To the Graduate Council:

I am submitting herewith a dissertation written by William Tunstall Rogerson, Jr., entitled "Absenteeism and Presenteeism as Related to Self-Reported Health Status and Health Beliefs of Tennessee Safety and Health Professionals." I have examined the final paper copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Human Ecology.

Susan M. Smith, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Vice Chancellor and
Dean of Graduate Studies

ABSENTEEISM AND PRESENTEEISM AS RELATED TO SELF-REPORTED HEALTH STATUS AND HEALTH BELIEFS OF TENNESSEE SAFETY AND HEALTH PROFESSIONALS

A Dissertation
Presented for the
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William Tunstall Rogerson, Jr.
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DEDICATION

This dissertation is dedicated to my family, whom I love very much. To my wife, Lorna, without whose help, love, and devotion, this would have never been possible. This is as much your achievement as it is mine, and like everything in my life, I joyfully share it with you. This dissertation is also dedicated to the memory of my mother, Georgelyn C. Rogerson, who gave me her inquisitiveness and thirst for knowledge, and to my father, William T. Rogerson, who set the example for me for determination and perseverance. Finally, this dissertation is dedicated to my children, Michelle, Megen, Lindsay, and Douglas. I hope you are as proud of me as I am of each of you.

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I would also like to thank graduate assistants Kathy Council and Elizabeth Brown for their help, advice and encouragement during the data collection phase of this project, and Cary Springer for her assistance with the large volume of statistics generated by the research data.

ABSTRACT

The purpose of this study was to investigate the health conditions, health status, and health beliefs of Tennessee safety and health professionals using self-reported absenteeism and presenteeism. The study collected self-reported absenteeism, which is missed work due to health conditions, and, presenteeism, which is the decrement in performance due to remaining at work while impaired by health problems. The Health Belief Model was used as the theoretical framework for the study.

Two valid and reliable instruments were adapted for this study. "The Wellness Inventory," by Dr. Ron Goetzel and associates at Cornell University, and "The Health Beliefs Questionnaire," by Dr. Jerrold Mirotznik and associates at Brooklyn University, were combined to create the survey questionnaire, "Your Perceptions of How Health Conditions Impact Work Productivity," used for this research. This questionnaire was pilot tested and administered to a convenience sample of 526 safety and health professionals who attended the Tennessee Safety and Health Congress in Nashville, Tennessee, July 24-27, 2005.

The study found that Tennessee safety and health professionals who self-reported poor or fair health also reported the most absenteeism and presenteeism due to health conditions. The self-report of health status as poor or fair may serve as an accurate indicator of high rates of absenteeism and presenteeism. Employers should consider actions that focus on workers self-reporting poor or fair health status in order to reduce absenteeism and presenteeism.

The study found that allergic rhinitis did not vary by sub-groups such as age, gender, health status, smoking status, and hours worked per week. Actions to address

absenteeism and presenteeism due to certain health conditions, like allergic rhinitis, that do not vary by sub-groups should focus on all employees.

The study also found that high stress, migraines, sleep difficulties, and respiratory illness did vary by sub-groups. Actions to address these health conditions may be more efficiently addressed by focusing on sub-groups that showed significant differences in absenteeism, presenteeism, and health beliefs related to these health conditions.

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INTRODUCTION

Introduction

Health is a key component of human capital and plays a role in production at the individual, corporate, and industrial levels. Economists and company executives now realize that the general status of workforce health is a significant predictor of subsequent economic growth (McCunney, 2001; Burton, Conti, Chen, Shultz, & Edington, 1999).

Health conditions are a common cause of absenteeism and have traditionally been reported as incidental absences, sick leave, short-term disabilities, and workers' compensation. Research has suggested that presenteeism has a considerable effect on worker productivity and may be more significant than absenteeism in both costs and time lost (Goetzel, Hawkins, Ozminkowski, & Wang, 2003). Presenteeism is operationally defined as the decrement in performance in terms of efficiency, quality, speed, or output volume associated with remaining at work while impaired by health problems (Burton, et al., 1999).

For business leaders, a healthy workforce can be a potential competitive advantage. The challenge for managers is to provide effective tools that will minimize the detrimental effect of health conditions on the workforce, and thereby help corporations gain that competitive advantage. This challenge is particularly important for safety and health professionals because they are critical to corporate operations and

success, including accident prevention, emergency response, and hazardous material handling.

Few studies have investigated the health conditions that most frequently cause absenteeism and presenteeism among safety and health professionals (Ozminkowski, Goetzel, Chang, & Long, 2004). Additionally, no studies have examined the health beliefs related to absenteeism and presenteeism among this population.

Statement of the Problem

This study was designed to investigate the health conditions that caused absenteeism and presenteeism as related to the health status and health beliefs of safety and health professionals.

Purpose of the Study

The purpose of this study was to investigate the health conditions, health status, and health beliefs of Tennessee safety and health professionals usingself-reported absenteeism and presenteeism.

Research Questions

The following research questions were formulated to address the purpose of the study:

Research question 1. Are there significant differences for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, and hours worked per week in absenteeism due to health conditions?

Research question 2. Are there significant differences for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, and hours worked per week in presenteeism due to health conditions?

Research question 3. Are there significant differences between reported absenteeism and presenteeism due to self-reported health conditions for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, or hours worked per week?

Research question 4. Are there significant differences between the absenteeism and presenteeism of Tennessee safety and health professionals and their health beliefs, including perceived susceptibility, severity, benefits, and barriers?

Research question 5. Are there significant differences for Tennessee safety and health professionals grouped by age, gender, health status, smokingstatus, and hours worked per week and their health beliefs, including perceived susceptibility, severity, benefits, and barriers?

Need for the Study

Studies attempting to identify the causes of lost productivity in workforces have traditionally focused on summing illness-related absences such as incidental absences, sick leave, workers' compensation, and long- and short-term disabilities. These causes are only partial contributors to the total loss of productivity due to health conditions. Data were difficult and expensive to obtain and compile (Burton, et al., 1999). Missing from this analysis was an account of the lost productivity of workers with health conditions who remained at work.

As industry continues to transition from the age of manufacturing to the age of information, traditional measures of productivity, such as piece rates and rejection rates, lose meaning (Ozminkowski, et al., 2004). The increasingly prevalent business practice of commingling sick and vacation day allowances also makes collecting data related to absenteeism and presenteeism due to health conditions more problematic (Burton, et al., 1999).

In the past 10 years, researchers have explored the use of questionnaires that request employees to retrospectively estimate the effect of their chronic medical conditions on their work (Goetzel, Ozminkowski, & Long, 2003). Compared to traditional data collection methods, the costs of determining the effect of absenteeism and presenteeism due to health conditions can be substantially reduced when valid and reliable questionnaires are used. Additionally, these techniques open the possibility of determining lost worker productivity due to health conditions while at work (presenteeism). To date, these surveys support the assumption that job productivity is related to the health conditions of the worker (Burton, et al., 1999; Goetzel, Ozminkowski et al., 2003).

Studies linking specific health conditions to absenteeism and presenteeism and the resulting effects on productivity suggest that appropriately designed interventions may be effectively employed to reduce the degree of impairment, thereby improving worker productivity (Burton, et al., 1999; Goetzel, Anderson, Whitmer, Ozminkowski, Dunn, & Wasserman, 1998; Goetzel, Ozminkowski et al., 2003). In addition, valid and reliable self-reporting survey tools can be applied retrospectively, during the course of an intervention program, in order to evaluate the program's effect on employee health and to

monitor for improvements in productivity (Goetzel, Ozminkowski et al., 2003). With the information provided through this process, workers' productivity and health status may be considered by management to support safety and health awareness practices among workers.

A convenience sample of Tennessee safety and health professionals was chosen for this study. Safety and health professionals are expected to be more aware of their health status and beliefs than the general population of workers because of the safety and health professionals' education, training, and professional experience. In the course of their duties, safety and health professionals are more likely to be subjected to certain health conditions than workers in other professions. Law enforcement, emergency responders, and firefighters have been documented to have higher incidence rates of health conditions such as high stress and depression as a result of their work environment (Gershon, Lin & Li, 2002; Neely & Spitzer, 1997; Marmar, Weiss, Metzler, Ronfeldt, & Foreman, 1996). Numerous studies have documented the post-traumatic stress conditions affecting emergency responders and law enforcement officials after major disasters, in addition to the day-to-day stresses of responding to emergencies in their communities (Gershon, et al., 2002; Neely & Spitzer, 1997; Thompson, Kirk, & Brown, 2005).

Safety and health professionals, including medical services personnel and first responders, have exhibited respiratory illnesses and allergies at rates greater than the general population. The health conditions resulting from environmental contaminants such as mold, mildew, smoke inhalation, asbestos, and dust from building materials are likely to cause absenteeism and presenteeism (Centers for Disease Control and Prevention, 1-5, 2002; Udasin, 2000). Safety and health professionals' health conditions

are representative of those found in many industries because of the aging workforce. Additionally, broadening the understanding of how absenteeism and presenteeism can be used to measure productivity for the specific worker population is important because traditional methods of measurement, such as piecework rates, quality of product, or output volume, are not appropriate for this population (Gershon, et al., 2002).

An important component of this research was relating health beliefs to the absenteeism and presenteeism caused by health conditions for a worker population. The selection of a study population of safety and health professionals improves the ability to generalize the results. Safety and health professionals work in business and industrial settings with other worker groups and share commonalities and similar characteristics with these other members of the workforce.

Assumptions

The basic assumptions made regarding this study were as follows:

1. The respondents understood and responded truthfully and honestly to the survey questions.
2. The respondents were aware of the confidentiality of their responses.
3. The instrument used to collect data was valid and reliable.
4. Study participants volunteered to participate.

Delimitation

For the purpose of this study the following delimitation was made:

The study population was delimited to a convenience sample drawn from the attendees at the Tennessee Safety and Health Congress who visited the University of Tennessee Safety Center exhibit booth at the Gaylord Opryland Resort and Convention Center, Nashville, Tennessee, on July 25 and 26, 2005.

Limitations

The study was limited in the following ways:

1. Tennessee safety and health professionals self-reported absenteeism and presenteeism due to health conditions. No effort was made to ascertain the reliability of what they self-reported.
2. Existing health conditions may or may not have been reported because they were not diagnosed or treated by a health care professional.
3. Tennessee safety and health professionals self-reported health status and health beliefs accurately. No effort was made to ascertain the reliability of what they reported.

Definition of Terms

Specific terms operationally defined for this study are as follows:

A. Absenteeism: Missing work because of health conditions (Ozminkowski, et al., 2004).

B. Presenteeism: The decrement in performance (efficiency, quality, speed, or volume) associated with remaining at work while impaired by health problems (Burton, et al., 1999).

C. Health Belief Model: A conceptual framework for studies that propose to identify and clarify other factors involved in patient compliance to a suggested regimen for health problem management (Dean-Baar, 1994).

D. Perceived Susceptibility: An individual's subjective perception of his or her own risk of, or vulnerability to, a specific disease or condition (Dean-Baar, 1994).

E. Perceived Severity: An individual's perception of the medical and social consequences of contracting a disease, or not treating a disease that is already present (Dean-Baar, 1994).

F. Perceived Benefits: An individual's beliefs about the likelihood that possible actions available to him or her will lead to effective treatment or prevention of the disease (Dean-Baar, 1994).

G. Perceived Barriers: The potential negative aspects of a recommended course of action. Perceived barriers can include factors such as cost, amount of time required, convenience or inconvenience related to the course of action, side effects of the action, and degree of unpleasantness (e.g., pain, upset, difficulty) (Dean-Baar, 1994).

H. Health Conditions: Operationally defined as chronic and acute illnesses and diseases that affect adult workers (Wilson,Sisk, & Baldwin., 1997).

Summary

The amount of worker absenteeism and presenteeism due to health conditions has a significant effect on worker productivity. Absenteeism and presenteeism are unknown variables that may affect the cost of doing business for employers. Until recently, management has focused on health care insurance costs and lost time due to absenteeism as measures to gauge the cost of lost productivity due to health conditions. However, research has suggested that this practice significantly understates the extent of lost productivity by ignoring presenteeism—the impairment caused by health conditions on workers while at work. In some cases, research has indicated that presenteeism may be a more significant cost than absenteeism, and should not be ignored when evaluating possible actions (Goetzel, Long, Ozminkowski, Hawkins, Wang & Lynch, 2004). Research has further suggested that surveys are a valid, reliable, and cost effective way to evaluate worker absenteeism and presenteeism due to health conditions (Ozminkowski, et al., 2004).

Current efforts to assess lost productivity due to health conditions are aimed at determining which health conditions are the most prevalent and costly (Goetzel, Hawkins, et al., 2003). If absenteeism and presenteeism costs can be reduced by overcoming the effects of health conditions, substantial improvement in productivity may be realized.

A key factor in the potential effectiveness of any health intervention method is understanding the health beliefs of the employees. In order to design effective intervention programs, managers must understand employee beliefs as they relate to

health conditions. This study adopted the Health Belief Model as the theoretical framework for investigation.

In order to study the population of safety and health workers, a convenience sample of safety and health professionals was selected. Safety and health professionals are subject to many of the same issues and work alongside other workforce populations. However, they are subject to more work-related stress and depression and are exposed to more environmental and communicable diseases than most other sub-populations of workers (Thompson, et al, 2005; Gershon, et al., 2002; Neely & Spitzer, 1997; Marmar, et al., 1996).

In this chapter, the introduction, purpose, and research questions that guided the study were presented. Additionally, delimitations and limitations were identified and the justification for the study was presented. Chapter 2 provides a review of the literature, including literature related in content and methodology. Chapter 3 presents the methodology selected for collecting and analyzing the data. Chapter 4 discusses the data, and Chapter 5 presents the conclusions and recommendations.

CHAPTER 2

REVIEW OF RELATED RESEARCH AND LITERATURE

Introduction

The purpose of this chapter is to review research and literature related to absenteeism and presenteeism caused by health conditions, health conditions affecting safety and health professionals, and health beliefs of affected workers who suffer from these health conditions. The chapter is divided into three sections:

1. Literature related in content
2. Literature related in methodology and content
3. Literature related in methodology

Part 1 presents literature and research related to the impact of health conditions on the work productivity of safety and health professionals. This part identifies the primary health conditions that cause reduced work productivity and discusses the health conditions that present the highest risk factors among safety and health professionals. Literature and research related to the health beliefs of adult members of the workforce, evaluated within the framework of the Health Belief Model, are then presented.

Part 2 presents literature and research related in methodology and content. This part includes a discussion of the instruments selected for inclusion in the questionnaire used in this study, the reasons they were selected, and validity and reliability information.

Part 3 of this chapter presents literature related in methodology.

Part 1: Literature Related in Content

Health Conditions Affecting Safety and Health Professionals

The purpose of this section is to present literature related in content. The primary heath conditions affecting safety and health professionals can be divided into two major categories: stress-induced illnesses, such as high stress, migraines, sleep difficulties, and depression; and environment-induced illnesses, such as allergic rhinitis and respiratory illness.

There is general agreement in the literature that safety and health professionals, by the nature of their work, are subject to some of the most stressful work environments, and rank near the top of job categories for stress and stress-induced illnesses (Collins & Gibbs, 2003; Sauter, Murphy, & Hurrell, 1990). Health professionals have higher than expected rates of burnout, mental disorders, admission rates to mental health centers, and suicide rates (Sauter, et al. 1990). Firefighters, ambulance drivers, law enforcement personnel, and hospital and nursing home employees experience stressors specific to these occupations that can result in post traumatic stress disorder (Collins & Gibbs, 2003; Sauter, et al., 1990). They are also subject to normal administrative and workplace stresses inherent in a rigid command-and-control organizational structure. They deal with cultural factors that cause them to feel they have no control over decision making. They also deal with the general public on a daily basis and are subject to oversight and internal investigations (Collins & Gibbs, 2003).

The Occupational Disease Intelligence Network system for Surveillance of Occupational Stress and Mental Illness reports that law enforcement is considered among the top three most stressful occupations (Collins & Gibbs, 2003). Studies examining the

effect of stress on police forces have found levels of post traumatic stress disorder above the levels in the general population (Gershon, el al., 2002). In these studies, police officers self-report the traumatic affect of the increasing threat of violent crimes, including partners killed or injured, gruesome murders, deaths, and injuries to women and children near the age of their own family members, and mass casualty disasters, such as the World Trade Center terrorist attack (Gershon, et al., 2002; CDC, 1-5, 2002; CDC 8-10, 2002).

Gershon, et al. (2002) studied work stress in aging police officers and found that the most important risk factors were poor coping behaviors, such as alcohol abuse or problem gambling, and exposure to critical events like shootings. The researchers found that older police officers subject to high stress are at risk for other serious health conditions. Three of four officers reporting high stress also reported symptoms of depression, and half reported symptoms of post traumatic stress disorder. The researchers also found that 60% of the officers reporting high stress also reported abusing alcohol in an effort to cope (Gershon, et al., 2002).

Twenty percent of the rescue and emergency workers at the World Trade Center reported symptoms above the threshold level for post traumatic stress, four times the percentage lifetime expectancy of post traumatic stress disorder in the male general population (CDC, 2004). Researchers are finding that post traumatic stress disorder can occur in persons, such as ambulance attendants and firefighters, who witness stressful events (Laposa, Alden, & Fullerton, 2003). A study of emergency nurses at an urban center hospital reported that 12% of the emergency nurses who participated in the study

met the criteria for a diagnosis of post traumatic stress disorder and 20% had post traumatic stress symptoms (Laposa, et al., 2003).

Stressful events most frequently selected as upsetting were (1) providing care to a patient who is a relative or close friend and who is dying or in serious condition; (2) threatened physical assault of self; (3) multiple trauma with massive bleeding or dismemberment; (4) death of a child; (5) providing care to a traumatized patient who resembles yourself or family members in age or appearance; and (6) caring for a severely burned patient (Laposa, et al., 2003). The researchers reported that the prevalence of diagnosis of post traumatic stress disorder in the emergency nurse sample was similar to the prevalence in ambulance drivers and somewhat lower than the prevalence in firefighters found in their other research (Laposa, et al., 2003; Laposa & Alden, 2003)

However, other studies have shown that daily occupational stress caused by organization climate and culture is a more significant cause of stress and related health conditions such as depression, migraines, and sleep difficulties than is post traumatic stress (Collins & Gibbs, 2003; Violanti & Aron, 1994; Kirkcaldy, Cooper, & Ruffalo, 1995). Collectively, these stress-related sicknesses have placed a significant burden on productivity and caused sickness absence and early retirement. Studies have also found suicide levels several times higher in police officers than in the general public (Neylan, Metzler, Best, Weiss, Fagan, Liberman, et al., 2002; McCafferty, F., McCafferty, E., & McCafferty M., 1992). In the United Kingdom, records indicate that 26% of police-force medical retirement is due to psychological ill health (Her Majesty's Inspectorate of Constabulary, 1997). Organizational issues such as police work conflicting with home-life demands, ever increasing workload, constant contact with the general population,

rigid managerial structure, cultural factors that preclude seeking counseling, and internal affairs investigations are frequently reported as causes of high stress.

Collins & Gibbs (2003) reported that 41% of a sample of county police officers reported high stress levels. The study found that the daily organizational and operational stressors were significantly more stressful than for the low stress respondents, but that median values clearly showed a greater perception of stress associated with organizational issues than operational issues. Five of the seven significant predictors of reporting high stress were organizational, and included the top two stressors. These were (1) demands of work impinging on home; (2) not enough support from senior officers; (3) subject to complaints and investigation; (4) not enough control over work; and (5) urgent requests preventing planned work. The two operational stressors that were significant predictors of high stress in police officers were (1) dealing with someone who was drunk and (2) being at risk for hepatitis or AIDS (Collins & Gibbs, 2003).

Safety and health professionals experience sleep difficulties at higher rates than does the general population. Sleep difficulties are often associated with high stress and high stress occupations, and have been associated with migraines, depression, and other stress related health conditions. Many safety and health occupations, such as law enforcement, fire fighting, and hospital and nursing home medical services, involve shift work and shift rotations. Shift work and rotating shifts have been shown to disrupt normal sleep patterns and affect work performance (Gold, Rogacz, Bock, Tosteson, Baun, Speizer, & Czeisler, 1992; Neyan, et al., 2002).

In Gold, et al. (1992), a hospital-based self-reporting questionnaire administered to nurses found that nurses on night and rotating shifts reported less uninterrupted sleep.

They were twice as likely to use medications to get to sleep, nodded off more at work and while driving to and from work, and had twice the odds of incurring accidents or errors related to drowsiness on the job, compared to day shift nurses. The researchers reported that their results were consistent with laboratory studies showing that interrupted sleep and sleep deprivation as a result of rotating shifts were associated with lapses of attention and increased reaction time and lead to increased error rates (Gold, et al., 1992).

Sleep difficulties among police officers have also been studied. In one study, police officers from New York, Oakland, and San Jose were divided into day shift and rotating shift groups, and both groups were compared to a control group uninvolved with police or emergency work. Police officers on rotating shifts were found to have more disturbed sleep than the rotating shift control group, and day shift officers had more sleep difficulties than the day shift control group. Both groups of police officers reported less time asleep on average that either control group (Neylan, et al., 2002). In this study, the high prevalence of sleep difficulty was not explained by rotating shifts or by traumatic stress, implying that the routine occupational stresses of police work were responsible (Neylan, et al., 2002).

Safety and health professionals are also at high risk of experiencing the environment-related health conditions of allergic rhinitis and respiratory illness. National and international studies have related allergic rhinitis, respiratory illness, asthma, and lung disease to occupational causes, resulting in lost work days, job changes, duty limitations, and reduction of work hours (Blanc, Burney, Janson, & Toren, 2003). These studies have shown that even upper respiratory tract infections that are normally not disabling are still often associated with a significant decrement in productivity (Blanc, et

al., 2003). Using data from the European Community Respiratory Health Survey to analyze workplace exposures and respiratory symptoms that caused job changes due to breathing difficulty, Blanc, et al. (2003), found that United States workers ranked second among industrialized nations in the prevalence of reported chest tightness or wheezing (13.1%) due to workplace atmospheric contaminants, and third in the percentage of respondents who changed jobs due to breathing difficulty (5.2%). In this study, firefighting was identified as a high-risk occupation where high occupational exposures to inhalants like vapors, gas, dust, and fumes were expected.

Research conducted on firefighters, rescue workers, and emergency personnel who were near ground zero, or who were involved in the rescue and recovery efforts immediately following the collapse of the World Trade Center Towers, has found respiratory illness and allergic rhinitis caused by acute smoke and fume inhalations and dust from crushed concrete, asbestos, gypsum, fiberglass, furnishings, paints, and office and janitor supplies (Kipen & Gochfeld, 2002; Beckett, 2002; CDC, 8-10, 2002; Banauch, Alleyne, Sanchez, Olender, Cohen, Weiden, et al., 2003). Emergency and rescue workers reported widespread development of a cough, labeled "WTC cough" by firefighters, due to the dust, smoke, and fumes at the site (Kipen & Gochfeld, 2002; CDC, 8-10, 2002; Banauch et al., 2003). "WTC cough" was found to be airway inflammation and obstruction (Banauch, et al., 2003).

During the first 48 hours after the World Trade Center collapse, 90% of the rescue workers reported WTC-related coughs, often presenting additional symptoms of nasal congestion, chest tightness or burning (CDC, 1-5, 2002; Banauch, et al., 2003). The number of respiratory medical leave incidents during the 11 months after the attack were

five times the number recorded in the 11 months before the attack, and 333 firefighters and emergency workers had WTC-related coughs severe enough to require more than four weeks of consecutive medical leave. Nearly a year later, 173 of them had not recovered and were still on medical leave or light duty (CDC, 1-5, 2002).

Absenteeism and Presenteeism

The cost burden of health conditions among employees is recognized as a significant business expense that directly affects the bottom line of large and small businesses alike. As the population ages, the work force is aging. Employees are working to an older age, and population demographics indicate that fewer young people will be entering the work force. Both of these dynamics contribute to an increase in the average age of the workforce and translate into a larger portion of the workforce that will suffer chronic health conditions that affect their work productivity. This phenomenon will further affect the cost burden of health conditions among workers for corporations.

It is difficult to determine the magnitude, principle causes, and actual cost burden of chronic illnesses. Medical expense statistics alone do not adequately represent the cost burden of chronic medical conditions to employers. Many researchers agree that medical expense statistics may represent less than half of the related expenses (Goetzel, Hawkins, et al., 2003). Absenteeism has been shown to be a significant contributor to the financial burden of health conditions. Absenteeism takes many forms, including sick time, short- and long-term disabilities (STD & LTD), workers' compensation, and Family Medical Leave (FMLA). Each form is often separately reported by different departments in most corporate offices (Goetzel, Hawkins, et al., 2003; Goetzel, Guindon, Turshen, &

Ozminkowski, 2001). Furthermore, performance on the job can suffer due to health conditions and their effects, to the point that researchers and experts in the field have coined the term "presenteeism" (Goetzel, Ozminkowski, et al., 2003; Goetzel, et al., 2004).

Operationally defined in Chapter 1, presenteeism is the reduced effectiveness or lost productivity of employees while at work due to the effects of heath conditions (Goetzel, Qzminkowski, et al., 2003). Productivity loss at work can result from a number of causes. For example, workers could lose the ability to focus or concentrate on their work, causing them to work more slowly or need to repeat a job. Interpersonal communications could also be a source of lower work productivity, resulting in delays or the necessity to repeat the communications or do the work over. This reduced effectiveness manifests itself as an indirect cost burden to businesses because employers must compensate for lost work productivity by overstaffing or suffer a reduction in sales, revenues, and profits (Goetzel, Ozminkowski, et al., 2003; Goetzel, et al., 2004).

As health insurance costs continue to rise every year at double-digit rates, and the average age of the workforce increases, the corporate community is starting to recognize that controlling these costs requires a holistic approach. To make efficient use of available resources, the most significant contributors to lost productivity must be identified, and effective intervention protocols must be devised that will provide the return on investment that justifies the effort (Goetzel, Hawkins, et al., 2003).

In *The Health and Productivity Cost Burden of the "Top 10" Physical and Mental Health Conditions Affecting Six Large U.S. Employers in 1999*, Goetzel, Hawkins, et al. (2003) conducted a retrospective review of absenteeism and STD data in medical and

pharmacy claim files of six large companies totaling 374,700 employees over a three-year period. Their goal was to determine and rank the health conditions that resulted in the highest absenteeism and costs. Physical and mental health conditions were considered separately.

The study identified the top 20 most prevalent and costly physical health conditions. These costs include the cost of absenteeism and the cost of medical treatments due to health conditions. The conditions were grouped into four broad disease categories in order of costliness: (1) cardiovascular disorders, which included angina pectoris, essential hypertension, and acute myocardial infarction, and represented the largest medical, absence, and disability costs; (2) musculoskeletal disorders, including back disorders, osteoarthritis, and spine trauma; (3) ear, nose and throat conditions; and (4) cancer (Goetzel, Hawkins, et al., 2003). Of the average $2,505 in chronic health care costs per employee, employers paid 71% for medical care, 20% for absenteeism, and 9% for STD programs (Goetzel, Hawkins, et al., 2003).

The researchers also identified the top 10 most costly mental health conditions. Bipolar disorders and depression represented the most costly mental health conditions, although these costs, at about $179 per employee, were only 4.8% of the total health care expenses. The costs for mental health conditions were more evenly divided, with medical care representing 53%, absenteeism 34%, and STD programs accounting for 13% of the total (Goetzel, Hawkins, et al., 2003).

In aggregate, the total health care costs due to health conditions averaged $3,703 per employee. The top 10 physical health conditions represented 27% of total health care costs for the six companies, and the top 20 accounted for 38% (Goetzel, Hawkins, et al.,

2003). The researchers also found that incidental absences, such as when employees call in "sick," cost employers more than twice as much as STD absences (20% versus 9% for chronic physical conditions and 34% versus 13% for mental health conditions, of the total health program budget). They conclude that this provides an indication that incidental absences are not well managed, whereas STD incidents are closely monitored, often by outside subcontractors (Goetzel, Hawkins, et al., 2003).

In a follow-up article, Goetzel, et al. (2004) further refined their analysis, and included work productivity losses due to presenteeism. Five large-scale multi-health condition studies that included self-reported surveys assessing both presenteeism and absenteeism were analyzed. These data were then compared to the absenteeism data from medical records and prescription drug insurance claims, absence, and STD records studied previously.

In this study, presenteeism was found to account for an average of 61% of the total costs for each of the top 10 physical health conditions, ranging from migraine/headache (89%), allergies (82%), and arthritis (77%) at the high end, to respiratory infections (25%) and heart disease (19%) at the low end, implying that between one-fifth and three-fifths of employer costs for health conditions are due to the loss of on-the-job work effectiveness. Furthermore, the effects of presenteeism drove the main contributors to health care costs. When presenteeism was taken into account, the researchers found that the top four most expensive chronic health conditions were hypertension, depression/sadness/mental illness, heart disease, and arthritis (Goetzel, et al., 2004).

There were several limitations to this study. The researchers found little uniformity in the five self-reporting presenteeism surveys they evaluated and a large variability in cost estimates due to lost work productivity generated by the instruments. They called for additional surveys to reduce this variability, and recommended establishing common metrics and approaches to measuring presenteeism (Goetzel, et al., 2004).

In 1998, Goetzel, et al. studied the relationship between 10 modifiable health risk factors and medical costs among an employee population. The researchers used the Health Enhancement Research Organization (HERO) database, consisting of 61,568 employees at six large companies across the country over 1990-1995 and generated by a self-report instrument that measured health habits and practices. Health risks associated with physical activity, exercise patterns, alcohol consumption, eating habits, tobacco use, depression, and stress were assessed through the self-report instrument. Blood pressure, total cholesterol, height, body weight, and blood glucose level were collected during screening exams. Insurance claims for inpatient and outpatient medical services were also incorporated into the study.

The results of the study suggested that employees with high risk factors for poor health outcomes had significantly higher health care expenditures than did those at lower risk in seven of the ten risk categories (those depressed, under high stress, having high blood glucose level, having extremely high or low body weight, being former and current tobacco users, having high blood pressure, and having sedentary lifestyles). These employees also showed a likelihood of having extremely high (outlier) expenditures over a short-term period. Two psychological factors—depressed and highly stressed—were

found to be the largest causes of medical expenditures, accounting for the largest cost variance between low- and high-risk workers. Additionally, employees with multiple high-risk profiles (such as self reporting high stress, high blood pressure, and excessive alcohol consumption) had higher health care expenditures than did those without the profiles for heart disease, psychological problems, and stroke (Goetzel, et al., 1998).

Goetzel et al. (1998) concluded that common modifiable health risks are related to a short-term increase in incurring health expenditures and to the size of those expenditures. Furthermore, these researchers defined the need for future research on establishing which interventions are most effective in reducing population risk, and whether cost benefits accrue with the risk reduction (Goetzel, et al., 1998).

Few rigorous studies have evaluated the effect of workplace programs in reducing these modifiable health risks in a cost effective manner. In 1999, Goetzel, Juday, & Ozminkowski conducted a systematic Meta literature study and analysis of return-on-investment studies of corporate health and productivity management programs. The researchers identified the most rigorous studies of health management (including health promotion, disease prevention, and wellness), as well as disease and demand management programs, and evaluated their health benefit versus cost ratios, or return-on-investment. All of these definitive studies demonstrated a positive return on the health care investment dollar (Goetzel, et al., 1999).

The study found that less costly interventions provided to the employee at home, by mail, or by telephone were often more cost effective than were many of the more expensive programs. The researchers also found that programs that combined corporate health management and disease and/or demand management were also particularly

successful. These programs employed health-risk appraisal methods to identify workers with high-risk profiles. These employees were triaged into risk-appropriate intervention programs and provided tailored communication and health education, appropriate self-help materials, and appropriate follow-up. The study concluded that in keeping with the researchers' experience, these programs can yield significant cost savings if they target a high-risk population and provide effective interventions (Goetzel, et al., 1999).

Health Beliefs and the Health Belief Model

Once the primary health conditions affecting the workforce and the associated amount of absenteeism and presenteeism due to employee health conditions have been identified, the potential for determining actions to improve health and reduce absenteeism and presenteeism should be investigated. This study used the Health Belief Model to form the conceptual framework for evaluating health beliefs, which may be considered when determining appropriate actions to improve health and reduce absenteeism and presenteeism.

The Health Belief Model has been one of the most widely used theoretical concepts for explaining individual human behavior and beliefs for over 50 years (Strecher & Rosenstock, 1997; Quinn & Coreil; 2001). It provides a conceptual framework for studies that propose to identify and clarify factors involved in patient participation in and compliance to a suggested regimen for health problem management (Rosenstock, 1974; Dean-Baar, 1994).

The Health Belief Model is a psychological value expectancy theory translated into health-related behavior (Strecher & Rosenstock, 1997). It evolved from efforts by

psychologists to understand the failure of many adults to participate in free tuberculosis screening in the early 1950s, and has been used to explain and intervene in a wide variety of health-related behaviors (Strecher & Rosenstock, 1997).

The Health Belief Model postulates that if individuals are to take disease prevention measures, they must feel susceptible to the disease, believe that occurrence of the disease would have a serious impact on life, and judge that preventive measures are beneficial, out-weighing any barriers involved in taking such measures (Chang, Chen CN, & Chen CL, 2003; Conway, Hu, Bennett, & Niedos, 1999; Strecher & Rosenstock, 1997; Wilson, et al., 1997). The four constructs of the Health Belief Model are presented below.

Perceived Susceptibility: An individual's subjective perception of his or her own risk of, or vulnerability to, a specific disease or condition (Dean-Baar, 1994; Wilson, et al., 1997; Chen, Neufeld, Feely, & Skinner, 1998). If the individual has already contracted the disease or condition, the model considers an individual's acceptance of the diagnosis or susceptibility to illness in general (Strecher & Rosenstock, 1997).

Perceived Severity: An individual's perception of the medical and social consequences of contracting a disease or of not treating a disease that is already present (Dean-Baar, 1994). It is an individual's perception of the degree of harm such a disease would bring upon that individual (e.g., death, disability, pain) and possible social consequences (e.g., effects of the condition on work, family life, and social relations) (Wilson, et al., 1997; Chen et al., 1998; Strecher & Rosenstock, 1997).

Perceived Benefits: An individual's beliefs about the likelihood that possible actions available to him or her will lead to effective treatment or prevention of the disease. This also includes an evaluation by the individual of the feasibility of the course(s) of action available and the individual's belief that complying with the intervention or wellness education may help improve health (Dean-Baar, 1994; Wilson, et al., 1997). Benefits do not have to relate to the individual's health. Potential benefits that are not health related include saving money by quitting smoking or pleasing family members, or a child receiving a lollypop for getting a shot (Strecher and Rosenstock, 1997).

Perceived Barriers: Barriers are the potential negative aspects of a recommended course of action and can include factors such as cost, amount of time required, convenience or inconvenience related to the course of action, side effects of the action, and degree of unpleasantness (e.g., pain, upset, difficulty) (Dean-Baar, 1994). Barriers can also include unpleasantness associated with adopting or undertaking the intervention or wellness program and logistical difficulties in participation (e.g., too expensive, dangerous side effects, painful, difficult, upsetting, inconvenient, or time-consuming (Wilson, et al., 1997; Chen et al., 1998; Quinn & Coreil, 2001).

Although published research exists regarding a number of specific disease prevention practices, including AIDS protection, breast self-examination, testicular self-examination, and compliance with mammography, little information about the specific health beliefs of employee populations concerning actions to improve health status has been found in the literature (Wilson, et al., 1997). The role of health beliefs and how

behaviors can be changed during the management of chronic illnesses have not been adequately explored (Wilson, et al., 1997).

Health behaviors and barriers of specific worker groups may differ significantly. For example, reasons for non-participation in company-sponsored standard employee wellness programs could involve special barriers associated with shift work, rotating shifts, or working more than one job to make ends meet (Alexy, 1991).

Researchers have reported that population-specific Health Belief Model tools have been used to plan actions to reduce chronic and preventable diseases such as diabetes and to improve breast self-examination as a preventive measure (Dean-Baar, 1994; Chang, et al., 2003). However, additional research is needed to systematically compare the attitude of specific groups to reported health conditions related to acute and chronic disease association with lifestyle habits (Gabhainn, Kelleher, Naughton, Carter, Flannagan, & McGrath, 1999; Goldring, Taylor, Kemeny, Anton, 2002). A number of studies of chronically ill populations have applied the Health Belief Model to the respondents' willingness to maintain a medication-taking regimen. Perceived benefits and costs were found to be predictors of medication-taking behavior among hypertension and cancer patients (Brown & Segal, 1996; Newell, Price, Roberts, & Bauman, 1986), and perceived severity was predictive of smoking cessations in medication-taking heart disease patients (Pederson, Wanklin, & Baskerville, 1984). Health Belief Model constructs have also been used as the framework for studying self-reported medication-taking behavior among diabetics, and adherence to arthritis regimen among a group with chronic arthritis (Dean-Baar, 1994).

Age, knowledge, smoking, and fitness level are socio-demographic factors that have been studied in relationship to health behavior (Wilson, et al., 1997). In a study that looked at socio-demographic factors using the framework of the Health Belief Model, Dean-Baar (1994) reported that age, diagnosis, marital status, and religion resulted in significant differences between two samples of arthritis patients. In this study, the research findings suggest that investigating the relationship between the dimensions of the Health Belief Model and socio-demographic variables may provide information that can be used to tailor interventions. Dean-Baar (1994) suggests that in the future, clinicians may be able to use valid and reliable Health Belief Model instrument subscale scores to indicate which specific health beliefs are most important to the individual and therefore which aspects a health care provider should focus on to modify behavior.

Goldring et al. (2002) explored the health beliefs of a population of chronically ill inflammatory bowel disease patients using the framework of the Health Belief Model, and also considered the effects of quality of life and physician-patient relationship. The researchers found that the Health Belief Model constructs were the strongest predictors of medication-taking intention. In particular, the researchers found that the higher the self-reported perceived risk of disease flare-up, the higher the self-reported intention to take their medicine. The researchers concluded that because chronically ill patients face different challenges and constraints, they might make different treatment decisions than would healthy or acutely ill patients. The severity of the patient's condition was a significant factor in the patient's receptivity to the costs and benefits of proposed treatments. More symptomatic patients were sensitive to both costs and benefits, whereas less symptomatic patients focused more on costs alone (Goldring, et al., 2002).

Janz and Becker (1984) reviewed 46 different studies that used the Health Belief Model constructs and found perceived barriers to be the most powerful single predictor of health behavior across all of the studies. Perceived susceptibility was a stronger predictor of participation in preventive health behaviors, whereas the construct of perceived benefits was a stronger predictor of health actions recommended for persons who already had a medical condition (i.e. compliance with a treatment or rehabilitative regimen).

As advancements in medical care contribute to lengthening average life spans, the number of members in the general population with chronic illness is increasing. One of the treatment goals for chronic illness is to get patients to engage in behaviors that will help manage their diseases. Dean-Baar (1994) used the Health Belief Model as the conceptual framework for studying the factors that affect patient compliance with a suggested regimen, including self-management techniques, modifications in lifestyle, and medical treatment for arthritis.

Likewise, in a study of the health beliefs of a general population sample of Michigan residents, Weissfeld, Kirscht, & Brock (1990) suggested that practitioners may be better able to tailor the content of health education programs to particular members and specific population subgroups of the community with knowledge gained from the Health Belief Models. These researchers suggest that doing so may have wide implications for policy makers. In the Michigan survey, strong associations between perceived health status and other health beliefs were found. In addition, female, non-white, less educated, and lower income respondents reported more concern about their health and reported greater susceptibility to the ill effects of disease (Weissfeld, et al., 1990).

Part 2: Literature Related in Methodology and Content

Absenteeism and Presenteeism

The purpose of this section is to present literature related in methodology and content. As health care costs have spiraled, corporations have taken note of literature demonstrating that chronic and acute health conditions reduce employee productivity. Employers have come to realize that if they keep their employees healthier, the employees will be more productive, and the improvement will be apparent in the corporate bottom line. As a result, there has been a recent surge in new productivity tools constructed to measure the loss of work productivity due to absenteeism and presenteeism. These tools are designed to assist employers in quantifying the full cost burden of health conditions within their companies (Ozminkowski, et al., 2004; Goetzel, Ozminkowski, et al., 2003).

To quantify the cost burden of health conditions, careful research into the impact of major health conditions on work productivity is being conducted, but this research is still in its infancy. The aim of the research is to relate the health and productivity cost burden of specific illnesses to their respective risk factors in order to identify appropriate and effective health and disease management programs and interventions. Once accurate, valid, and reliable measurement instruments exist, corporations can employ them to evaluate the potential return on investment of providing alternative health and disease management programs for their employees. Additionally, employers will be able to apply these tools retrospectively, after interventions have been established for some period of time, in order to measure and evaluate a program's performance in improving health and productivity (Goetzel, Ozminkowski, et al., 2003).

Ozminkowski, et al. (2004) conducted a Meta literature review using the Medline/Healthstar database, and supplemented by the "Gold Book," *Measuring Employee Productivity: A Guide to Self-Assessment Tools,* published by Lynch and Riedel (2001). The researchers reviewed nine productivity surveys designed primarily for adult employees, varying from 15 to 30 questions, and including telephone surveys, and paper and pencil instruments. Recall periods varied from one week to one year, although most were three months or less. One instrument, the Work Productivity Short Inventory (WPSI), consisted of four versions with different recall periods. Based on results from the one-year WPSI, the researchers reported some evidence indicating that a one-year period induces conservatism because current temporary health conditions could get extended across a full year time frame when shorter periods summed together would show more variation (Ozminkowski, et al., 2004).

The researchers conducted a comparison study utilizing the WPSI and the Work Limitations Questionnaire (WLQ) administered to the same employee population (N=567) of a large telecommunications firm over the Internet. Survey order bias was eliminated by asking the WPSI questions first for half of the population and the WLQ questions first for the other half, selected randomly. The researchers reported that reliability and validity data for both instruments were available in the literature (Ozminkowski, et al., 2004).

The WPSI, also known as the "The Wellness Inventory," was characterized as a directional device to assist employers in quickly estimating the productivity losses associated with 15 highly prevalent or expensive acute, intermittent, or chronic medical conditions over a four-week recall period. Based on the results, the employer would be

better able to select appropriate disease management or intervention programs to target a reduction in the health-related productivity costs of the company's workforce (Ozminkowski, et al., 2004; Goetzel, Ozminkowski, et al., 2003).

The instrument was not designed to determine the full cost burden of all illnesses but, instead, to identify the burden of the most prevalent and expensive health problems experienced in the corporate environment. The results can be utilized to prioritize the most prevalent chronic health conditions and predict the return on investment of competing intervention programs (Goetzel, Ozminkowski, et al., 2003).

The researchers described the WLQ as a general tool to measure the degree to which health conditions interfered with performing job tasks and contributed to subsequent productivity loss. This 25-item instrument used a two-week recall period and has been validated for a variety of employee populations and illnesses. For this comparison, the researchers used a four-week recall timeframe (Ozminkowski, et al., 2004; Lerner, Amick, Rogers, Malspeis, Bungay, & Cynn, 2001).

The WLQ yields data on performance of specific job tasks and generates four scale scores, summarizing the job's (1) physical demands, (2) time-management demands, (3) mental and interpersonal demands, and (4) output demands, in terms of quantity, quality, and timeliness. These scores are combined to generate a productivity loss index, or the loss of work output due to presenteeism per hour compared to a healthy employee standard (Ozminkowski, et al., 2004; Lerner, et al., 2001).

In this study, average at-work productivity loss, or presenteeism, was measured as 4.9% on the WLQ, and 6.9% on the WPSI, and was associated with the existence of particular medical conditions. Significant statistical correlations between the surveys

were identified for allergy (.16), depression (.28), and high stress (.25), and marginally so for workers who served as caregivers for children with respiratory disorders (.33 correlation; p = .0512) (Ozminkowski, et al., 2004).

Both instruments also suggested that total productivity losses were significantly influenced by perceived health status as well as specific medical conditions. However, the losses due to specific medical conditions suggested by the WPSI were more pronounced. The researchers attributed this to narrower, illness-specific items in the WPSI compared to the broader WLQ questions that may also have resulted in the summing of multiple medical conditions that existed at the same time. As a result, they postulated that although the WPSI was more useful as a diagnostic tool to determine whether specific diseases or medical conditions affected productivity, it might overstate productivity losses for employees who have more that one health condition and are unable to differentiate between them in determining the cause (Ozminkowski, et al., 2004).

The comparison study was limited by response rate (9.7%) and medical conditions that affected fewer than 30 respondents. The researchers believed that these limitations affected the generalizing of the results to other employers, but the comparison of the instruments was still valid, since the same population was used for both (Ozminkowski, et al., 2004).

The WPSI development and reliability was assessed by Goetzel, Ozminkowski, et al. (2003) and found to be a highly reliable tool for estimating the relative contribution of specific medical conditions to worker productivity. For the assessment, three versions of the instrument were developed and distributed randomly to volunteers at a large

manufacturing and communication firm's health fair. The surveys differed only in the recall time periods to be considered, consisting of surveys for recall response periods of one year, three months, and two weeks (Goetzel, Ozminkowski, et al., 2003).

Since the WPSI was short and considered a variety of conditions that were not expected to be problematic for the respondents, scale-based reliability measures such as Cronbach's alpha were not considered applicable. Additionally, only one administration of the instrument was possible, so test-retest could not be used. As a result, the researchers used split-sample techniques focused on the variability of the survey responses to assess reliability. Participants were randomly divided into two equal groups, and reliability was determined by comparing the portion of respondents that suffered productivity losses due to health conditions across the two groups for each survey instrument. Z-tests for differences in proportions were calculated to evaluate whether the proportions differed by group for each version of the survey (Goetzel, Ozminkowski, et al., 2003).

The researchers established five reliability criteria for the financial metrics for each version of the WPSI. The overall reliability of each instrument was then estimated as the percentage of time these criteria were met. The criteria were:

1. Correlation of dollar metric values between the two groups as measured by the correlation coefficient. The researchers reported that Nunnally (1978) suggested that correlations greater than .70 were evidence of satisfactory reliability. They used Kendall's tau as the correlation measure, in order to measure the direction as well as the magnitude of differences between group dollar values.

2. Correlations were determined to be significantly different from zero by Z-test.
3. The third criterion was to investigate the consistency of the averages between the two randomly divided respondent groups by applying the *t*-test to differences in the average values. A significant difference in mean values would be interpreted as a reliability problem.
4. No group mean should be more than twice as large as the mean of the other group that participated in the survey. This criterion guarded against the possibility that the *t*-tests might miss moderately sized reliability problems, or that sample sizes were too small to find significant differences in the comparisons.
5. The fifth criterion utilized the calculation of coefficients of variation on the differences in the dollar metrics across the two groups. This was accomplished by sorting each group from lowest to highest and then calculating the difference between the dollar metrics as the group 1 dollar metric for each respondent minus the associated group 2 value. The coefficient of variation was defined as the standard deviation of the difference value, divided by its mean. Whereas the *t*-test had measured whether the difference values had a mean equal to zero, the coefficient of variation focused on the variability of the differences (Goetzel, Ozminkowski, et al., 2003).

Once these criteria were completed, the results were determined by counting the frequency and proportional time the criteria were met. The overall reliability was then evaluated by the proportion of time the dollar metrics were consistent with expectations.

Z-tests were used to compare the reliability of the three different survey recall periods (Goetzel, Ozminkowski, et al., 2003).

Based on their results, the researchers reported that the WPSI was likely to provide very reliable estimates of the percentage of employees with absenteeism or presenteeism productivity losses related to the 15 medical conditions tested by the instrument. In addition, the WPSI was found to generate reliable estimates of the financial burden of the conditions. Although the reliability statistics of the three survey recall periods varied, the variance was not significantly different to the .05 level, ranging from 66.2% to 75.4%. However, the researchers recommended the 12-month survey recall period, suggesting that it would better capture intermittent and acute health problems in addition to chronic health conditions (Goetzel, Ozminkowski, et al., 2003).

The researchers recommended two actions to potentially improve instrument reliability: increase the sample population size and modify the wording for items related to depression, stress, diabetes, and hypertension to compensate for outlier values found in the data. Finally, the researchers contended that most instrument developers focus on simpler reliability metrics like Cronbach's alpha or replications that generate correlation coefficients. They recommended applying multiple reliability metrics similar to those they used as well in order to develop a more complete picture of reliability (Goetzel, Ozminkowski, et al., 2003).

Ozminkowski, Ozminkowski, et al. (2003) conducted a validity analysis of the WPSI. In this study, content, predictive, and construct validity were investigated for all three survey recall periods. The WPSI was pre-tested at a large company prior to being administered to test validity at a manufacturing firm in Virginia. The responses were

used to revise the instrument to enhance clarity and readability (Ozminkowski, Goetzel, & Long, 2003).

Content validity was performed to determine whether the WPSI adequately represented the group of medical conditions having a large potential impact on work productivity. The researchers compared the list of diseases tested by the instrument with a list of high prevalence and high cost burden diseases derived from company medical claims and short-term disability (STD) data combined with prevalence and cost burden data from other studies that had examined productivity losses related to health conditions (Ozminkowski, et al., 2003).

Predictive validity, or the ability to predict subsequent health status, was assessed using multiple regressions. Absenteeism, presenteeism, and associated cost burden across all 15 health conditions and their influence on current perceived health status were tested while controlling for age, gender, and hours worked per week. The impact of each disease was then regressed individually (Ozminkowski, et al., 2003).

Since a high predictive validity would imply a lower perceived health status for those employees with high rates of absenteeism or presenteeism, the percentage of regression coefficients that were negative were expected to be high. Therefore, the researchers applied a *Z*-test to the difference in positive/negative coefficients to determine whether the percentage of negative regression coefficients was significantly greater than 50% (Ozminkowski, et al., 2003).

To assess construct validity, the researchers compared the three survey recall periods utilizing *Z*-tests to determine whether prevalence percentages differed according to recall period, accounting for expected variations in acute and intermittent medical

conditions over the various periods. They also compared the percentage of respondents who reported a loss in work productivity for each health condition to the proportion who used any medical care or STD program for them. A strong positive correlation coefficient was considered evidence of construct validity (Ozminkowski, et al., 2003).

Based on their results, the researchers found evidence of content validity and some evidence of predictive validity but reported that evidence for construct validity was inconclusive. Except for migraines/major headaches and asthma, the WPSI included all of the top ten most prevalent and costly diseases identified in the employer's medical claims and STD data, indicating acceptable content validity. Most of the predictive validity regression coefficients were negative, implying lower health status for employees reporting absenteeism and presenteeism, but few met significance levels of $p<.10$. Predictive validity measures were generally higher for absenteeism than for presenteeism (Ozminkowski, et al., 2003).

Although evidence for construct validity was mixed, the 12-month version of the WPSI indicated more intermittent and acute conditions than other versions, as expected. A fairly high correlation of .58 was also found between the percentage of respondents who reported absenteeism or presenteeism and the percentage of respondents who used medical care or STD programs (Ozminkowski, et al., 2003).

The study was limited by respondents' abilities to accurately assess their own productivity, and could vary if the health condition was symptomatic or if the respondent had been diagnosed and treated for the condition. To alleviate these limitations, the researchers suggested adding to the instrument questions about symptoms and whether the conditions have been formally diagnosed and treated. In addition, the researchers

reported that the self-reported survey provides indirect data, whereas the analysis of medical claims records and STD program costs provides direct data and they would not be expected to be exactly the same, although correlations of these data are implied in several studies noted in the literature (Ozminkowski, et al., 2003).

The researchers determined that the WPSI content adequately represented the conditions that influenced absenteeism and presenteeism. However, they reported that content validity was somewhat limited, since only one question on absenteeism and presenteeism was asked for each medical condition in order to limit the length of the survey instrument. They did not investigate whether more than one question was necessary to fully represent the absenteeism and presenteeism domains (Ozminkowski, et al., 2003).

Finally, the researchers identified a number of other factors that might be predicted by absenteeism and presenteeism, such as employee morale, turnover, or extent of interactions with coworkers. They suggested that additional questions about consequences of health-related absenteeism and presenteeism would improve the instrument's predictive validity, and recommended that further studies utilizing the WPSI include reliability and validity testing to strengthen the instrument (Ozminkowski, et al., 2003).

Health Beliefs

"The Health Beliefs Questionnaire," developed by Mirotznik, Feldman, & Stein (1995), has been used for a number of studies of chronic and preventable health conditions, including the health beliefs of cardiac and myocardial infarction patients

regarding adaptation and adherence to exercise programs (Al-Ali & Haddad, 2004). The questionnaire consists of six sections, including demographics, general health motivation, perceived susceptibility, perceived severity, perceived benefits, and perceived barriers to exercise.

Determining Health Beliefs and Attitudes Using the Health Belief Model Framework

Questionnaires about health beliefs and attitudes that employ the Health Belief Model framework have been used extensively in general population studies to explain and predict individual participation in, and willingness to conform to, a number of preventive and health promotion and education programs that would improve their health. These studies have included analyses of such programs as exercise regimens for heart disease patients, maintenance of diet programs for diabetics, and breast cancer screening attendance, among others (Mirotznik, et al., 1995; Al-Ali & Haddad, 2004; Lostao, Joiner, Pettit, Chorot, & Sandin, 2001).

While the Health Belief Model has been used to explain preventive, protective, illness, and sick role behaviors, little research existed that analyzed the willingness of participants to conform to a program or treatment over an extended period of time (Mirotznik, et al., 1995; Al-Ali & Haddad, 2004). Additionally, few studies of the health beliefs and attitudes of specific employee groups or worker groups exist in the literature (Wilson, et al., 1997).

To analyze the health beliefs and attitudes of the study population, "The Health Beliefs Questionnaire," developed by Dr. Jerrold Mirotznik, et al., at Brooklyn College, City University of New York, was adapted for the current study. This questionnaire

focused on the adherence of participants to an exercise regimen over an extended period, rather than on the participants' initial willingness to start such a program (Mirotznik, et al., 1995).

The strength of Mirotznik and associates' retrospective study was that it used multivariate analysis to compare the health beliefs and attitudes of participants with and without myocardial infarction, using the framework of the Health Belief Model, with actual archival records maintained by the exercise program on the participants' adherence to the program over an extended period, rather than comparing the participants' health beliefs and attitudes with subjective, self-reported exercise participation. This methodology was designed to determine the explanatory power of the Health Belief Model in total and for each of its constructs of general health motivation, perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. The study yielded evidence that health beliefs using the framework of the Health Belief Model were associated with coronary heart disease patients' adherence to the exercise regimen (Mirotznik, et al., 1995).

Validity and Reliability of "The Health Beliefs Questionnaire"

Mirotznik and associates established validity for "The Health Beliefs Questionnaire" by adopting conventionally agreed upon definitions of the Health Belief Model constructs from the literature and then modifying questionnaire items from valid and reliable questionnaires used in other situations. The resulting questions were pre-tested in a pilot questionnaire prior to administering the questionnaire to the study population. The researchers reported that this process was consistent with the

development of other Health Belief Model questionnaires found throughout the literature. In addition, the researchers concluded that the use of attendance records provided apparent objectivity and face validity. The researchers assessed internal consistency reliability for "The Health Beliefs Questionnaire" constructs using Cronbach's alpha. These reliability coefficients ranged from .44 for general health motivation to .73 for perceived benefits of exercise, which was consistent with other related studies in the literature (Mirotznik, et al., 1995).

"The Health Beliefs Questionnaire" has also been used internationally in a study of Jordanian myocardial infarction patients' adherence to an exercise program, generating additional reliability and validity data (Al-Ali & Haddad, 2004). This study used an expert panel of cardiovascular nurses employed in a public health department, who were also on the faculty of nursing at Jordan University of Science and Technology, to establish content validity for the questionnaire. The panel recommended minor changes to the survey to account for Arab culture. In this use of "The Health Beliefs Questionnaire," internal reliability coefficients ranged from .82 to .32, also consistent with other related studies in the literature (Al-Ali & Haddad, 2004).

Adaptation of "The Health Beliefs Questionnaire"

An instrument that can reliably determine the valid health beliefs and attitudes of participants who subsequently are more likely to comply with a health promotion and education program or intervention throughout the duration of the program has more direct relevance to this study than other instruments that measure health beliefs and attitudes that merely focus on participants' willingness to begin such a program. Adherence to a

wellness program or intervention over a period of time would be required for participants to improve their health to the extent that a measurable effect resulting in improved worker productivity could be realized by an employer.

In addition, the administration of the questionnaire to participants with coronary heart disease in a community center–based, supervised exercise program was similar in form to a workplace fitness program that might be provided by an employer to employees. Based on these criteria and the strength of the reliability and validity data for such varied studies utilizing the questionnaire, "The Health Beliefs Questionnaire" was adapted for use in this study in order to determine the self-reported health beliefs and attitudes of survey participants compared to the participants' self-reported absenteeism and presenteeism caused by health conditions. By comparing these self-reported health beliefs and attitudes with the most prevalent health conditions responsible for employee absenteeism and presenteeism, health promotion and education programs can be tailored to be more efficient and effective.

"The Health Beliefs Questionnaire" was modified for use in the current study by combining it with "The Wellness Inventory," discussed above, and merging the demographics questions with those of "The Wellness Inventory." The resulting combined questionnaire maintains the integrity of both questionnaires, and therefore maintains the associated validity and reliability.

Part 3: Literature Related in Methodology

Absenteeism and Presenteeism

The purpose of this section is to present literature related in methodology. The loss of worker productivity due to health conditions has been measured by a number of instruments. Ozminkowski, et al. (2004) reviewed nine questionnaires designed to measure the loss of worker productivity due to health conditions. From this list, "The Wellness Inventory," adapted for this study, and the "Work Limitations Questionnaire," were selected as the most valid and reliable questionnaires, and both were applied to a large employer in order to compare the results (Ozminkowski, et al., 2004).

The "Work Limitations Questionnaire" was developed without focus on specific diseases and takes a more general measure of the total impact of chronic health conditions. It assesses the degree to which chronic illnesses limit performance of physical, mental, and time- and output-related job tasks and the productivity losses and costs resulting from these limitations (Lerner, et al., 2001; Lerner, Amick, Lee, Rooney, Rogers, Chang, & Berndt, 2003; Reilly, Zbrozek, & Dukes, 1993). It has been validated in various employee populations and for a variety of different health conditions and consists of two-week or four-week recall versions (Ozminkowski, et al., 2004; Lerner, et al., 2003). The 25-item questionnaire generates four scale scores that assess a job's physical, time-management, mental and interpersonal, and output demands, and generates a productivity loss index that compares the percent decrement in performance per hour due to presenteeism to an unhampered worker benchmark group (Ozminkowski, et al., 2004; Lerner, et al., 2001).

The results of the comparison of the "Work Limitations Questionnaire" and "The Wellness Inventory" were that total productivity losses were significantly influenced by perceived health status, and the losses due to a particular medical condition tended to be higher with "The Wellness Inventory." The researchers concluded that "The Wellness Inventory" may overstate lost productivity due to a specific illness, since it is difficult for an individual to determine which particular illness was responsible for missed work, or for feeling ill while at work, if the individual had multiple illnesses. However, "The Wellness Inventory" was considered the instrument of choice by the researchers for applications in which specific diseases most responsible for lost productivity are of interest (Ozminkowski, et al., 2004).

Loeppke, Hymel, & Lofland (2003) and Lynch and Riedel (2001) recommended selecting instruments that 1) are useful across multiple work environments, job types, and diseases of interest; 2) produce data to support effective business decision-making by providing results that are measurable in terms of lost work time and revenue; 3) are inexpensive and easy to administer; and 4) are available in multiple languages and reading levels. "The Wellness Inventory" best meet these criteria for the current study.

Health Beliefs

The Health Belief Model has been used extensively as the conceptual framework for identifying factors that influence individual compliance to a suggested regimen for health problem management (Dean-Baar, 1994). A consistent methodology has been replicated in these studies that results in the application of the Health Belief Model to new populations while ensuring the validity and reliability of the model. Studies exist in

the literature that follow this replication and apply the Health Belief Model conceptual framework, including the health beliefs of individuals with arthritis (Dean-Baar, 1994), health perceptions in the study of pesticide application (Martinez, Gratton, Coggin, Rene, & Waller, 2004; Arcury, Quandt, & Russel, 2002), tuberculosis screening behaviors (Poss, 1999), and general health beliefs (Weissfeld, et al., 1990), among others.

The well established method used to apply the Health Belief Model conceptual framework consists of determining prospective questions for each construct of the Health Belief Model using a combination of the following techniques: adapting an existing valid and reliable instrument and modifying it to correspond with the target study population; gathering questions from reviews of the literature; or developing questions using knowledgeable subject matter experts. Once a list of prospective questions is developed, the questions may be reviewed for content relevance and ranked by importance by an expert panel. The resulting questions are then pilot tested and revised as necessary to create the final survey. The final survey is then administered and tested for validity and reliability.

"The Health Beliefs Questionnaire" (Mirotznik, et al., 1995) adapted for this study was rigorously developed following the methodology discussed above. In addition, it has been adapted for use in Jordan using an expert panel of cardiovascular nurses employed as health department officials and as faculty members at Jordan University of Science and Technology to rank the questions by content relevance and to modify the questions to reflect the culture and language of Jordanians. It was subsequently pilot tested and administered in final form, and demonstrated adequate content validity and reliability (Al-Ali & Haddad, 2004).

Summary

This chapter presented literature related in content, content and methodology, and methodology. The impact of health conditions on worker productivity was discussed in terms of missed days of work (absenteeism) and hours feeling ill and less productive while at work (presenteeism). The use of self reporting questionnaires to measure absenteeism and presenteeism was discussed, and the selection of "The Wellness Inventory" for adaptation for this study was presented.

The assessment of health beliefs and attitudes using the conceptual framework of the Health Belief Model constructs was also discussed. The selection of "The Health Beliefs Questionnaire" to measure the health beliefs and attitudes of workers and their willingness to comply with health promotion and education programs was presented.

This study is the first known application of self-reported health beliefs to self-reported absenteeism and presenteeism due to health conditions in order to investigate how health beliefs and their relationships to absenteeism and presenteeism might be considered when designing health promotion and education programs for a workforce.

Chapter 3 presents the methodology used in this study.

CHAPTER 3

METHODOLOGY

Introduction

This study investigated absenteeism and presenteeism due to health conditions to determine if there was significant cause and effect with self-reported health beliefs. The Health Belief Model, with constructs of perceived severity, perceived susceptibility, perceived benefits, and perceived barriers, was used in the development of the theoretical foundation for this research. Safety and health professionals were surveyed to determine their self-reported degree of absenteeism and presenteeism as well as their health beliefs.

The methodology used in the study was to assess self-reported health beliefs among safety and health professionals based on their reported absenteeism or presenteeism due to specific health conditions. In addition, self-reported absenteeism and presenteeism caused by health conditions for specific demographic groups of safety and health professionals were compared.

Instrumentation

The instrumentation used in this study was a combined questionnaire formed from "The Wellness Inventory," to obtain safety and health professionals' health related causes of absenteeism and presenteeism, and "The Health Beliefs Questionnaire," to subsequently determine the health beliefs of the same safety and health professionals within the framework of the Health Belief Model.

Instrument Selection

Instrument Selected to Measure Absenteeism and Presenteeism

"The Wellness Inventory" was selected for use in this study to obtain valid and reliable self-reported absenteeism (in days) and presenteeism (in hours) data and the health conditions most often self-reported as the cause of absenteeism and presenteeism by safety and health professionals. As discussed in Chapter 2, "The Wellness Inventory," was developed by Dr. Ron Z. Goetzel et al., at the Institute for Health and Productivity Studies, Cornell University, as a directional tool to help employers quickly determine the primary health conditions causing absenteeism and presenteeism in their workforce and calculate the total cost burden of this absenteeism and presenteeism (Goetzel, et al., 2003).

Content and construct validity and weak predictive validity for "The Wellness Inventory" were determined by Ozminkowski, et al., (2003) by comparing three versions of different recall periods (12 months, 3 months, and 2 weeks) with national data sources, company medical claims data, and short-term disability program files. Reliability was established by Goetzel, et al. (2003) using the split sample technique. Reliability coefficients for financial metrics generated by "The Wellness Inventory" for three different recall periods (12 months, 3 months, and 2 weeks) ranged from 66.2% to 75.4%, and no significant differences among reliability estimates for the three versions were found ($p = .05$).

Modification of "The Wellness Inventory" consisted of tailoring the requested self-reported job categories to fit the population under study. The review of the literature in content and methodology for "The Wellness Inventory" determined that in other

studies researchers have modified the job categories to tailor the questionnaire to the target population, normally a corporation or government entity, and that these modifications did not affect the validity or reliability of the questionnaire (Goetzel, et al., 2003).

Instrument Selected to Measure Health Beliefs

To analyze the health beliefs of safety and health professionals, "The Health Beliefs Questionnaire," developed by Dr. Jerrold Mirotznik, et al., at Brooklyn College, City University of New York, was selected for the current study. "The Health Beliefs Questionnaire" was selected as the first component of the survey instrument used in the study because:

1. This was one of the few health belief instruments cited in the literature that assessed the adherence of participants to an exercise regimen over an extended period, rather than assessing the participants' initial willingness to start such a program (Mirotznik, et al., 1995).
2. This instrument included questions concerning beliefs about activities that could be undertaken to prevent a broad variety of health conditions.

Mirotznik and associates established the validity of the "The Health Beliefs Questionnaire" by adopting conventionally agreed upon definitions of the Health Belief Model constructs from the literature and then modifying questionnaire items from valid and reliable questionnaires used in other situations. The resulting questions were pre-tested in a pilot questionnaire prior to administering the questionnaire to the study population. The researchers reported that this process was consistent with the

development of other Health Belief Model questionnaires found throughout the literature. The researchers assessed internal consistency reliability for "The Health Beliefs Questionnaire" constructs using Cronbach's alpha. These reliability coefficients ranged from .44 for general health motivation to .73 for perceived benefits of exercise. The coefficients were consistent with other related studies in the literature (Mirotznik et al., 1995).

"The Health Beliefs Questionnaire" has been used internationally in a study of the adherence of Jordanian myocardial infarction patients to an exercise program, generating additional reliability and validity data (Al-Ali & Haddad, 2004). In this use of "The Health Beliefs Questionnaire," internal reliability coefficients (Cronbach's alpha) ranged from .82 to .32, which are also consistent with related studies in the literature. An expert panel determined a content validity index (CVI) for the questionnaire items ranging from 3 to 4 on a four-point rating scale (Al-Ali & Haddad, 2004).

"The Health Beliefs Questionnaire" was modified for use in the current study by combining it with "The Wellness Inventory," discussed above, and adding demographics questions to the questions on "The Wellness Inventory."

Instrument Variables and Constructs

Instrument Construction

The combined questionnaire was titled "Your Perceptions of How Work Conditions Impact Work Productivity" and consisted of 31 items. The seven-page self-administered questionnaire consisted of four sections: 1) Demographics and health status; 2) Health Belief Model constructs questions; 3) Health conditions affecting worker

absenteeism and presenteeism; and 4) Health conditions causing absenteeism and presenteeism due to care giving.

Section 1: Demographics and Health Status Questions

The questionnaire provided to participants included a demographic and health status section, which included five demographic and health status questions. Participants were asked to select from 15 job classifications the one that best described the participant's job. The options included an "other" job classification for participants whose main job responsibilities did not match any of the other classifications. The job classifications were created using information from the Tennessee Safety and Health Congress regarding typical attendees of the statewide event. A question was added to this section of the questionnaire asking participants to select "private," "public," or "non-profit" to describe the type of organization where they worked.

Questions concerning the participants' race and home zip code were also added. Race was determined by the question "What is your race?" There were six options available: "African-American," "White," "Asian," "Hispanic-Latino," "Native American," and "Other," with a line to write in any race not included in the options.

A health status question was incorporated from "The Wellness Inventory." An additional question focusing on smoking status was added by the researcher. This question asked participants to self-report their smoking status by choosing one of the following options: 1) never smoked; 2) former smoker; or 3) current smoker. The researcher added this item to determine whether smoking status was associated with health beliefs or absenteeism and presenteeism due to health conditions.

Section 2: Health Belief Model Constructs Questions

Mirotznik, et al.'s (1995) "The Health Belief Questionnaire" constructs were utilized in the researcher's combined survey. Specific health construct categories included perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and general health motivation.

Perceived Susceptibility Questions

Participants were asked to answer three questions pertaining to perceived susceptibility on a five-point Likert scale. One question asked if the participant's current lifestyle put the participant at risk of developing heart disease or if the participant already had heart disease, potentially aggravating the condition. Answer options ranged from "Not at all" to "Very large risk." Question two asked the participant to self-report how susceptible the participant was to developing a serious heart condition compared to most other people. Answer options ranged from "Much less" to "Much more." The third question in this section asked how likely the participant was to be ill with heart disease in the future. Answer options ranged from "Very unlikely" to "Very likely."

Perceived Severity Questions

Perceived severity was addressed by a question that asked participants how likely heart disease (including hypertension and high blood pressure) would result in 11 different potential impacts on the participant's life. These impacts included 1) physical pain; 2) shortness of breath; 3) fatigue; 4) emotional distress; 5) disrupt family life; 6) disrupt sex life; 7) disrupt work life; 8) hinder ability to enjoy life; 9) hurt self-esteem;

10) strain economic resources; and 11) death. Likert scale selections ranging from "Very Unlikely" to "Very Likely" were provided for the participants to select the response that best reflected their beliefs.

Perceived Benefits Questions

This section consisted of nine parts that asked participants to self-report their perceived benefits of exercise with regard to heart disease and health in general. The perceived benefits were self-reported on a Likert scale, with possible responses ranging from "Not At All Helpful" to "Extremely Helpful." The section asked participants to report perceptions related to whether exercise would be helpful in 1) relieving the symptoms of heart disease; 2) preventing death from heart disease; 3) preventing recurrence of a heart attack; 4) improving the quality of life after a heart attack; 5) improving one's self-esteem; 6) improving one's physical appearance; 7) improving one's mood; 8) improving one's social life; and 9) increasing one's energy level.

Perceived Barriers Questions

The questionnaire asked participants to address perceived barriers to exercise in terms of personal costs. Questions asked the participants' perceptions of costs in terms of 1) time; 2) money; 3) energy; and 4) pain. Questions also asked participants' perceptions of 1) the difficulty of finding time to exercise; 2) the perceived effect on the participant's lifestyles; and 3) the perceived interference with the participant's normal activities required in order to exercise on a regular basis.

Health Motivation Questions

Five questions focused on motivation regarding general health. Participants were asked to respond to these questions on a Likert scale. The five questions focused on 1) how concerned the participants were about getting sick; 2) how concerned the participants were about personal health; 3) how frequently the participants thought about their health; 4) how important health was to the participants; and 5) whether the participants did special things to improve or protect their health.

Table 3.1 presents a summary of the questions associated with their Health Belief Model constructs.

Section 3: Health Conditions Affecting Absenteeism and Presenteeism Questions

Goetzel, et al.'s (2003) "The Wellness Inventory" was utilized in the researcher's survey to collect self-reported information about health conditions affecting absenteeism and presenteeism. The questions on the survey asked participants to self-report the number of days they were absent from work (absenteeism) and the number of hours in a typical eight-hour day they were present but not feeling well (presenteeism) for each of 12 different health conditions. The 12 health conditions were determined by Goetzel et al. (2003) to be among the most frequently reported health conditions that cause employees to miss work or feel ill while at work. The health conditions include allergic rhinitis/hay fever, anxiety disorder, arthritis/rheumatism, asthma, coronary heart disease, depression, diabetes, high stress, hypertension or high blood pressure, migraine, respiratory illnesses, and sleep difficulties.

Table 3.1. Health Belief Model Constructs and Associated Questions

HBM Construct	Associated Questionnaire Items
Perceived Susceptibility	11. How likely is it that someday in the future you will be ill with heart disease? 12. Do you feel your present lifestyle puts you at risk of developing heart disease? (If you already have heart disease, does your lifestyle put you at risk of aggravating your present condition?) 13. In comparison to most other people, how susceptible do you think you are to developing a serious heart condition?
	19. Disease may impact on a person's life in many ways. How likely do you think it is that heart disease (including hypertension and high blood pressure) would result in each of the following: a. physical pain b. shortness of breath c. fatigue d. emotional distress e. disrupt family life f. disrupt sex life g. disrupt work life h. hinder ability to enjoy life i. hurt self-esteem j. strain economic resources k. death
Perceived Benefits	20. How helpful do you think exercise is in doing each of the following with regard to heart disease and health in general: a. relieving symptoms of heart disease b. preventing death from heart disease c. preventing recurrence of a heart attack d. improving quality of life after a heart attack e. improving one's self-esteem f. improving one's physical appearance g. improving one's mood h. improving one's social life i. increasing one's energy level
Perceived Barriers (costs)	14. Please indicate how costly in terms of time, money, energy, pain, etc., you think exercising would be. 15. It is hard to find time to exercise on a regular basis. Do you strongly agree, agree, neither agree nor disagree, or strongly disagree with this statement? 16. How much would you have to change your present lifestyle in order to exercise on a regular basis? 17. To what degree would exercising on a regular basis require you to adopt new patterns of behaviors? 18. To what degree would exercising on a regular basis interfere with your normal activities?
General Motivation	6. Some people are quite concerned about getting sick, while others are not as concerned. How concerned are you about getting sick? 7. How frequently do you think about your health? 8. Some people are quite concerned about their health, while others are not as concerned. How concerned are you about your health? 9. People differ in how much importance they place on health. In comparison to other people, how important is health to you? 10. Please indicate how closely the following statement describes you: "I do lots of special things to improve or protect my health."

Section 4: Health Conditions Causing Absenteeism and Presenteeism Due to Care Giving Questions

Questions from "The Wellness Inventory" section of the questionnaire (Goetzel, et al., 2003) used by the researcher requested participants to self-report the number of days they were absent from work (absenteeism) and the number of hours in a typical eight-hour day they were present but not fully productive (presenteeism) for each of four different health conditions for which they may have been a care giver. The health conditions that were selected are among the most common health conditions for care giving (Goetzel, et al., 2003). They are Alzheimer's disease, otitis media/earache, pediatric allergies, and pediatric respiratory infections.

Pilot Testing

Pilot Data Collection

Following the development of the new combined questionnaire entitled "Your Perceptions of How Health Conditions Impact Work Productivity," the instrument was pilot tested. The Oak Ridge Safety and Health Expo on June 22, 2005, was selected as the site for the pilot study because the participants at the expo were representative of the population under study. Expo participants visiting the UT Safety Center booth were asked to fill out the questionnaire and provide feedback on survey administration, clarity, and length. The pilot study resulted in a convenience sample of 50 safety and health professionals who chose to complete the survey.

The pilot survey was provided to booth visitors by the researcher, with a cover letter that explained the purpose of the survey. Participants were asked to identify

questions that were unclear. They were also instructed to ask for clarification and voice any concerns they had regarding the length of the instrument or problems with survey administration. Volunteers who chose to pick up and read the pilot survey were offered a small gift (a candy bar) for taking the time to read, review, and for choosing to complete the survey.

Pilot Data Analysis

Data collected from this one-day pilot study were subsequently analyzed to determine whether changes should be made in any of the following areas: 1) the survey questions; 2) the protocol; or 3) the methodology used for statistical analysis. The pilot data were analyzed using the Statistical Package for Social Sciences (SPSS) version 13.0. A review of the written responses regarding the clarity, length, readability, and administration of the survey was also conducted by the researcher. Several modifications to the questionnaire resulted from respondent comments.

One problem identified by respondents was that the survey was overly difficult because of its length and the placement of the absenteeism and presenteeism sections at the beginning of the survey. In addition, respondents noted that the job categories did not adequately reflect the job classifications of the Tennessee safety and health professionals selected as the sample of convenience. The job categories and demographic sections were reworked as a result of discussions with the coordinator of the Tennessee Safety and Health Congress and the list of delegates registered for the conference. The change resulted in the following job categories:

1) Human Resources Personnel or Manager
2) Safety Personnel, Supervisor or Manager
3) Health Care Professional, Technician or Manager
4) Emergency Management Personnel, EMS/First Responder/Ambulance Personnel
5) Health or Safety Claims/Risk Insurance Agent
6) Trainer/Educator
7) Security/Guard Force or Law Enforcement
8) Industrial Floor Supervisor/Team Leader
9) Industrial Line or Company Employee or Associate
10) Marketing or Sales Representative
11) Maintenance/Construction, and Related Occupations
12) Food Service and Related Occupations
13) Housekeeping and Related Occupations
14) Clerical/Administrative Support, and Customer Service Occupations
15) Other (please specify) _____

Changes were also made to the organization of the survey. Questions concerning health beliefs were moved from the end of the survey to the beginning of the questionnaire because of their importance. Questions related to absenteeism and presenteeism due to health conditions were placed later in the survey. This change was made to reduce the initial intimidation that might result from requesting math calculations and self-report data, such as days absent and hours unproductive while at work for various health issues, at the beginning of the survey.

Since the average time required to complete the pilot survey was found to be more than 20 minutes, one stand-alone section on arthritis health beliefs was deleted from the questionnaire. The removal of this section, which had been added from a separate

instrument designed by Dean-Baar (1994), left a final instrument that was expected to take about 10 minutes to complete. This shorter version of the questionnaire was subsequently administered to five additional volunteers. The revised survey took an average of 10-12 minutes, rather than 20 minutes, to complete.

Administration of the Final Questionnaire

The final questionnaire titled "Your Perceptions of How Health Conditions Impact Work Productivity" was administered to the study population.

Population Selected for Study

The target population selected for this study was a convenience sample of all employed adult safety and health professionals (at least 18 years of age) who attended the 2005 Tennessee Safety and Health Congress and visited the UT Safety Center booth in the congress exhibition hall. A majority of the individuals who chose to participate in the study indicated that they work as safety and health managers, industrial safety inspectors, insurance and risk assessors, fire fighters, emergency medical personnel, law enforcement representatives, state and local government officials, industry human resources managers, safety committee members and managers, safety and health educators, safety and health equipment and services vendors and booth employees, and managers and small business owners who did business in health, safety, emergency management, and environmental health.

Data Collection Method

All Safety and Health Congress attendees that walked by the UT Safety Center booth were invited to participate. Each individual choosing to participate received a questionnaire with a cover sheet that 1) explained the purpose of the questionnaire; 2) provided instructions for filling out and completing the questionnaire; and 3) directed the participants to place the completed questionnaire into the drop box located at the UT Safety Center booth. The drop box was monitored to ensure that submitted surveys were not viewed or removed by individuals other than the individual participant who filled out the questionnaire. Individuals' names, employer ID numbers, social security numbers, and any other personal identifiers were not collected. The voluntary completion of the anonymous questionnaire served as the individual participant's consent for participation in the research project.

Booth visitors who took the time to pick up a blank survey and read the survey were offered a candy bar or choice of a small carabineer key chain or orange collapsible drink cozy. If individuals chose to participate, they could also fill out a separate card with their name and contact information and place it in a separate collection box for a drawing to be held at the end of the Congress for a mini-IPOD music recorder/player. A total of 530 surveys were collected over the two-day period, from 10:30 AM until 6:00 PM on Monday, July 25, 2005, and from 8:45 AM until 6:00 PM on Tuesday, July 26, 2005, at the 2005 Tennessee Safety and Health Congress. An approved Form A certificate for exemption from IRB review is on file in the Department of Instructional Technology, Health, and Education Studies at the University of Tennessee, Knoxville.

Analysis of Data

Introduction

Data were hand entered into SPSS. Four of the 530 surveys were completed by participants outside the intended survey population (one student and three retirees who had no current work hours), leaving a total of 526 surveys that met study parameters. Data entry was double checked by randomly selecting ten percent of the surveys. SPSS version 13.0 and $p < .05$ were used in data analysis for the study.

While the questionnaire covered a wider variety of areas, the researcher chose to analyze only the data that directly related to the research questions under study. Data related to the following sections were eliminated from the analysis. In the section on Health Belief Model construct questions, only the data about the basic health belief constructs of perceived susceptibility, perceived severity, perceived benefits, and perceived barriers were analyzed. The data pertaining to the added concept of health motivation were not analyzed. In the section on health conditions causing absenteeism and presenteeism, only the data pertaining to the health conditions that directly affect safety and health professionals were analyzed. The data on health conditions causing absenteeism and presenteeism due to care giving were not analyzed.

Descriptive analysis was used to assess the prevalence of self-reported health conditions causing employees to miss work (absenteeism) or feel ill while at work (presenteeism) for the target population of safety and health professionals. Self-reported responses of participants to questions concerning the Health Belief Model constructs of perceived susceptibility, perceived severity, perceived barriers, and perceived benefits were calculated for demographic categories of self-reported age, gender, health status,

smoking status, and hours worked per week. Chi-square analyses were performed to determine significant differences for ordinal and nominal categorical variables. Multivariate analysis of variance (MANOVA) was used to test multiple means for continuous variables. When MANOVA results identified significant differences, analyses of variances (ANOVA) were calculated to determine the variables where the significant differences occurred, and mean values were also calculated to determine direction. Non-parametric Spearman correlations were calculated for continuous variables to determine the extent when responses to construct questions differed significantly. Mean values were also calculated to determine the strength and direction of significant differences.

Analysis of Research Questions

The statistical procedures were used to analyze each research question are discussed below.

Research Question 1

Research question 1 asks, "Are there significant differences for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, and hours worked per week in absenteeism due to health conditions?"

The top six specific health conditions causing the most self-reported absenteeism were selected for analysis. Chi-square tabulations were calculated for these health conditions for specific workers grouped by age, gender, health status, smoking status, and hours worked per week.

Research Question 2

Research question 2 asks "Are there significant differences for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, and hours worked per week in presenteeism due to health conditions?"

The analysis focused on the six health conditions that were responsible for the most self-reported presenteeism determined by descriptive statistics. Chi-square tabulations were calculated for each of these six health conditions for specific workers grouped by age, gender, health status, smoking status, and hours worked per week.

Research Question 3

Research question 3 asks "Are there significant differences between reported absenteeism and presenteeism due to self-reported health conditions for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, or hours worked per week?"

A multivariate analysis of variance (MANOVA) for each demographic of age, gender, health status, smoking status, and hours worked per week was conducted. When the demographic MANOVA results were significant, individual ANOVAs were run to determine which work impairments were significant.

Research Question 4

Research question 4 asks "Are there significant differences between the absenteeism and presenteeism of Tennessee safety and health professionals and their health beliefs, including perceived susceptibility, severity, benefits, and barriers?"

Participants who reported absenteeism were divided into three groups: 1) participants who self-reported less than one day of absenteeism (0 days); 2) participants who reported five or fewer days of absenteeism (1-5 days); and 3) participants who reported greater than 5 days of absenteeism. Participants who reported presenteeism were also divided into three groups: 1) participants who self-reported less than one hour of presenteeism (0 hours); 2) participants who reported 8 or fewer hours of presenteeism (1-8 hours); and 3) participants who reported more than 8 hours of presenteeism. Multivariate analyses of variance (MANOVAs) for absenteeism and presenteeism were conducted on each of the constructs (perceived susceptibility, perceived severity, perceived benefits, and perceived barriers) of the Health Belief Model. When the absenteeism or presenteeism MANOVA results were significant, individual ANOVAs were run to determine which work impairments were significant. Due to the large percentage of participants who self-reported no absenteeism or presenteeism, nonparametric correlations (Spearman's rho) were conducted after all surveys with no reported absenteeism or presenteeism were removed (removal of all zero values) to improve the power of the analysis.

Research Question 5

Research question 5 asks "Are there significant differences for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, and hours worked per week and their health beliefs, including perceived susceptibility, severity, benefits, and barriers?"

A multivariate analysis of variance (MANOVA) was conducted for specific workers grouped by self-reported age, gender, health status, smoking status, and hours worked per week. When the demographic MANOVA results were significant for a worker group, individual ANOVAs were run to better understand which Health Belief Model constructs were significant. Table 3.2 presents the analyses performed on the research questions.

Summary

Chapter 3 presented the methodology by which the sample population was selected and the data were collected. This chapter also included a description of the procedure used to construct the questionnaire and the changes made to improve its utility following a pilot test. IRB and participant consent information was also reviewed, and the specific statistical tests utilized to address each research question were presented. In Chapter 4, the analysis of the data will be presented. Chapter 5 will present the findings, conclusions, and recommendations based upon the results of the research questions in Chapter 4.

Table 3.2. Questionnaire Section and Statistical Analyses Performed

Questionnaire Section	Analyses Performed
Demographics and health conditions	Descriptive
RQ 1: Significant differences for TN safety and health professionals grouped by demographics and 6 most frequent health conditions causing absenteeism.	Chi-square analysis
RQ 2: Significant differences for TN safety and health professionals grouped by demographics and 6 most frequent health conditions causing presenteeism.	Chi-square analysis
RQ 3: Significant differences between self-reported absenteeism and presenteeism due to health conditions and specific workers grouped by demographics.	MANOVA ANOVA
RQ 4: Significant differences between self-reported absenteeism and presenteeism and self-reported health beliefs.	MANOVA ANOVA Spearman's rho correlations
RQ 5: Significant differences for TN safety and health professionals grouped by demographics and self-reported health beliefs.	MANOVA ANOVA

CHAPTER 4

ANALYSIS AND INTERPRETATION OF THE DATA

Introduction

The purpose of this study was to investigate the health conditions, health status, and health beliefs of Tennessee safety and health professionals using self-reported absenteeism and presenteeism. The study population consisted of a convenience sample of health and safety industry professionals who attended the 2005 Tennessee Safety and Health Congress. Data were collected using a questionnaire completed by a group of 526 health and safety professionals who attended the congress. This chapter presents the analysis and interpretation of the data associated with each of the research questions.

Study Population Description

The sample population of 526 Tennessee health and safety professionals was self-reported to be 90.5 % white (469), 5.6% African American (29), and about 1% each Asian (5), Hispanic-Latino (4), and Native American (5). One percent of respondents reported other ethnicities (6) and 8 respondents failed to report ethnicity. Of the 526 participants who submitted completed questionnaires, 336 were male (65.4%), 178 were female (34.6%), and 12 did not specify their gender. The respondents ranged in age from 18 to 83 years, with an average age of 45.5 years. One hundred and fifty respondents reported their age as 39 years old or younger (30.1%), 157 reported their age as between 40 and 49 years old (31.5%), 154 reported their age as between 50 and 59 years old

(30.9%), 37 reported their age as 60 years old or older (7.4%), and 28 respondents did not specify their age.

The participants self-reported smoking and health status information. For those reporting smoking status, 297 reported having never smoked (56.9%), 150 reported being former smokers (28.7%), and 75 reported being current smokers (14.4%) (N = 522; 4 missing). Of the 523 participants who reported health status, 32 reported being in poor or fair health (6.1%), 187 reported being in good health (35.8%), 231 reported being in very good health (44.2%), and 73 reported being in excellent health (14%). Three respondents did not complete the health status question.

Average hours worked per week over the previous year ranged from zero to 80 hours. The average was 42.5 hours per week. Two hundred thirty-seven participants reported working 40 hours or less per week (47.7%) and 260 participants reported working more than 40 hours per week (52.3%). Average hours worked per week was not given by 29 respondents. Table 4.1 tabulates the demographic and health status data for the sample of safety and health professionals used in this study.

Analysis of Health Conditions

Descriptive statistics were used to assess the prevalence of self-reported health conditions that resulted in absenteeism and presenteeism. The number of days respondents missed work because of the 12 health conditions listed on the questionnaire as the primary causes of work impairment were tabulated. Frequencies and means were calculated. The data indicated that allergic rhinitis was the most often experienced health

Table 4.1. Demographics and Health Status of Health and Safety Professionals

Demographic Description	N	Percent of Total*
Race		
- White	469	90.5
- African American	29	5.6
- Asian	5	1
- Latino-Hispanic	4	.8
- Native American	5	1
- Other ethnicities	6	1.2
- Missing	8	
Gender		
- Males	336	65.4
- Females	178	34.6
- Missing	12	
Age		
- 39 or less	150	30.1
- 40-49	157	31.5
- 50-59	154	30.9
- 60 or more	37	7.4
- Missing	28	
Smoking Status		
- Never Smoked	297	56.9
- Former Smoker	150	28.7
- Current Smoker	74	14.4
- Missing	4	
Health Status		
- Poor or Fair	32	6.1
- Good	187	35.8
- Very Good	231	44.2
- Excellent	73	14
- Missing	3	
Work Hours Per Week		
- 40 or Less	237	47.7
- More Than 40	260	52.3
- Missing	29	

* May exceed 100% due to rounding

condition by safety and health professionals and was the primary cause of missed workdays (60.1%).

Allergic rhinitis was also the most frequent cause of presenteeism (22.6%). Other illnesses occurred at different frequencies for presenteeism than for absenteeism. These results are presented in Table 4.2, Table 4.3, and Table 4.4.

Analysis Related to Research Questions

Research Question 1

Research question 1 asks, "Are there significant differences for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, and hours

Table 4.2. Participants' Reported Health Conditions

Health Condition	N	%
Allergic Rhinitis	312	60.1
Sleep Difficulties	296	57.0
High Stress	282	54.2
Arthritis	154	29.6
Migraine	141	27.1
Hypertension	132	25.4
Anxiety Disorder	116	22.3
Respiratory Illness	106	20.4
Depression	102	19.7
Asthma	64	12.3
Heart Disease	41	7.9
Diabetes	41	7.9

Table 4.3. Participants' Reported Absenteeism Due to Health Conditions

Health Condition	N	%
Allergic Rhinitis	67	13.0
Respiratory Illness	52	10.1
Migraine	51	9.9
Sleep Difficulties	33	6.4
High Stress	30	5.8
Depression	28	5.4
Anxiety Disorder	19	3.7
Arthritis	16	3.2
Hypertension	16	3.1
Heart Disease	9	1.7
Diabetes	8	1.6
Asthma	6	1.7

Table 4.4. Participants' Reported Presenteeism Due to Health Conditions

Health Condition	N	%
Allergic Rhinitis	119	23.1
High Stress	90	17.4
Sleep Difficulties	81	15.7
Migraine	74	14.3
Depression	43	8.3
Respiratory Illness	36	7.0
Anxiety Disorder	32	6.2
Arthritis	28	5.4
Hypertension	16	3.1
Asthma	16	3.1
Diabetes	14	2.7
Heart Disease	10	1.9

worked per week in absenteeism due to health conditions?"

Analysis of the data related to research question 1 focused on the six health conditions that were responsible for the most self-reported absenteeism. These health conditions were allergic rhinitis (13.0%), respiratory illness (10.1%), migraine (9.9%), sleep difficulties (6.4%), high stress (5.8%), and depression (5.4%). Chi-square tabulations were calculated for each of these health conditions most frequently self-reported for causing absenteeism for specific workers grouped by age, gender, health status, smoking status, and hours worked per week.

Allergic Rhinitis

Significant differences were found between self-reported absenteeism due to allergic rhinitis and gender. Significant differences were not found for absenteeism and age, health status, smoking status, or average hours worked per week. These results are presented in Table 4.5.

Table 4.5. Chi-square Values for Worker Groups Reporting Absenteeism Due to Allergic Rhinitis

Demographic	Chi-Square value	df	P-value
Age	2.68	3	.443
Gender	4.07	1	.044*
Health Status	2.04	3	.564
Smoking Status	.42	2	.811
Work Hrs/Wk	1.71	1	.191

* $p < .05$

Table 4.6. Absenteeism Due to Allergic Rhinitis by Gender

			Allergic Rhinitis		Total
			Without	With	
Gender	Male	Count	295	36	331
		% within Gender	89.1%	10.9%	100.0%
	Female	Count	144	30	174
		% within Gender	82.8%	17.2%	100.0%
Total		Count	439	66	505
		% within Gender	86.9%	13.1%	100.0%

From the significant Chi-square analysis presented in Table 4.5, the percentage of change between groups was determined. The results indicate that females were significantly more likely to have self-reported allergic rhinitis than were males. These results are presented in Table 4.6.

Respiratory Illness

Significant differences between self-reported absenteeism due to respiratory illness and participants' gender and health status were found. No significant differences were found between absenteeism due to respiratory illness and age, smoking status, or average hours worked per week. These results are presented in Table 4.7.

From the significant Chi-square analysis presented in Table 4.7, the percentages of change between groups were determined. The results indicate that females reported absenteeism due to respiratory illness more than twice the percentage of time that males did. These results are presented in Table 4.8.

Table 4.7. Chi-square Values for Worker Groups Reporting Absenteeism Due to Respiratory Illness

Demographic	Chi-Square value	df	P-value
Age	5.65	3	.130
Gender	9.65	1	.002*
Health Status	8.49	3	.037*
Smoking Status	1.13	2	.567
Work Hrs/Wk	1.15	1	.284

* $p < .05$

Table 4.8. Absenteeism Due to Respiratory Illness by Gender

			Respiratory Illness		Total
			Without	With	
Gender	Male	Count	307	24	331
		% within Sex	92.7%	7.3%	100.0%
	Female	Count	146	28	174
		% within Sex	83.9%	16.1%	100.0%
Total		Count	453	52	505
		% within Sex	89.7%	10.3%	100.0%

From the significant Chi-square analysis presented in Table 4.7, the percentages of change between groups were determined. The results indicate that the significant difference between health status due to respiratory illness and absenteeism is an inverse relationship. As self-reported group health status declined, the percentage of the group that self-reported respiratory illness increased. These results are presented in Table 4.9.

Migraine

Significant differences between self-reported absenteeism due to migraines and participants' age and gender were found. No significant differences were found between absenteeism due to migraines and smoking status or hours worked per week. These results are presented in Table 4.10.

Table 4.9. Absenteeism Due to Respiratory Illness by Health Status

			Respiratory Illness		Total
			Without	With	
Health Status Groups	Poor to Fair	Count	23	7	30
		% within health	76.7%	23.3%	100.0%
	Good	Count	161	22	183
		% within health	88.0%	12.0%	100.0%
	Very Good	Count	210	17	227
		% within health	92.5%	7.5%	100.0%
	Excellent	Count	67	6	73
		% within health	91.8%	8.2%	100.0%
Total		Count	461	52	513
		% within health	89.9%	10.1%	100.0%

Table 4.10. Chi-square Values for Specific Worker Groups Reporting Absenteeism Due to Migraines

Demographic	Chi-Square value	df	P-value
Age	22.60	3	<.001*
Gender	36.45	1	<.001*
Health Status	4.46	3	.216
Smoking Status	4.79	2	.091
Work Hrs/Wk	.10	1	.753

* $p < .05$

From the significant Chi-square analysis presented in Table 4.9, the percentages of change between groups were determined. The results indicate that migraines were reported as a cause for absenteeism more frequently among participants 39 years old or younger than among participants in other age groups. Migraines were self-reported as a cause for absenteeism less often as self-reported age increased. These results are presented in Table 4.11.

Also from the significant Chi-square analysis presented in Table 4.10, the percentage of difference between genders was determined. Five times the percentage of females self-reported absenteeism due to migraines than did males. These results are presented in Table 4.12.

Sleep Difficulties

Significant differences between absenteeism due to sleep difficulties and participants' self-reported gender and health status were found. No significant

Table 4.11. Absenteeism Due to Migraines by Age Group

			Migraine		Total
			Without	With	
Age Groups	39 or younger	Count	120	28	148
		% within Group	81.1%	18.9%	100.0%
	40-49	Count	139	16	155
		% within Group	89.7%	10.3%	100.0%
	50-59	Count	145	6	151
		% within Group	96.0%	4.0%	100.0%
	60 or older	Count	35	0	35
		% within Group	100.0%	.0%	100.0%
Total		Count	439	50	489
		% within Group	89.8%	10.2%	100.0%

Table 4.12. Absenteeism Due to Migraines by Gender

			Migraine		Total
			Without	With	
Gender	Male	Count	317	14	331
		% within Gender	95.8%	4.2%	100.0%
	Female	Count	137	37	174
		% within Gender	78.7%	21.3%	100.0%
Total		Count	454	51	505
		% within Gender	89.9%	10.1%	100.0%

differences were found between absenteeism due to health status and age, smoking status, or hours worked per week. These results are presented in Table 4.13.

From the Chi-square analysis presented in Table 4.13, the percentages of change between groups were determined. The results indicate that participants who reported poor or fair health status reported significantly more sleep difficulties causing absenteeism than any other health status group. These results are presented in Table 4.14.

From the significant Chi-square analysis presented in Table 4.13, the percentages of change between genders were determined. Significantly more females self-reported absenteeism due to sleep difficulties than did males (17, 9.8% compared to 16, 4.8%, p = .033). These results are presented in Table 4.15.

High Stress

Significant differences were found between self-reported absenteeism due to high stress and self-reported gender. Significant differences were not found between self-

Table 4.13. Chi-square Values for Worker Groups Reporting Absenteeism Due to Sleep Difficulties

Demographic	F value	df	P-value
Age	6.06	3	.109
Gender	4.55	1	.033*
Health Status	10.08	3	.018*
Smoking Status	.55	2	.761
Work Hrs/Wk	.06	1	.807

* $p < .05$

Table 4.14. Absenteeism Due to Sleep Difficulties by Health Status

			Sleep Difficulties		Total
			Without	With	
Health Status Group	Poor to Fair	Count	24	6	30
		% within Health Group	80.0%	20.0%	100.0%
	Good	Count	174	9	183
		% within Health Group	95.1%	4.9%	100.0%
	Very Good	Count	214	13	227
		% within Health Group	94.3%	5.7%	100.0%
	Excellent	Count	68	5	73
		% within Health Group	93.2%	6.8%	100.0%
Total		Count	480	33	513
		% within Health Group	93.6%	6.4%	100.0%

Table 4.15. Absenteeism Due to Sleep Difficulties by Gender

			Sleep Difficulties		Total
			Without	With	
Gender	Male	Count	315	16	331
		% within Gender	95.2%	4.8%	100.0%
	Female	Count	157	17	174
		% within Gender	90.2%	9.8%	100.0%
Total		Count	472	33	505
		% within Gender	93.5%	6.5%	100.0%

reported high stress and self-reported age, health status, smoking status, or hours worked per week. These results are presented in Table 4.16 and Table 4.17.

From the significant Chi-square analysis presented in Table 4.16, the percentages between genders were determined. Significantly more females self-reported absenteeism due to high stress than did males (16, 9.2% compared to14, 4.2%, p = .025). These results are presented in Table 4.17.

Depression

Significant differences were found between self-reported absenteeism due to depression and self-reported age and gender. Self-reported depression was much higher among participants in the 39 and under age group than among participants in other age groups. Depression was self-reported more than twice the percentage of time among females (17, 9.8%) than males (11, 3.3 %). Significant differences were not found for self-reported frequency of depression and self-reported health status, smoking status, or

Table 4.16. Chi-square Values for Worker Groups Reporting Absenteeism Due to High Stress

Demographic	F value	df	P-value
Age	3.17	3	.336
Gender	5.03	1	.025*
Health Status	.75	3	.861
Smoking Status	2.39	2	.302
Work Hrs/Wk	.66	1	.415

* $p < .05$

Table 4.17. Absenteeism Due to High Stress by Gender

			High Stress		Total
			Without	With	
Gender	Male	Count	317	14	331
		% within Gender	95.8%	4.2%	100.0%
	Female	Count	158	16	174
		% within Gender	90.8%	9.2%	100.0%
Total		Count	475	30	505
		% within Gender	94.1%	5.9%	100.0%

average hours worked per week. These results are presented in Table 4.18, Table 4.19, and Table 4.20.

Research Question 2

Research question 2 asks, "Are there significant differences for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, and hours worked per week in presenteeism due to health conditions?"

Analysis of the data related to research question 2 focused on the six health conditions that were responsible for the most self-reported presenteeism. These health conditions were allergic rhinitis (23.1%), high stress (17.4%), sleep difficulties (15.7%), migraine (14.3%), depression (8.3%), and respiratory illness (7.0%). Chi-square tabulations were calculated for each of the health conditions most frequently self-reported for causing presenteeism.for specific workers grouped by age, gender, health status, smoking status, and hours worked per week

Table 4.18. Chi-square Values for Worker Groups Reporting Absenteeism Due to Depression

Demographic	Chi-Square value	df	P-value
Age	14.52	3	.002*
Gender	9.05	1	.003*
Health Status	4.66	3	.198
Smoking Status	2.88	2	.237
Work Hrs/Wk	.05	1	.821

* $p < .05$

Table 4.19. Absenteeism Due to Depression by Age Groups

			Depression		Total
			Without	With	
Age Group	39 or younger	Count	131	17	148
		% within Age	88.5%	11.5%	100.0%
	40-49	Count	150	5	155
		% within Age	96.8%	3.2%	100.0%
	50-59	Count	147	4	151
		% within Age	97.4%	2.6%	100.0%
	60 or older	Count	34	1	35
		% within Age	97.1%	2.9%	100.0%
	Total	Count	462	27	489
		% within Age	94.5%	5.5%	100.0%

Table 4.20. Absenteeism Due to Depression by Gender

			Depression		Total
			Without	With	
Gender	Male	Count	320	11	331
		% within Gender	96.7%	3.3%	100.0%
	Female	Count	157	17	174
		% within Gender	90.2%	9.8%	100.0%
Total		Count	477	28	505
		% within Gender	94.5%	5.5%	100.0%

Allergic Rhinitis

There were no significant differences between allergic rhinitis and any of the demographic groups. These results are presented in Table 4.21.

High Stress

Significant differences between presenteeism due to high stress and participants' self-reported age, gender, and hours worked per week were found. No significant differences were found between presenteeism due to high stress and health status or smoking status. These results are presented in Table 4.22.

From the significant Chi-square analysis presented in Table 4.22, the percentages of change between groups were determined. The results indicate that the significant difference between age and presenteeism due to high stress is an inverse relationship. As age increases, self-reported presenteeism due to high stress decreases. This relationship is presented in Table 4.23.

Table 4.21. Chi-square Values for Worker Groups Reporting Presenteeism Due to Allergic Rhinitis

Demographic	Chi-Square value	df	P-value
Age	4.28	3	.233
Gender	1.40	1	.237
Health Status	2.40	3	.493
Smoking Status	.33	2	.846
Work Hrs/Wk	1.91	1	.166

Table 4.22. Chi-square Values for Worker Groups Reporting Presenteeism Due to High Stress

Demographic	Chi-Square value	df	P-value
Age	10.32	3	.016*
Gender	6.18	1	.013*
Health Status	6.47	3	.091
Smoking Status	1.84	2	.400
Work Hrs/Wk	4.73	1	.030*

* $p < .05$

Table 4.23. Presenteeism Due to High Stress by Age Group

		Age Group				Total
		39 or Younger	40-49	50-59	60 or Older	
No High Stress	Count	110	133	130	31	404
	% without High Stress	27.2%	32.9%	32.2%	7.7%	100.0%
High Stress	Count	38	22	21	4	85
	% with High Stress	44.7%	25.9%	24.7%	4.7%	100.0%
Total	Count	148	155	151	35	489

Likewise, about 8% more males than females self-reported presenteeism due to high stress. This relationship is shown in Table 4.24.

Average hours worked per week were also shown to differ significantly regarding presenteeism due to high stress. Participants who self-reported working more than 40 hours per week on average reported 25% more instances of presenteeism due to high stress than did participants who worked an average of 40 hours or less a week. These results are presented in Table 4.25.

Migraine

Significant differences between presenteeism due to migraines and participants' self-reported age and gender were found. No significant differences were found between presenteeism due to high stress and health status, smoking status, or hours worked per week. These results are presented in Table 4.26

Table 4.24. Presenteeism Due to High Stress by Gender

		Gender		Total
		Male	Female	
No High Stress	Count	284	134	418
	% without High Stress	67.9%	32.1%	100.0%
High Stress	Count	47	40	87
	% with High Stress	54.0%	46.0%	100.0%
Total	Count	331	174	505

Table 4.25. Presenteeism Due to High Stress by Hours Worked Per Week

		Hours Worked Per Week		Total
		40 hours or less	Over 40 hours	
No High Stress	Count	201	200	401
	% without High Stress	50.1%	49.9%	100.0%
High Stress	Count	32	54	86
	% with High Stress	37.2%	62.8%	100.0%
Total	Count	233	254	487

Table 4.26. Chi-square Values for Worker Groups Reporting Presenteeism Due to Migraines

Demographic	Chi-Square value	df	P-value
Age	30.05	3	<.001*
Gender	32.42	1	<.001*
Health Status	1.03	3	.795
Smoking Status	3.88	2	.144
Work Hrs/Wk	1.63	1	.201

* $p < .05$

From the significant Chi-square analysis presented in Table 4.26, the percentages of change between groups were determined. The results indicate that the significant difference between age and presenteeism due to migraines is an inverse relationship. As age increases, self-reported presenteeism due to migraines decreases. These results are presented in Table 4.27.

Likewise, significant differences were found between self-reported presenteeism due to migraines and gender. Females self-reported more than 25% more instances of presenteeism due to migraines than did males. These results are presented in Table 4.28.

Sleep Difficulties

There were no significant differences between presenteeism due to sleep difficulties and any of the demographic groups. These results are presented in Table 4.29.

Table 4.27. Presenteeism Due to Migraines by Age

		Age Group				Total
		39 or Younger	40-49	50-59	60 or Older	
No Migraines	Count	107	135	138	35	415
	% without Migraines	25.8%	32.5%	33.3%	8.4%	100.0%
Migraines	Count	41	20	13	0	74
	% with Migraines	55.4%	27.0%	17.6%	.0%	100.0%
Total	Count	148	155	151	35	489

Table 4.28. Presenteeism Due to Migraines by Gender

		Gender		Total
		Male	Female	
No Migraine	Count	304	127	431
	% without Migraines	70.5%	29.5%	100.0%
Migraines	Count	27	47	74
	% with Migraines	36.5%	63.5%	100.0%
Total	Count	331	174	505

Table 4.29. Chi-square Values for Worker Groups Reporting Presenteeism Due to Sleep Difficulties

Demographic	F value	df	P-value
Age	5.46	3	.141
Gender	1.94	1	.163
Health Status	5.41	3	.144
Smoking Status	.32	2	.853
Work Hrs/Wk	1.50	1	.220

Depression

Significant differences between presenteeism due to depression and participants' self-reported age and health status were found. No significant differences were found between presenteeism due to depression and gender, smoking status, or hours worked per week. These results are presented in Table 4.30.

From the significant Chi-square analysis presented in Table 4.30, the percentage change between groups was determined. A significantly higher percentage of participants in the 39 and under age group self-reported presenteeism due to depression than did participants in other age groups (24, 16.2%). The next highest group was the 50–59 year olds, who self-reported a (11) 7.3% frequency of depression. Participants in the 40 to 49 year old and 60 and older age groups reported (6) 3.9% and (1) 2.9% frequency of depression. These results are presented in Table 4.31.

The significant difference between health status and presenteeism due to depression was an inverse relationship. As reported health status declined, the percentage of respondents within the age group who self-reported presenteeism due to depression

Table 4.30. Chi-square Values for Worker Groups Reporting Presenteeism Due to Depression

Demographic	F value	df	P-value
Age	17.15	3	.001*
Gender	3.03	1	.082
Health Status	9.04	3	.029*
Smoking Status	.68	2	.713
Work Hrs/Wk	.28	1	.598

* $p < .05$

Table 4.31. Presenteeism Due to Depression by Age Group

			Depression		Total
			Without	With	
Age Groups	39 or younger	Count	124	24	148
		% within Age	83.8%	16.2%	100.0%
	40-49	Count	149	6	155
		% within Age	96.1%	3.9%	100.0%
	50-59	Count	140	11	151
		% within Age	92.7%	7.3%	100.0%
	60 or older	Count	34	1	35
		% within Age	97.1%	2.9%	100.0%
Total		Count	447	42	489
		% within Age	91.4%	8.6%	100.0%

increased. Twenty percent (6) of those with poor or fair health self-reported presenteeism due to depression. The percentage was lower for participants in the other health status groups, with (18) 9.8% of participants in good health reporting presenteeism due to depression, (17) 7.5% of participants in very good health reporting presenteeism due to depression, and (2) 2.7% of participants in excellent health reporting presenteeism due to depression. These results are presented in Table 4.32.

Respiratory Illness

Significant differences between presenteeism due to respiratory illness and participants' self-reported gender and health status were found. No significant differences were found between presenteeism due to respiratory illness and age, smoking status, or hours worked per week. These results are presented in Table 4.33.

Table 4.32. Presenteeism Due to Depression by Health Status

			Depression		Total
			Without	With	
Health Status Groups	Poor to Fair	Count	24	6	30
		% within health	80.0%	20.0%	100.0%
	Good	Count	165	18	183
		% within health	90.2%	9.8%	100.0%
	Very Good	Count	210	17	227
		% within health	92.5%	7.5%	100.0%
	Excellent	Count	71	2	73
		% within health	97.3%	2.7%	100.0%
Total		Count	470	43	513
		% within health	91.6%	8.4%	100.0%

Table 4.33. Chi-square Values for Worker Groups Reporting Presenteeism Due to Respiratory Illness

Demographic	Chi-Square value	df	P-value
Age	3.54	3	.316
Gender	4.15	1	.042*
Health Status	8.81	3	.032*
Smoking Status	4.21	2	.122
Work Hrs/Wk	.95	1	.331

* $p < .05$

From the significant Chi-square analysis presented in Table 4.33, the percentage of change between groups was determined. Nearly twice the percentage of females self-reported presenteeism due to respiratory illness than did males. These results are presented in Table 4.34.

The significant difference between health status and presenteeism due to respiratory illness is an inverse relationship. As health status declined, the percentage of respondents within the age group who reported respiratory illness increased. Among those with poor or fair health, (5) 16.7% reported presenteeism due to respiratory illness. The percentage was lower for participants in other health status groups, with (17) 9.3% of participants in good health reporting presenteeism due to respiratory illness, (12) 5.3% of participants in very good health, and (2) 2.7% of participants in excellent health also reporting presenteeism due to respiratory illness. These results are presented in Table 4.35.

Table 4.34. Presenteeism Due to Respiratory Illness by Gender

			Respiratory Illness		Total
			Without	With	
Gender	Male	Count	313	18	331
		% within Gender	94.6%	5.4%	100.0%
	Female	Count	156	18	174
		% within Gender	89.7%	10.3%	100.0%
Total		Count	469	36	505
		% within Gender	92.9%	7.1%	100.0%

Table 4.35. Presenteeism Due to Respiratory Illness by Health Status

			Respiratory Illness		Total
			Without	With	
Health Groups	Poor to Fair	Count	25	5	30
		% within health	83.3%	16.7%	100.0%
	Good	Count	166	17	183
		% within health	90.7%	9.3%	100.0%
	Very Good	Count	215	12	227
		% within health	94.7%	5.3%	100.0%
	Excellent	Count	71	2	73
		% within health	97.3%	2.7%	100.0%
Total		Count	477	36	513
		% within health	93.0%	7.0%	100.0%

Research Question 3

Research question 3 asks, "Are there significant differences between reported absenteeism and presenteeism due to self-reported health conditions for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, or hours worked per week?"

A multivariate analysis of variance (MANOVA) for each demographic was conducted. When the demographic MANOVA results were significant, individual ANOVAs were run to determine which work impairments were significant.

A MANOVA of gender was conducted and found significant differences ($F_{2,502} = 6.100$, $p = .002$). Individual ANOVAs determined that presenteeism was significant ($p = .001$) but absenteeism was not ($p = .123$). The means for males and females are

presented in Table 4.36. Females spent nearly twice as much time feeling ill at work as males.

A MANOVA for health status also found significant differences ($F_{6,1016} = 5.510$, $p < .001$). Individual ANOVAs for health status were significant for both absenteeism ($p < .001$) and presenteeism ($p < .001$). The means relationships for health status compared to absenteeism and presenteeism are presented in Table 4.37.

Participants who reported poor or fair health self-reported significantly more missed days of work due to health conditions (absenteeism) than did participants who reported better health (an average of 53.8 days compared to 5.5 days or less for other health groups). Participants in good health missed an average of 5.5 days, while participants in very good or excellent health missed an average of 1.5 days and 1.9 days, respectively.

Likewise, self-reported presenteeism improved as health status improved. Participants who reported poor or fair health spent an average of 11.31 hours feeling ill or

Table 4.36. Presenteeism Hours by Gender

Gender	Mean (hrs)	Std. Error
Male	3.01	.446
Female	5.66	.615

Table 4.37. Participants' Average Self-Reported Absenteeism (Days) and Presenteeism (Hours) by Self-Reported Health Status

Dependent Variable	Health Status Group	Ave. (days/hrs)	Std. Error
Absenteeism (days)	Fair or Poor	53.8	11.37
	Good	5.5	4.61
	Very Good	1.5	4.14
	Excellent	1.9	7.29
Presenteeism (hrs)	Fair or Poor	11.3	1.45
	Good	4.0	.59
	Very Good	3.2	.53
	Excellent	2.6	.93

not effective while at work (presenteeism). Participants in good health averaged 3.954hours of presenteeism, while those participants in very good or excellent health reported 3.242 and 2.637 presenteeism hours, respectively.

Smoking status ($F_{4,1016} = 1.298$, $p = .269$), hours worked per week ($F_{2,484} = .790$, $p = .455$), and age ($F_{6,968} = 1.568$, $p = .153$) were not significant for absenteeism and presenteeism when compared to health status.

Research Question 4

Research question 4 asks, "Are there significant differences between the absenteeism and presenteeism of Tennessee safety and health professionals and their health beliefs, including perceived susceptibility, severity, benefits, and barriers?"

To answer this question, absenteeism was divided into three groups: participants who reported less than one day of absenteeism (0 days), participants who reported five days or less of absenteeism (1 to 5 days), and participants who reported greater than 5

days of absenteeism. Presenteeism was divided into three groups: participants who reported less than one hour of presenteeism (0 hours), participants who reported less than 8 hours of presenteeism (1 to 8 hours), and participants who reported more than 8 hours of presenteeism. Multivariate analyses of variance (MANOVAs) for absenteeism and presenteeism were conducted on each of the constructs (perceived susceptibility, perceived severity, perceived benefits, and perceived barriers) of the Health Belief Model. When the absenteeism or presenteeism MANOVA results were significant, individual ANOVAs were run to determine work impairments.

Significant differences were not found between self-reported absenteeism and the constructs of the Health Belief Model ($F_{10,996} = 1.527$, $p = .124$). However, significant differences did exist between self-reported presenteeism and the Health Belief Model constructs ($F_{10,998} = 2.152$, $p = .019$). ANOVA analysis of between-subjects effects found that significant differences existed for perceived susceptibility ($F_{2,2.857} = 4.390$, $p = .013$) and perceived barriers of heart disease ($F_{2,2.328} = 6.566$, $p = .002$). Individual ANOVA results between presenteeism and the Health Belief Model constructs are presented in Table 4.38

Participants who reported more than 8 hours of presenteeism over the last year due to health conditions had a significantly higher perceived susceptibility to heart disease. Additionally, as presenteeism hours increased, the perceived barriers to exercise significantly increased. Table 4.39 presents the means for the Health Belief Model constructs related to these presenteeism groups.

Because a large percentage of participants (60.2%) self-reported no absenteeism or presenteeism, nonparametric correlations were conducted after all of the participants

Table 4.38. Presenteeism by the Health Belief Model Constructs

Health Belief Model Construct	F	p-value
Susceptibility	4.390	.013*
Perceived Barriers	6.566	.002*
Perceived Severity	1.373	.254
Perceived Benefit	.299	.742

* $p < .05$

Table 4.39. Health Belief Model Constructs Relationship to Presenteeism Group

Dependent Variable	Presenteeism Group	Mean	Std. Error
Susceptibility	0 hours	2.66	.049
	1-8 hours	2.77	.061
	More than 8 hours	2.98	.102
Perceived Barriers	0 hours	2.58	.036
	1-8 hours	2.57	.045
	More than 8 hours	2.87	.076

with no reported absenteeism or presenteeism were removed (removal of all zero values) to improve the power of the analysis. Self-reported absenteeism was positively correlated with perceived susceptibility and perceived barriers to exercise. Therefore, as absenteeism increased, perceived susceptibility to heart disease and perceived barriers to exercise increased. Presenteeism was positively correlated with perceived severity of heart disease.As presenteeism increased, perceived severity of heart disease increased. Table 4.40 presents these results.

Research Question 5

Research question 5 asks, "Are there significant differences for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, and hours

Table 4.40. Absenteeism and Presenteeism Correlations with Health Belief Model Constructs

Constructs		Spearman's rho	
		Absenteeism	Presenteeism
Susceptibility	Correlation Coefficient	.187(*)	.067
	Sig. (2-tailed)	.014	.305
Perceived Barriers	Correlation Coefficient	.177(*)	.120
	Sig. (2-tailed)	.020	.064
Perceived Severity	Correlation Coefficient	.100	.160(*)
	Sig. (2-tailed)	.186	.013
Perceived Benefits	Correlation Coefficient	.091	.065
	Sig. (2-tailed)	.231	.318

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

worked per week and their health beliefs, including perceived susceptibility, severity, benefits, and barriers?"

To answer this question, multivariate analyses of variance (MANOVAs) for each demographic were conducted. When the demographic MANOVA results were significant, individual ANOVAs were run to better understand which Health Belief Model constructs were significant.

Significant differences were shown to exist between gender and health beliefs ($F_{5,499} = 6.229, p < .001$). These results are presented in Table 4.41.

ANOVA analyses of the relationship between gender and Health Belief Model constructs were performed. ANOVAs for gender indicated that females perceived higher severity to heart disease ($F_{1,7.027} = 10.807, p = .001$) and a higher benefit of exercise ($F_{1,8.547} = 10.892, p = .001$) than did males. Males, on the other hand, reported a higher perceived susceptibility to heart disease than did females ($F_{1,5.778} = 13.832, p < .001$). There was no significant difference between gender and perceived barriers to exercise ($F_{1,.040} = .109, p = .741$). Means data are presented in Table 4.42.

Table 4.41. Gender Related to Health Belief Model Constructs

Source	Dependent Variable	df	Mean Square	F	Sig.
Gender	Susceptibility	1	7.027	10.807	.001*
	Perceive Barriers	1	.040	.109	.741
	Perceived Severity	1	8.547	13.832	<.001*
	Perceived Benefits	1	5.778	10.892	.001*

* $p < .05$

Table 4.42. Gender Compared to Health Belief Model Constructs

Dependent Variable	Sex	Mean	Std. Error
Susceptibility	Male	2.82	.044
	Female	2.57	.061
Perceived Severity	Male	3.75	.043
	Female	4.02	.059
Perceived Benefits	Male	3.87	.040
	Female	4.10	.055

Significant differences existed between age groups and the participants' health beliefs ($F_{15,1325} = 2.172$, $p = .006$). ANOVA analysis means data show that as age increased, perceived susceptibility to heart disease increased, and the perceived benefit of exercise decreased. Differences did not exist for perceived barriers to exercise and perceived severity of heart disease. These results are shown in Table 4.43 and Table 4.44.

MANOVA results for heath status indicated that significant differences existed between health groups ($F_{15,1394} = 6.698$, $p < .001$). ANOVA analysis showed that as health status improved, perceived benefits of exercise increased. Also, as health status improved, perceived susceptibility to heart disease and barriers to exercise decreased. There was no significant difference in the perceived severity of heart disease compared to health status. These results are shown in Table 4.45 and Table 4.46.

Significant differences were found in smoking status ($F_{10,1010} = 4.584$, $p < .001$). Participants who self-reported being current smokers reported feeling more susceptible to heart disease but perceived less benefit to exercise than did former smokers or those who never smoked. Significant differences were not found between smoking groups and

Table 4.43. Age Related to Health Belief Model Constructs

Source	Dependent Variable	df	Mean Square	F	Sig.
Age	Susceptibility	3	2.023	3.052	.028*
	Perceived Barriers	3	.286	.778	.506
	Perceived Severity	3	1.050	1.565	.197
	Perceived Benefits	3	1.532	2.976	.031*

* $p < .05$

Table 4.44. Health Belief Model Constructs and Age Groups

Dependent Variable	Age	Mean	Std. Error
Perceived Benefits	39 or younger	4.03	.059
	40-49	4.05	.058
	50-59	3.86	.058
	60 or older	3.77	.120
Susceptibility	39 or younger	2.60	.067
	40-49	2.72	.066
	50-59	2.82	.066
	60 or older	2.98	.136

Table 4.45. Health Status Related to Health Belief Model Constructs

Source	Dependent Variable	df	Mean Square	F	Sig.
Health Status	Susceptibility	3	12.886	22.085	<.001*
	Perceived Barriers	3	4.061	11.985	<.001*
	Perceived Severity	3	1.376	2.050	.106
	Perceived Benefit	3	2.060	3.892	.009*

* $p < .05$

Table 4.46. Health Belief Model Constructs Relationship to Health Status Groups

Dependent Variable	Health Status	Mean	Std. Error
Susceptibility	Poor to Fair	3.47	.137
	Good	2.92	.057
	Very Good	2.62	.051
	Excellent	2.32	.090
Perceived Barriers	Poor to Fair	3.08	.105
	Good	2.68	.043
	Very Good	2.57	.039
	Excellent	2.37	.069
Perceived Benefit	Poor to Fair	4.00	.131
	Good	3.87	.054
	Very Good	3.92	.048
	Excellent	4.21	.086

perceived barriers to exercise and perceived severity of heart disease.

The results of smoking status compared to health beliefs are presented in Table 4.47 and Table 4.48.

Significant differences were found between those who worked more than 40 hours per week and those who worked 40 hours or less per week and health beliefs ($F_{5,482} = 3.015$, $p = .011$). Those who worked more than 40 hours per week reported feeling more susceptible to heart disease than did those who worked fewer hours. No significant differences were found for perceived barriers to exercise, perceived severity of heart disease, or perceived benefits of exercise when compared to hours worked. The results of hours worked related to health beliefs are presented in Table 4.49 and Table 4.50.

Table 4.47. Smoking Status Related to Health Belief Model Constructs

Source	Dependent Variable	df	Mean Square	F	Sig.
Smoking	Susceptibility	2	9.746	15.695	<.001*
	Perceived Barriers	2	.125	.345	.708
	Perceived Severity	2	.192	.283	.754
	Perceived Benefit	2	2.138	4.011	.019*

* $p < .05$

Table 4.48. Health Belief Model Constructs Relationship to Smoking Status Groups

Dependent Variable	Smoking Status	Mean	Std. Error
Susceptibility	Never Smoked	2.60	.046
	Former Smoker	2.79	.065
	Current Smoker	3.16	.091
Perceived Benefit	Never Smoked	4.02	.043
	Former Smoker	3.90	.060
	Current Smoker	3.77	.084

Table 4.49. Work Hours Related to Health Belief Model Constructs

Source	Dependent Variable	df	Mean Square	F	Sig.
Work Hours	Susceptibility	1	3.564	5.484	.020*
	Perceived Barriers	1	.309	.929	.336
	Perceived Severity	1	.371	.592	.442
	Perceived Benefit	1	.639	1.266	.261

* $p < .05$

Table 4.50. Health Belief Model Constructs Compared to Work Hours Groups

Dependent Variable	Work Hours Group	Mean	Std. Error
Susceptibility	40 hours or less	2.64	.053
	Over 40 hours	2.81	.050

Summary

Chapter 4 presented the analysis and interpretation of data collected from the questionnaire concerning the relationships between health conditions that result in safety and health professionals' absenteeism and presenteeism and their health beliefs. A convenience sample of safety and health professionals who attended the 2005 Tennessee Safety and Health Congress was used as the study population. Demographic and descriptive information about the Tennessee safety and health professionals was provided. Then, each research question with associated statistical analysis was presented.

The analysis showed that significant differences existed between absenteeism and presenteeism due to health conditions. Significant differences also existed between absenteeism and presenteeism and health status. The most frequent health conditions causing absenteeism and presenteeism were allergic rhinitis, respiratory illness, high stress, depression, sleep difficulties, and migraines. Each of these health conditions exhibited significant differences among safety and health professionals grouped by age, gender, health status, smoking status, and hours worked per week. However, except for absenteeism related to gender, allergic rhinitis did not differ between groups for absenteeism or presenteeism.

The analysis of the data also showed that significant differences existed between absenteeism and presenteeism reported by safety and health professionals and health beliefs. This was determined through an analysis of specific constructs within the Health Belief Model. Significant differences were also found between self-reported gender, age, health status, smoking status, and hours worked per week and reported health beliefs.

Chapter 5 presents a summary of the findings, conclusions, and recommendations.

CHAPTER 5

FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary of the Study

The purpose of this study was to investigate the health conditions, health status, and health beliefs of Tennessee safety and health professionals using self-reported absenteeism and presenteeism. A convenience sample of safety and health professionals who attended the 2005 Tennessee Safety and Health Congress was selected to serve as the sample for the study.

A questionnaire focusing on absenteeism and presenteeism, health beliefs, smoking and health status, and basic demographic information was compiled, piloted, and administered to collect the required data. Two valid and reliable questionnaires, "The Wellness Inventory" by Goetzel, et al. (2003) and "The Health Beliefs Questionnaire" by Mirotznik, et al. (1995), were merged to create a new questionnaire: "Your Perceptions of How Health Conditions Impact Work Productivity." The new questionnaire was pilot tested at the Oak Ridge Safety and Health Expo on June 22, 2005, using a sample of safety and health professionals. In addition to piloting the questionnaire, the Expo site served as a pilot for the collection site methodology.

The data gathered through the questionnaire were coded and analyzed by using Chi-square, MANOVAs and ANOVAs, and Spearman's rho testing. Comparisons were made between demographic characteristics of safety and health professionals participating in the study and self-reported health related absenteeism and presenteeism.

The comparisons were made for 12 health conditions itemized within the questionnaire. Comparisons were also made to health beliefs and attitudes. Additionally, demographic characteristics were compared to health beliefs.

To analyze the health beliefs and attitudes of the safety and health professionals participating in the study, the framework of the Health Belief Model and its constructs of perceived susceptibility, perceived severity, perceived barriers, and perceived benefits were utilized.

Findings and Conclusions

Within the study population of Tennessee safety and health professionals, 39.8% of the participants self-reported missing work due to health conditions (absenteeism) or feeling ill and less productive while at work (presenteeism), while 60.2% of the study participants self-reported no absenteeism or presenteeism. Findings and conclusions for each of the study's research questions are discussed below.

Research Question 1

Research question 1 asks, "Are there significant differences for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, and hours worked per week in absenteeism due to health conditions?"

Research Findings

The research findings for research question 1 are as follows.

1. The six most frequently self-reported health conditions causing absenteeism were allergic rhinitis (67, 13.0%), respiratory illness (52, 10.1%), migraines (51, 9.9%), sleep difficulties (33, 6.4%), high stress (30, 5.8%), and depression (28, 5.4%).
2. *Allergic rhinitis:* Absenteeism due to allergic rhinitis was significantly more common among female participants (30, 17.2%) than among male participants (36, 10.9%; p = .044).
3. *Allergic rhinitis:* Significant differences in absenteeism due to allergic rhinitis were not found when safety and health participants were grouped by age, health status, smoking status, or hours worked per week.
4. *Respiratory illness*: Female participants (28, 16.1%) self-reported significantly more absenteeism due to respiratory illness than did male participants (24, 7.3%; p = .002).
5. *Respiratory illness:* Absenteeism due to respiratory illness was greater for participants with lower reported health status (Poor or Fair: 7, 23.3%; Good: 22, 12.0%; Very Good: 17, 7.5%; and Excellent: 6, 8.2%; p = .037).
6. *Respiratory illness:* A significant difference was found among participants who reported absenteeism caused by respiratory illness and reported poor or fair health (7, 23.3%) than among any other health group (Good: 22, 12.0%; Very Good: 17, 7.5%; and Excellent: 6, 8.2%; p = .037).

7. *Respiratory illness*: No significant differences were found for self-reported absenteeism due to respiratory illness when safety and health participants were grouped by age, smoking status, or hours worked per week.
8. *Migraines:* Migraines were found to cause absenteeism in significantly more participants 39 years old or younger than in participants in older age groups. (39 or younger: 28, 18.9%; 40-49: 16, 10.3%; 50-59: 6, 4%; 60 and over: 0, 0%; $p < .001$).
9. *Migraines:* Female participants (37, 21.3%) self-reported significantly more absenteeism due to migraines than did male participants (14, 4.2%, $p < .001$).
10. *Migraines:* No significant differences were found for absenteeism due to migraines when safety and health participants were grouped by smoking status and hours worked per week.
11. *Sleep difficulties:* Female participants (17, 9.8%) self-reported significantly more absenteeism due to sleep difficulties than did male participants (16, 4.8%, $p = .033$).
12. *Sleep difficulties:* Participants who self-reported poor or fair health status reported significantly more sleep difficulties causing absenteeism than did all other participants from other health status response groups. (Poor or Fair: 6, 20.0%; Good: 9, 4.9%; Very Good: 13, 5.7%; Excellent: 5, 6.8%; $p = .018$).
13. *Sleep difficulties:* No significant differences were found for absenteeism due to sleep difficulties when safety and health participants were grouped by age, smoking status, or hours worked per week.

14. *High stress:* Female participants (16, 9.2%) self-reported significantly more absenteeism due to high stress than did male participants (14, 4.2%, p = .025).
15. *High stress:* No significant difference were found for absenteeism due to high stress when safety and health participants were grouped by age, health status, smoking status, or hours worked per week.
16. *Depression:* Depression was significantly higher for safety and health study participants from the 39 and under age group than for participants from other age groups (39 or younger: 17, 11.5%; 40-49: 5, 3.2%; 50-59: 4, 2.6%; 60 and over: 1, 2.9%; p = .002).
17. *Depression:* Absenteeism due to depression was significantly more common among female safety and health study participants (17, 9.8%) than among male participants (11, 3.3 %; p = .003).
18. *Depression*: No significant differences were found for absenteeism due to depression when safety and health participants were grouped by health status, smoking status, or hours worked per week.

Research Conclusion

Absenteeism caused by the six most frequently reported health conditions (allergic rhinitis, respiratory illness, migraines, sleep difficulties, high stress, and depression) reported by the Tennessee safety and health professionals varied when the safety and health professionals were grouped by self-reported age, gender, health status, smoking status, and self-reported hours worked per week.

The most frequently found health conditions causing absenteeism and presenteeism reported by this study (allergic rhinitis, respiratory illness, migraines, sleep difficulties, high stress, and depression) were similar to the results reported by Goetzel, Ozminkowski and associates. Goetzel et al.'s study, published in 2003, reported that allergies, migraines, respiratory illness, and stress were the health conditions responsible for the most absenteeism and presenteeism (Goetzel, et al., 2003). The actual percentages of respondents self-reporting a specific health condition causing absenteeism due to allergic rhinitis (13%), respiratory illness (10.1%), migraines (9.9%), and high stress (5.8%) from this current research were similar to the study by Goetzel, et al. (2003), which reported allergies were 13%, respiratory illness was 19%, migraines were 14%, and stress was 9%.

With the exception of health status, the results of research focusing on comparisons of work groups by gender, age, health status, smoking status, and hours worked per week to self-reported absenteeism caused by health conditions were not found in the published literature. Ozminkowski, et al., (2003) is the only published study to analyze absenteeism relationships due to specific health conditions with self-reported health status. The study by Ozminkowski, et al. (2003) indicated that of the health conditions analyzed, health status was related to self-reported stress, migraines, and respiratory illness. No relationship was reported between health status and the health conditions of allergies and depression as causes of absenteeism.

Research Question 2

Research question 2 asks, "Are there significant differences for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, and hours worked per week in presenteeism due to health conditions?"

Research Findings

The research findings for research question 2 are as follows.

1. The six most frequently self-reported health conditions causing presenteeism were allergic rhinitis (119, 23.1%), high stress (90, 17.4%), sleep difficulties (81, 15.7%), migraine (74, 14.3%), depression (43, 8.3%), and respiratory illness (36, 7.0%).
2. *Allergic rhinitis:* No significant differences were found for self-reported presenteeism caused by allergic rhinitis when safety and health study participants were grouped by age, gender, health status, smoking status, and hours worked per week.
3. *High stress:* Presenteeism due to high stress declined significantly with age (39 or younger: 38, 44.7%; 40-49: 22, 25.9%; 50-59: 21, 24.7%; 60 and over: 4, 4.7%; $p = .016$).
4. *High stress:* Male participants (47, 54.0%) self-reported significantly more presenteeism due to high stress than did female participants (40, 46.0%; $p = .013$).
5. *High stress:* A significantly greater percentage of participants who worked more than 40 hours per week reported presenteeism due to high stress (25%)

than did participants who reported working 40 hours or less a week (More than 40 hours per week: 54, 62.8% compared to 40 hours or less per week: 32, 37.2%; $p = .030$).

6. *High stress:* No significant differences were found for presenteeism due to high stress when safety and health study participants were grouped by health status or smoking status.
7. *Migraines:* Significantly more participants 39 or younger reported presenteeism due to migraines than did safety and health study participants over 39 (39 or younger: 41, 55.4%; 40-49: 20, 27.0%; 50-59: 13, 17.6%; 60 and over: 0, 0%; $p < .001$).
8. *Migraines:* A significantly greater percentage of female participants (47, 63.5%) self-reported presenteeism due to migraines (25%) than did male participants (27, 36.5%; $p < .001$).
9. *Migraines:* No significant differences were found for presenteeism caused by high stress when safety and health study participants were grouped by health status, smoking status, or hours worked per week.
10. *Sleep difficulties:* No significant differences were found for presenteeism due to sleep difficulties when safety and health study participants were grouped by age, gender, health status, smoking status, and hours worked per week.
11. *Depression:* A significantly higher percentage of participants in the 39 and under age group reported presenteeism due to depression than did participants in older age groups (39 or younger: 24, 16.2%; 40-49: 6, 3.9%; 50-59: 11, 7.4%; 60 and over: 1, 2.9%; $p = .001$).

12. *Depression:* Presenteeism due to depression was greater for participants who reported lower health status (Poor or Fair: 6, 20.0%; Good: 18, 9.8%; Very Good: 17, 7.5%; Excellent: 2, 2.7%; p = .029).
13. *Depression:* No significant differences were found for presenteeism due to depression when safety and health study participants were grouped by gender, smoking status, and hours worked per week.
14. *Respiratory illness:* A significantly greater percentage of female participants self-reported presenteeism due to respiratory illness (18, 10.3%) than did male participants (18, 5.4%; p = .042).
15. *Respiratory illness:* Presenteeism due to respiratory illness was greater for participants who reported lower health status. (Poor or Fair: 5, 16.7%; Good: 17, 9.3%; Very Good: 12, 5.3%; Excellent: 2, 2.7%; p = .032).
16. *Respiratory illness:* No significant differences were found for presenteeism due to respiratory illness when safety and health study participants were grouped by age, smoking status, and hours worked per week.

Research Conclusion

Of the six most frequently reported health conditions causing presenteeism reported by Tennessee safety and health professionals, high stress, migraines, depression, and respiratory illness varied when safety and health professionals were grouped by age, gender, health status, smoking status, and self-reported hours worked per week. Presenteeism caused by allergic rhinitis and sleep difficulties did not vary when safety and health professionals were grouped by age, gender, health status, smoking status, and

self-reported hours worked per week. These results were similar to research reported by Goetzel, et al. (2004). Goetzel, et al.'s (2004) research investigated presenteeism due to 10 different health conditions using five different surveys and found allergies and migraines to be the most prevalent causes of presenteeism.

With the exception of health status, the results of research focusing on comparisons of work groups by gender, age, health status, smoking status, and hours worked per week to self-reported presenteeism caused by health conditions were not found in the published literature. Ozminkowski, et al. (2003) is the only published study to analyze absenteeism relationships due to specific health conditions with self-reported health status. The study by Ozminkowski, et al. (2003) indicated that of the health conditions analyzed, health status was related to self-reported stress, migraines, and respiratory illness. No relationship was reported between health status and the health conditions of allergies and depression as causes of presenteeism.

Research Question 3

Research question 3 asks, "Are there significant differences between reported absenteeism and presenteeism due to self-reported health conditions for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, or hours worked per week?"

Research Findings

The research findings for research question 3 are as follows.

1. Female participants self-reported a significantly higher amount of presenteeism due to health conditions (5.66 days) than did male participants (3.01 days).
2. Self-reported absenteeism was significantly greater for participants who reported lower health status (Poor or Fair: 53.8 days; Good: 5.5 days; Very Good: 1.5 days; Excellent: 1.8 days).
3. Self-reported presenteeism was significantly greater for participants who reported lower health status (Poor or Fair: 11.3 hours; Good: 4.0 hours; Very Good: 3.2 hours; Excellent: 2.6 hours).
4. No significant differences were found for absenteeism or presenteeism when safety and health study participants were grouped by age, smoking status, and hours worked per week.

Research Conclusion

Absenteeism, the number of workdays missed due to health conditions, was different for Tennessee safety and health professionals when they were grouped by health status, but it was not different when the study participants were grouped by age, gender, smoking status, and hours worked per week.

Presenteeism, the number of hours a person feels ill and less effective at work, was different for Tennessee safety and health professionals when they were grouped by gender and health status. Reported presenteeism was not different when the safety and

health study participants were grouped by age, smoking status, and hours worked per week.

When grouped by health status, Tennessee safety and health professionals self-reporting fair or poor health status reported a greater frequency of absenteeism and presenteeism than did those who self-reported good, very good, or excellent health status. The research of Ozminkowski, et al. (2003) found a similar relationship between health status and absenteeism and presenteeism.

Research Question 4

Research question 4 asks, "Are there significant differences between the absenteeism and presenteeism of Tennessee safety and health professionals and their health beliefs, including perceived susceptibility, severity, benefits, and barriers?"

Research Findings

The research findings for research question 4 are as follows.

1. *Absenteeism:* No significant differences were found between the absenteeism and health beliefs of participants based on the Health Belief Model constructs of perceived susceptibility, perceived severity, perceived barriers, and perceived benefits.
2. *Presenteeism:* Those participants who reported feeling ill while at work (presenteeism) for more than 8 hours over the last year had a significantly higher perceived susceptibility to heart disease than did those participants who

reported less than 8 hours or no presenteeism (Mean = 2.98 compared to 2.66 for 0 hours and 2.77 for 1-8 hours; p = .011).

3. Those participants who reported more than 8 hours of presenteeism also reported significantly greater perceived barriers to exercise (Mean = 2.868 vs. 2.583 for 0 hours and 2.566 for 1-8 hours; p = .002).

Research Conclusion

Reported absenteeism of Tennessee safety and health professionals was similar regardless of perceived susceptibility to heart disease, perceived severity of heart disease, perceived benefits of exercise, and perceived barriers to exercise.

Self-reported susceptibility to heart disease and perceived barriers to exercise were higher for safety and health study participants who reported more than 8 hours of presenteeism than for those who reported 8 hours or less time lost due to presenteeism. Perceived severity of heart disease and perceived benefits of exercise were the same for Tennessee safety and health professionals who self-reported more than 8 hours of presenteeism compared to Tennessee safety and health professionals who reported 8 hours or less of presenteeism.

Research Question 5

Research question 5 asks, "Are there significant differences for Tennessee safety and health professionals grouped by age, gender, health status, smoking status, and hours worked per week and their health beliefs, including perceived susceptibility, severity, benefits, and barriers?"

Research Findings

The research findings for research question 5 are as follows.

1. *Gender:* Female participants reported perceiving a higher average severity to heart disease (Mean: 4.02) than did male participants (Mean: 3.75; $p = .001$).
2. *Gender:* Female participants reported perceiving a higher average benefit to exercise for improved health (Mean: 4.10) than did male participants (Mean: 3.87; $p = .001$).
3. *Gender:* Male participants reported perceiving a higher average susceptibility to heart disease (Mean: 2.82) than did female participants (Mean: 2.57; $p < .001$).
4. *Gender:* No significant difference between male and female participants was found for perceived barriers to exercise.
5. *Age groups:* Perceived susceptibility to heart disease increased with age (39 or younger Mean: 2.60; 40-49 Mean: 2.72; 50-59 Mean: 2.82; 60 and over Mean: 2.98; $p = .028$).
6. *Age groups:* Perceived benefit of exercise decreased with age (39 or younger Mean: 4.03; 40-49 Mean: 4.05; 50-59 Mean: 3.86; 60 and over Mean: 3.77; $p = .031$).
7. *Age groups:* No significant differences were found for perceived barriers to exercise and perceived severity of heart disease when participants were grouped by age.

8. *Health status:* Perceived benefits of exercise increased with higher health status (Poor or Fair Mean: 4.00; Good Mean: 3.87; Very Good Mean: 3.92; Excellent Mean: 4.21; $p < .001$).
9. *Health status:* Those participants who reported higher health status also reported a lower perceived susceptibility to heart disease (Poor or Fair Mean: 3.47; Good Mean: 2.92; Very Good Mean: 2.62; Excellent Mean: 2.32; $p < .001$).
10. *Health status:* Those participants who reported a higher health status also reported lower barriers to exercise (Poor or Fair Mean: 3.08; Good Mean: 2.68; Very Good Mean: 2.57; Excellent Mean: 2.37; $p = .009$).
11. *Health status:* No significant differences were found for safety and health participants' perceived severity of heart disease when grouped by health status.
12. *Smoking status:* Current smokers reported feeling more susceptible to heart disease (Mean: 3.16) than did former smokers (Mean: 2.79) and those who have never smoked (Mean: 2.60; $p < .001$).
13. *Smoking status:* Current smokers reported that they perceived less benefit to exercise (Mean: 3.77) than did former smokers (Mean: 3.90) and those who have never smoked (Mean: 4.02; $p = .019$).
14. *Smoking status:* No significant differences were found between smoking groups and perceived barriers to exercise and perceived severity of heart disease.

15. *Hours worked per week:* Those participants who worked more than 40 hours per week reported a higher susceptibility to heart disease (Mean: 2.81) than did those participants who worked fewer hours (Mean: 2.64; $p = .020$).
16. *Hours worked per week:* No significant differences were found between hours worked per week and perceived barriers to exercise, perceived severity of heart disease, or perceived benefits of exercise.

Research Conclusion

Health beliefs and attitudes of Tennessee safety and health professionals were different when grouped by self-reported age, gender, health status, smoking status, and hours worked per week. This conclusion is similar to the conclusions reported by Al-Ali & Haddad (2004). Al-Ali & Haddad concluded that variables such as age and gender "demonstrate a varied effect on exercise participation." Al-Ali & Haddad (2004) also found that as age increased, perceived barriers to exercise also increased, and age was negatively correlated with exercise participation. Their conclusion was similar to this study's finding that the perceived benefits of exercise decreased with age; however, significant differences did not exist for perceived barriers to exercise and age.

Gender also presented significant differences with the Al-Ali & Haddad (2004) study. While this current study found that males had a higher perceived susceptibility to heart disease than did females, earlier research by Al-Ali & Haddad (2004) reported the opposite finding: that females had a higher perceived susceptibility to heart disease (myocardial infarction) than did males.

Recommendations

The following recommendations are based on the findings and the conclusions of this study.

1. When considering future actions for employers to address absenteeism caused by specific workplace illnesses for safety and health professionals, certain health conditions such as allergic rhinitis should be addressed for all employees, since all groups reported this health condition as a cause of reduced productivity due to absenteeism. However, actions for the health conditions of migraines, sleep difficulties, high stress, depression, and respiratory illness should be addressed by separating individuals into sub-groups related to age, gender, health status, smoking status, and hours worked per week.
2. When considering future actions for employers to address presenteeism caused by health conditions such as allergic rhinitis and sleep difficulties for safety and health professionals, these health conditions should be addressed for all employees since all groups reported these problems as causes of reduced productivity due to presenteeism. However, the health conditions of migraines, high stress, depression, and respiratory illness should be addressed by separating individuals into sub-groups related to age, gender, health status, smoking status, and hours worked per week.
3. Actions to reduce absenteeism and presenteeism due to health conditions for safety and health professionals in Tennessee should focus on employee groups self reporting poor or fair health status. This recommendation is made

because respondents in these health status groups were found to have reported the majority of absenteeism and presenteeism in this study.

4. Actions to reduce absenteeism and presenteeism for safety and health professionals in Tennessee should be targeted at specific categorical sub-groups based on age, gender, health status, smoking status, and hours worked per week to recognize the differences between the health beliefs of these sub-groups.

Recommendation for Further Research

Further research using this study's questionnaire, "Your Perceptions of How Health Conditions Impact Work Productivity," is recommended to support the utilization of health status and beliefs related to reported absenteeism and presenteeism due to health conditions. Applying this study's questionnaire to other populations will allow comparisons between sub-populations and improve the ability to generalize the results of the questionnaire.

Summary

This chapter discussed the findings, conclusions, and recommendations generated by this study. Employer actions may focus on workers who self-report poor or fair health status in order to reduce absenteeism and presenteeism of safety and health professionals in Tennessee.

When considering future actions to address absenteeism caused by specific workplace illnesses for safety and health professionals, employers should address certain

health conditions such as allergic rhinitis for all employees, while other health conditions should be addressed for specific groups only. When considering future actions to address presenteeism caused by health conditions such as allergic rhinitis and sleep difficulties, employers should address these health conditions for all employees, since all groups reported these problems as causes of reduced productivity due to presenteeism.

Further research using this study's questionnaire, "Your Perceptions of How Health Conditions Impact Work Productivity," is recommended to support utilization of health status and beliefs related to reported absenteeism and presenteeism due to health conditions.

REFERENCES

Al-Ali, N., Haddad, L.G. (2004). The effect of the health belief model in explaining exercise participation among Jordanian myocardial infarction patients. Journal of Transcultural Nursing, 15 (2), 114-121.

Alexy, B. (1991). Factors associated with participation or non-participation in a workplace wellness center. Research in Nursing and Health, 14 (1), 33-40.

Arcury, T., Quandt, S., Russel, G. (2002). Pesticide safety among farm workers: perceived risk and perceived control as factors reflecting environmental justice. Environmental Health Perspectives, 110 (2), 233-240.

Banauch, G.I., Alleyne, D., Sanchez, R., Olender, K., Cohen, H.W., Weiden, M., Kelly, K.J., Prezant, D.J. (2003). Persistent hyperreactivity and reactive airways dysfunction in world trade center firefighters. American Journal of Respiratory and Critical Care Medicine, 168, 54-62.

Beckett, W.S. (2002). A New York City firefighter overwhelmed by World Trade Center dust. American Journal of Respiratory and Critical Care Medicine, 166, 785-786.

Blanc, P.D., Burney, P., Janson, C., Torén, K. (2003). The prevalence and predictors of respiratory-related work limitation and occupational disability in an international study. The Cardiopulmonary and Critical Care Journal (CHEST), 124, 1153-59.

Brown, C.M., Segal, R. (1996). The effects of health and treatment perceptions on the use of prescribed medication and home remedies among African American and white American hypertensives. Social Science and Medicine, 43 (6), 903-917.

Burton, W.N., Conti, D.J., Chen, C., Schultz, A.B., Edington, D.W. (1999). The role of health risk factors and disease on worker productivity. Journal of Occupational and Environmental Medicine, 41 (10), 863-877.

Centers for Disease Control and Prevention (CDC) (2002). Injuries and illnesses among New York City Fire Department rescue workers after responding to the World Trade Center attacks. MMWR Morbidity and Mortality Weekly Report, 51 (Special Issue), 1-5.

Centers for Disease Control and Prevention (CDC) (2002). Impact of September 11 attacks on workers in the vicinity of the World Trade Center – New York City. MMWR Morbidity and Mortality Weekly Report, 51 (Special Issue), 8-10.

Centers for Disease Control and Prevention (CDC) (2004). Mental health status of World Trade Center rescue and recovery workers and volunteers – New York City, July 2002-August, 2004. MMWR Morbidity and Mortality Weekly Report, 53 (35), 812-815.

Chang, S., Ching, C., Chen, P., Chung, U. (2003). Predictors of community women's osteoporosis prevention intention – a pilot study. Journal of Nursing Research, 2 (3), 231-239.

Chen, C., Neufeld, P., Feely, C.A., Skinner, C.S. (1999). Factors influencing compliance with home exercise programs among patients with upper-extremity impairment. American Journal of Occupational Therapy, 53 (2), 171-80.

Collins, P.A., Gibbs, A.C.C., (2003). Stress in police officers: a study of the origins, prevalence and severity of stress-related symptoms within a county police force. Occupational Medicine, 53 (4), 256-264.

Conway, T., Hu, T., Bennett, S., Niedos, M. (1999). A pilot study describing local residents' perceptions of asthma and knowledge of asthma care in selected Chicago communities. The Cardiopulmonary and Critical Care Journal, 116 (4), 229-234.

Dean-Baar, S.L. (1994). Development of the arthritis health belief inventory. Rehabilitation Nursing Research, 3 (4), 111-129.

Gabhainn, S. N., Kelleher, C.C., Naughton, A.M., Carter, F., Flanagan, M., McGrath, M.J. (1999). Socio-demographic variations in perspectives on cardiovascular disease and associated risk factors. Health Education Research, 14 (5), 619-628.

Gershon, R.R., Lin, S., Li, X. (2002). Work stress in aging police officers. Journal of Occupational and Environmental Medicine, 44 (2), 160-167.

Goetzel, R.Z., Guindon, A.M., Turshen, J., Ozminkowski, R. (2001). Health and productivity management: establishing key performance measures, benchmarks, and best practices. Journal of Occupational & Environmental Medicine, 43 (1), 10-17.

Goetzel, R.Z., Juday, T.R., Ozminkowski, R.J. (1999). What's the ROI? A systematic review of return-on-investment studies of corporate health and productivity management initiatives. Association for Worksite Health Promotion, 6 (3), 12-21.

Goetzel, R.Z., Long, S.R., Ozminkowski, R.J., Hawkins, K., Wang, S., Lynch, W. (2004). Health, absence, disability, and presenteeism cost estimates of certain physical and mental conditions affecting US employers. Journal of Occupational and Environmental Medicine, 46 (4), 398-412.

Goetzel, R.Z., Ozminkowski, R.J., Long, S.R. (2003). Development and reliability analysis of the Work Productivity Short Inventory (WPSI) instrument measuring employee health and productivity. Journal of Occupational and Environmental Medicine, 45 (7), 743-762.

Goetzel, R.Z., Hawkins, K., Ozminkowski, R.J., Wang, S. (2003). The health and productivity cost burden of the "top 10" physical and mental health conditions affecting six large U.S. employers in 1999. Journal of Occupational and Environmental Medicine, 45 (1), 5-14.

Goetzel, R.Z., Anderson, D.R., Whitmer, R.W., Ozminkowski, R.J., Dunn, R.L., Wasserman, J. (1998). The relationship between modifiable health risks and health care expenditures: an analysis of the multi-employer HERO health risk and cost database. Journal of Occupational and Environmental Medicine, 40 (10), 843-854.

Gold, D.R., Rogacz, S., Bock, N., Tosteson, T.D., Baum, T.M., Speizer, F.E., Czeisler, C.A. (1992). Rotating shift work, sleep, and accidents related to sleepiness in hospital nurses. American Journal of Public Health, 82 (7), 1011-14.

Goldring, A., Taylor, S., Kemeny, M., Anton, P. (2002). Impact of health beliefs, quality of life, and the physician-patient relationship on the treatment intentions of inflammatory bowel disease patients. Health Psychology, 21 (3), 219-228.

Her Majesty's Inspectorate of Constabulary (HMIC). (1997). Lost time. The management of sickness absence and medical retirement in the police service. Thematic Inspection Report, HMIC, 59-75.

Janz, N.K., Becker, M.H. (1984). The health belief model: A decade later. Health Education Quarterly, 11 (1), 1-47.

Kipen, H.M., Gochfeld, M. (2002). Mind and matter: OEM and the World Trade Center. Occupational and Environmental Medicine, 59, 145-146.

Kirkcaldy, B., Cooper, C.L., Ruffalo, P. (1995). Work stress and health in a sample of U.S. police. Psychological Reports, 76 (2), 700-702.

Laposa, J.M., Alden, L.E. (2003). Posttraumatic stress disorder in the emergency room: exploration of a cognitive model. Behaviour Research and Therapy, 41 (1), 49-65.

Laposa, J., Alden, L., Fullerton, L. (2003). Work stress and posttraumatic stress disorder in ED nurses/personnel (CE). Journal of Emergency Nursing, 29 (1), 23-28.

Lerner, D., Amick, B.C., Lee, J.C., Rooney, T., Rogers, W.H., Chang, H., Berndt, E.R. (2003). Relationship of employee-reported work limitations to work productivity. Medical Care, 41 (5), 649-659.

Lerner, D., Amick, B.C., Rogers, W.H., Malspeis, S., Bungay, K., Cynn, D. (2001). The work limitations questionnaire. Medical Care, 39 (1), 72-85.

Loeppke, R., Hymel, P.A., Lofland, J.H., Pizzi, L.T., Konicki, D.L., Anstadt, G.W., Baase, C., Fortuna, J., Scharf, T. (2003). Health-related workplace productivity measurement: General and migraine-specific recommendations from the ACOEM expert panel. Journal of Occupational and Environmental Medicine, 45 (4), 349-359.

Lostao, L., Joiner, T.E., Pettit, J.W., Chorot, P., Sandín, B. (2001). Health beliefs and illness attitudes as predictors of breast cancer screening attendance. European Journal of Public Health, 11 (3), 274-279.

Lynch, W., Reidel, J. (2001). Measuring Employee Productivity: A Guide to Self-Assessment Tools. Phoenix and Scottsdale, AZ: William M. Mercer, Inc. and The Institute for Health and Productivity Management, 22-43.

Marmar, C.R., Weiss, D.S., Metzler, T.J., Ronfeldt, H.M., Foreman, C. (1996). Stress responses of emergency services personnel to the Loma Prieta earthquake Interstate 880 freeway collapse and control traumatic incidents. Journal of Traumatic Stress, 9 (1), 63-85.

Martinez, R., Gratton, T., Coggin, C., René, A., Waller, W. (2004). A study of pesticide safety and health perceptions among pesticide applicators in Tarrant County, Texas. Journal of Environmental Health, 66 (6) 34-37.

McCafferty, F., McCafferty, E., McCafferty, M. (1992). Stress and suicide in police officers: paradigm of occupational stress. Southern Medical Journal, 85 (3), 223-243.

McCunney, R.J. (2001). Health and productivity: a role for occupational health professionals. Journal of Occupational and Environmental Medicine, 43 (1), 30-35.

Mirotznik, J., Feldman, L., Stein, R. (1995). The health belief model and adherence with A community center–based, supervised coronary heart disease exercise program. Journal of Community Health, 20 (3), 233-247.

Neely, K.W., Spitzer, W.J. (1997). A model for a statewide critical incident stress (CIS) debriefing program for emergency services personnel. Prehospital and Disaster Medicine, 12 (2), 114-119.

Newell, S.M., Price, J.H., Roberts, S.M., Bauman, R.R. (1986). Utility of the modified health belief model in predicting compliance with treatment by adult patients with advanced cancer. Psychological Reports, 59 (2 Pt 2), 783-791.

Neylan, T.C., Metzler, T.J., Best, S.R., Weiss, D.S., Fagan, J.A., Liberman, A., Rogers, C., Vedantham, K., Brunet, A., Lipsey, T.L., Marmar, C.R (2002). Critical incident exposure and sleep quality in police officers. Psychosomatic Medicine, 64, 345-352.

Nunnally, J. (1978). Psychometric Theory. New York: McGraw-Hill Book Company.

Ozminkowski R.J., Goetzel R.Z., Long S.R. (2003). A validity analysis of the Work Productivity Short Inventory (WPSI) instrument measuring employee health and productivity. Journal of Occupational and Environmental Medicine, 45 (11), 1183-1195.

Ozminkowski R.J., Goetzel R.Z., Chang S., Long S. (2004). The application of two health and productivity instruments at a large employer. Journal of Occupational and Environmental Medicine, 46 (7), 635-648.

Pederson, L.L., Wanklin, J.M., Baskerville, J.C. (1984). The role of health beliefs in compliance with physician advice to quit smoking. Social Science and Medicine, 19 (5), 573-580.

Poss, J. (1999). Developing an instrument to study the tuberculosis screening behaviors of Mexican migrant farm workers. Journal of Transcultural Nursing, 10 (4), 306-319.

Quinn, G.P., Coreil, J. (2001). Health and illness behavior, in Coreil, J., Bryant, C.A., Henderson, J.N., (ed): Social and Behavior Foundations of Public Health, Thousand Oaks, CA: Sage Publications, Inc., 78-83.

Reilly, M.C., Zbrozek, A.S., Dukes, E.M. (1993). The validity and reproducibility of a work productivity and activity impairment instrument. Pharmacoeconomics, 4 (5), 353-365.

Rosenstock, I.M. (1974). Historical origin of the health belief model. Health Education Monograph, 2 (4), 328-395.

Sauter, S., Murphy, L., Hurrell, J. (1990). Prevention of work-related psychological disorders. American Psychologist, 45 (10), 1146-1158.

Strecher, V.J., Rosenstock, I.M. (1997). The health belief model, in Glanz, K., Lewis, F., Rimer, B. (ed): Health Behavior and Health Education, San Francisco, CA: Jossey-Bass, 41-59.

Thompson, B.M., Kirk, A., Brown, D.F. (2005). Work based support, emotional exhaustion, and spillover of work stress to the family environment: A study of policewomen. Stress and Health, 21 (3), 199-207.

Udasin, I.G. (2000). Health care workers. Primary Care, 27 (4), 1079-102.

Violanti, J.M., Aron, F. (1994). Ranking police stressors. Psychological Reports, 75 (2), 824-826.

Weissfeld, J., Kirscht, J., Brock, B. (1990). Health beliefs in a population: the Michigan blood pressure survey. Health Education Quarterly, 17 (2), 141-155.

Wilson, S., Sisk, R., Baldwin, K. (1997). Health beliefs of blue collar workers. American Association of Occupational Health Nurses Journal, 45 (5), 254-257.

APPENDIX

Your Perceptions of How Health Conditions Impact Work Productivity

Dear Tennessee Health and Safety Congress participants,

By completing the attached questionnaire you can help insure that future health promotion and injury protection programs in companies such as yours better meet the needs of their employees.

As a part of completing this questionnaire, you will help to identify the primary chronic illnesses that contribute to missing work and feeling ill while at work. Information provided by your participation in this survey can help develop future work related health promotion, injury prevention, and health education programs that will be better tailored to help your employees feel better and live healthier lives.

Completing this questionnaire will take approximately 8 to 10 minutes of your time.

This research project is being sponsored by the UT Safety Center. Your participation in this survey is completely voluntary and confidential. No identifiers, identification numbers, or names are requested on this questionnaire. You must be at least 18 years old to participate. Completion and return of this questionnaire serves as your acknowledgement and informed consent to participate in the survey.

Please place your completed questionnaire in the slot on the top of the sealed drop box located at the UT Graduate Safety Booth.

Included with the survey is a UT Safety Center calling card. Be sure to take the attached card to the UT Graduate Safety Booth and choose one of the three small appreciation gifts for taking the time to pick up and read our survey. Additionally, put your name, phone number, and address on the back of the card, and place it in the separate box labeled "IPOD drawing" for entry into the drawing for a new silver mini-IPOD.

Thank you for providing your valuable insights to this study.

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Your Perceptions of How Health Conditions Impact Work Productivity

Please complete the following section concerning your job classification and health

Mark One with an "X" **Example: "_X_"(1) Human Resources**

1. **Which of the following best describes your main job responsibilities?**
   (Please select only one)

_____ **(1)** Human Resources Personnel or Manager

_____ (2) Safety Personnel, Supervisor, or Manager

_____ (3) Health Care Professional, Technician, or Manager

_____ (4) Emergency Management Personnel, EMS/First Responder/Ambulance Personnel

_____ (5) Health or Safety Claims/Risk Insurance Agent

_____ (6) Trainer/Educator

_____ (7) Security/Guard Force or Law Enforcement

_____ (8) Industrial Floor Supervisor/Team Leader

_____ (9) Industrial Line or Company Employee or Associate

_____ (10) Marketing or Sales Representative

_____ (11) Maintenance/Construction, and Related Occupations

_____ (12) Food Service and Related Occupations

_____ (13) Housekeeping and Related Occupations

_____ (14) Clerical/Administrative Support, and Customer Service Occupations

_____ (15) Other (please specify) _____

Please "X" the appropriate selection for 2a, 2b, and 2c

EMPLOYMENT

2a. Which sector do you work in?

_____ (1) Private _____ (2) Public ____ (3) Non-Profit

SEX

2b. What is your sex: _____(1) Male ____(2) Female

RACE

2c. What is your race?

_____ (1) African American _____ (4) Hispanic-Latino
_____ (2) White _____ (5) Native American
_____ (3) Asian _____ (6) Other (Please specify)_____

3a. Please fill in your age *(nearest year)* _____ Years
3b. Please fill in your home zip code: _____

HEALTH STATUS

4. In general, would you say your health is:
(Please mark one with an "X")

_____ (1) POOR _____ (2) FAIR _____ (3) GOOD ____ (4) VERY GOOD ____ (5) EXCELLENT

5. Which cigarette smoking pattern best describes your behavior?
(Please mark one with an "X")

_____ (1) NEVER SMOKED _____ (2) FORMER SMOKER _____ (3) CURRENT SMOKER

Please continue with item 6 on to the next page.

Now you will be asked how you feel about some of the medical conditions that might make you ill. **Please "X"** one box under each question. **For example**, if you are not at **all** concerned about getting sick: "X" (1) NOT AT ALL

6. Some people are quite concerned about getting **sick**, while others are not as concerned.
   How concerned are you about getting **sick**?
   ___ (1) NOT AT ALL ___ (2) SLIGHTLY ___ (3) FAIRLY ___ (4) VERY ___ (5) EXTREMELY

7. **How frequently** do you think about your **health**?
   ___ (1) NEVER ___ (2) SELDOM ___ (3) SOMETIMES ___ (4) FAIRLY OFTEN ___ (5) VERY OFTEN

8. Some people are quite concerned about **health**, while others are not as concerned.
   How concerned are you about your **health**?
   ___ (1) NOT AT ALL ___ 2) SLIGHTLY ___ (3) FAIRLY ___ (4) VERY ___ (5) EXTREMELY

9. People differ in how much importance they place on **health**. In comparison to other people, **how important is health to you**?
   ___ (1) MUCH LESS ___ (2) SOMEWHAT LESS ___ (3) EQUALLY ___ (4) SOMEWHAT MORE ___ (5) MUCH MORE

10. Please indicate **how closely the following statement describes you**:
    "I do lots of special things to improve or protect my **health**."
    ___ (1) NOT AT ALL ___ (2) VERY LITTLE ___ (3) SOMEWHAT ___ (4) WELL ___ (5) VERY WELL

11. **How likely** is it that someday in the future you will be **ill** with heart disease?
    ___ (1) VERY UNLIKELY ___ (2) FAIRLY UNLIKELY ___ (3) EQUALLY LIKELY & UNLIKELY ___ (4) FAIRLY LIKELY ___ (5) VERY LIKELY

12. **Do you feel that your present lifestyle puts you at risk** of developing heart disease? (If you already have heart disease, does your lifestyle put you at risk of aggravating your present condition?)
    ___ (1) NOT AT ALL ___ (2) SLIGHT RISK ___ (3) FAIR RISK ___ (4) LARGE RISK ___ (5) VERY LARGE RISK

13. In comparison to most other people, **how susceptible** do you think you are to developing a serious heart condition?

___ (1) MUCH LESS ___ (2) SOMEWHAT LESS ___ (3) EQUALLY ___ (4) SOMEWHAT MORE ___ (5) MUCH MORE

14. Please indicate **how costly** in terms of time, money, energy, pain, etc., you think exercising would be.

___ (1) NOT AT ALL ___ (2) SLIGHTLY ___ (3) FAIRLY ___ (4) VERY ___ (5) EXTREMELY

15. **It's hard to find the time to exercise on a regular basis.** Do you strongly agree, agree, neither agree nor disagree, disagree, or strongly disagree with this statement?

___ (1) STRONGLY AGREE ___ (2) AGREE ___ (3) NEITHER ___ (4) DISAGREE ___ (5) STRONGLY DISAGREE

16. **How much** would you have to change your present life style in order to exercise on a regular basis?

___ (1) NOT AT ALL ___ (2) SLIGHT DEGREE ___ (3) FAIR DEGREE ___ (4) LARGE DEGREE ___ (5) VERY LARGE DEGREE

17. **To what degree** would exercising on a regular basis require you to adopt new patterns of behaviors?

___ (1) NOT AT ALL ___ (2) SLIGHT DEGREE ___ (3) FAIR DEGREE ___ (4) LARGE DEGREE ___ (5) VERY LARGE DEGREE

18. To **what degree** would exercising on a regular basis interfere with your normal activities?

___ (1) NOT AT ALL ___ (2) SLIGHT DEGREE ___ (3) FAIR DEGREE ___ (4) LARGE DEGREE ___ (5) VERY LARGE DEGREE

Please continue with Item 19 on the next page.

Please circle the number beside the statement that best describes your beliefs for each item in questions 19 and 20.

19. Disease may impact on a person's life in many ways. How likely do you think it is that heart disease (including hypertension and high blood pressure) would result in each of the following?

	(1) VERY UNLIKELY	(2) FAIRLY UNLIKELY	(3) EQUALLY LIKELY AND UNLIKELY	(4) FAIRLY LIKELY	(5) VERY LIKELY
a. physical pain.....	1	2	3	4	5
b. shortness of breath.....	1	2	3	4	5
c. fatigue.....	1	2	3	4	5
d. emotional distress.....	1	2	3	4	5
e. disrupt family life.....	1	2	3	4	5
f. disrupt sex life.....	1	2	3	4	5
g. disrupt work life.....	1	2	3	4	5
h. hinder ability to enjoy life.....	1	2	3	4	5
i. hurt self-esteem.....	1	2	3	4	5
j. strain economic resources.....	1	2	3	4	5
k. death.....	1	2	3	4	5

20. How helpful do you think exercise is in doing each of the following with regard to heart disease and health in general:

	(1) NOT AT ALL HELPFUL	(2) SLIGHTLY HELPFUL	(3) FAIRLY HELPFUL	(4) VERY HELPFUL	(5) EXTREMELY HELPFUL
a. relieving symptoms of heart disease.....	1	2	3	4	5
b. preventing death from heart disease.....	1	2	3	4	5
c. preventing a recurrence of a heart attack	1	2	3	4	5
d. improving quality of life after a heart attack.....	1	2	3	4	5
e. improving one's self-esteem.....	1	2	3	4	5
f. improving one's physical appearance.....	1	2	3	4	5
g. improving one's mood	1	2	3	4	5
h. improving one's social life.....	1	2	3	4	5
i. increasing one's energy level.....	1	2	3	4	5

Please continue with item 21 on the next page.

Please respond to the following questions about the effect certain health conditions have had on your work during the past year.

PAST YEAR = (MONTH YEAR to MONTH YEAR)

21. During the last year, approximately how many HOURS PER WEEK and WEEKS PER YEAR did you work in your job?
(Include overtime, but do not include vacation time or other paid time off.)
(Please fill in both parts a. and b.)

a. ___ (1) **HOURS PER WEEK**

b. ___ (2) **WEEKS PER YEAR**

22. During the past year, estimate the TOTAL NUMBER of DAYS you EXPERIENCED each of the following health conditions. *(If you did not experience the condition in the past year ,please write "0" days.)*

Example: If you experienced Allergic Rhinitis 5 days last year, please enter "5":
A. **ALLERGIC RHINITIS: "5" DAYS**

TOTAL DAYS YOU EXPERIENCED EACH CONDITION IN PAST YEAR

A. **ALLERGIC RHINITIS/HAY FEVER** AND RELATED SYMPTONS, INCLUDING SNEEZING ATTACKS, STUFFY NOSE, AND ITCHING OF NOSE, EYES EARS AND THROAT. ___ **DAYS**

B. **ANXIETY DISORDER**, SUCH AS GENERALIZED ANXIETY DISORDER, PANIC DISORDER, PHOBIAS, OBSESSIVE-CUMPULSIVE DISORDER, AND POST TRAUMATIC STRESS DISORDER. ___ **DAYS**

C. **ARTHRITIS/RHEUMATISM** AND RELATED SYMPTOMS, INCLUDING PAIN, SWELLING, STIFFNESS, AND LOSS OF FUNCTION IN JOINTS. ___ **DAYS**

D. **ASTHMA** AND RELATED SYMPTOMS, INCLUDING SHORTNESS OF BREATH, WHEEZING, ___ **DAYS**

COUGHING, AND TIGHTNESS IN THE CHEST.

E. **CORONARY HEART DISEASE** AND RELATED PROBLEMS. INCLUDING ANGINA (CHEST PAIN), HIGH COHOLESTEROL, OR HEART ATTACK. ___ **DAYS**

F. **DEPRESSION** OR OTHER MOOD DISORDERS, SUCH AS MAJOR DEPRESSION, DYSTHYMIA, AND BIPOLAR DISORDER. ___ **DAYS**

G. **DIABETES** AND RELATED PROBLEMS, INCLUDING HYPOGLYCEMIA (LOW BLOOD SUGAR), FOOT INFECTIONS, VISION PROBLEMS, AND FREQUENT INFECTIONS. ___ **DAYS**

H. **HIGH STRESS** ___ **DAYS**

I. **HYPERTENSION OR HIGH BLOOD PRESSURE** ___ **DAYS**

J. **MIGRAINE** AND RELATED SYMPTOMS, SUCH AS MAJOR HEADACHES, SENSITIVITY TO LIGHT OR NOISE, NAUSEA, AND OCCASIONAL VOMITING. ___ **DAYS**

K. **RESPIRATORY ILLNESSES**, SUCH AS PNEUMONIA, BRONCHITIS, TONSILLITIS, STREP THROAT, EMPHASEMA, OR CHRONIC PULMONARY DISEASES (COPD). ___ **DAYS**

L. **SLEEP DIFFICULTIES –** PROBLEMS FALLING ASLEEP OR STAYING ASLEEP OR WAKING UP TOO EARLY, HAVING SLEEP THAT IS NOT REFRESHING, LEADING TO PROBLEMS THE NEXT DAY SUCH AS FATIGUE, TIREDNESS, DIFFICULTY CONCENTRATING, ETC. ___ **DAYS**

Please continue with item 23 on the next page.

23. **During the past year, estimate the TOTAL DAYS you MISSED FROM WORK because you experienced each health condition.** *Include time you missed because you were sick, times you went in late or left early for doctor's appointments, etc. (If you did not experience the condition in the past year, write "0" days.)*

	TOTAL DAYS YOU MISSED FROM WORK IN PAST YEAR
A. **ALLERGIC RHINITIS/HAY FEVER**	___ **DAYS**
B. **ANXIETY DISORDER**	___ **DAYS**
C. **ARTHRITIS/RHEUMATISM**	___ **DAYS**
D. **ASTHMA**	___ **DAYS**
E. **CORONARY HEART DISEASE**	___ **DAYS**
F. **DEPRESSION**	___ **DAYS**
G. **DIABETES**	___ **DAYS**
H. **HIGH STRESS**	___ **DAYS**
I. **HYPERTENSION OR HIGH BLOOD PRESSURE**	___ **DAYS**
J. **MIGRAINE**	___ **DAYS**
K. **RESPIRATORY ILLNESS**	___ **DAYS**
L. **SLEEP DIFFICULTIES**	___ **DAYS**

24. **During a typical 8-hour workday, when you had any of the following health conditions, estimate the TOTAL HOURS you were UNPRODUCTIVE because of the condition.** *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes. Do not include unproductive time that was caused by another health condition you were experiencing at the same time. (If you did not experience the condition or had no unproductive time in the past year, write "0" hours.)*

	TOTAL HOURS UNPRODUCTIVE IN A TYPICAL 8-HOUR DAY
A. **ALLERGIC RHINITIS/HAY FEVER**	___ **HOURS**
B. **ANXIETY DISORDER**	___ **HOURS**
C. **ARTHRITIS/RHEUMATISM**	___ **HOURS**
D. **ASTHMA**	___ **HOURS**
E. **CORONARY HEART DISEASE**	___ **HOURS**
F. **DEPRESSION**	___ **HOURS**
G. **DIABETES**	___ **HOURS**
H. **HIGH STRESS**	___ **HOURS**
I. **HYPERTENSION OR HIGH BLOOD PRESSURE**	___ **HOURS**
J. **MIGRAINE**	___ **HOURS**
K. **RESPIRATORY ILLNESS**	___ **HOURS**
L. **SLEEP DIFFICULTIES**	___ **HOURS**

Please continue with item 25 on the next page.

25. **During the past year, estimate the TOTAL NUMBER of DAYS you were a CAREGIVER for someone experiencing each of the following health conditions.** *(If you did not provide care for the condition in the past year, write "0" days.)*

	TOTAL DAYS YOU WERE A CAREGIVER FOR EACH CONDITION IN PAST YEAR
A. **ALZHEIMERS DISEASE**.....	___ **DAYS**
B. **OTITIS MEDIA/EARACHE**.....	___ **DAYS**
C. **PEDIATRIC ALLERGIES**.....	___ **DAYS**
D. **PEDIATRIC RESPIRATORY INFECTIONS**.....	___ **DAYS**
E. OTHER: _____ **(Please describe)**	___ **DAYS**

26. **During the past year, estimate the TOTAL DAYS you MISSED FROM WORK because you were a CAREGIVER for someone with each health condition listed below.** *Include time you were absent, times you went in late or left early for doctors' appointments, etc. (If you did not provide any care for the condition in the past year or missed no time from work because of the care, write "0" days.)*

	TOTAL DAYS YOU MISSED FROM WORK IN PAST YEAR
A. **ALZHEIMERS DISEASE**.....	___ **DAYS**
B. **OTITIS MEDIA/EARACHE**.....	___ **DAYS**
C. **PEDIATRIC ALLERGIES**.....	___ **DAYS**
D. **PEDIATRIC RESPIRATORY INFECTIONS**.....	___ **DAYS**
E. OTHER: _____ **(Please describe)**	___ **DAYS**

27. **During a typical 8-hour workday, when you were a CAREGIVER for someone who had the following health conditions, estimate the TOTAL HOURS you were UNPRODUCTIVE because of providing care for the condition.** *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes. (If you did not provide any care for the condition in the past year or had no unproductive time because of the provided care, write "0" hours.)*

	TOTAL HOURS UNPRODUCTIVE IN A TYPICAL 8-HOUR DAY
A. **ALZHEIMERS DISEASE**	___ **HOURS**
B. **OTITIS MEDIA/EARACHE**	___ **HOURS**
C. **PEDIATRIC ALLERGIES**	___ **HOURS**
D. **PEDIATRIC RESPIRATORY INFECTIONS**	___ **HOURS**
E. OTHER: _____ **(Please describe)**	___ **HOURS**

28. **During the past year, how many days did you MISS FROM WORK for *all* of the health conditions YOU EXPERIENCED (including other conditions not listed above)?** *Include time you missed because you were sick, times you went in late or left early for doctors' appointments, etc.*

___ **DAYS**

29. **During the past year, how many days did you miss from work because you were a CAREGIVER for someone else (including other conditions not listed above)?** *Include time you missed because you were providing care, times you went in late or left early for doctors' appointments, etc.*

___ **DAYS**

Please continue with question 30 on the next page.

30. Please list and describe the Health/Safety issue you feel affects absenteeism the most in your place of employment:
(Please list and describe)

_____

_____

_____

31. Please list and describe the Health/Safety issue you feel contributes most to employees feeling sick and not as effective as they would otherwise be at your place of employment:
(Please list and describe)

_____

_____

_____

THIS COMPLETES THE SURVEY.

PLEASE PLACE THE SURVEY IN THE SLOT ON THE SEALED DROP BOX AT THE UT GRADUATE SAFETY PROGRAMS BOOTH.

THANK YOU FOR YOUR SUPPORT OF THIS STUDY.

For more information concerning this research project please contact

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VITA

William Tunstall Rogerson, Jr., was born on June 15, 1952, at Fort Polk, Louisiana, the son of an Army Officer. After completing Annandale High School in Northern Virginia, he was appointed to the United States Naval Academy by Senator Howard Baker of Tennessee, and graduated in 1974 with a Bachelor of Science Degree in Marine Engineering.

Following Submarine School in Groton, Ct., and Nuclear Power School in Bainbridge, Maryland, he was assigned to nuclear submarine duty in San Diego, California, and subsequently served in a variety of sea and shore duty stations in positions of increasing authority, including California, Connecticut, South Carolina, Northern Virginia, Washington State, and Scotland.

While on shore duty at the Pentagon in 1991, he competed a Master of Arts Degree in National Security Studies from Georgetown University, Washington D.C.

In February 1992, he assumed command of the nuclear powered submarine USS John C. Calhoun (SSBN 630) (Gold). As the Commanding Officer, he completed two strategic deterrent patrols, and transited through the Panama Canal to Bremerton Naval Shipyard in Washington State for a defueling overhaul and decommissioning.

Following his command tour, he extended his experience in emergency management at the Department of Energy Headquarters' Office of Emergency Response. As the Program Manager of the Accident Response Group from 1994-1996, he directed operational and deployment readiness of national assets for the mitigation of nuclear weapons accidents or incidents. He additionally served as the lead Department of Energy Headquarters' field planner for national level nuclear weapons emergency response

exercises and was team leader of the Department of Energy Headquarters emergency response operations center team.

Bill retired from the submarine force in 1996, after 22 years of active duty service, and took employment at the Y-12 Nuclear Weapons Complex facility in Oak Ridge, Tennessee, where he is currently a senior process engineering manager.

During this time he entered into the doctoral program in community health at the University of Tennessee, Knoxville, with an emphasis in safety and emergency management.

He has continued to use his emergency management background to author and present at various juried venues, including: "Ramsafe – The Situation Master," at the 2002 International Emergency Management Society Conference in Ontario, Canada, and "Cutting Edge Decision Making Tools For Emergency Preparedness," at the 2003 National Safety Council Conference and Congress, in Chicago, Illinois.

He also maintains an interest in the application of human factors engineering to help solve medical and safety problems. In 2004, his article: "Turning The Tide On Medical Errors In Intensive Care Units: A Human Factors Approach," co-authored by Dr. Mary Tremethick, Ph.D, RN, was published in *Dimensions of Critical Care Nursing.* Bill is married to the former Lorna Meikle of Elderslie, Scotland, and has four children: Michelle, Megen, Lindsay, and Douglas. Bill, Lorna, and his two youngest children, Lindsay and Douglas, currently reside in Knoxville, Tennessee.