THE RELATIONSHIP BETWEEN EXERCISE STAGE OF CHANGE AND JOB STRAIN VARIABLES

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Abstract

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TITLE: The Relationship Between Exercise Stage of Change And Job Strain Variables

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The detrimental effects of job strain were the same detrimental effects that regular exercise impacted and often prevented. The purpose of this study was to use Prochaska's stages of change model and Karasek's job strain model to determine relationships between perceived job strain variables and exercise stage of change. A questionnaire was administered to 905 corporate associates that measured exercise stage of change, job strain, job control, job demand, and social support.

The survey response rate was 62.8% (n=568). The proportions of participants in each stage were: precontemplation 7% (n=40), contemplation 13.7% (n=78), preparation 29.9% (n=170), action 14.4% (n=82), and maintenance 34.9% (n=198). Participant mean scores reflected national average scores in job control and social support, but were higher in job demands. The majority of participants were Caucasian (84.5%) women (68.3%) close to 40 years of age who worked approximately 42 hours a week in a position held for longer than 6 months.

Pearson correlation results indicated significant relationships between exercise stage of change and both job control and job strain. As exercise stage of change progressed towards the maintenance stage, job control increased and job strain decreased.
Women scored significantly lower in job control and higher in job strain than men scored.

ANOVA tests showed significant differences in both job control and job strain levels between the preparation and maintenance exercise stages of change. Maintainers scored significantly higher in job control and significantly lower in job strain than preparers scored.

This study reinforces the role of exercise adherence initiatives in the design of corporate stress management programs. Employees engaging in regular exercise for durations longer than 6 months perceive the lowest levels of job strain and the highest levels of job control. Employees who do not exercise regularly, but are preparing to within 30 days, perceive less job control and higher job strain. Employees in the preparation stage may need tailored help to overcome barriers such as low control and high strain. Because this study shows that job strain is related to exercise behavior, integrative efforts should be made to simultaneously reduce job strain and enhance progression through the exercise stages of change.
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Chapter One

The Problem

Numerous empirical studies validated the impact of sedentary behavior on human health (U.S. Department of Health and Human Services [USDHHS], 1996; Macera, Hootman, & Sniezek, 2003). Exercise was identified as a prevention technique for several physical and mental health problems. Even with these reliable statements, over 60% of U.S. adults were not regularly active, and 25% were sedentary. Public health professionals needed more effective interventions to reduce the number of sedentary people in the U.S.

Cardiovascular disease (CVD) accounted for over 40% of all American deaths, and killed nearly one million men and women annually (American Heart Association [AHA], 2003). Population-based studies consistently found that physical fitness reduced the risk of developing CVD in a dose-response manner (USDHHS, 1996). Those who participated in the most physical activity or who tested to be most fit were subsequently at the lowest risk. The relationship between vigorous, regular exercise and cardiovascular health was promoted to Americans, yet only 15% of adults in the U.S. exercised regularly at a vigorous intensity.

The USDHHS (2000) launched Healthy People 2010, an all-inclusive health promotion and disease prevention plan to advance the health of Americans during the first decade of the 21st century. Healthy People 2010 recognized that only 23% of U.S. adults regularly exercised the major muscle groups at least 3 days per week and for 20 minutes each session. Only 15% of U.S. adults exercised the recommended 5 or more days per week, and 40% of Americans avoided exercise altogether. The prevalence of
sedentary Americans was so high that one of Healthy People 2010's 28 focus areas was dedicated to physical activity. Specifically, 15 of its 467 objectives were committed to increasing physical activity across America.

Macera et al. (2003) identified exercise as a primary and a secondary prevention factor to reduce disability and mortality due to coronary heart disease (CHD), diabetes, and osteoarthritis. Sedentary behavior doubled the risk of CHD development. A second outcome partially attributable to physical inactivity was type 2 diabetes, which affected over 17 million Americans. Additionally, lack of exercise increased pain and quickened disability development among osteoarthritis sufferers. Macera et al. concluded that exercise slowed disease progression and reduced the symptoms of CHD, type 2 diabetes, and osteoarthritis.

Annually, 12% of deaths in the U.S. were directly attributed to the lack of regular physical activity. The AHA (2003) furthermore reported that less active people had a 30 to 50% greater chance of developing hypertension, a major risk factor for CVD. Accounting for 40% of American deaths, CVD killed one million men and women annually. Exercise prevented, delayed, or decreased hypertension in a dose-response manner.

In addition to the health detriments associated with sedentary behavior, higher healthcare costs were also an outcome of reduced activity. Pronk, Goodman, O'Connor, and Martinson (1999), hypothesized that sedentary behavior provoked chronic illnesses, and subsequently higher healthcare costs. The researchers administered a 60-item questionnaire to 5,689 members of a Minnesota healthcare plan who were aged 40 years or older. For every additional day that a patient exercised during an 18-month period, his
or her treatment costs decreased an average of nearly 5%. The researchers concluded that both insurance companies and employers who subsidized employee healthcare plans had a stake in reducing chronic illness development. The study results were of serious financial interest to insurance companies and employers whose members did not exercise enough to deter chronic illness development.

In addition to highlighting the prevalence of inactivity, the U.S. Surgeon General promoted the stages of change model as a possible means to intervene with sedentary behavior (USDHHS, 1996). The stages of change model provided a framework to determine a person’s motivation to change exercise practice, the pros and cons to change, and the particular procedures and tactics for promoting change (Marcus & Forsyth, 2003). The model presented a means to time a person’s readiness to change, which was a crucial factor in designing intervention and promotion programs.

The five stages of change were as follows: precontemplation, contemplation, preparation, action, and maintenance. A person did not consider engaging in physical activity during the precontemplation period (Marcus & Forsyth, 2003). Contemplation was the period when an inactive person seriously considered trying physical activity within the next six months. Preparation was the stage when a person planned to implement a steady routine within the next month. During the action stage, a person participated in the recommended amount of physical activity, but six months time had not yet passed. Finally, a person reached the maintenance stage when physical activity was a habit for at least six months.

According to Marcus and Forsyth (2003), most stages of change literature excluded the sixth stage called the termination stage. The termination stage indicated that
an individual had been in the exercise maintenance stage (fifth stage) long enough to conclude that regression was impossible. Marcus and Forsyth argued that exercisers remained in the maintenance stage throughout their active years because dynamic life experiences averted a guaranteed point at which exercise was a permanence in life.

Movement through the stages of change was not always linear; over a lifetime, individuals could cycle through the stages of change with regards to exercise (Marcus & Forsyth, 2003). Researchers tried to identify variables that influenced cycling through the different stages of change. Stress was identified as one factor that influenced behavioral outcomes. In particular, the health outcomes of work-related stress received increased attention in recent years (Payne, Jones, & Harris, 2002). There was a valid argument that work stress could be one reason for the lack of exercise among Americans.

Galinsky, Kim, and Bond (2001) conducted a national telephone survey using 1,003 random American workers. Within the prior three months, 28-29% of the employees responded that they often or very often felt overworked and overwhelmed by the number of tasks they had to complete, and felt that there was not enough time to process or reflect on their work. Nearly half of the sample (46%) reported feeling at least one of the above pressures. More than one quarter of the participants reported working in an organization that downsized in the preceding year, and 37% reported working for an organization that experienced difficulty hiring. Those who worked for organizations that downsized or had difficulty hiring perceived an increased workload.

Kivimaki et al. (2002) reported that job strain seemed to double the rate of death from CVD. Four measures: high demands, low control, low job security, and few career opportunities contributed to the summative stress of study participants. The researchers
found that high demands with low control doubled the risk of CVD mortality among employees who were free from overt CVD at the baseline of the study. Moreover, high demands and low control also predicted unfavorable changes in biological factors such as cholesterol levels and body mass index. Empirical research continued to support a positive relationship between job stress and CVD development and mortality.

According to the American Institute of Stress (n.d.), U.S. industries spent over $300 billion annually for work-related stress outcomes. Direct costs were painfully clear, and indirect costs were evident but difficult to measure. The true economic strain of stress was confounded by the fact that most associated costs were not reflected in a dollar-measurable format (Karasek & Theorell, 1990). The quality of life costs to the stressed worker and associated production loss to the employer were not expressible in dollar amounts. Job strain imposed health risks that increased health care costs and emotional costs. The indirect and direct costs of a stressed employee burdened his or her employer, coworkers, family, and society.

Through his demand-control model, Karasek (1979) pioneered the idea that physical and mental health consequences of job strain resulted from a combination of high demands and little control. Theorell and Karasek (1996) wrote that psychological demand was a measure of mental workload and arousal demands. The demand concept included qualitative and quantitative demands, mental loads, and interpersonal demands. Control was a measure of a worker’s decision-making authority and opportunity to utilize job skills. Karasek (1979) hypothesized that high demands coupled with little control would induce psychological stress and illness among workers.
A third job characteristic was added to the demand-control model that was valid both as a main effect and as an interactive buffer to job strain. Johnson and Hall (1988) examined whether the lack of social support combined with job strain further increased the likelihood of CVD prevalence. The results showed that for each demand-control combination (measures of job strain), CVD prevalence rates and ratios increased when social support was low. The inclusion of social support in the demand-control model expanded the theory from a personal connection between a person and the job, into a realm of collective work relationships between people.

Statement of the Problem
The detrimental effects of job strain were the same detrimental effects that regular exercise impacted and often prevented. While researchers continued to provide support for the job strain and exercise connection (Payne et al., 2002), sedentary behavior and its negative health effects remained a crisis in America. Health professionals struggled to pinpoint the reason that some people did not progress or consistently regressed through the stages of change with regards to exercise.

The purpose of this study was to determine if perceived job strain levels were related to exercise stage of change. The ability to associate a level of job strain to a particular exercise stage of change could lead to better exercise intervention designs for American workers. Employers could better understand employee exercise behavior in relation to employee job strain. Worksite health promoters could detail interventions specific to employee exercise stage of change (i.e. identify the stage of change most associated with high strain, then promote exercise to that group as a form of stress relief).
Finally, increased awareness of a job strain and exercise behavior connection could be a useful planning tool when determining proper intervention timing (e.g. to determine the likelihood of an effective exercise promotion during a company’s most strenuous time of the year).

Research Questions

Is there a relationship between perceived job strain and exercise stage of change?

Is there a relationship between perceived job demands and exercise stage of change?

Is there a relationship between perceived job control and exercise stage of change?

Is there a relationship between perceived social support and exercise stage of change?

Does gender modify the relationship between perceived job strain and exercise stage of change?

Hypotheses

Hypothesis 1. As job strain levels increase, exercise stage of change will decrease.

Alternative Hypothesis 1. As job strain levels increase, exercise stage of change will increase.

Null Hypothesis 1. There will be no relationship between strain levels and exercise stage of change.

Hypothesis 2. As job demands increase, exercise stage of change will decrease.
Alternative Hypothesis 2. As job demands increase, exercise stage of change will increase.

Null Hypothesis 2. There will be no relationship between job demands and exercise stage of change.

Hypothesis 3. As job control increases, exercise stage of change will increase.

Alternative Hypothesis 3. As job control increases, exercise stage of change will decrease.

Null Hypothesis 3. There will be no relationship between job control and exercise stage of change.

Hypothesis 4. As social support at work increases, exercise stage of change will increase.

Alternative Hypothesis 4. As social support at work increases, the stage of change with regards to regular exercise will decrease.

Null Hypothesis 4. There will be no relationship between social support at work and exercise stage of change.

Delimitations

1. The sample in this study was white-collar associates at an international retail company's headquarters in the Midwestern U.S. The results may not be generalizable to other employment settings.
Limitations

1. This study was limited by the accuracy and honesty of the respondents when answering questions on the self-report questionnaire.

2. The study was also limited in that some employees could perceive a situation of high demands, low control, and low social support as stressful, whereas other employees could perceive the same situation to be not stressful.

Assumptions

1. It was assumed that the employees could understand and read the questions, and would answer the questions in an honest, sincere manner.

2. It was assumed that situations of high demands, low control, and low social support were each perceived as stressful to employees.

Operational definitions

1. Job strain- In this study job strain was the result of a combination of high demands and low control at work as measured by the Job Content Questionnaire (Karasek et al., 1998).

2. Exercise stage of change- The stages of change model developed by J.O. Prochaska identified the state of readiness to change a health behavior (Prochaska & DiClemente, 1983). For the purpose of this study, stage of change regarded regular exercise and was measured by choosing one of five statements, each of which related to a specific exercise stage of change.
3. Precontemplator- For the purpose of this study, a precontemplator did not plan to adopt exercise behavior within the next 6 months.

4. Contemplator- For the purpose of this study, a contemplator considered exercise adoption within the next 6 months, but not the next 30 days.

5. Preparer- For the purpose of this study, a preparer planned to adopt exercise behavior within the next 30 days.

6. Actor- For the purpose of this study, an actor adopted exercise behavior, but for less than 6 months.

7. Maintainer- For the purpose of this study, a maintainer has adopted exercise behavior for at least 6 months.

8. Regular exercise- For the purpose of this study exercise was activity performed three to five times per week, for 20 to 60 minutes each session, and at 60 to 90% of the exerciser’s maximum heart rate (American College of Sports Medicine [ACSM], 1990).

9. Job Demand- For the purpose of this study job demand was psychological workload intensity as indicated by questionnaire items 10-14.

10. Job Control- For the purpose of this study job control was the combination of skill utilization and decision latitude as indicated by questionnaire items 1-9.

11. Social Support- For the purpose of this study social support included supervisory and coworker assistance and was indicated by questionnaire items 15-22.
Chapter Two

Review of the Literature

The detrimental effects of job strain were the same detrimental effects that regular exercise impacted and often prevented. While researchers continued to provide support for the job strain and exercise connection (Payne et al., 2002), sedentary behavior and its negative health effects remained a crisis in America. Health professionals struggled to pinpoint the reason that some people did not progress or consistently regressed through the stages of change with regards to exercise.

The purpose of this study was to determine if perceived job strain levels were related to exercise stage of change. The ability to associate a level of job strain to a particular exercise stage of change could lead to better exercise intervention designs for American workers. Employers could better understand employee exercise behavior in relation to employee job strain. Worksite health promoters could detail interventions specific to employee exercise stage of change (i.e. identify the stage of change most associated with high strain, then promote exercise to that group as a form of stress relief). Finally, increased awareness of a job strain and exercise behavior connection could be a useful planning tool when determining proper intervention timing (e.g. to determine the likelihood of an effective exercise promotion during a company’s most strenuous time of the year).
Exercise

Prevalence in America. Much scientific attention was devoted to determining the benefits of regular exercise on health and well-being (USDHHS, 1996; Macera et al., 2003). Exercise was identified as a technique to prevent several physiological and psychological health problems. Along with increased public awareness of exercise benefits came a steady rise in exercise adoption from the 1960s through the early 1980s (AHA, 2003). The number of exercise adopters leveled off at the turn of the 21st century, even though mass communications and community programs more efficiently informed people of the benefits of exercise. A record 60% of U.S. adults were not regularly active, and 25% were sedentary. More effective interventions were needed to reduce the number of sedentary people in the U.S. (USDHHS, 1996).

Healthy People 2010 was a manual published by the U.S. government to set health promotion and disease prevention goals for the coming decade (USDHHS, 2000). Healthy People 2010 recognized the importance of physical activity in 15 of its 467 objectives and placed exercise among the top 10 health indicators. One objective was for 30% of Americans to engage in vigorous physical activity that promoted the development and maintenance of aerobic fitness three or more days per week and for 20 or more minutes per session. The relationship of regular exercise and well-being was promoted to Americans, yet only 15% of U.S. adults exercised at an intensity great enough to achieve maximum health benefits (USDHHS, 1996).

Since 1956, several U.S. Presidents expanded government interests in exercise promotion, and in 1982 the President's Council on Physical Fitness and Sports (PCPFS, n.d.) was established via an Executive Order. The mission of the PCPFS was to assist
elements of the U.S. Public Health Service in advising the President and the Secretary of Health and Human Services on issues related to increasing physical fitness among Americans. The PCPFS cooperated with commercial, trade, government, and labor organizations to use innovative programs to reduce the healthcare costs associated with sedentary behavior. Further, the PCPFS collaborated with allied healthcare professionals to encourage patient counseling and inspire research regarding exercise adoption and fitness maintenance.

*Effect of exercise on workplace absenteeism and productivity.* Healthy employees were assets to their employers with regards to lower healthcare costs and reduced absenteeism. Lechner, De Vries, Adriaansen, and Drabbels (1997) conducted a study that divided 884 workers into three groups regarding an employee fitness program: high participation, low participation, and no participation. Results showed that the high participation group had a significant decline in sick days, while the latter two groups showed no change.

Similarly, Kerr and Vos (1993) showed that workplace fitness programs reduced absenteeism. The workplace fitness sessions were targeted at endurance, strength, flexibility, body posture, and decreased body fat. Program participants were randomly chosen and then matched for age, gender, and total number of days absent from work in the previous year. The researchers formed two control groups and two experimental groups: regular members of the worksite fitness program; part-time members of the worksite fitness program; sedentary individuals; and those who exercised regularly outside of the worksite. The researchers found that total absence frequency of the non-fitness program exercisers and of the non-exercisers increased, while both groups of the
fitness participants decreased the total absence frequency during the fitness program. The results supported the possibility that a sense of social support felt through worksite fitness programs facilitated employee work attendance.

Leutzinger and Blanke (1991) found that fitness level, work aptitude, exhaustion, and stress were related to health behaviors and impacted productivity. The researchers measured the relationship between regular exercise and worker productivity among members and nonmembers of a 9 month worksite fitness program. The results suggested that a strong positive relationship existed between membership status, exercise adherence, and perceptions of the fitness center. Furthermore, there was a positive relationship between regular exercise and perceptions of worker productivity.

*Health and stress management benefits of exercise.* The U.S. Surgeon General's Report on Physical Activity and Health (USDHHS, 1996) suggested that increased exercise duration or intensity likely produced greater health benefits. Accordingly, people who performed the greatest amount of exercise were at the lowest risk for physical and mental health disparities. The American College of Sports Medicine (ACSM, 1990) recommended the following equation to achieve the greatest health benefits from exercise: 20 to 60 minute exercise sessions three to five times per week at 60 to 90% of the exerciser’s maximum heart rate.

The National Heart, Lung, and Blood Institute (NHLBI, 1990) identified exercise as one of six key factors in preventing coronary heart disease (CHD). Furthermore, exercise modified four of the other key factors to CHD: cholesterol, obesity, type 2 diabetes, and blood pressure. Affecting over 12 million Americans, CHD was the most common form of heart disease and often resulted in heart attacks. Annually, over one
15 million Americans experienced a heart attack, over half of which were fatal. Exercise played a key role in cardiac rehabilitation programs and improved the health status of many heart attack survivors.

Arthritis caused 18% of disability cases, and was the most common cause of disability among Americans in 1999 (Centers for Disease Control [CDC], 2004). In 2001, nearly 50 million Americans reported physician-diagnosed arthritis. An additional 21 million Americans reported chronic joint complications, a number the CDC expected to double by the year 2030. The number of diagnosed arthritis cases was also expected to rise due to the aging of the baby boomer population. Although arthritis mostly affected women and the elderly, nearly two thirds of arthritis sufferers were under 65 years of age. Accordingly, the disabling factors of arthritis in America were the source of $51 billion in medical costs, and $86 billion in total costs.

Osteoarthritis was the most prevalent of over 100 conditions encompassed by arthritis. Researchers initiated several longitudinal studies regarding the relationship between exercise and osteoarthritis (National Institute of Arthritis and Musculoskeletal and Skin Diseases, 2001). While high-impact sports that involved joint twisting (e.g. soccer, baseball, and football) increased the risk of developing osteoarthritis, moderate and regular jogging nearly eliminated the risk of developing osteoarthritis. In the early 21st century, research concentrated on the effects of muscle strength on osteoarthritis. Studies showed that strengthening the quadriceps muscle reduced knee pain and disability associated with osteoarthritis. One such study showed that strengthening the quadriceps muscle by 20 to 25% decreased the risk of developing knee osteoarthritis by 20 to 30%.
Macera et al. (2003) identified exercise as a primary and a secondary prevention to reduce disability and mortality due to CHD, type 2 diabetes, and osteoarthritis. Sedentary behavior doubled a person’s chance of developing CHD. In the U.S. over 17 million people had type 2 diabetes, an outcome partially attributable to physical inactivity. Over 75% of people with type 2 diabetes developed heart or blood vessel diseases (NHLBI, 1990). Exercise decreased pain and delayed disability among osteoarthritis sufferers. Exercise slowed disease progression and reduced the symptoms of CHD, type 2 diabetes, and osteoarthritis.

Annually, 12% of deaths in the U.S. were directly attributed to the lack of regular physical activity. That is to say that a quarter-million Americans lost their lives by ignoring a controllable, preventive factor. The AHA (2003) further reported that people who were less active had a 30 to 50% greater chance of developing hypertension than their active counterparts. Similar to the ACSM (1990) guidelines to gain maximum heart and lung health, the AHA recommended vigorous aerobic activity (e.g. jogging, swimming, or brisk walking) most days of the week for at least 30 minutes per session.

Cardiovascular disease (CVD) accounted for over 40% of all American deaths, killing nearly one million men and women annually (AHA, 2003). Exercise prevented, delayed, or decreased hypertension in a dose-response manner. Those who participated in the most physical activity or who tested to be most fit were consequently at the lowest risk. Through reducing hypertension and improving circulatory function, exercise lessened the risk of CVD and CHD development (USDHHS, 1996).

Eriksen, et al. (2002) tested the effects of exercise, stress management training, and a combination intervention on subjective health complaints, sick leave, and job
stress. Although the intervention interactions did not produce statistically significant
effects, participants of each intervention reported meeting individual goals for treatment.
The physical activity intervention improved reports of general health, physical fitness,
and reduced muscle pain. The stress management group increased coping skills. Finally,
participants of the integrated intervention (stress management training with exercise)
reported the highest ratings of improved health.

Bellarosa and Chen (1997) surveyed subject-matter experts (SMEs) in the
occupational stress management field to evaluate six popular stress management
interventions. Physical fitness was identified as the most effective stress intervention.
Exercise was understood to relax muscle tension that had accumulated from
physiological responses to stress. Additionally, exercise increased the capacity to resist
stressors and strain. Finally, the SMEs responded that physical fitness was the most
effective intervention at lowering corporate healthcare costs.

Mokdad, Marks, Stroup, & Gerberding (2004) reported that in the next decade,
the combination of sedentary behavior with poor diet could replace smoking as the lead
cause of preventable mortality in America. The researchers analyzed data on risk
behaviors and deaths published from 1980 to 2002, and included comprehensive
mortality data from 2000. From this, the researchers estimated the causes of preventable
deaths during 2000. Smoking was the lead killer with 18% of deaths, and the combination
of sedentary behavior and poor diet was second with 17%. The gap between the two
leading causes of preventable deaths had almost disappeared, and the number of inactive
Americans continued to increase.
Psychology of exercise behavior. Although there was little scientific evidence of the psychological pathways that connected exercise to stress management, there were many theories of mind-body interaction with regards to exercise. Flood and Long (1996) noted the plethora of microtheories and variable processes that surrounded exercise psychology. The authors then discussed a metatheory that explained an individual’s perception of exercise. The constructivist metatheory combined philosophies related to the nature of reality and the processes of change. Constructivism provided an integrative explanation of exercise’s role in stress management.

Self-development was the central core of constructivism. People created their own realities based upon life experiences and interpretations of life purpose. Flood and Long (1996) related the constructivist metatheory to exercise and stress. Exercise was either positively or negatively viewed based on an individual’s interpretation of enjoyment, past behavior, and exercise-related cultural norms. Constructivism presented stress as the result of individual coping assets being overridden by perceived demands. Exercise interpretation combined with stress coping skills determined the way exercise might relieve stress to each individual.

Because employee constructive views of job stress were varied among each individual, even the most conscientious organization could not completely eradicate work stress variables. Still, preventive intervention efforts were necessary. Flood and Long discussed primary, secondary, and tertiary levels of job stress prevention (1996). Primary intervention dealt with stress potential from structural, social, and environmental factors in an occupational setting. The authors noted that exercise was at best used as a secondary prevention to improve the ability to handle contact with stressful situations.
Finally, tertiary prevention used exercise as an intervention for already stressed employees.

Fasting and Gronningsaeter (1986) studied the effects of an exercise intervention on anxiety traits among a sample of unemployed adults. From the researchers’ analysis, they construed four categories of meaning that exercise had to the participants. The first category was an instrumental meaning, in which exercise was a mechanism separate from the individual, as in competitive sports. The second category described exercise as an exploratory or knowledge-building experience. The third category listed exercise as a means of social interaction. The fourth category attributed exercise to self-actualization. The four categories of personal meaning ascribed to exercise offered a framework to promote exercise in accordance with individual motivational factors to exercise.

Baker (2001) reported data compiled by the British National Association for Mental Health, better known as Mind. Mind surveyed 400 exercise participants with mental health problems in England and Wales. Survey results indicated that people with mental health problems reported the following effects of regular exercise: 62% improved stress, 50% improved self-esteem, 24% improved social skills, and 57% improved motivation. Baker also reported the results of a survey that included 500 members of British fitness clubs. The survey found similar percentages for improving motivation and self-esteem, as well as a 35% improvement in occupational performance. The survey also reported that 68% of regular exercisers regarded exercise maintenance as necessary to mental well-being. Baker concluded that survey respondents used exercise to improve moods and reduce stress, and many respondents also relieved some of the symptoms of diagnosed mental health problems like depression and anxiety.
Among a sample of civil servant workers, Thirlaway and Benton (1992) found a high correlation between physical activity and fitness levels, but physical activity was associated with mental health and fitness was not. Analysis was based on a self-report mental health questionnaire and a maximum oxygen consumption test. Scores from the self-report assessment indicated that subjects who were inactive and fit perceived worse moods than those who were inactive and unfit. The researchers proposed that an external factor prohibited the fit but inactive group from exercising, consequently leading to poorer scores on the mental health questionnaire. The researchers concluded that the fit individuals became accustomed to a certain degree of exercise, and ceasing to exercise possibly lead to depressed moods.

**Job Strain**

*Prevalence in America.* American corporations competed in an increasingly global economy with intense competition, downsizing, and foreign hiring practices. (National Institute of Occupational Safety and Health [NIOSH], 2002). As the use of temporary labor and contractors steadily grew, many large companies reduced their workforces. The result was an increased workload for the remaining workforce, and job insecurity for many U.S. workers with the threat of becoming unemployed. According to a 1997 American Management Association survey (as cited in NIOSH, 2002), organizational downsizing reached its peak in the early 1990s, when over one third of U.S. organizations reported that they reduced their workforces on a yearly basis. Since then the risk of job loss declined, but the present economic downturn produced a new flux of workforce reductions.
The American Institute of Stress (AIS, n.d.) reviewed incidents during the turn of the 21st century that made job insecurity a currently prominent stress source. More jobs were lost in 1998 than in any other year since the end of World War II. Over 200 dot.com companies either collapsed or went bankrupt, and a subsequent February 2000 poll revealed that nearly half of U.S. employees were worried that they could lose their jobs. Then came the aftereffects of September 11th, when terrorism became an additional factor in economic stability and job security. The following year Enron crumpled, causing a nationwide concern of corporate ethics as it related to job and pension security. As of January 2004, the U.S. national unemployment rate was 5.6% (U.S. Department of Labor, Bureau of Labor Statistics, 2004), a mere 0.4% drop from 2003’s alarmingly high rate.

According to the Northwestern National Life Insurance Company, 25% of the United States workforce viewed work as life’s greatest stressor (as cited in NIOSH, 1999). A follow-up study found that 40% of Americans reported that their jobs were very or extremely stressful. Frank Kenna III, President of a workplace communications firm (The Marlin Company, 2001) stated the following:

Half of American workers say that they have a more demanding workload this year than they did a year ago, and 38% say they are feeling more pressure at work this year. Stress has become the emotional toothache of the workplace. It leads to serious impairment that can cause big mistakes and serious injuries. As the economy worsens, we need the equivalent of a root canal- employers need to help educate their people on how to fight the infection and ease the pain. (p.2)
Galinsky et al. (2001) conducted a national telephone survey on 1,003 random American workers. Within three months prior to the survey, 28-29% of the employees responded that they *often* or *very often* felt overworked and overwhelmed by the number of tasks they had to complete, and felt that there was not enough time to process or reflect on their work. Nearly half of the sample (46%) reported feeling at least one of the above pressures. More than one quarter of the participants reported working in an organization that downsized in the preceding year, and 37% reported working for an organization that experienced difficulty hiring. Workers in organizations that downsized or had difficulty hiring perceived a significantly increased workload.

As a result of downsizing, U.S. employees averaged more weekly work hours than any other developed country's employees (Center for the Advancement of Health, 2003). Over the last 30 years, work hours decreased in Japan and in several European countries, while in the U.S. the opposite occurred. CVD studies provided support that recent job trends possibly damaged occupational health. Researchers identified job strain, the combination of high-demands and low-decision latitude, as a significant risk factor for high blood pressure and heart disease. Because these health problems took years to develop, the possible effects of current employment trends possibly would not surface for years.

Increased attention of the detrimental health effects from job strain was a direct result of the salient rise in research during the later quarter of the 20th century (Quick, 1998). Employers and their workers became increasingly aware that job strain posed a serious health threat. Results from physiological and psychological empirical research on
stress were circulated through the press and the medical community in order to build awareness of occupational strain prevalence.

*Absenteeism, productivity, and healthcare costs related to job strain.* According to the AIS (n.d.), job strain cost U.S. industries over $300 billion annually. Direct costs accrued from medical, legal, insurance, and workers’ compensation payments specifically for stress-related issues. The indirect costs were from stress-related accidents, absenteeism, employee turnover, and diminished productivity. Work pressures alone accounted for reports of workers experiencing: back pain (30%), fatigue (20%), muscular pain (17%), and headaches (13%). A survey of over 800,000 employees from 300 companies showed that the number of stress-related sick calls tripled from 1996-2000, and every day an estimated one million workers were absent because of stress.

Karasek and Theorell (1990) proposed that the immense direct costs of job strain were only a fraction of the actual costs accrued from problematic psychosocial job design. Even in-depth qualitative research would have found difficulty in figuring the percentage of lack of productivity and increased absenteeism solely as a result of job strain. The authors analyzed that the poorer moods of workers in high-strain jobs may not have resulted in hospital visits or other obvious direct costs, but exhausted employees were more likely to work erroneously and slowly. The actual portion of health care costs attributable to job strain and the preventable components within that portion were questionable but deserved attention.

Galinsky et al. (2001) reported the dilemmas of job strain. Overworked employees reported the following: unsuccessful personal relationships, self-neglect, insomnia, poor health perception, stress, and lack of coping ability. These symptoms
were positively associated with impaired job performance and increased healthcare costs. Mental health disparities and related physical health problems created an increasing burden on families, taxpayers, and on employers who offered subsidized health insurance.

**Demand-Control Model**

Robert Karasek’s 1979 demand-control model (commonly referred to as the job strain model or demand-discretion model) was the most influential model to assess job strain and its effects on health and well-being (Hurrell, Nelson, & Simmons, 1998; Kompier, 1996; Payne et al. 2002). The demand-control model was popular mainly because it was straightforward and it emphasized structural characteristics of work environments as objective indicators of strain. The model defined two independent dimensions of job strain risks: psychological demands and decision latitude. Johnson and Hall (1988) later added social support as a third dimension to the model.

Through the demand-control model, Karasek (1979) conceived the notion that physical and mental health consequences of job strain resulted from a combination of high demands and little control. Theorell and Karasek (1996) wrote that psychological demand was a measure of mental workload and arousal demands. The demand concept included qualitative and quantitative demands, mental loads, and interpersonal demands. Control was a measure of decision-making authority and opportunity to utilize job skills. Karasek’s original hypothesis was that high demands coupled with little control would induce psychological stress and illness among workers.
The demand-control model predicted active versus passive behaviors and stress-related health risks in the work setting. Karasek (1979) suggested that health outcomes could be predicted through various combinations of the demand-control model variables. The most adverse effect was *job strain*; which resulted from high demands and low decision latitude. Low social support at work further increased the risk of job strain (Karasek et al., 1998). *Active behavior* was an outcome that could occur with high demand and high decisional latitude. Active behavior was beneficial in that it was indicative of the motivation to learn and of good coping skills. *Passive behavior* resulted from a combination of low job demand and low control and usually involved a lackluster job with an apathetic worker. Theoretically, low demand together with high control created the ultimate job situation.

Karasek and Theorell (1990) used the demand-control model to evaluate average job characteristics as listed in the U.S. Quality of Employment Surveys. Active behavior (high-demand/high control) was associated with high-prestige occupations (i.e. physicians, managers, political figures). Passive behavior (low demand/low-control) involved clerical workers and lower-status service personnel. The high strain quadrant (high-demand/low-control) included jobs such as assembly line workers and waiters. Low strain occupations (low demand/high control) included jobs with specified training and self-pacing, such as tailors and maids.

*Social support scale.* A third job dimension was added to the demand-control model that was valid both as a main effect and as an interactive buffer to job strain. The combination of job strain and low social support was labeled *iso-strain,* or *isolated high strain* work. Johnson and Hall (1988) examined whether the lack of social support
combined with job strain further increased the likelihood of CVD prevalence in a self-report study. The researchers used three scales to measure job demands, decision latitude, and social support at work. The Pearson correlation between the three scales showed a weak association and verified the independence of the three job characteristics. The researchers divided each scale range into low, medium, and high scores, and adjusted CVD prevalence for age in years.

Johnson and Hall (1988) showed that for each demand-control combination (measure of job strain), CVD prevalence rates and ratios increased when social support was low. Further, the highest strain groups (high demand with low control) showed an increase in the degree of the CVD prevalence when social support lacked. The researchers concluded that social support at work impacted all levels of job strain. The inclusion of social support in the demand-control model expanded the theory from a personal connection between a person and the job, into a realm of collective work relationships between people.

In the aforementioned study, Johnson and Hall (1988) examined 13,779 male and female workers in various occupational categories. Among blue-collar men, high demands and lack of control interacted most significantly, whereas lack of control and lack of social support were more important for women and white-collar men. The social support construct was complex because collective support possibly provided the individual with an increased perception of control, and therefore women and white-collar men possibly perceived social support as a form of control.

The direct effects of job demands, control, and social support was potentially causative in undermining health status. Although most researchers predicted social
support to be a mediating buffer, researchers also explored social support as a main effect. Wager, Fieldman, and Hussey (2003) suggested that the powerful status of the supervisor could have positively or negatively affected the subordinate's willingness to socially interact. In cases where the subordinate perceived the supervisor to be acting inappropriately or unfairly, mental and physical well-being was potentially compromised. The researchers studied the effect of perceived supervisor support on job strain that potentially increased morbidity and mortality risks from cardiovascular disorders.

Wager, Fieldman, and Hussey (2003) conducted a quasi-experimental field study of 28 female healthcare assistants. The researchers devised a control group and an experimental group based on participant responses to a questionnaire that assessed supervisory interaction. The participants' ambulatory blood pressure was measured every 30 minutes, over a 12-hour period for three days. The researchers concluded that an unfavorably perceived supervisor was a compelling workplace stressor, which might have had a clinically significant effect on supervisees' cardiovascular health. Finally, poor interpersonal relations between supervisors and employees potentially raised blood pressure to levels rated to a 16% increase in heart disease incidence and a 38% increase in stroke incidence.

In a national telephone survey of men and women employees, Galinsky et al. (2001) validated the need to recognize work-related social support. The researchers reported that 51% of employees who disagreed to the statement that his or her supervisor genuinely cared about the effects work demands may have on personal life, also reported feeling significantly overworked. Conversely, only 28% of those who strongly agreed to
the same statement reported feeling overworked. The results showed that social support accounted for a portion of the variability.

Falk, Hanson, Isacsson, and Ostergren (1992) studied the long-term affects of job strain on mortality risk among a sample of retired, elderly men. The researchers further examined the buffer effect of social support outside of the workplace on job strain. Men who had been exposed to job strain showed a significant increase in relative mortality risk. A combination of job strain and weak social support was associated with the highest relative mortality risk. The researchers concluded that social support buffered the effect of job strain in men with regards to mortality risk after retirement.

**Demand and control construct interactions.** Karasek (1979) emphasized the control concept significance when he suggested that increased control reduced job strain, even with a heavy workload (known as *active behavior*). In evaluating the effects of demand-control model variables, other researchers shared their criticisms of model interactions. Few demand-control based studies found the predicted interaction effect between demand and control, and evidence for the main effects of demand was less than that for control (Schnall, Landsbergis, & Baker, 1994). In several studies, the control construct of the demand-control model showed a more significant effect on job strain than the demand construct of the model showed.

Some studies that evaluated the demand-control model failed to emphatically support the interaction effect, possibly due to the nonlinear relationship between job characteristics and stress (Jones & Fletcher, 1996). For example, Landsbergis (1988) found that psychological stress was significantly higher in jobs where employees perceived a high workload with a low sense of control. However, the results showed no
relationships between job characteristics and CHD. For this and similar demand-control model study findings, Jones and Fletcher suggested three reasons that could explain the lack of interaction: inadequate interaction testing, disregard of individual difference variables, and confounding variables in studies using the occupational level of analysis.

Demand-control model studies generally fell into one of three categories based on analysis level (Jones & Fletcher, 1996). The broadest level measured long-term health effects between occupational groups. To predict behavioral differences within a single occupation, a researcher took a between-subject approach. Last, to predict immediate responses of job strain (e.g. new task assignment) required either a within-subject or a between-subject study. The demand-control model appealed to researchers in that it was appropriate for a vast range of circumstances and levels of analysis.

Gender and the demand-control model. Gender-based research produced mixed results with regards to the demand-control model. Weidner, Boughal, Connor, Pieper, and Mendell (1997) showed that high-demand jobs coupled with low-decision latitude added to reports of stress among men, as shown by increased reports of medical symptoms and health-detrimental behaviors. The women in the same study did not experience significant stress from the same variables. One explanation for the mixed results was that the women sample was taken from 1978-1980 data that included only healthy Caucasians: a sample not representative of the 21st century job market. Using a sample of almost 34,000 women, Amick, Kawachi, and Coakley (1998) showed that high-demands and low latitude in the work environment were indeed important determinants of health status among America’s female workforce.
Theorell (1991) found that women reported more psychological and psychosomatic symptoms than men reported. The results had serious implications with regards to job strain research. Based on the 1991 findings, Theorell and Karasek (1996) conjectured that women were more honest than men in describing work conditions, suggesting that men tended to deny difficulties more frequently than women denied difficulties. The authors proposed that if further research would support this notion, it would be simpler to ascertain an association between job strain and blood pressure in women than in men.

Galinsky et al. (2001) reported that women felt more overworked than their male coworkers felt. The study results showed that women employees perceived more frequent interruptions and multiple tasks than did men employees. When the researchers compared men and women who experienced those problems at equal frequencies, the gender difference in feeling overworked vanished. The researchers concluded that women experienced extensive multi-tasking and interruptions as a result of either social vulnerabilities or of the specific job types assigned to women.

*Demand-control model, cardiovascular disease, and mortality.* As a result of the demand-control model’s popularity (Jones, Bright, Searle, & Cooper 1998; Kompier 1996), there was a multifaceted body of research and reviews regarding the effects of psychosocial work factors on disease control and causation (particularly CVD). Between 1981 and 1995, 44 studies that used the demand-control model were published in which the majority found a significant positive relationship between job strain and CVD risk factors or all-cause mortality (Job Stress Network, n.d.). Karasek and Theorell (1990) calculated that up to 23% of CVD cases were potentially preventable if job strain levels
were decreased in highly stressful jobs, as identified in a list of occupational stress averages.

Johnson, Hall, and Theorell (1989) described the physiology of detrimental health outcomes from a negative psychosocial work environment. In laboratory and field research, work aspects as described by the demand-control model affected hormonal responses to stress. There is evidence that induced stress hormone elevations resulted from high job demands coupled with low control. Additionally, job strain potentially caused chronic adrenaline arousal that resulted in elevated blood pressure. When low social support was added to this complex, CVD prevalence risk increased significantly. The authors concluded that demand, control, and social support were three factors that functioned as a composite psychosocial risk to health outcomes.

More than 50 million Americans had high blood pressure; 95% of the cases were from an unknown cause. Landsbergis, Schnall, Pickering, Warren, and Schwarz (2003) reported a gradual but significant increase in the blood pressure of men who self-reported working in stressful jobs. The findings resulted from a ten-year study of men who spent at least 50% of their working years (minimum 25 working years) in a stressful job. Participants that met the above criteria had a 4.8 mm Hg higher blood pressure at work and 7.9 mm Hg higher blood pressure at home than did men with no significant previous exposure to job strain (independent to current exposure). The researchers concluded that cumulative contact with job strain could have a negative effect on systolic blood pressure.

Amick et al. (2002) hypothesized that a career that portrayed high psychosocial job demands and low job control increased the risk of mortality. The researchers used Karasek's demand-control model to analyze data collected via the Job Characteristics
Scoring System (JCSS). The independent effects of one physical and four psychosocial job conditions were measured from self-reported answers to the JCSS. The results showed that employees who experienced little control over their jobs were up to 50% more subjective to mortality during a five to ten year period than were workers with demanding jobs but more decision-making authority.

Similarly, in a study of 812 healthy employees, Kivimaki et al. (2002) reported that job strain seemed to double the rate CVD mortality. Four measures: high demands, low control, low job security, and few career opportunities contributed to the summative stress of study participants. The researchers found that high demands combined with low control doubled the risk of CVD mortality among employees who were free from overt CVD at baseline. Moreover, high demands and low control also predicted unfavorable changes in biological factors such as cholesterol levels and body mass index. Empirical research continued to support a positive relationship between job stress and heart disease development and mortality.

*Job Strain and Exercise*

Payne et al. (2002) investigated both the ability to predict exercise behavior from the theory of planned behavior (TPB), and the effect work conditions may have had on exercise behavior. The researchers first evaluated TPB variable predictions on exercise intention and implementation. The researchers then examined three possible correlations between work and exercise: the effect of work and other barriers and facilitators on perceived behavioral control, the relationship between Karasek’s demand-control model and TPB variables, and the effect of job strain on carrying out exercise intentions. The
researchers hypothesized that perceptions of reduced control would result from work barriers, and that workers with high-demand jobs would show a decreased probability of exercise intentions.

Payne et al. recruited volunteers for the study via the Intranet of a large British company (2002). Of the 241 employees who complied, 70% were men, and 93% were under age 55. The mean number of years participants worked at their current jobs was 3.9 (ranged from 1 month to 30 years), and the mean number of hours per week worked was 44 (ranged from 20-70 hours). The Intranet questionnaire included one initial and one follow-up survey. The initial survey inquired about exercise intention for the following week. One week later, the Intranet posted a follow-up survey that measured actual exercise behavior, TPB variables, and demand-control model variables.

Employees were classed as having either high or low strain positions based on a median split in demands and control. Over 80% of participants scored high for items related to working hard and working to meet deadlines. Most participants rated their jobs as neither high nor low in control. Fifty-four participants had high strain jobs (high-demand with low-control), and 53 participants had low strain jobs (low demand with high control). All of the TPB variables were significantly related with intention and behavior except for subjective norms. Answering the second research question, demand and control showed significant correlations with exercise self-efficacy (work barriers explained 2% \( p<.05 \) of the variance), but not with intention or behavior.

The study results supported the significance of work influence over exercise behavior. Job strain did not influence attitude, intentions, or subjective norms with regards to exercise. However, highly stressed workers reported engaging in less exercise
than less stressed workers reported, even though their initial exercise intentions were not
less. Furthermore, the intenders who did not carry out their intentions had lower exercise
self-efficacy scores than those who implemented their intentions. The researchers
concluded that job strain does not have a direct effect on intention formation, but may
disrupt the ability to actually carry out exercise intentions.

Payne et al. (2002) empirically showed a connection between work strain and
exercise behavior. Work-related exercise barriers influenced the formation of exercise
self-efficacy, which affected behavioral intentions. Also, work demands significantly
affected the implementation of these intentions. In summary, low exercise self-efficacy
and job demands interfered with the implementation of exercise intentions.

Theory and research showed that jobs promoting social interaction, skill
utilization, and decisional authority affected behavioral patterns, including exercise
behavior. Johansson, Johnson, and Hall (1991) studied the influences of job strain and
work-related social support on leisure-time exercise behavior. The impacts of stressful
job characteristics on exercise behavior were partially mediated by social support. The
researchers concluded that demanding jobs that limited autonomy and allowed for little
social interaction influenced workers to engage in fewer leisurely activities that required
preparation and cooperation with others. Physically and psychologically demanding jobs
were associated with sedentary behavior, and social support and personal autonomy were
predictive of regular exercise. Weidner et al. (1997) also found sedentary behavior
prevalent in men with high-strain jobs; job demands was the most significant factor
affecting lack of exercise.
The Clemson Extension (1997) recommended stress prevention through regular exercise. Aches in the head, neck and back were indicative of stress and were reflective of the strength and flexibility of muscles in the related area. Flexing and stretching those muscles reduced the chance that the muscles would tighten during stressful situations. Aerobic exercise caused biochemical changes that resulted in elevated mood and healthy self-efficacy. Exercising both skeletal and cardiac muscle in combination with stretching allowed workers to complete their tasks with less fatigue. Furthermore, the Clemson Extension recommended cardiovascular exercise (e.g. brisk walking, cycling, swimming, rowing, fast dancing, and cross-country skiing) at least three times a week.

Hurwitz (2003) surveyed 2,902 men and women to test the association of stressors with perceived stress and depression, and to determine if these associations were modified by sedentary behavior. The dual effects of personal stressors and sedentary behavior on stress and depression were significant. Sedentary workers with high personal stressor scores were more likely than active workers with similar stressors to have high levels of stress and/or depression. Hurwitz concluded that because inactivity possibly augmented the effects of stressors, exercise could have moderated stress by reducing stressor effects.

Hellerstedt and Jeffery (1997) used the demand-control model to assess associations between job strain and cardiovascular-related health characteristics in a random sample of 3,843 men and women from 32 worksites. The researchers found that high-demand jobs were associated with smoking and high-fat food choices in men, and with body mass index and smoking in women. High-control jobs (a beneficial characteristic) were positively associated with exercise behavior. The correlational study
design did clarify whether the exercise caused the perception of high-control, or if high-control influenced a person to exercise, but an association was evident.

The amount of stress and anxiety a person experienced was a major factor in CVD (Neu, in press). At the turn of the 21st century, experts hesitated to recommend the amount and intensity of exercise required to alleviate stress and anxiety. A study at the University of Missouri-Columbia showed that relatively high-intensity exercise was superior in reducing stress and anxiety that may otherwise have lead to heart disease. Moreover, the researchers found that high-intensity exercise especially benefited women.

Stages of Change

The transtheoretical model (TTM) was an all-inclusive model that explained and predicted when and how people changed a behavior (Sarkin, Johnson, Prochaska, J.O. & Prochaska, J.M., 2001). The TTM was a tool to assess and intervene with numerous health behaviors across various populations. The main constructs of the TTM model were stages of change, processes of change, decisional balance, and self-efficacy.

Prochaska and DiClemente (1983) showed that behavioral patterns occurred in a series of five stages. In an effort to study how people quit smoking outside of formal treatment, the five stages and 10 processes of change constructs were integrated into the TTM. The stages of change construct became the core of the TTM and was widely used to assess the readiness to change health behaviors (Marcus & Forsyth, 2003).

The five stages of change were labeled: precontemplation, contemplation, preparation, action, and maintenance. Marcus and Forsyth (2003) explained the five stages with regards to physical activity. A person did not consider engaging in physical
activity during the precontemplation period. Contemplation was the period when an inactive person seriously considered trying physical activity within the next six months. Preparation was the stage when a person had unsuccessfully attempted physical activity adoption within the previous year, but planned to try again within the next month. During the action stage, a person participated in the recommended amount of physical activity, but six months time had not yet passed. Finally, a person reached the maintenance stage when physical activity was a habit for at least six months.

According to Marcus and Forsyth (2003), most stages of change literature excluded a sixth stage called the termination stage. The termination stage indicated that an individual was in the exercise maintenance stage (fifth stage) for a period long enough to presume that regression was impossible. Marcus and Forsyth argued that dynamic life experiences averted a guaranteed point at which exercise was permanence in life, and that exercisers remained in the maintenance stage throughout their active years.

Velicer, Norman, Fava, and Prochaska described the common transitioning a person experienced during behavior change (1999). Individuals often progressed forward for a time and then regressed to an earlier stage. People may have cycled through the stages several times before successfully changing a behavior. Individuals were classified as progressing, stable, or regressing; depending on at which stage he or she started.

*Stages of change criticism.* Despite the popularity and general acceptance of the stages of change among the scientific community, there remained some skeptics. Littell and Girvin (2002) compared 87 research articles that provided evidence on the stages of change. The researchers then evaluated the development of the stages of change model, stage measures, and escalating scientific evidence across an assortment of populations
and problem behaviors. The authors focused on construct validity of the stages of change and on opposing views of fundamental constructs and relationships among them. Littell and Girvin concluded against support of the model:

The search for a generic, underlying structure of behavioral change has led to unnecessary reductionism, reliance on a set of categories that do not reflect qualitatively different states, and adherence to assumptions about stage progression that have not been supported. The model cannot have much practical utility for the design or allocation of treatment services if basic tenets do not hold up. (pp.253)

**Exercise Behavior and Stages of Change**

The stage of change for exercise model assessed an individual's readiness to adopt exercise behavior by measuring self-reported intentions and behaviors (Laforge et al., 1999). There were several scales that assessed stage of change for exercise. Some examples included descriptive anchors, a 5 or 6-item true/false format, and a 32-item descriptive statement scale. The stage in which an individual was placed showed the degree of intention or current devotion to regular exercise.

Reed, Velicer, Prochaska, Rossi and Marcus (1997) recommended a one-item algorithm with five discrete response choices to measure stage of change because of its simplicity and its consistency. Further, the researchers suggested that defining exercise as a vigorous activity in combination with the 5-choice algorithm resulted in the most typical theoretical patterns: pros to exercise heightened from precontemplation to action
and then dropped from action to maintenance; and barriers fell and self-efficacy increased from precontemplation through maintenance.

Cardinal (1997) showed construct validity for the exercise stages of change in a cross-sectional study of 235 adults. Participants were classed into an exercise stage of change and then compared on two biometrical, two behavioral, and three psychological variables, while social desirability and demographical differences were controlled. The results determined significant differences between exercise stages with respect to body mass index, cardiorespiratory fitness, exercise behavior, relapse, barriers, and self-efficacy. Each variable accounted for differential characteristics in each of the five stages of change with regards to exercise. Differences on all seven measures and linear progression across the five stages of change validated the exercise stage of change model.

Studies have consistently shown that readiness to change was the most reliable measure to predict exercise adoption. Litt, Kleppinger, and Judge (2002) tested the effects of stages of change, self-efficacy, and social support on exercise adoption. Of the three variables, the researchers found that the stages of change model most significantly indicated exercise adoption.

Similarly, Prochaska et al. (1994) tested the generality of findings across problem behaviors regarding the stages of change and other constructs of the TTM. Twelve distinctive and varied behaviors were chosen for the study, one of which was exercise acquisition. The results showed explicit cohesion of internal structures across the 12 areas. The authors concluded that the stages of change construct was a valid and reliable measure for most behaviors.
Stages of change represented the chronological and readiness dimensions of the general TTM. Sarkin et al. (2001) examined the stages of change with regards to exercise in a sample of 670 healthy adults. The results indicated that regular moderate exercise could validly be assessed using the stages of change construct. Furthermore, the patterns across the stages of change were steady with the TTM predictions and replicated the findings of previous studies.

Peterson and Aldana (1999) evaluated the effect of a 6-week stage-based exercise intervention in a randomized trial at a large telecommunications company. Evaluations were measured by changes in exercise and by stages of change. Of the participants who received educational materials tailored to their current activity level and readiness to change, a significant 13% increased physical activity. The researchers concluded that stage-based, customized messages emerged to be more effective at improving short-term activity levels than either nonspecific messages or the absence of information.

The Center for the Advancement of Health (2000) explained how exercise adoption fit in with the stages of change model. The importance of recognizing an individual’s stage of change when designing an exercise program was described for each of the five stages. In the first stage, precontemplators needed to be convinced that the benefits of exercise outweighed the barriers, and needed direction on how to overcome those barriers. In the second stage, contemplators needed to increase their knowledge about exercise in order to develop skills. Contemplators required knowledge about how to exercise, or about how to make exercise an enjoyable activity. In the third stage, a person engaged in irregular exercise or was preparing to begin exercise. At this stage a person needed to regulate exercise behavior, for example by evaluating his or her
schedule to accommodate the desired change. In the fourth stage, the goal for active people was to ingrain exercise as a habit. Someone in the fourth stage might have varied the activity in order to avoid monotony, or have kept a log in order to track success. For those in the final stage, the goal was to maintain exercise even during major life changes, such as after having children. With few exceptions, people expressed specific needs depending on their exercise stage of change.

The National Center for Chronic Disease Prevention and Health Promotion ([NCCDPHP], 2003) prepared a detailed action plan for each stage of change with regards to exercise behavior. The five stages were listed as: not ready for change, thinking about change, preparation for action, taking action, and maintaining a good thing. The NCCDPHP emphasized that an individual's exercise behavior should be categorized into one of these five stages of change when promoting exercise effort and commitment.

Summary

Exercise contributed to disease prevention and to the enhancement of physical and mental functions. People who participated in regular exercise at 60 to 90% of their maximum heart rate received and maintained the greatest health benefits. Exercise reduced risk factors associated with CVD, the number one killer in America. Reduced chances of developing other chronic conditions such as CHD, type 2 diabetes, and osteoarthritis were additional outcomes of exercise. Nevertheless, over 60% of U.S. adults were not regularly active, and 25% were sedentary. Moreover, only 15% of U.S.
adults exercised regularly and at an intensity great enough to achieve and maintain optimal cardiovascular benefits.

Many Americans found the motivation to exercise regularly, but then quit as soon as a barrier challenged their goals. Healthcare professionals needed a framework to assess an individual’s readiness to adopt exercise, and the stages of change model provided such an outline. Healthcare professionals used the stages of change first as a tool to determine progression or regression of behavioral change, and then to suggest particular procedures and tactics for promoting change.

Researchers identified variables that influenced cycling through the different stages of change. It was crucial to identify factors in a person’s life that influenced his or her decision to halt in stage progression or even to regress. Stress was identified as a factor that influenced behavioral outcomes. Workers who could use their skills and make decisions on the job were found to exercise more than workers with little job control. Workers with high-demand jobs carried out their intentions to exercise less often than their coworkers who perceived less job demands. A demanding job combined with little control and low social support were factors that influenced exercise behavior.

Nearly half of all Americans reported experiencing job stress, and the current job insecurity trends did not provide a positive outlook for the future. Job strain cost U.S. industries billions of dollars every year directly from medical care and indirectly from absenteeism and production losses. Stressed employees not only impeded industrial success, but also burdened coworkers, loved ones, and society. Organizational leaders needed to recognize the prevalence of job strain, and to be aware that stress may have influenced their employees’ adoption and maintenance of health behaviors.
Vast literature covered the individual fields of job strain and of exercise behavior, but very few studies have tested the link between job strain and exercise behavior. Moreover, there have been only a few studies that used a theoretical framework of exercise behavior as it related to job strain. Researchers neglected to distinguish the differences of perceived job strain between the five exercise stages of change, or to determine if a correlation existed. The ability to associate a level of job strain with a particular exercise stage of change could have improved exercise intervention design for American workers.
Chapter Three

Methods

The detrimental effects of job strain were the same detrimental effects that regular exercise impacted and often prevented. While researchers continued to provide support for the job strain and exercise connection (Payne et al., 2002), sedentary behavior and its negative health effects remained a crisis in America. Health professionals struggled to pinpoint the reason that some people did not progress or consistently regressed through the stages of change with regards to exercise.

The purpose of this study was to determine if perceived job strain levels were related to exercise stage of change. The ability to associate a level of job strain to a particular exercise stage of change could lead to better exercise intervention designs for American workers. Employers could better understand employee exercise behavior in relation to employee job strain. Worksite health promoters could detail interventions specific to employee exercise stage of change (i.e. identify the stage of change most associated with high strain, then promote exercise to that group as a form of stress relief). Finally, increased awareness of a job strain and exercise behavior connection could be a useful planning tool when determining proper intervention timing (e.g. to determine the likelihood of an effective exercise promotion during a company’s most strenuous time of the year).
Participants

Associates of an international retail company headquartered in Mason (a suburb of Cincinnati), Ohio served as the population for this study. Participation in the study was voluntary, anonymous, and open to all of the approximately 905 site employees. Potential participants included both genders aged 18 years and older. The white-collar setting included a wide range of occupational levels from clerical to managerial to executive. At the time of this study, the corporation had acquired new enterprises and was preparing to significantly expand its workforce within the following year. In order to achieve a 95% confidence level and a .05 alpha level, 269 employees needed to complete the survey. The minimal required sample size was determined from Krejcie and Morgan's (1970) sample calculator.

Instrumentation

The study's three-part questionnaire included: one algorithm scale to measure exercise stage of change, three Likert scales to measure job strain variables, and a demographics section.

Stages of change. A one-item algorithm with five distinct response choices (Reed et al., 1997) was used to place each participant in a particular stage of readiness for regular exercise (See Appendix A). A detailed definition of regular, vigorous exercise was stated, and participants were asked to choose one of five statements that best described their engagement in regular exercise in accordance to the given definition. Participants were placed in the stage of change that corresponded to their selected answer...
from the five statements. The algorithm used for this study was the version recommended and validated by Cardinal (1997) and Reed et al. (1997).

In a study that examined eight different exercise stages of change scales, Reed et al. (1997) concluded that the 5-choice algorithm with a detailed definition of vigorous exercise was the most valid and reliable tool. The researchers concluded that the chosen format was most effective for several reasons. First, exercise was clearly defined by frequency, duration, and intensity. Second, the definition included examples of exercise intensity that allowed the general population to more accurately assess their exercise behavior, with less subjective interpretation. Third, the vigorous exercise definition was more closely related to actual behavior than was a lifestyle activity definition of exercise. The researchers determined that the 5-choice algorithm best matched the theoretical basis that from precontemplation to maintenance: exercise duration increased and exercise barriers decreased. Furthermore, the 5-choice algorithm showed the classic pattern of perceived exercise benefits increasing from precontemplation to action, and then falling slightly at maintenance.

The five stages of change included precontemplation, contemplation, preparation, action, and maintenance. Termination was the sixth stage of change and represented a state of no temptation and complete self-efficacy, regardless of unexpected obstacles in behavioral maintenance. Because lifetime maintenance was the realistic goal of someone who adopted a health behavior, the validity of the sixth stage, termination, was questionable (Marcus & Forsyth, 2003). This study, like most stages of change research, omitted the termination stage from the questionnaire.
Precontemplators expressed no regular exercise at present, and no intention to begin regular exercise within the following 6 months. Contemplators signified no regular exercise at present or planned for the next 30 days, but did consider regular exercise within the next 6 months. Preparers did not exercise regularly at present, but were ready to begin within the next month. Actors reported current regular exercise, but for less than 6 months. Maintainers indicated current regular exercise for more than 6 months.

*Job Strain.* The second section was three scales (containing four subscales) that totaled 22 questions taken from The Job Content Questionnaire (JCQ) (See Appendix A). The JCQ was a self-report instrument that measured psychosocial characteristics of jobs (Karasek et al., 1998). The JCQ was translated into over 12 languages and its policies and development were ruled by an international board of researchers. Karasek et al. cited several studies that reported JCQ validity to assess job strain and associated health outcomes. The JCQ adequately predicted stress-related chronic disease development, with particular emphasis on cardiovascular illnesses. Other valid JCQ predictions included musculoskeletal injury, mental strain, and detrimental behavioral outcomes. The JCQ was also used to forecast active versus passive job settings, worker satisfaction, and productivity. Additionally, skill utilization, job quality, and market-based economic expansion issues were measured through the JCQ. In this study, the JCQ was used to assess perceived job strain, which was then tested for correlational value with exercise behavior.

The JCQ scales used in this study originated from the three nationally representative samples of the Quality of Employment Survey (QES) conducted by the University of Michigan Research Center in 1969, 1972, and 1977 for the U.S.
Department of Labor. In the early 1980s, Schwarz, Pieper, and Karasek (1988) analyzed the following: broad statistics, theoretical consistency, and QES question validity. The results validated the ability to assess the psychosocial work environment from the QES questions. Based on the results, the researchers extracted a subset of the QES questions and comprised the Job Characteristic Linkage System (JCLS). The original JCQ was derived from the two thirds of the JCLS questions that yielded a reliable assessment of scale scores. The JCQ scales were nationally standardizable to the cross-sectional sample of 4,500 workers who completed the QES.

Karasek et al. (1998) reported that the JCQ was reliable in diverse studies that involved various populations and variables. The researchers compared mean values, reliability, and validity of the JCQ scales across six studies in four countries (two in the U.S., two in Canada, one in Holland, and one in Japan). The sample size in each study ranged from 580 to 6,053 and totaled 16,601 subjects aged 20 to 65 years. Participation rates ranged from 65% to 93% (38% were women and 62% were men).

In each study, women and men were analyzed separately, and the occupational characteristics varied (Karasek et al., 1998). Reliability was determined by the internal consistency as measured by the Cronbach's alpha coefficients. The scales' mean reliability for men was as follows: decision latitude .807; psychological demands .630; supervisor support .838; and coworker support .752. The scales' mean reliability for women was as follows: decision latitude .818; psychological demands .628; supervisor support .840; and coworker support .766.

The combination of two JCQ scales was most often used to determine job strain development: decision latitude and psychological demands (Karasek et al., 1998). The
social support scale was shown to measure both main effects and buffer effects on job strain. The full version (49 questions) of the JCQ included additional scales that accounted for factors such as physical exertion. The three major JCQ scales were chosen to research the population of this study.

Each item had a 4-point response ranging from 1 (strongly disagree) to 4 (strongly agree). A sum of weighted scores was used as a scale score. Kawakami, Kobayashi, Araki, Haratani, and Furui (1995) listed an abbreviated form of the 22 item JCQ and range calculation formulas (See Appendix B). The scales were described as follows:

1. The decision latitude scale (9 items) had a score range from 24-96, and was the sum of two subscales: decision authority (3 items; range 12-48) and skill discretion (6 items, range 12-48). A higher score indicated a lower perception of strain (i.e. high control). The decision authority subscale rated the employee's opportunity to determine which tasks to manage and how to go about handling them. The skill discretion subscale measured the ability of the employee to use his or her skills and to develop new skills.

2. The psychological job demand scale (five items) measured the employee's perception of workload and time allotment, and had a score range from 12-48. A higher score indicated a higher perception of strain (i.e. high workload demands).

3. The social support scale (eight items) had a score range from 8-32 and was the sum of two subscales: supervisor support (four items; range 4-16) and coworker support (four items; range 4-16). A higher score indicated a lower perception of strain (i.e. high social support). The supervisor support subscale measured supervisory assistance and competence. The coworker support subscale measured instrumental and emotional help from colleagues.
Job strain would be defined using a quotient method. Job demand (multiplied by 2 to equate both scale ranges) was divided by job control. A score greater than or equal to one indicated job strain (Schnall, 2004). A score less than one indicated no job strain.

**Demographics.** The third section of the study questionnaire contained four questions that gathered demographic information including: age, gender, marital status, and race (See Appendix A). This section also asked the length of time the employee had worked at his or her current position, and how many hours per week the employee worked at his or her current position.

**Procedures**

The researcher obtained permission to use the survey from the questionnaire author. The survey instrument and official research proposal were reviewed and approved by the researcher’s graduate committee and the Institutional Review Board for Human Subjects. The questionnaire (See Appendix A) was reviewed and approved by the Health Promotion Specialist (HPS) at the company that hosted the survey data collection.

Together with the sample population's HPS, the researcher designed a cover letter (Appendix C) that introduced the researcher and explained the purpose of the research and the importance of the following: study findings, voluntary participation, and anonymity. The timeframe to submit the survey (10 workdays) and the estimated survey duration (10 minutes) were also stated. The cover letter instructed participants to place the completed questionnaire in the provided, preaddressed envelope and submit the sealed envelope to a central contact (the HPS) via internal mail. Internal mail was a
system that involved a third party who collected and distributed mail between the offices of that company. Anonymity was assured by using internal mail for this study.

The morning of May 17th, the HPS, the researcher, and an assistant distributed the questionnaire, cover letter, and a chocolate mint to the desk of each employee. Accordingly, an email (See Appendix D) was sent to each employee that morning briefly asking each employee to complete and return the questionnaire.

Two days before the questionnaire return deadline of May 28th, a reminder email (See Appendix E) with an attached cover letter and questionnaire (See Appendix C and A, respectively) was sent to each employee's work email address. The purpose of attaching the survey to the email was to allow employees who discarded or misplaced the originally distributed survey to still participate. The HPS held the envelopes in a designated container in a secure location. On May 28th the researcher retrieved the questionnaires from the HPS for data processing and analysis.

Data Analysis

Data from the questionnaires were entered into a computer for statistical analysis at a University of Cincinnati office. The participants’ stage of change was determined by their chosen response to the statement that best described their readiness to adopt regular exercise. All demographic data were analyzed as frequencies and corresponding percentages were reported. The Statistical Package for the Social Sciences (SPSS) was used to assess correlations between exercise stage of change and the variables of perceived job strain (i.e. job control, job demands, social support, and job strain).
SPSS calculated each participant's score for each JCQ scale, and calculated job strain via a quotient score from two of the scales. A Pearson correlation determined a relationship between exercise stage of change and each of the three JCQ scales. A Pearson correlation tested a correlation between exercise stage of change and perceived job strain. Significance was set at the .05 alpha level to reduce the likelihood of committing a Type 1 error.

Exercise stage of change was the independent variable in an Analysis of Variance (ANOVA) test to determine differences in perceived levels of each job strain variable. A t-Test was run to find differences in gender and stage of change or the job strain variables. A Pearson correlation determined relationships between age and stage of change or the job strain variables. Two separate ANOVAs tested marital status and racial differences in both stage of change and the job strain variables.
Chapter Four

Results and Discussion

The detrimental effects of job strain were the same detrimental effects that regular exercise impacted and often prevented. While researchers continued to provide support for the job strain and exercise connection (Payne et al., 2002), sedentary behavior and its negative health effects remained a crisis in America. Health professionals struggled to pinpoint the reason that some people did not progress or consistently regressed through the stages of change with regards to exercise.

The purpose of this study was to determine if perceived job strain levels were related to exercise stage of change. The ability to associate a level of job strain to a particular exercise stage of change could lead to better exercise intervention designs for American workers. Employers could better understand employee exercise behavior in relation to employee job strain. Worksite health promoters could detail interventions specific to employee exercise stage of change (i.e. identify the stage of change most associated with high strain, then promote exercise to that group as a form of stress relief). Finally, increased awareness of a job strain and exercise behavior connection could be a useful planning tool when determining proper intervention timing (e.g. to determine the likelihood of an effective exercise promotion during a company’s most strenuous time of the year).

Results

A total 905 questionnaires were distributed, and 594 (65.6%) were returned. Of the 594 surveys, 568 (62.8%) answered the exercise stage of change question. Because
the stage of change variable was essential to answering the hypotheses, only the 568 completed questionnaires were analyzed. The proportions of participants in each stage were: precontemplation 7% (n=40); contemplation 13.7% (n=78); preparation 29.9% (n=170); action 14.4% (n=82); and maintenance 34.9% (n=198).

Demographic frequencies. The median age of participants was 40 years old (M=40.3786, s.d.=9.61697). Of the 568 respondents, 31.3% (n=177) were men and 68.3% (n=388) were women. The sample majority was married 67.8% (n=385) and the remaining proportions were: single 18.8% (n=107), divorced or separated 12.3% (n=70), and widowed 0.5% (n=3). The proportions of racial backgrounds were: Asian 1.8% (n=10), African American 10% (n=57), Hispanic 1.4% (n=8), Caucasian 84.5% (n=480), or Other 10% (n=1.8). The median number of hours worked per week was 42 (M=43.1968, s.d.=6.65506) hours. Participants who were in their job position (in terms of major duties and responsibilities) for at least 6 months made up 87.7% (n=498), and 6.2% (n=35) were in their current positions fewer than 3 months.

Hypothesis 1. As job strain levels increase, exercise stage of change will decrease. There was a significant relationship between exercise stage of change and job strain, r=-.116, p=.007. As exercise stage of change progressed towards the maintenance stage, job strain levels decreased. The null hypothesis that stated there would be no relationship between job strain and exercise stage of change was rejected. When considering differences in perceived job strain among the five stages of change, a significant difference was found, F(4,533)=3.843, p=.004. A Scheffé post hoc test showed the only significant difference was between the means of the maintenance stage (M=.9278) and preparation stage (M=1.0200), p=.007.
**Results and Discussion**

**Hypothesis 2.** As job demands increase, exercise stage of change will decrease.

There was not a significant relationship between exercise stage of change and job demands, $r=.004, p=.933$. Based on the results of this study, the null hypothesis that stated that there would be no relationship between job demands and exercise stage of change failed to be rejected. When considering differences in perceived job demands among the five stages of change, no significant differences were found, $F(4,551)=1.065, p=.373$.

**Hypothesis 3.** As job control increases, exercise stage of change will increase.

There was a significant relationship between exercise stage of change and job control, $r=.142, p=.001$. As exercise stage of change progressed towards the maintenance stage, job control increased. Therefore, the null hypothesis was rejected. When considering differences in perceived job control among the five stages of change, a significant difference was found, $F(4,545) = 3.985, p=.003$. A Scheffé post hoc test showed the only significant difference between the means of the maintenance stage ($M=73.2821$) and the planning stage ($M=68.8395$), $p=.007$.

**Hypothesis 4.** As social support at work increases, exercise stage of change will increase. There was not a significant relationship between exercise stage of change and social support, $r=.082, p=.053$. Therefore, the null hypothesis could not be rejected. When considering differences in perceived social support among the five stages of change, no significant differences were found $F(4,546) = 1.647, p=.161$.

**Demographic correlations and variances.** A one-way ANOVA showed a significant difference in perceived job control and marital status, $F(3,544) = 10.203, p<.001$. A Scheffé post hoc test showed that married people ($M=72.6096$) scored
significantly higher than did people who were single ($M=66.3846, p<.001$) and divorced/separated ($M=68.0597, p=.024$). Furthermore, a significant difference was found between social support and marital status $F(3,544) = 4.201, p=.006$. Married people ($M=24.9198$) scored significantly higher in social support than single people scored ($M=23.6731, p=.013$). Finally, significant differences existed between job strain and marital status, $F(3,532)= 4.638, p=.003$. Married people ($M=0.9492$) scored significantly lower on job strain than single people ($M=1.0277$) scored, $p=.022$. Although differences were not significant, widows (0.5% of study population) scored the highest on job demands ($M=40.0000$) and social support ($M=25.3333$).

An ANOVA showed a significant difference in perceived job control and race, $F(4,543) = 3.972, p=.003$. A Scheffé post hoc test showed that Caucasian people ($M=71.5418$) scored significantly higher in job control than African American people ($M=66.3396$) scored. A t-test showed that women ($M=69.2693, s.d.=10.88548$) scored significantly lower on job control than men ($M=74.1850, s.d.=11.82481$) scored, $p<.001$. Women ($M=0.9893, s.d.=.22052$) also scored significantly higher on job strain than men ($M=0.9344, s.d.=.24106$) scored, $p= .010$.

Both job control ($r=.321, p<.001$) and job demands ($r=.360, p<.001$) increased significantly with an increase in hours worked per week. Age was significantly correlated with job control, $r = .119, p=.006$. As employee age increased, perceived job control increased.

The survey scale means reflected that of national averages for JCQ scales from 1969, 1972, and 1977 U.S. Quality of Employment Surveys of 4,495 men and women (Schnall, 2004). See Table 4.1.
Table 4.1
Job Strain Variable Means: National, Study, and Individual Exercise Stages of Change

<table>
<thead>
<tr>
<th>Job Strain Variable</th>
<th>Exercise Stage of Change</th>
<th>National Means &amp; s.d.</th>
<th>Study Means &amp; s.d.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Precontemplator</td>
<td>Contemplator</td>
<td>Preparer</td>
</tr>
<tr>
<td>Job Control</td>
<td>69.8378</td>
<td>69.3158</td>
<td>68.8395</td>
</tr>
<tr>
<td>Job Demands</td>
<td>32.4615</td>
<td>33.4868</td>
<td>34.2440</td>
</tr>
<tr>
<td>Social Support</td>
<td>24.4722</td>
<td>24.3636</td>
<td>24.0798</td>
</tr>
<tr>
<td>Job Strain</td>
<td>0.9593</td>
<td>0.9962</td>
<td>0.10200</td>
</tr>
</tbody>
</table>

* Formulas vary; exact data not available
Note. See Appendix B for calculation formulas. In this study, job strain was the quotient of (job demands x 2)/ job control.

Discussion

Exercise stage of change was analyzed in relation to four variables: job strain, job demands, job control, and social support. A Pearson correlation showed that exercise stage of change was significantly related with both job control and job strain. As stage of change progressed from precontemplation to maintenance, perceptions of job control increased significantly. As stage of change progressed from precontemplation to maintenance, perceptions of job strain lessened significantly.

Significant differences in both job strain and job control were found between the maintenance and planning stages of change. The results indicated that an exercise maintainer perceived higher control at work than did an exercise preparer. Accordingly, an exercise maintainer perceived lower job strain than did an exercise preparer. While no significant differences in social support were found between the stages of change,
preparers scored the lowest ($M=24.0798$) and maintainers scored the highest
($M=24.9744$) on the social support scale.

Significant differences in job demands were not found between the five stages of
change. However, preparers reported having the highest demands (mean range 32.4615 to
34.2440). Along with the preparers' significantly lower scores on job control, the higher
demand score contributed to the planners' significantly higher job strain scores.
The detrimental effects of job strain were the same detrimental effects that regular exercise impacted and often prevented. While researchers continued to provide support for the job strain and exercise connection (Payne et al., 2002), sedentary behavior and its negative health effects remained a crisis in America. Health professionals struggled to pinpoint the reason that some people did not progress or consistently regressed through the stages of change with regards to exercise.

The purpose of this study was to determine if perceived job strain levels were related to exercise stage of change. The ability to associate a level of job strain to a particular exercise stage of change could lead to better exercise intervention designs for American workers. Employers could better understand employee exercise behavior in relation to employee job strain. Worksite health promoters could detail interventions specific to employee exercise stage of change (i.e. identify the stage of change most associated with high strain, then promote exercise to that group as a form of stress relief).

Finally, increased awareness of a job strain and exercise behavior connection could be a useful planning tool when determining proper intervention timing (e.g. to determine the likelihood of an effective exercise promotion during a company’s most strenuous time of the year).

A questionnaire was administered to 905 employees that examined relationships between exercise stage of change and variables of perceived job strain. The response rate was 62.8% (n=568). The proportions of participants in each exercise stage were:
Conclusions and Recommendations

Significant relationships were found between exercise stage of change and both job control and job strain. There were no significant relationships between exercise stage of change and either job demands or social support. Women scored significantly lower in job control and higher in job strain than men scored. Job strain and exercise behavior were determinants of both the physical and financial health of a company.

Discussion

Although longitudinal research was needed to determine any causal relationships, this research suggested that encouraging individuals to become vigilant with exercise might influence perceptions of job control and job strain, or vise versa. Regular exercise
is perhaps a behavior related to reducing psychological perceptions of strain and increasing feelings of job control.

Payne et al. (2002) investigated the effect of work conditions on exercise behavior. Highly strained workers reported engaging in less exercise than less strained workers reported, even though their initial exercise intentions were not less. In this study, highly strained workers reported exercise preparation (intention but no current exercise) whereas less strained workers reported exercise maintenance (carry out exercise intentions). Maintainers carried out their intentions to exercise and also perceived lower job strain levels than any other stage of change. Preparers had not yet carried out their intentions to exercise, and scored significantly higher in job strain than did maintainers.

Payne et al. (2002) concluded that exercise intenders who did not carry out their intentions had lower perceived controllability (as measured by the question, "How much control do you have over whether you exercise?") than those who implemented their intentions. This study suggested that intenders who did not yet carry out their intentions (preparers) perceived significantly lower job control than those who implemented their intentions (maintainers). Although exercise control and job control are separate factors, they were both pertinent to people who did not yet carry out intentions to exercise.

Payne et al. (2002) further concluded that job strain does not have a direct effect on intention formation. This study concluded that job strain in the precontemplation (no intentions) and contemplation (no immediate intentions) stages of change was not significantly different from other stages. Payne et al. concluded that job strain might disrupt the ability to actually carry out exercise intentions. This study concluded that job strain was significantly higher in the preparation stage, the phase when a person had not
yet carried out his or her intention to exercise. The cross-sectional design of this study prevents presumptions that job strain precluded those who intended to exercise from implementing a regular program, but this study's results are reflective of previous experimental research.

Kristensen (1995) noted a plethora of research that showed low job strain to be associated with lower risk of health detriments such as CVD. In this study, low job strain and high job control were significant factors among exercise maintainers. Therefore, exercise maintainers possibly lowered their risks of developing vast health complications such as CVD both indirectly through low job strain, and directly through the physiological benefits of exercise.

Previous research showed social support at work to have a significant effect on certain health behaviors (Wager et al., 2003). This study found no significant direct relationship between social support and exercise stage of change. However, social support may have indirectly influenced overall perceptions of job strain.

Marcus and Forsyth (2003) recommended the stages of change as a reliable tool in implementing exercise behavior change interventions. This study reinforced the distinctiveness of exercise stage of change and suggested an inclusion of stage of change assessment in the design of corporate stress management programs. Employees engaging in regular, vigorous exercise perceived the lowest levels of job strain and enjoyed the highest levels of job control. Preparers perceived the highest levels of job strain. It was perhaps stressful to truly intend to exercise regularly, and yet lack the necessary means to reach the action stage.
Conclusions and Recommendations

Recommendations

For practice. This study provided preliminary support for incorporating exercise into stress management programs. Health educators could concentrate on helping those who are ready to begin exercise, but perhaps need to conquer barriers such as high strain working conditions. The results showed that those who have not yet carried out intentions to exercise perceived a lack of control at work and also higher levels of job strain. By assessing individual stage of change with regards to exercise, health educators could identify exercise preparers and offer professional, tailored advice to guide employees to the action stage.

If experimental studies support an interdependence of exercise and stress management, onsite exercise facilities may become standard protocol with which corporations manage stress. Likewise, stress management interventions targeted to people who are preparing to begin an exercise program might be one step towards reducing the large number of inactive Americans. Corporations might enhance exercise promotion programming in conjunction with efforts to reduce employee job strain.

For future research. Future research might add a scale that measures coping strategies. The detriment of extremely stressful working conditions depends on employee coping skills. For example, equal working conditions might affect an employee with poor coping skills differently than an employee with established coping skills. The ability to cope with stressful work conditions might significantly affect employee health behaviors, to include physical activity.

The addition of scales to measure stressors outside of the workplace would more accurately pinpoint an association between job strain and exercise stage of change. This
study measured conditions at work but did not account for life's other stressors. Future studies should measure conditions regarding finances, family, friends, health complications, and offer a chance for participants to express miscellaneous stressors.

The stages of change model used in this study incorporated both exercise intention and actual initiation. This cross-sectional study did not account for the number of times each employee cycled through the stages of change. Further, job strain levels during stage cycles were unknown. A longitudinal study could show stage cycling trends and better explain job strain implications in exercise behavior.

Future studies could benefit from limiting the sample of participants to a predetermined percentage of participants in each stage of change. This could be accomplished by qualifying all participants prior to the study, and would ensure sufficient representation of all exercise stages.

Future research might vary the methods that measure job strain and exercise behavior. Job strain could be measured independently as opposed to self-perception. Independent assessment can be done using job descriptions, cycle time in repetitive work, files produced, or any other means of verifiable data. Stress levels could be measured physiologically (heart rate, blood pressure, stress hormones); psychologically (reports of anxiety or irritability); or via third party reports (absenteeism records from Human Resources, health insurance claims).

Future research might incorporate the other Transtheoretical Model variables into the questionnaire and analysis. Factors such as decisional balance and self-efficacy would offer a more intricate view of the relationship or differences in job strain and exercise
patterns. Researchers might also explore the possibility of using exercise stage of change as a parametric, dependent variable in a study related to job strain.

Job control was significant to exercise maintainers and preparers. It would be interesting to see if lack in job control is related to lack in control in other life aspects. Longitudinal research could determine if increasing perceived exercise control might enhance the same psychological skills that perceive control in general, or at work in particular.

This study found no significant relationships between psychological job demands and exercise stage of change. Future research might vary the scale used to measure job demands. Researchers may also explore the possibility that workers with high job demands use exercise as a stress coping mechanism. Finally, researchers might rate the enjoyment and interest levels of workers with regards to their tasks, in addition to measuring the intensity of job demands.
References


Appendix A
EMPLOYEE SURVEY

**DIRECTIONS**: Please answer each question. All of your responses will be kept anonymous and confidential. By completing this questionnaire, you indicate your consent to participate in this study. Thanks for your help!

**For the purpose of this study, regular exercise is activity performed 3 to 5 times per week, for 20 to 60 minutes each session, and at 60 to 90% of your maximum heart rate. Examples include: brisk walking, swimming, basketball, jogging, aerobic classes, etc. Examples do NOT include: bowling, golf, etc.**

**Do you exercise regularly according to the above definition?** (Please check only **ONE** answer)

- ___ Yes, I have been exercising regularly for more than 6 months
- ___ Yes, I have been exercising regularly for less than 6 months
- ___ No, but I am planning to start exercising regularly in the next 30 days
- ___ No, but I am planning to start exercising regularly in the next 6 months
- ___ No, and I do not plan to start exercising regularly in the next 6 months

Because special permission is required to use questions from the Job Content Questionnaire (JCQ), questions 1-22 regarding job strain variables have been omitted from this appendix. Abbreviated forms of questions 1-22 are included in Appendix B. For a full version of JCQ questions, please contact the JCQ center (www.workhealth.org).

**DEMOGRAPHIC INFORMATION**: Please answer each question honestly.

<table>
<thead>
<tr>
<th>What is your age?</th>
<th>___Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your gender?</td>
<td>___Male ___Female</td>
</tr>
<tr>
<td>What is your marital status?</td>
<td>___Single ___Married ___Divorced/Separated ___Widowed</td>
</tr>
<tr>
<td>Which best describes your race?</td>
<td>___African American ___Asian ___Hispanic ___White ___Other</td>
</tr>
<tr>
<td>What is the average number of hours per week that you work?</td>
<td>___Hours</td>
</tr>
<tr>
<td>How long have you been in your current position (in terms of major job responsibilities and duties)?</td>
<td>___Less than 3 months ___ 3 to 6 months ___ 6 months or more</td>
</tr>
</tbody>
</table>

THANK YOU!
Appendix B

Abbreviated question forms and range calculation formulas as described by Kawakami et al. (1995).

Q1. Learn new things
Q2. Repetitive work
Q3. Requires creativity
Q4. Allows own decisions
Q5. High skill level
Q6. Little decision freedom
Q7. Variety
Q8. Lot of say
Q9. Develop own abilities
Q10. Work fast
Q11. Work hard
Q12. No excessive work
Q13. Enough time
Q14. No conflicting demands
Q15. Supervisor is concerned
Q16. Supervisor pays attention
Q17. Helpful supervisor
Q18. Supervisor is good organizer
Q19. Coworkers competent
Q20. Coworker interest in me
Q21. Friendly coworkers
Q22. Coworkers helpful

Skill Discretion  \[(Q1 + Q3 + Q5 + Q7 + Q9 + (5 – Q2)) * 2\]

Decision Authority \[(Q4 + Q8 + (5 – Q6)) * 4\]

Decision Latitude \[(\text{Skill Discretion}) + (\text{Decision Authority})\]

Psychological Demand \[(Q10 + Q11) * 3 + (15-(Q12 + Q13 + Q14)) * 2\]

Social Support \[(\text{Supervisor Support}) + (\text{Coworker Support})\]
Appendix C

Dear Associates,

Many of you may recall that in March of 2000, I had the privilege of presenting my graduate thesis at a national conference. Representing this company, my paper won an award for "Best of Conference Papers." The research demonstrated the relationship between confidence in ability to exercise and physical activity. This year, I agreed to partner with a graduate student from the University of Cincinnati, Phoebe Lubonovich to examine perceived job stress and exercise behavior. This research will help her to reach her graduate requirement and will further the understanding of variables associated with physical activity.

We need your help. We would appreciate you taking 10 minutes to complete the attached questionnaire. Your participation is voluntary and refusal to participate involves no penalty. However, your participation is greatly needed to ensure success in this study. All information will be kept anonymous and strictly confidential. Do NOT put your name on the questionnaire. Please place your completed questionnaire in the provided envelope, seal it, and submit the questionnaire via interoffice mail to Amy Pawlak in Human Resources by Friday, May 28th.

Thank you for your time and contribution to the field of occupational health!

Sincerely,

Amy Pawlak, M.Ed., CHES
Health Promotion Specialist

Phoebe Lubonovich
Graduate Student
University of Cincinnati
Appendix D

This morning, 5-17-04, you received a brief survey.

Please take a moment to review the cover letter, complete the one-page questionnaire, and return it to Amy Pawlak in HR no later than Friday, May 28th.

Your participation is greatly appreciated.

Thank you.

Amy E. Pawlak, M.Ed., CHES
Health Promotion Specialist
Appendix E

This is a friendly reminder that Friday, May 28th is the deadline for the Job Content & Exercise survey to be returned. You should have received the survey last Monday, the 17th. If you did not receive one, or have misplaced it, it is attached for your convenience.

Please return all surveys attention Amy Pawlak in Human Resources.

Thank you for your attention.