sweat heavily and experience great difficulty when talking. Approximately 7.1% of the respondents stated that they perceived their physical exertion be very minimal, and at times, to be completely unperceivable. An even smaller portion of the respondents, 5.6 %, stated that they perceived their physical exertion to be weak with a minimal feeling of motion. However, there was a small amount of respondents, 5.0%, who stated that they perceived level of physical exertion was extremely strong and felt that they were at the brink of near exhaustion when engaged in some form of exercise. The smallest portion of respondents, 1.2%, marked down their perceived level of physical exertion to be other, or not adequately described by the categories provided.

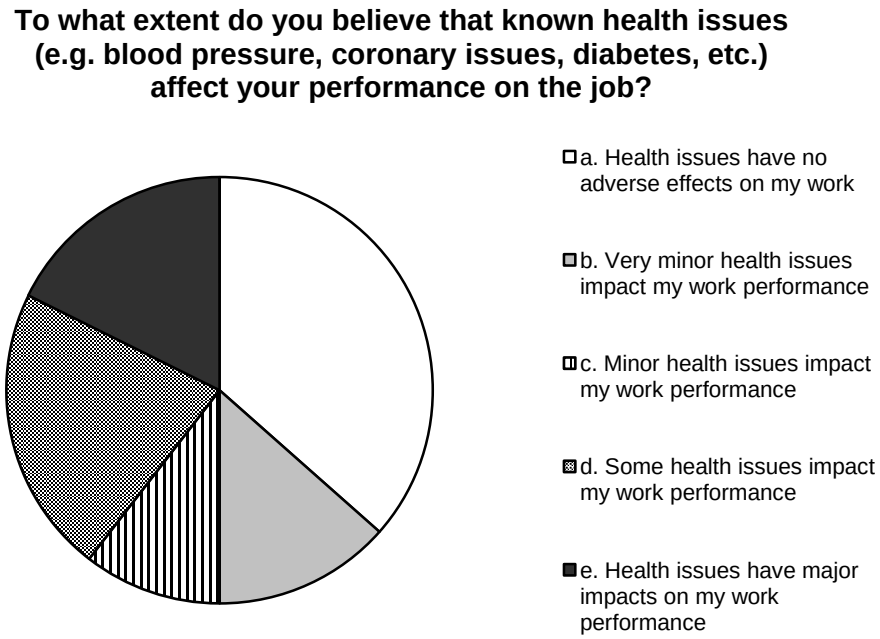
Please look back to the options in question 7. How many times in the last week did you achieve an exercise rating of option "c" or higher?		
Answer Options	**Response Percent**	**Response Count**
a. 0 Times	16.3%	55
b. 1-2 Times	49.3%	166
c. 3-5 Times	30.9%	104
d. 5+ Times	3.6%	12
	answered question	**337**
	skipped question	**4**



The respondents were asked to reflect on how many times they believed their perceived exertion and physical signs to fall somewhere between moderate to extremely strong during their workout sessions in

the previous week. A majority of the survey respondents, 49.3%, stated that they perceived their exertion and physical signs to be moderate to extremely strong during 1-2 of their workouts. The next highest percentage of respondents, 30.9%, stated that they would rate their perceived exertion between moderate and extremely strong during 3-5 of their workout sessions, while the smaller portion of respondents, 3.6%, believed their perceived physical exertion to be moderate to extremely strong during 5 or more of their workout sessions. There were also a significant number of the respondents, 16.3%, who stated their perceived physical exertion level fell below moderate during any of their workout sessions.

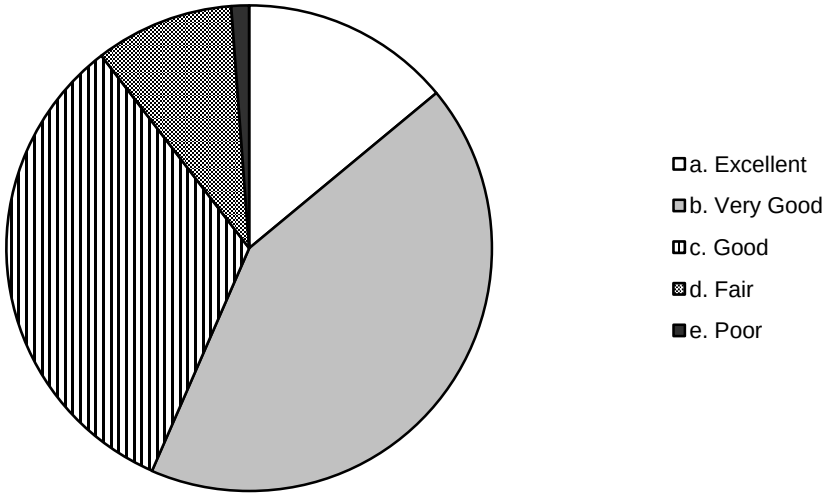
To what extend do you believe that known health issues (e.g. blood pressure, coronary issues, diabetes, etc.) affect your performance on the job?		
Answer Options	**Response Percent**	**Response Count**
a. Health issues have no adverse effects on my work performance	36.5%	122
b. Very minor health issue impact my work performance	13.5%	45
c. Minor health issues impact my work performance	10.5%	35
d. Some health issues impact my work performance	21.9%	73
e. Health issues have major impacts on my work performance	17.7%	59
	answered question	**334**
	skipped question	**7**



A large portion of the respondents, 36.5%, stated that known health issues have no adverse effects on their work performance. The next largest portion of respondents, 21.9%, stated that some of the health issues that they are aware of do impact their work performance in some way. The next most significant portion of respondents, 17.7%, stated that known health issues have a major impact on their work performance. The second smallest portion of respondents, 13.5%, stated that very minor known health issues impact their work performance, while the smallest portion of respondents, 10.5%, stated that very minor known health issues impact their work performance in one way or another.

How would you rate your current health?	Response Percent	Response Count
a. Excellent	14.0%	47
b. Very Good	42.6%	143
c. Good	33.0%	111
d. Fair	9.2%	31
e. Poor	1.2%	4
answered question		336
skipped question		5

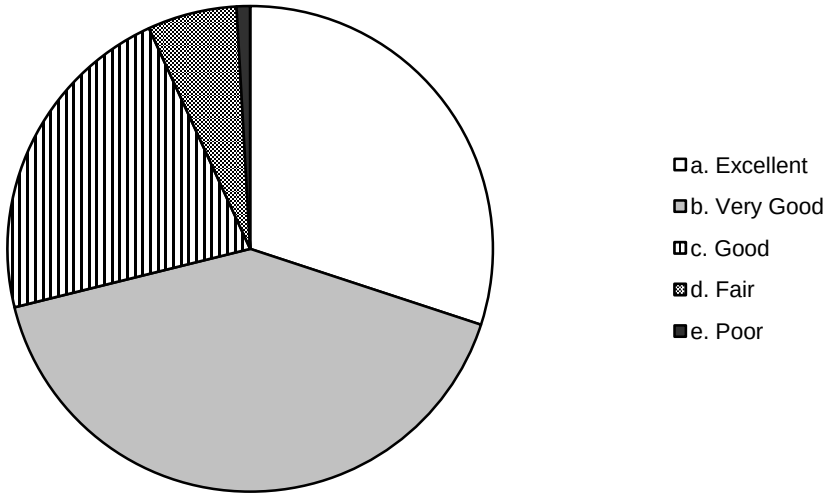
How would you rate your current health?



A large portion of the respondents, 42.4%, stated they would rate their current health to be very good. The next largest portion of respondents, 33.0%, stated they would rate their current health to be good. Out of the respondents left, 14.0% stated that they would rate their current health as excellent, 9.2% stated they would rate it as being fair while the smallest portion of respondents, 1.2%, stated they would rate it to be poor.

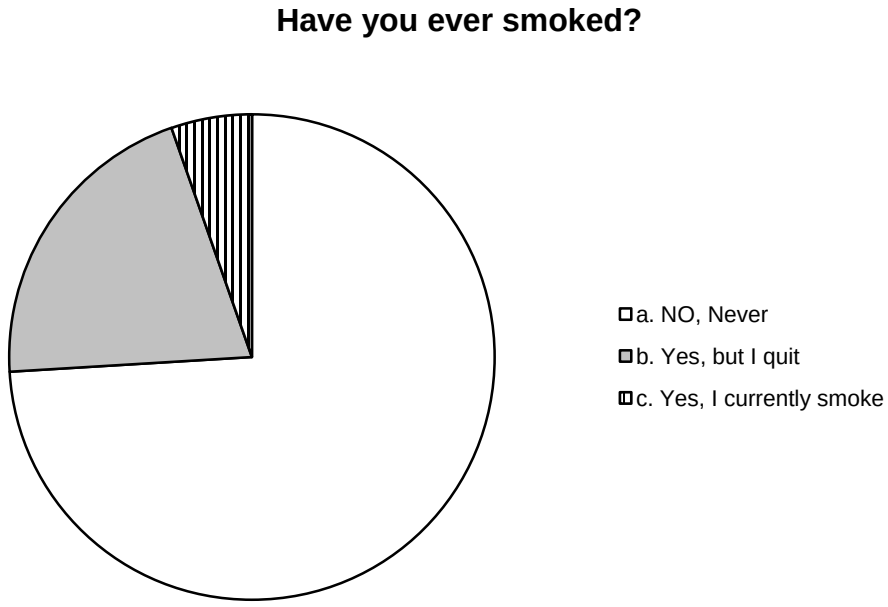
How would you rate your current mental health?	Response Percent	Response Count
a. Excellent	30.1%	101
b. Very Good	41.1%	138
c. Good	22.0%	74
d. Fair	6.0%	20
e. Poor	0.9%	3
answered question		336
skipped question		5

How would you rate your current mental health?



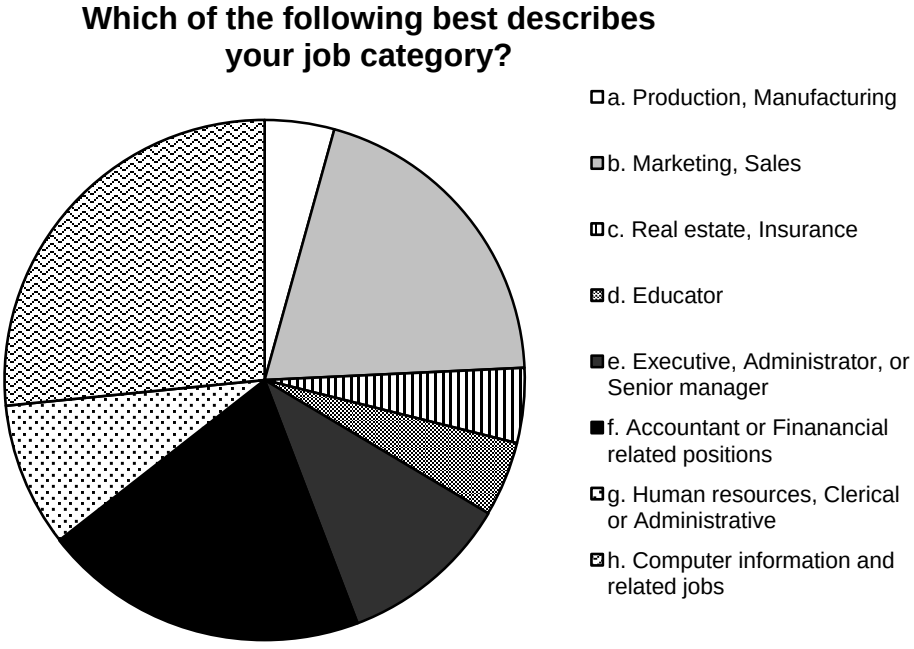
This survey question asked the respondents to reflect on their current metal health. The largest portion of respondents, 41.1%, of the respondents stated they would rate their current mental health to be very good. The next highest portion of respondents, 30.1%, rated their current mental health to be excellent. Another marked portion of respondents, 22.0%, rated their current mental health to be good. Out of the portion of respondents left, 6.0% stated they would rate their mental health to be fair, while only 0.9% rated their current mental health to be poor.

Have you ever smoked?		Response Percent	Response Count
a. NO, Never		74.0%	248
b. Yes, but I quit		20.6%	69
c. Yes, I currently smoke		5.4%	18
	answered question		335
	skipped question		6



The respondents were asked if they have ever smoked. A rather large portion of the respondents, 74.0%, stated that they have never smoked. The next highest portion of respondents, 20.6%, stated that they had smoked at one time in their lives but have quit. The remaining portion of respondents, 5.4%, stated that they currently smoke.

Which of the following best describes your job category?	Response Percent	Response Count
a. Production, Manufacturing	4.3%	13
b. Marketing, Sales	19.9%	60
c. Real estate, Insurance	4.7%	14
d. Educator	4.7%	14
e. Executive, Administrator, or Senior manager	10.6%	32
f. Accountant or Financial related positions	20.3%	61
g. Human resources, Clerical or Administrative	9.0%	27
h. Computer information and related jobs	**26.6%**	**80**
Other (please specify)		42
answered question		**301**
skipped question		**40**

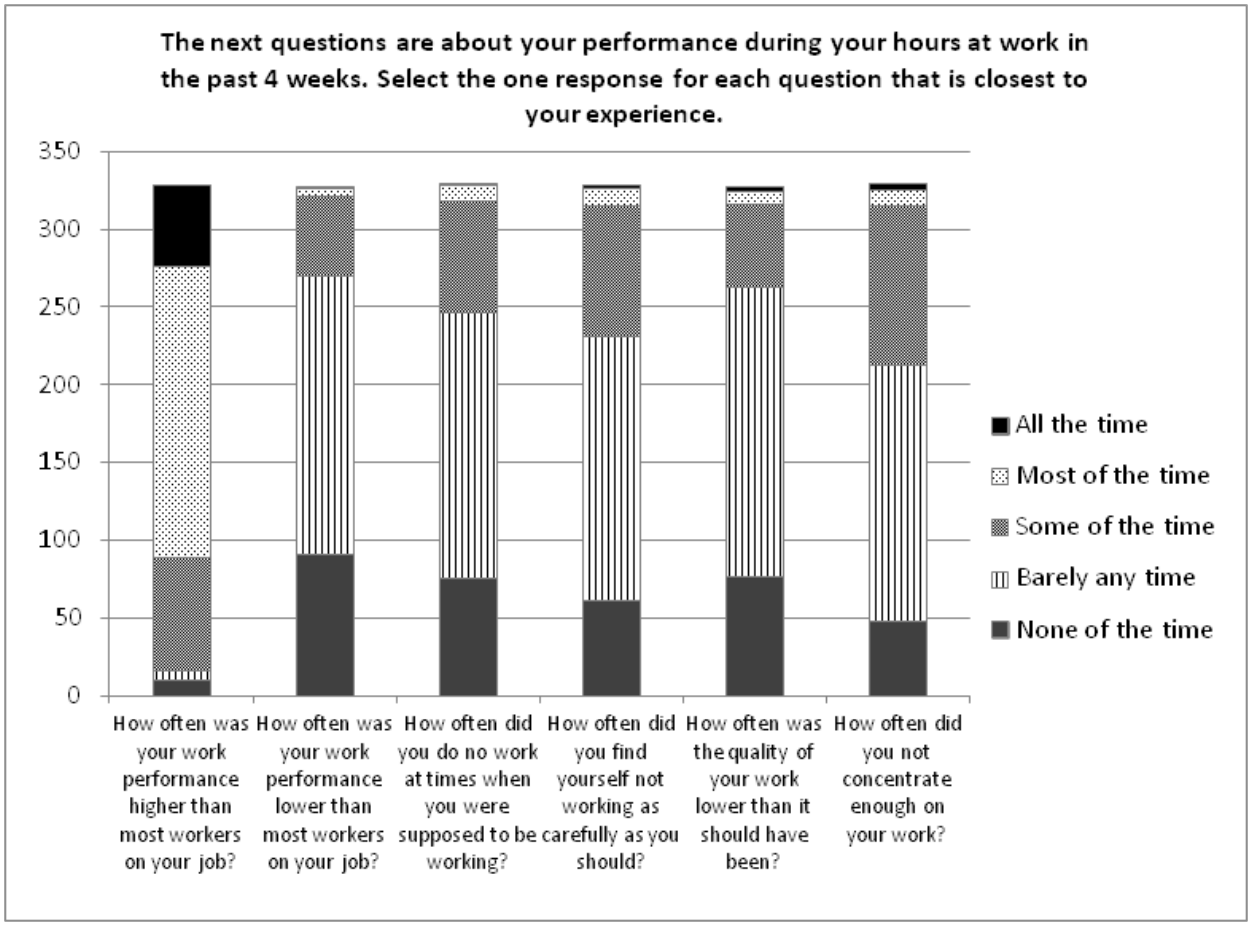


The survey question asked the respondents to choose a category that best describes their line of work. A large portion of respondents, 26.6%, stated that they work in computer information related jobs. The next largest portion of respondents, 20.3%, stated that they work in accountant or financial related jobs. The other large portion of respondents, 19.9%, stated that their jobs are related to marketing and sales. Of

the respondents that are left, 10.6% stated they work in executive, administrator or senior manager positions; 9.0% work in human resources, clerical or administrative positions; 4.7% work as educators; 4.7% are in real estate or insurance type positions; and 4.3% are involved in production and manufacturing positions.

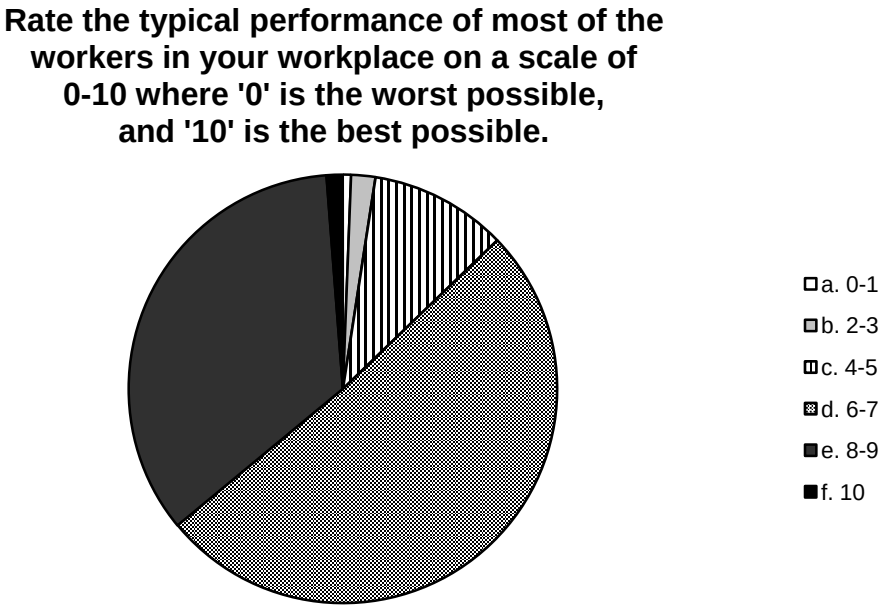
The next questions are about your performance during your hours at work in the past 4 weeks. Select the one response for each question that is closest to your experience.

	All the time	Most of the time	Some of the time	Barely any time	None of the time	Response Count
How often was your performance higher than most workers on your job?	15.9% (52)	**57.0% (187)**	22.3% (73)	1.8% (6)	3.0% (10)	328
How often was your performance lower than most workers on your job?	0.3% (1)	1.5% (5)	15.6% (51)	**54.7% (179)**	27.8% (91)	327
How often did you do no work at times when you were supposed to be working?	0.3% (1)	3.0% (10)	21.9% (72)	**52.0% (171)**	22.8% (75)	329
How often did you find yourself not working as carefully as you should?	0.6% (2)	3.4% (11)	25.6% (84)	**51.8% (170)**	18.6% (61)	328
How often was the quality of your work lower than it should have been?	0.9% (3)	2.4% (8)	16.2% (53)	**57.2% (187)**	23.2% (76)	327
How often did you not concentrate enough on your work?	1.2% (4)	3.1% (10)	31.5% (103)	**50.2% (164)**	14.1% (46)	327
					answered question	**330**
					skipped question	**11**



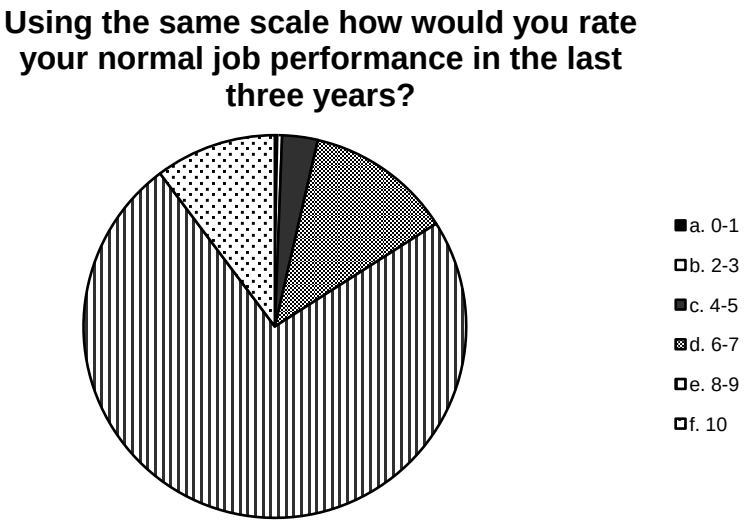
The following questions asked the respondents to reflect on their performance at their work in the past 4 weeks. When asked how often their performance was higher than most of the workers at their work, 57.7% of the respondents stated most of the time. When asked how often their performance was lower than most of the workers at their work, 54.7% of the respondents stated barely any time. The next question asked the respondents how often they were not working during the time they were supposed to be working. A large portion, 52.0%, of the respondents stated barely any time. The respondents were then asked how often they found themselves not working as carefully as they should and 51.8% of the respondents stated barely any time. The next question asked the respondents to reflect on how often the quality of their work was lower than what it should have been. A large portion of the respondents, 57.2%, stated barely any time. The last question asked the respondents how often they did not concentrate enough on their work, and 50.2% stated barely any time.

Rate the typical performance of most of the workers in your workplace on scale of 0-10 where '0' is the worst possible, and '10' is the best possible.	Response Percent	Response Count
a. 0-1	0.6%	2
b. 2-3	1.8%	6
c. 4-5	10.4%	34
d. 6-7	**51.2%**	**168**
e. 8-9	34.8%	114
f. 10	1.2%	4
answered question		**328**
skipped question		**13**



This survey question asked the respondents to rate the typical performance of most of the workers in their workplace on a scale of 0-10, where 0 is the worst possible rating and 10 is the best possible rating. A large portion of the respondents, 51.2%, rated their co-workers' performance at 6-7. The next largest portion of respondents, 34.8%, stated that they would rate their co-workers' performance at 8-9. Of the remaining respondents, 10.4% rated their co-workers' performance at 4-5; 1.8% rated it at 2-3; 1.2% rated it at 10; and the smallest portion of respondents, 0.6%, rated it at 0-1.

Using the same scale how would you rate your normal job performance in the last three years?	Response Percent	Response Count
a. 0-1	0.3%	1
b. 2-3	0.3%	1
c. 4-5	3.0%	10
d. 6-7	12.3%	41
e. 8-9	73.8%	245
f. 10	10.2%	34
answered question		332
skipped question		9



This survey question asked the respondents to rate their own normal job performance over the last three years by following the same scale used to rate their co-workers' performance. The largest portion of respondents, 73.8%, rated their personal job performance at 8-9. The next largest portion of respondents, 12.3%, rated their performance at 6-7. Of the remaining respondents, 10.2% rated their job performance over the last three years at 10; 3.0% at 4-5; 0.3% at 2-3; and 0.3% at 0-1.

BMI average	Fitness average	Health average	Average score of Fitness+Health+BMI	Average score of productivity
1.231788079	3.435761589	1.84602649	6.513576159	13.52317881

Average score of productivity by level of BMI fitness and health

Level	Body Fat Percentage	Fitness	Health
Low		13.52173913	13.5
Medium	13.47569444	13.50735294	13.46694215
High	13.63235294	13.55241935	13.625

① Body Fat Percentage

Description	**Women**	**Men**	**Score**	**Level**
	<10%	<2%	0	low
Essential fat	10–13%	2-5%	1	Low
Athletes	13–21%	5–13%	1.5	Medium
Fitness	21–25%	13–17%	2	Medium
Acceptable	25–31%	17–26%	1.5	Medium
Overweight	31-41%	26-37%	1	High
Obese	41%+	37%+	0	High

② Fitness Score

<3	Not fit
>3 and <5.6	Medium fit
>5.6	Very fit

③ Health Score

<1.25	Not healthy
>1.25 and <3	Medium healthy
>3	Very healthy

The first part of the above chart represents the average scores of the survey respondents' BMI, fitness, health, a combination of these three elements, as well as the average score of their productivity. The respondents' average BMI level was 1.23, their average fitness level was 3.43, their average health level was 6.51, and their average score of productivity was 13.52. The next part of the chart shows the average score of productivity by level of BMI, fitness and health. Respondents whose level of body fat percentage, fitness and health were low obtained scores of 13.52 and 13.5. Respondents, whose level of body fat percentage, fitness and health were medium, obtained scores of 13.37, 13.5, and 13.46. Finally the respondents whose level of body fat percentage, fitness and health were high obtained scores of 13.63, 13.55 and 13.62.

The next portion of the chart shows the body fat percentage of the respondents. The largest portion of respondents, 26-37% for men and 31-41% for women, had a body fat percentage description of being overweight. An even more significant portion the female respondents, 41% or more, had a body fat percentage that was at the obese level, as well as 37% or more of the male respondents. Of the female respondents, 13-21% had a body fat percentage of an athlete; 21-25% had a fit body fat percentage; while 25-31% had a percentage that was acceptable. Of the male respondents, 5-13% had a body fat percentage of the athletic level; 13-17% had a fit body fit percentage; and 17-26% had an acceptable body fat percentage.

SUMMARY AND CONCLUSION

The idea of a direct relationship between fitness and productivity has made companies spend billions to improve employees' fitness. The idea of a relationship can easily be recognized without much thought as many jobs do require physical skills. However, in today's job market when most jobs require little or no physical exertion, are fitness and productivity really related? The majority of scholarly articles hold the belief that there is a relationship between fitness and productivity. If fitness could be increased through some type of fitness program, there would be a noticeable increase in productivity. Other articles suggest that there is a relationship between fitness and productivity, yet only in extreme cases. Still other articles suggest that a relationship may exist, but it cannot be proved without more research.

Questionnaires were sent to 1765 Cal Poly College of Business alumni. A total of 355 responded to the questionnaire, but only 328 of them were complete. The majority of the respondents were male, accounting for more than half of the responses and totaling 59.3%. As far as how many times they typically exercise, a high percentage of the survey respondents, 43.3%, stated that they exercise an average of 2-3 times a week. All of the survey respondents stated that they participate in some form of exercise on a weekly basis. 34.7% of the respondents stated their perceived exertion was strong, that during exercise they experienced sweating and could talk without much difficulty. A majority of the survey respondents, 49.3%, stated that they perceived their exertion and physical signs to be moderate to extremely strong during 1-2 of their workouts. A large portion of the respondents, 36.5%, stated that known health issues have no adverse effects on their work performance. 42.4% of the respondents stated they would rate their current health to be very good. 41.1% of respondents stated they would rate their current mental health to be very good. The respondents were asked if they have ever smoked. A large portion of the respondents, 74.0%, stated that they have never smoked. When asked how often their work performance was higher than most of the workers at their job, 57.7% of the respondents stated most of the time. After applying a set of statistical models and conducting an analysis, the results showed no significant correlations between the productivity of those who are fit and have a healthy BMI, and those who are not fit and have a BMI that is higher or lower than it should be.

REFERENCES

Der-Karabetian, Aghop & Gebharbp, Norma (1986). Effect of Physical Fitness Program in the Workplace. *Journal of Business and Psychology, 1*(1), 51-58.

Mills PR, et al (2007). Impact of a health promotion program on employee risks and work productivity. *American Journal of Health Promotion, 22*(1), 45-53.

Burton WN, et al (2005). The association of health status, worksite fitness center participation, and two measures of productivity. *Journal of Occupational and Environmental Medicine, 47*(4), 343-351.

Neck, Christopher P & Cooper, Kenneth H (2000). The Fit Executive: Exercise and Diet Guidelines for Enhancing Performance. *The Academy of Management Executive (1993-2005), 14*(2), 72-83.

DeNelsky, Garland Y & McKee, Michael G (1969). Prediction of job performance from assessment reports: Use of a modified Q-sort technique to expand predictor and criterion variance. *Journal of Applied Psychology, 53*(6), 439-445.

Allen, Harris, Hubbard, David, & Sullivan, Sean (2005). The Burden of Pain on Employee Health and Productivity at a Major Provider of Business Services. *Journal of Occupational and Environmental Medicine, 47*(7), 658-670.

Bernaards, Claire M, Proper, Karin I, & Hildebrandt, Vincent H (2007). Physical Activity, Cardiorespiratory Fitness, and Body Mass Index in Relationship to Work Productivity and Sickness Absence in Computer Workers with Preexisting Neck and Upper Limb Symptoms. *Journal of Occupational and Environmental Medicine, 49*(6), 633-640.

Falkenberg, Loren E (1987). Employee Fitness Programs: Their Impact on the Employee and the Organization. *The Academy of Management Review, 12*(3), 511-522.

Cox, M, Shepard, RJ, & Corey, P (1981). Influence of an employee fitness programme upon fitness, productivity and absenteeism. *Ergonomics, 24*(10), 795-806.

Bertera, R (1990). The effects of workplace health promotion on absenteeism and employment costs in a large industrial population. *American Journal of Public Health, 80*(9), 1101-1105.

Note: This author is also known as M. Sharif.